A multidisciplinary approach towards understanding and solving social dilemmas

Edited by
Lei Wang, Richard Paul Ebstein and Qiang Shen

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A multidisciplinary approach towards understanding and solving social dilemmas

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Love Your Country: EEG Evidence of Actor Preferences of Audiences in Patriotic Movies

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Movie watching is one of the common ways to spark love for the country. A good patriotic movie can arouse love and pride, encourage people to stand by their countries, and reinforce a sense of national belonging. To evoke audience emotion and enhance patriotism, the choice of actors is fundamental and is a dilemma for film producers. In this exploratory study, an electroencephalogram (EEG) with a rating task was used to investigate how actor types (i.e., skilled vs. publicity) in patriotic movies modulate the willingness of audiences to watch a film and their emotional responses. Behavioral results showed that audiences are more willing to watch patriotic movies starring skilled actors than to watch patriotic movies starring publicity actors. Furthermore, brain results indicated that smaller P3 and late positive potential (LPP) were elicited in response to skilled actors than to publicity actors in patriotic movies. A larger theta oscillation was also observed with skilled actors than with publicity actors. These findings demonstrate that the willingness of audiences to watch a movie is deeply affected by actor types in patriotic films. Specifically, skilled actors engage audiences emotionally, more so than publicity actors, and increase the popularity of patriotic movies. This study is the first to employ neuroscientific technology to study movie casting, which advances film studies with careful scientific measurements and a possible new direction.
La première des vertus est le dévouement à la patrie.

Napoléon Bonaparte

Keywords: audience emotions, actor preferences, cognitive conflict, patriotic movies, EEG

INTRODUCTION

Patriotism is an important social concern. It is passion and pride for the motherland, and respect for our roots, which holds the whole nation together. We will have tears in our eyes seeing soldiers put their lives in danger to fight for the motherland. We will also feel anger seeing the country led down the wrong path by the wrong people. Movie watching is one of the common ways to spark this love for the country in our daily lives. When emotions of an audience are well-engaged, a good patriotic movie can arouse love and pride, encourage people to stand by their countries, and reinforce a sense of national belonging. However, not all patriotic movies manage to evoke a strong audience reaction and perform well at the box office.

The cast of the movie may be an important factor that caused this difference. It has been acknowledged that one of the most important means to engage audiences emotionally, and in turn, increase their willingness to watch a film, is to hire suitable stars (Vincendeau, 2000; Marich, 2009; Gunter, 2018). For example, Austin discussed the star/character interface of different

actors who have played Batman and argued that actors with a well-built appearance asserted Batman "authenticity," while those who had a non-matched persona would lead to well-publicized complaints from fans and commentators (Austin, 2003). Furthermore, Hofmann suggested that actors can be assigned to one of two generic star profiles: skilled and publicity. Skilled actors are famous for their acting ability, whereas publicity actors are often chosen for their physical appearance (Hofmann and Opitz, 2019). Previous studies have explained different functions of drawing power of stars (Chisholm, 2004; Joshi, 2015; Suárez-Vázquez, 2015; Hennig-Thurau and Houston, 2019). When it comes to understanding the willingness of an audience to watch a patriotic movie, it is interesting to ask what is more important—Is it the professional skills or the outer appearance of actors?

For skilled stars, it is acknowledged that they can signal production quality. Skilled stars are famous for their outstanding acting abilities and are often capable of winning prestigious awards. They improve the artistic value of the patriotic movies in which they appear, and they shape more subtle and demanding character roles to arouse audience emotions (Hofmann, 2019). Since artistic quality is what patriotic movies have at stake (Yang, 2017), skilled stars may increase the willingness of an audience to watch a patriotic movie by making this type of movie more artistically engaging and creating the kind of cinematographic experience that film connoisseurs look for. They may also be good with the realistic storyline that patriotic movies often deploy, catering to the cognitive needs of the audience (Hofmann, 2019), and have a positive influence on the market performance of movie (Desai and Basuroy, 2005). Furthermore, it has been argued that, since patriotic movies are a less familiar genre, they require strong, skilled actors to bring subtle emotional touches, boost the overall aesthetic quality of the production (Yang, 2017), and, with it, the willingness of the audience to watch, more so than in the more popular and familiar genre movies (Desai and Basuroy, 2005).

On the other hand, publicity stars are more suited to create a media buzz and make the movies more visible for a mass audience (Hofmann, 2019). They add dynamism to market campaigns and provide opportunities for gossip and small talk, but their entertainment function does not seem to be compatible with patriotic movies. This is because publicity stars are famous mainly for their physical appearance (Hofmann and Opitz, 2019), which may not be an important element for patriotic movies. Moreover, publicity stars are more likely to have a relatively fixed screen persona, which may be easily associated with particular types of movies, such as comedy or romance, as well as the gossip they produce. We believed that this "mismatch" may engender a cognitive conflict for the audience. It may also distract people from the storyline and the emotional power of patriotic movies and, in turn, reduce willingness of the audience to watch. It is also suggested by previous studies that publicity stars are more suitable for movie genres that strive to offer an accessible and easily comprehensible entertainment experience for a mainstream audience (Giles, 2000; McCutcheon et al., 2003; Cheung and Yue, 2011). To sum up, we hypothesize that audiences prefer skilled actors to publicity actors in patriotic movies.

Beyond behavioral tests, neural techniques are well-placed to measure emotional arousal and cognitive conflict. Film studies have embraced neural techniques in recent years in order to better understand the emotional reactions of audiences. Electroencephalography (EEG) offers high temporal resolution (Xu et al., 2018), which makes it a valuable technique to distinguish early perceptual reactivity from more complex and elaborated emotional processes (Gardener et al., 2013). A recent EEG study, for example, found a relatively high proportion of relaxed alpha waves when people watched television and video content, confirming that viewing induces a state of pleasant and wakeful relaxation (Barwise et al., 2019). In the present study, we also use EEG to measure the emotional responses of audiences to two types of actors in patriotic movies, with an attempt to examine the underlying neural basis of the effects of actor types on their willingness to watch a patriotic movie. To the best of our knowledge, this study is the first to use neural techniques to differentiate the influences of actors on the willingness of an audience to watch a movie.

Previous studies have shown that the EEG and some late event-related potential (ERP) components, such as the theta ERS (Mitchell et al., 2008), P3 (Hajcak et al., 2010), and late positive potential (LPP) (Cuthbert et al., 2000), are sophisticated ways to process emotional visual stimuli and detect the emotional effect. In this study, we examine the time-frequency power and two ERP components: the theta ERS, P3, and LPP. The P3 is a positive-going waveform over the centro-parietal sites, which peaks around 250–450 ms after the stimuli onset. It was reported that affective and motivational stimuli elicit enhanced P3 amplitudes (Palomba et al., 1997; Cuthbert et al., 2000; Di Russo et al., 2006; Hajcak et al., 2010). In addition, some empirical evidence suggested that long-lasting, positive LPP, which reaches its maximum around 500–700 ms (Olofsson et al., 2008; Hajcak et al., 2010), is a more reliable, replicable, and temporally sensitive indicator of emotional processing (Cuthbert et al., 2000; Schupp et al., 2003, 2007; Hajcak et al., 2006). According to previous studies, in the context of affective perceptual processing, the LPP amplitude is reported to reflect sustained and enhanced attention allocation and motivational significance to emotional visual stimuli (Bradley et al., 2003; Lang and Bradley, 2009). Specifically, the higher amplitude of the P3 and LPP tends to occur more often for emotionally significant stimuli (pleasant and unpleasant) than for neutral visual stimuli (Carretié et al., 1997; Olofsson et al., 2008). In other words, the P3 and LPP emotional effect may be dependent on how a person appraises an emotional stimulus and is likely to reflect the motivations underlying behaviors (Conroy and Polich, 2007; Zhang et al., 2019). Thus, in this study, according to the behavioral hypothesis, we predict that, in the patriotic movie condition, the not well-matched publicity stars would gain a greater allocation of attention for the emotion arousal effect than the fit skilled actors, indicating the top-down mechanism that is involved in emotion regulation (McRae et al., 2012), which is reflected in larger LPP and P3 amplitude.

In addition to the EEG and ERPs, we also investigated whether the event-related desynchronization or synchronization (ERD

or ERS) can reflect the evaluation of actors and films. Theta band oscillation (4–8 Hz) is a frequently examined functional signaling in the neural system, which is related to emotion and motivation (Başar et al., 2006). It was reported that motivational and affective stimuli (e.g., erotic and threatening pictures) induce larger theta ERS regions when compared with neutral stimuli, indicating that theta oscillation mediates motivated attention (Aftanas et al., 2008). Furthermore, larger theta ERS was observed to be positively correlated with pleasant emotional experience and negatively correlated with negative emotions (Aftanas and Golocheikine, 2001; Sammler et al., 2007). A previous study also confirmed that the presentation of positive affective movies yields an increment in theta power, while a power decrease was observed in response to emotionally negative movies (Aftanas et al., 1998). In line with the hypothesis proposed above, we predict that, in the patriotic movie condition, larger theta ERS would be observed for the skilled actors than for the publicity actors.

Overall, we aimed to use EEG techniques to explore how actor types in patriotic movies modulate film-watching willingness and emotional responses of an audience. We supposed that audiences would prefer skilled actors to publicity actors in patriotic movies, reflecting in behavioral rating scores and deflection of P3 and LPP amplitude, and theta ERS.

MATERIALS AND METHODS

Participants

Fifty female (mean age = 21.9, SD = 2.1) students from Shanghai International Studies University participated in this study, and four of them were discarded due to inadequate artifact-free ERP trials. All participants are right-handed with a normal or a corrected-to-normal visual acuity and reported no history of neurological or psychiatric disorders or head trauma. None of them were fans of our stimuli actors. Before the research protocol began, all participants received experimental instructions and gave written informed consent. The experiment was conducted under the Declaration of Helsinki (World Medical Association, 2013) and was approved by the Ethics Committee. Each participant was compensated with 50 RMB (about US $7.50) for the study when finished.

Materials and Procedure

A 2 (movie type) × 2 (actor type) study was conducted. Forty movies (patriotic vs. non-patriotic) and 20 actors (skilled vs. publicity) were paired up. A total of 800 pairs constituted the stimuli pool, and 160 stimuli (40 per condition) randomly from the stimuli pool were shown in every experiment with a programmatically fixed occurrence number of each movie title (four times) and actor name (eight times).

In the present study, participants were asked to identify the movie type from their titles. A movie title is one of the first pieces of information delivered to potential viewers, and it can provide information for moviegoers to interpret the genre or storyline of the movie (Bae and Kim, 2019). Eighty fictional titles were brainstormed (i.e., 40 patriotic and 40 non-patriotic), and an independent cohort of 40 students was recruited. All titles were rated by the degree of patriotism on a 7-point Likert scale (1 = not at all, 7 = very much). Consequently, the top 20 rated titles (mean score = 6.17, SD = 0.31) were categorized as patriotic, and the lowest scored 20 titles (mean score = 2.98, SD = 0.65) were the non-patriotic [t-test: $t_{(19)}$ = 40.146, p = 0.000]. The length of all film titles used was within three to five Chinese characters.

As for actor selection, 48 Chinese actors (24 per type) whose ages ranged from 26 to 39 were chosen. Fifty-eight students (15 males) were recruited to rate them based on their acting skills, publicity, and familiarity on a 5-point Likert scale. After that, actors were selected according to three criteria. First, the scores they gained should have a small SD. Second, they should gain high scores (above average) in one actor type and low scores (below average) in another. Third, they should have medium familiarity (within plus or minus one SD on average) to assure a similar familiarity level. As a result, 20 actors (mean age = 32.6, SD = 4.41; mean familiarity = 3.37, SD = 0.28), namely, 10 skilled actors (mean skilled score = 3.91, SD = 0.19; mean publicity score = 2.72, SD = 0.38) and 10 publicity actors (mean skilled score = 2.79, SD = 0.27; mean publicity score = 3.77, SD = 0.25), were selected [skilled t-test: $t_{(9)}$ = 7.063, p = 0.000; publicity t-test: $t_{(9)}$ = −8.639, p = 0.000]. No significant familiarity difference was found across the two types [$t_{(9)}$ = 0.580, p = 0.576].

After seating the participants in an armchair ∼70 cm in front of the computer screen, a rating task, programmed and executed with E-prime 3.0 (Science Plus Group, Groningen, The Netherlands), was performed. Five practice trials (not considered for the analysis) were conducted to acquaint participants with the procedure before starting.

As shown in **Figure 1**, each trial began with a fixation point (duration = 500 ms) followed by a blank screen (duration = 400–600 ms). A movie title and the name of an actor were then displayed simultaneously at the center of the screen (duration = 3,000 ms). Next, a 7-point rating bar (1 = not at all, 7 = very much) appeared below, asking participants to rate their willingness to watch this movie starring this actor by pressing the numeric keyboard. After the response, the interstimulus interval (ISI), a blank screen was presented randomly from 800 to 1,200 ms as a link between two trials.

When finished, participants were invited to fill out a self-reported questionnaire to record their demographic information and general movie consumption habits. They were also asked to rate their interest in different attributes of movies and familiarity with patriotic films.

Recording of EEG

The EEG was recorded (band-pass = 0.1–100 Hz, sampling rate = 500 Hz) using a 32-channel EEG system (Brain Products GmbH, Gilching, Germany). Distributed according to the 10–20 international system (Sharbrough et al., 1991), all Ag/AgCl electrodes were mounted in the caps, and their impedances were maintained below 10 kΩ. Electrode FCz was used for online EEG reference. The correct functioning of all electrodes was verified before starting the recording.

FIGURE 1 | Example of trial sequence. The movie title and actor name were shown to subjects after a fixation point and a blank screen in each trial. Then, subjects were asked to perform a rating task.
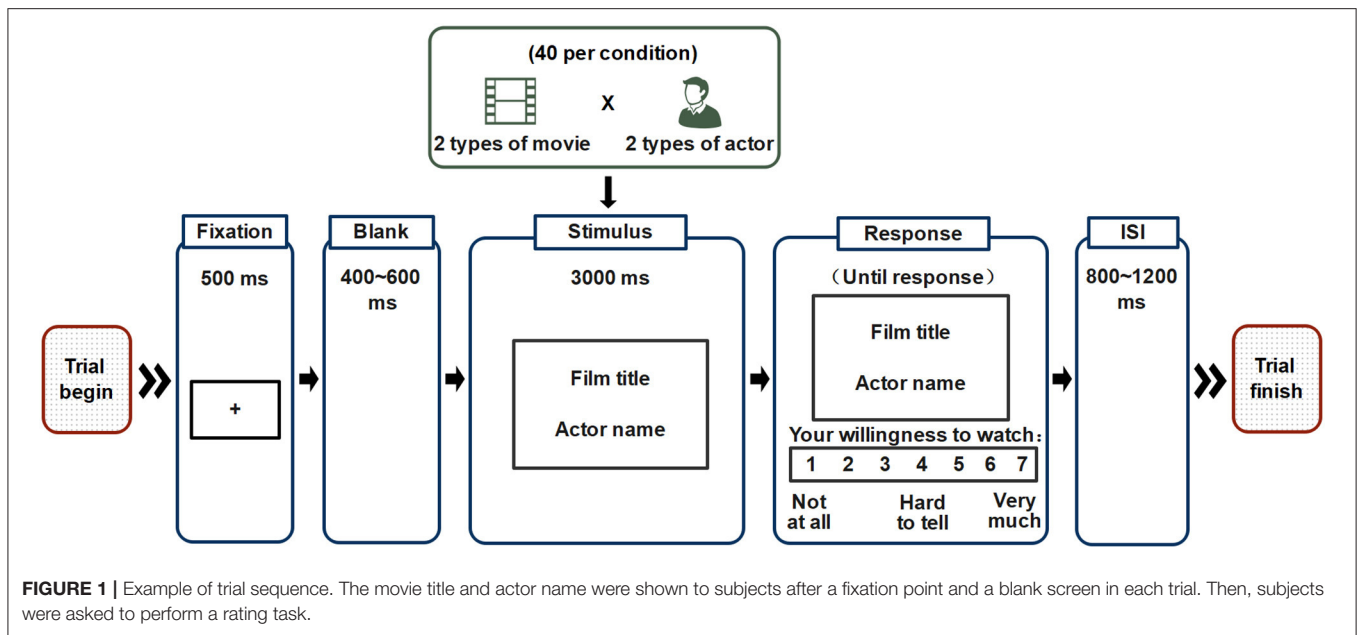
Data Analysis of EEG

The data were processed using the EEGLAB (Delorme and Makeig, 2004) open-source software version 14.1.1, running on MATLAB R2016a (The Mathworks Inc.). The EEG signal was algebraically re-referenced offline to the average of the left and right mastoids. A basic FIR filter between 0.1 and 30 Hz was then applied. Continuous EEG was segmented into ERP epochs, which were time-locked from 200 ms before the stimuli screen to 800 ms after the onset. The baseline for ERP measurements was the mean voltage over 200 ms before the stimuli onset. For correcting artifacts caused by eyeblinks, eye movements, or muscle potentials, the independent component analysis (ICA) was applied with the ADJUST plugin (Mognon et al., 2011) for EEGLAB as an accessory tool. After that, trials contaminated by remaining artifacts that exceeded ± 100 μV at any electrode were excluded from averaging. ERP was then averaged under each condition. Participants were removed from the following analysis if any of the condition averages were <30 trials due to excessive artifacts. Ultimately, 46 out of 50 participants entered the subsequent studies.

Based on the P3 (Johnson, 1988; Polich, 2007; Zhang et al., 2017) and LPP (Schupp et al., 2000; Liu et al., 2012; Hajcak and Foti, 2020) results in previous studies, as well as visual inspection of the waveforms and their topographical distributions, we carried out an analysis of the P3 using the mean amplitude over 300–390 ms in the parietal area (P3, Pz, P4), and the 550–700 ms time window from five electrodes (P3, Pz, P4, CP1, and CP2) was chosen for LPP analysis. The repeated-measures ANOVA was used to examine the effects of movie types (patriotic vs. non-patriotic) and actor types (skilled vs. publicity) on component amplitudes.

As for the time-frequency analysis, the artifact-free EEG data within each condition were decomposed into time-frequency representations with a frequency range from 1 to 30 Hz in 50 logarithmically spaced steps in which the power spectrum of the

EEG signal was multiplied by the power spectrum of complex Morlet wavelets ($e^{j2\pi t f}\ e^{-t^2/2\sigma^2}$). In this formula, t represents the time, f represents the frequency, and σ is the width of each frequency band, set as 3–7 logarithmically spaced cycles to allow a trade-off of temporal and frequency resolution. After that, we applied the inverse FFT (fast Fourier transform). The modulus of the resulting complex signal Z(real $[z(t)]^2$ + imag $[z(t)]^2$) was defined as power. The TFRs of each condition of each participant were averaged and transformed using a decibel (dB) scale. For normalization, the activity from −300 to −100 ms before the stimuli was used as the baseline for each frequency with the equation: $dB\ power = 10 \times \log 10(power/baseline)$.

Since the frontal midline theta (FM-theta) activity was recognized as a crucial indicator of emotional state (Aftanas and Golocheikine, 2001; Kubota et al., 2001), the electrode Fz, where the FM-theta is generally maximal (Yamamoto and Matsuoka, 1990; Mitchell et al., 2008), was chosen for analysis. Additionally, a complementary line of research has observed target-related theta ERS in the period 200–500 ms (Kolev et al., 1997; Yordanova and Kolev, 1998; Wang and Ding, 2011). Therefore, the mean magnitude of FM-theta-band activity (Fz) (frequency range = 4.1–5.8 Hz, time range = 330–380 ms) was delivered to a repeated-measures ANOVA with factors "movie type" and "actor type." A simple-effect analysis would be performed once any significant interaction occurred. Greenhouse–Geisser correction (Greenhouse and Geisser, 1959) for repeated measures was applied for statistical analysis. The significance level was set as $p < 0.05$.

RESULTS

Behavioral Results

A 2 (movie type: patriotic vs. non-patriotic) × 2 (actor type: skilled vs. publicity) repeated-measures ANOVA was conducted on the average willingness to watch (**Figure 2A**). This analysis

FIGURE 2 | Behavioral results. (A) Average willingness under four conditions. (B) Willingness differences (skilled–publicity) in two movie types. (C) Scatter plots of Pearson's correlation coefficient analysis results between the familiarity level with patriotic movies and the willingness growth in such movies. The willingness growth represented the willingness difference (skilled–publicity) in each movie type. Blue, red, green, and yellow in bar graphs stood for skilled, publicity, patriotic, and non-patriotic. Error bar: standard error, $*p < 0.05$, $***p < 0.001$.

revealed a significant main effect of actor type [mean ± standard error, skilled: 4.06 ± 0.13 vs. publicity: 3.27 ± 0.13, $F_{(1, 45)} = 39.83$, $p = 0.000$] with a more vital willingness in the skilled actor condition, but there was no significant main effect of movie type [$F_{(1, 45)} = 0.08$, $p = 0.773$]. Moreover, a significant interaction [$F_{(1, 45)} = 5.68$, $p = 0.021$] between movie type and actor type was found. When movie types were fixed, the simple-effects analysis confirmed a stronger willingness for skilled than for publicity actors in both patriotic movies [skilled: 4.11 ± 0.98 vs. publicity: 3.24 ± 0.91, $F_{(1, 45)} = 47.565$, $p = 0.000$] and non-patriotic movies [skilled: 4.01 ± 0.91 vs. publicity: 3.29 ± 1.04, $F_{(1, 45)} = 29.617$, $p = 0.000$].

Further analysis was conducted, in which we defined the average willingness difference (skilled–publicity) in each movie type as the willingness growth caused by skilled actors. The result illustrated a more significant willingness increase in patriotic movies than in non-patriotic movies [patriotic: 0.86 ± 0.12 vs. non-patriotic: 0.72 ± 0.13, $t_{(45)} = 2.384$, $p = 0.021$, **Figure 2B**]. Besides, we were curious about whether the watching experience might be related to actor preference in movie-watching. Pearson's correlation coefficient analysis was performed between the familiarity level with patriotic movies and the willingness growth in this type. A significant positive correlation was observed ($r = 0.30$, $p = 0.041$, **Figure 2C**), which meant the more familiar the participant was with patriotic movies, the larger was the growth of her willingness.

Results of ERP: P3

Consistent with previous studies (Johnson, 1988; Polich, 2007; Zhang et al., 2017), a robust P3 component was observed in the parietal scalp region (**Figures 3A,B**). We analyzed the P3 using the mean amplitude over 300–390 ms from three electrodes (P3, Pz, and P4). A three-way 2 (movie type: patriotic vs. non-patriotic) × 2 (actor type: skilled vs. publicity) × 3 (electrode: P3/Pz /P4) ANOVA was conducted (bar plot of P3 amplitudes, see **Figure 3C**). There was a significant main effect of movie type [patriotic: 2.83 ± 0.40 vs. non-patriotic: 2.34 ± 0.45, $F_{(1, 45)} = $

4.611, $p = 0.037$] with a larger P3 amplitude induced by patriotic movies than by non-patriotic ones. A significant interaction effect between movie type and actor type [$F_{(1, 45)} = 4.920$, $p = 0.032$] was found, whereas no significant main effect of actor type [$F_{(1, 45)} = 0.388$, $p = 0.536$] was observed. Further results of simple-effect analysis illustrated that the effect of actor type was significant [$F_{(1, 45)} = 4.211$, $p = 0.046$] when the movie type was fixed to patriotic movies. The mean amplitude of the P3 in response to publicity actors ($3.12 \pm 0.45\,\mu V$) was larger than that in response to skilled actors ($2.54 \pm 0.40\,\mu V$). However, the effect of actor type was not significant [$F_{(1, 45)} = 0.552$, $p = 0.461$] with non-patriotic movies.

Results of ERP: LPP

Based on the LPP results in previous studies (Schupp et al., 2000; Liu et al., 2012; Hajcak and Foti, 2020), as well as visual inspection of the waveforms and their topographical distribution (**Figures 3A**, **4A**), the time window of 550–700 ms from five centro-parietal electrodes (P3, Pz, P4, CP1, and CP2) was chosen for LPP analysis. The results of a 2 (movie type: patriotic vs. non-patriotic) × 2 (actor type: skilled vs. publicity) × 5 (electrode: CP1/CP2/P3/Pz /P4) ANOVA, as shown in **Figure 4B**, revealed a significant interaction between movie type and actor type [$F_{(1, 45)} = 6.416$, $p = 0.015$], but no significant main effects of either movie type [$F_{(1,45)} = 0.010$, $p = 0.919$] or actor type [$F_{(1, 45)}$ 0.798 1, $p = 0.376$]. When the simple-effect analysis was performed, a significant effect of actor type was found in patriotic movies [$F_{(1, 45)} = 5.341$, $p = 0.025$]. More specifically, the amplitude of LPP elicited by the publicity actors (3.05 ± 0.58 μV) was significantly larger than that by the skilled actors ($2.37 \pm 0.55\,\mu V$). No significant difference was observed under the non-patriotic movie condition [$F_{(1, 45)} = 0.597$, $p = 0.445$].

Correlation analyses were also performed on LPP to investigate relationships between watching habits and conflicted emotional responses. When it came to the publicity actor condition, no significant correlation was found between LPP amplitude and the interest degrees in patriotic ($p = 0.123$,
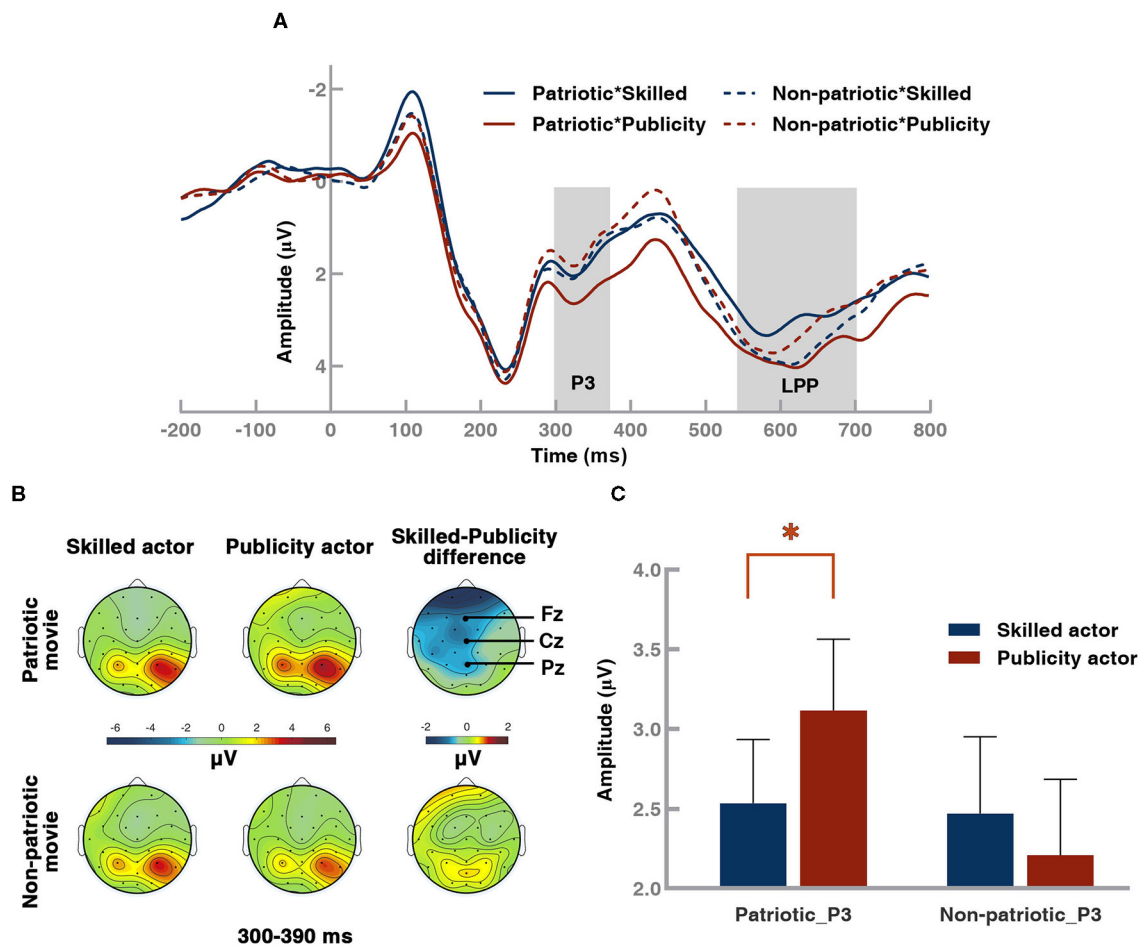
FIGURE 3 | Event-related potential (ERP) waveforms from Pz, topography of grand-averaged P3 waveforms from Pz, and P3 results. **(A)** Grand-averaged ERP under four conditions: 2 movie types (patriotic: solid line, non-patriotic: dotted line) × 2 actor kinds (skilled: blue, publicity: red). **(B)** Topography of P3. **(C)** P3 averaged amplitudes of patriotic movies and non-patriotic movies starring different types of actors from the parietal scalp region. Blue represents the skilled actors, and red represents the publicity actors. The topography was the averaged potential of the 330–390 ms time window. Error bar: standard error, *p < 0.05.
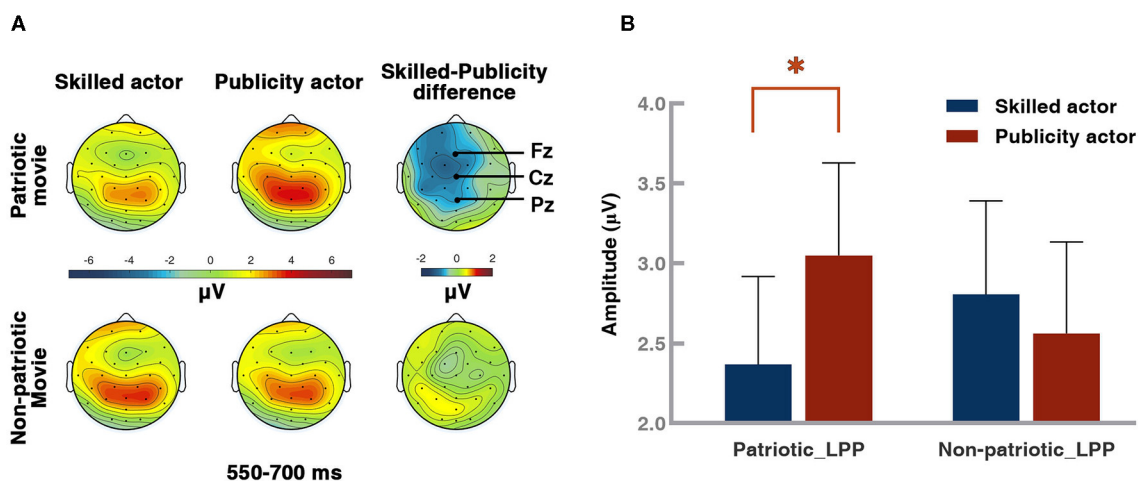
FIGURE 4 | Topography of grand-averaged late positive potential (LPP) waveforms from Pz and LPP results. **(A)** Topography of LPP. **(B)** LPP-averaged amplitudes of patriotic movies and non-patriotic movies starring different types of actors from selected electrodes. The topography was the averaged potential of the 550–700 ms time window. Blue represents the skilled actors, and red represents the publicity actors. Error bar: standard error, *p < 0.05.
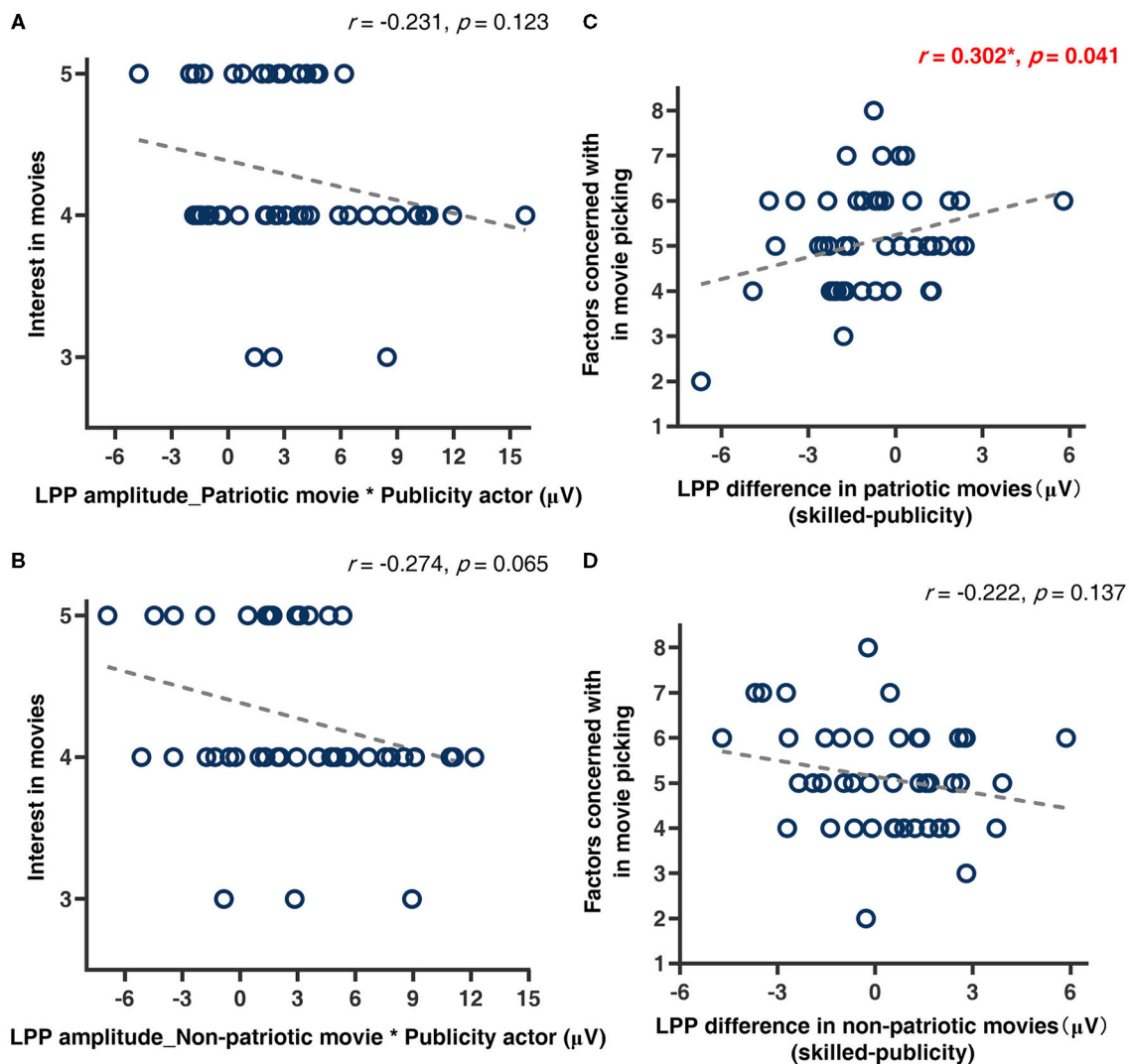
FIGURE 5 | Scatter plots and Pearson's correlation coefficient analysis results. **(A,B)** Correlations between average LPP amplitude and the degree of interest in movies under publicity actor conditions. **(C,D)** Correlations between LPP amplitude difference (skilled–publicity) in different movie types and the number of factors each participant concerned with in movie picking.

Figure 5A) and non-patriotic movies ($p = 0.065$, **Figure 5B**). Another interesting finding was that the number of attributes each participant identified (e.g., actor, script, director, movie genres, and so forth) in selecting movies was positively correlated with the LPP amplitude difference (skilled–publicity) in patriotic movies ($r = 0.30$, $p = 0.041$, **Figure 5C**). This meant that the more factors the participant took into account in selecting a movie, the larger the LPP amplitude difference she had. In contrast, no significant correlation was found in non-patriotic movies ($p = 0.137$, **Figure 5D**).

Theta ERS Results

In accordance with previous studies of theta band oscillation (Aftanas and Golocheikine, 2001; Kubota et al., 2001), the mean magnitude of FM-theta-band activity (Fz) (Yamamoto and Matsuoka, 1990; Mitchell et al., 2008) with the 330–380 ms time-window (Kolev et al., 1997; Yordanova and Kolev, 1998; Wang and Ding, 2011) was chosen for analysis (see in **Figure 6A**). A 2 (movie type: patriotic vs. non-patriotic) × 2 (actor type: skilled vs. publicity) ANOVA was conducted. The ANOVA result (**Figure 6B**) showed insignificant main effects of movie type [$F_{(1, 45)} = 0.042$, $p = 0.839$] and actor type [$F_{(1, 45)} = 1.886$, $p = 0.176$]. There was a significant interaction between the movie type and the actor type [$F_{(1, 45)} = 5.543$, $p = 0.023$]. The further simple effect test indicated an enhanced theta-band activity for skilled actors (0.61 ± 0.19 dB) compared to publicity actors (0.14 ± 0.17 dB) in patriotic movies [$F_{(1, 45)} = 7.136$, $p = 0.010$]. On the contrary, there was no significant difference between actor types in non-patriotic movies [$F_{(1, 45)} 0.443 1$, $p = 0.509$]. Results of behavior and brain activities are summarized in **Table 1**.
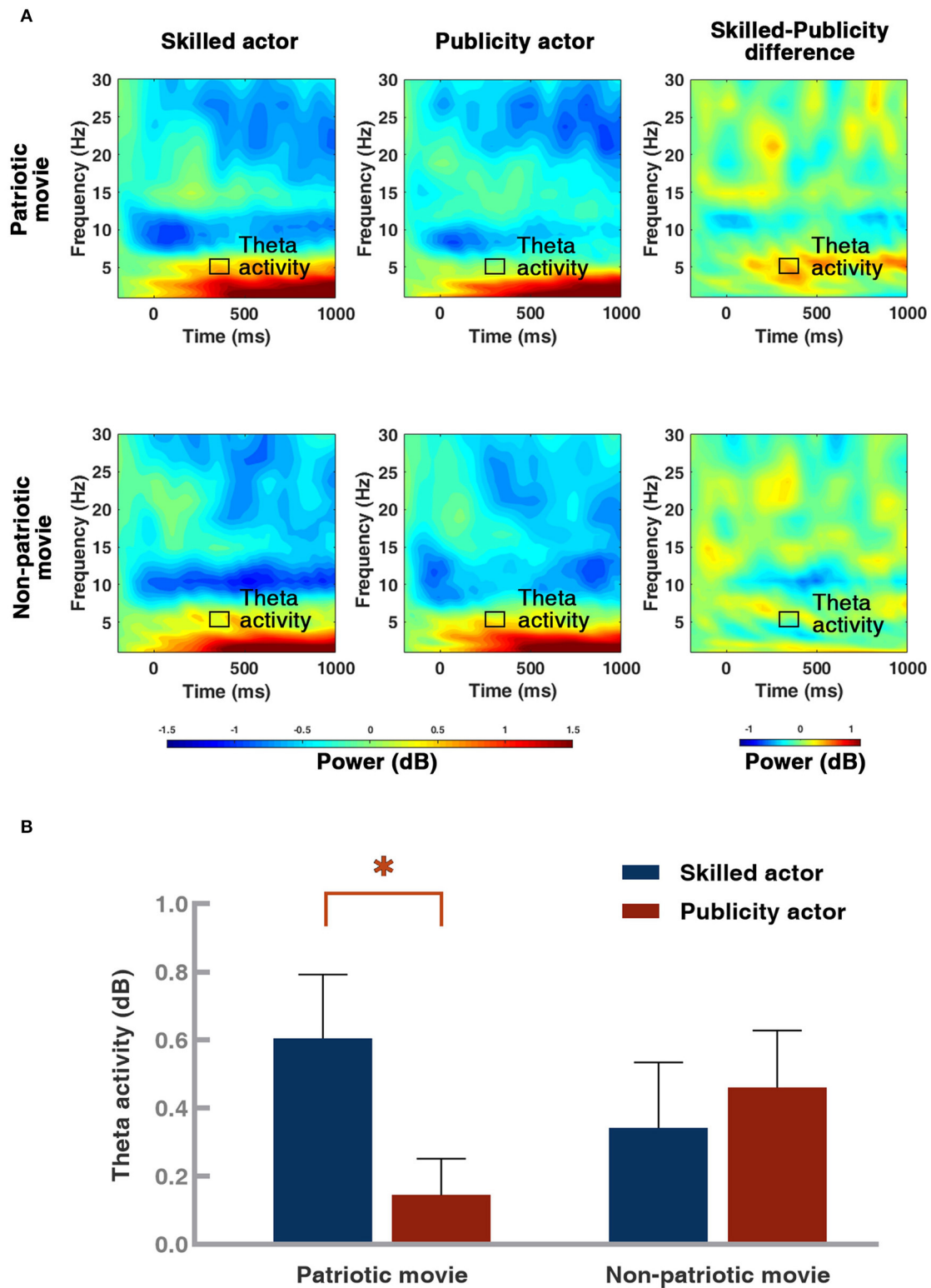
FIGURE 6 | Illustration of neural oscillation at Fz and theta ERS results. **(A)** Illustration of grand-averaged neural oscillation at Fz under four conditions and skilled/publicity difference. **(B)** Averaged magnitude of theta activity from Fz (frequency range = 4.1–5.8 Hz, time range = 330–380 ms) under four conditions. Theta band (4–7 Hz) activity from 330 to 380 ms, with a frequency range of 4.08–5.80 Hz, was selected (the black box area). In the graphs, the shade of the color represents the strength of the power. The darker the color was, the stronger was the power. Error bar: standard error, *$p < 0.05$.

TABLE 1 | The behavioral and brain results.

Behavioral results (movie-watching willingness)	ANOVA	ME-Movie type			N/A	
		ME-Actor type			SA > PA	
		Interaction effect		PM		SA > PA
				NM		SA > PA
	Pearson's correlation	Willingness growth caused by skilled actors	and	Familiarity with patriotic movies	Positive	
Brain results	P3 amplitude	ANOVA	ME-Movie type	PM > NM		
			ME-Actor type	N/A		
			Interaction effect	PM		SA < PA
				NM		N/A
		Pearson's correlation	N/A			
	LPP amplitude	ANOVA	ME-Movie type	N/A		
			ME-Actor type	N/A		
			Interaction effect	PM		SA < PA
				NM		N/A
		Pearson's correlation	Interest degree in movies	and	LPP amplitude (PA)	PM	N/A
						NM	N/A
			Factors participants concerned with in movie-picking	and	LPP difference (SA-PA)	PM	Positive
						NM	N/A
	Theta ERS	ANOVA	ME-Movie type		N/A	
			ME-Actor type		N/A	
			Interaction effect		PM	SA > PA
					NM	N/A
		Pearson's correlation		N/A		

N/A, this effect is insignificant. ME-Movie type, Main effect of movie type; ME-Actor type, Main effect of actor type; PM, Patriotic movie; NM, Non-patriotic movie; SA, Skilled actor; PA, Publicity actor.

DISCUSSION

This exploratory study set out to examine audience preferences on skilled or publicity actors for patriotic movies by using EEG. Plenty of previous studies have confirmed that the presence of actors in movies influence the choices of an audience one way or another (Faulkner and Anderson, 1987; Levy, 1990; Albert, 1998; Rein et al., 2006; Hadida, 2010; Liu et al., 2014; Joshi, 2015; Peng et al., 2019). Our behavioral data indicated that the willingness of an audience to watch a movie was higher for skilled actors than for publicity actors, especially for patriotic movies. This is consistent with the study by Yang on patriotic movies, arguing that patriotic movies need strong skilled actors to lift the artistic quality and, in turn, appeal to a large audience (Yang, 2017). Using skilled actors to attract audiences for better market performance was regarded as more important in less familiar genres than in popular genre movies, such as comedies and dramas (Desai and Basuroy, 2005). Audiences are less familiar with patriotic movies as a genre than with movies in which patriotism is not an issue, and this leads to a greater preference for skilled stars in this study. Further, the study further discovered that the more familiar the participant was with patriotic movies, the stronger preference she had for skilled actors than for publicity actors. This was also in line with previous studies, which suggested that more experienced moviegoers are more likely to be attracted by skilled stars with their outstanding acting abilities (Hofmann, 2019) and reliable film quality marker function (Franck, 2001). This led us to conclude that this type of audience puts a stronger emphasis on the artistic quality of the movies.

Following the behavioral results, our EEG experiment drew a similar picture. First, the ERP results showed that, as hypothesized, audiences had smaller P3 and LPP amplitude for skilled actors than for publicity actors in the patriotic movie condition. It has been argued that P3 is related to attentional salience (Palomba et al., 1997; Cuthbert et al., 2000; Di Russo et al., 2006; Hajcak et al., 2010), while LPP reflects the degree of emotional arousal (Cuthbert et al., 2000; Schupp et al., 2003, 2007; Hajcak et al., 2006). This result supported our hypothesis that the motivational salience and emotional arousal toward skilled actors are lower in the patriotic movie condition. In other words, people were more likely to be emotionally engaged with a patriotic movie if it stars a skilled actor, and this enhances their willingness to watch this type of movie. This was consistent with our behavioral results. Further, the correlation between the number of movie attributes that participants focused on when selecting a movie and the different LPP amplitude caused by the two types of actors also confirmed this, suggesting that in patriotic movies,

the performance of skilled actors can reduce the concerns of an audience about the script, props, and film type to a certain extent and make it easier to attract an audience. This further emphasizes the importance for a patriotic movie to hire skilled actors in order to have a positive influence on the audience.

Furthermore, as we have proposed, a larger theta oscillation was observed for the skilled actors than for the publicity actors in the patriotic movie condition. Since a larger theta ERS is induced by emotionally positive stimuli (Aftanas et al., 1998; Aftanas and Golocheikine, 2001; Sammler et al., 2007), our results confirmed that participants have more favorable emotional reactions to skilled actors when they watch a patriotic movie. This replicated the behavioral and ERP results of this study.

Taken together, both behavioral evidence and neural evidence from this study prove that the willingness of an audience to watch a patriotic movie is deeply affected by actor types. Specifically, skilled actors engage the audience emotionally, more so than publicity actors, and significantly increase the likelihood of the audience choosing patriotic movies. In particular, more experienced audience members showed a stronger preference for skilled actors. Furthermore, apart from acting as quality markers, skilled actors in patriotic movies also help distract people from other attributes of the movies, making them a more valuable asset for this type of production (Hofmann, 2019).

The current study may have a couple of theoretical implications. First, this study reveals the psychological and neural mechanism of how the willingness of an audience to watch patriotic movies is influenced by actor types. As argued before, screen images of publicity stars associated with the light comedies they appear in, and the daily gossip they generate, may distract people from the storyline of patriotic movies (Hofmann and Opitz, 2019) and induce a cognitive conflict for the audience. In addition, this study provides neurological evidence that patriotic movies should cast skilled actors to better engage audiences emotionally. Second, this is the first attempt in film study to explore the relationship between the willingness of audiences to watch a movie and their preferences for actor types by using neuroscience technology, revealing a close correlation between behaviors of audiences and their brain activities. These findings advance film study with careful scientific measurements and a possible new direction.

A bedrock issue in film studies concerns the use of empirical studies to guide production (Wallace et al., 1993). This study also has a couple of practical implications. First, the study provides a new perspective for the delivery of patriotism through cinemas by focusing on the mechanism of elevating the willingness of audiences to watch a patriotic movie. It suggests that the astute choice of suitable actors can enhance attention and positive emotional reaction of audiences to the patriotic movie, leading to large dissemination of the values and ideas dramatized. Second, this study, supported by clear neuroscientific evidence, provides the film industry with an effective tool to select actors for better audience engagement. This can be a useful alternative to practical industrial experience and findings from previous studies.

However, there are also some issues arising from this study that should be addressed in future research. First, we only selected female participants in this study. This is because previous studies have found that, in general, women have less interest in patriotic movies that often involve war, historical events, and political figures than men (Hsu, 2006; Kord and Krimmer, 2011), which means there is a greater urgency in studying the reactions of female audiences. To compensate, we used only male actors as stimuli in our experiment. As Addis and Holbrook (2010) have pointed out, audiences tend to orient their preferences toward opposite-gender stars. Future studies could include male participants and female actors in the material to explore possible differences in behavioral and neural reactions. Second, the experiments in this study were conducted with individual participants. However, movie watching can be a complex group behavior, which may not be fully comprehensible purely by studying the reactions of individual brains. For future studies, it is worth using hyper-scanning technology to further explore group dynamics among different audiences.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Laboratory of Applied Brain and Cognitive Sciences, Shanghai International Studies University. The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

LZ conceived the experiment and developed the project. YW conducted the experiment and analyzed the results. LZ and YW wrote the first draft. All authors reviewed the manuscript and contributed to the submitted version.

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Book Review: Psychology and the Conduct of Everyday Life

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A Book Review on

Psychology and the Conduct of Everyday Life

Ernst Schraube and Charlotte Højholt (New York, NY: Routledge), 2016, 272 pages, ISBN: 978-1138815124

From the earliest days of its formation as an independent discipline, psychology has been concerned with human experience, activity and self-reflection, but the question of how to conduct one's life has not received much attention (Carolyn, 2014). This book is about the psychological research and the conduct of everyday life in contemporary society. It brings psychological research from the laboratory to the real world. With its focus on the question of how people beings as active sensuous subjects live their everyday lives, it explores the conduct of life as a basis for comprehending the dilemmas and contradictions we face in daily lives.

Structurally, the book encompasses three parts, organized thematically into 13 chapters. The first chapters collect the latest interdisciplinary empirical research on the importance of environment. In the first chapter, it highlights the power of the concept of the conduct of everyday life to reform the perspective of psychology. In Chapter 2, a sociological approach to the research of the conduct of everyday life is introduced. Society can therefore be understood through the everyday lives of the individuals performing these actions. Chapter 3 presents the importance of everyday living for psychology, including a discussion of the sociological approach, an analysis of why the concept has not so far been investigated within psychology, as well as reflections on how to study the conduct of life from the standpoint of the subjects. In Chapter 4, it focuses on the importance of a specific practice of everyday living: walking and the practice of exposure as an alternative model of education. In Chapter 5, it reports the approach to the conduct of everyday life in the context of critical psychology. The study of the conduct of life needs to include concepts such as habitus, performativity, and privilege that are grounded in critical theories of embodiment and not in a philosophy of consciousness. Chapter 6 illustrates and reflects on how to carry out empirical research on everyday living. Everyday living is often conceptualized in terms of the mundane or ordinary. Yet, for increasing numbers of people disruption and the extra-ordinary have become normative (Highmore, 2002). In Chapter 7, based on empirical research on children's conduct of life, it focuses on conflicts in everyday life and their relatedness to social, political, and structural conflicts. This chapter discusses challenges of how to conceptualize meanings of the children's social backgrounds as well as how to conceptualize their personal agency. The starting point of everyday living in Chapter 8 is Adorno's famous dictum "there is no right life in the wrong one (Adorno, 2005)." Recognizing this dilemma is the first step out of it (p. 164). However, to overcome such a restricted concept of human agency and subjectivity, it is necessary to become aware of the varied forms and ways in which we unwittingly support in our own thoughts and actions conditions that we want to overcome. This includes the need to recognize and resist the many pressures that lead

us to ignore all contradictory information so as to keep up the semblance of being able to live our lives in the right way, in contrast to others (Holzkamp, 2013).

The middle part examines the interaction between daily life throughout the world and contemporary global phenomena such as the rise of the debt economy, the hegemony of the labor market, and the increased reliance on digital technology in educational settings. Chapter 9 examines everyday life in the shadow of the rise of the debt economy in the United States. The chapter concludes with a historical sketch of the anti-debt movement in the United States that developed in the wake of the 2008 financial crisis and that potentially can challenge contemporary conduct of everyday life in the debt economy. Chapter 10 discusses these issues through exploration how the restructuring of the world economy has affected reproductive work and gender relations, the role of technology in this process, and the initiatives taken by women in the world to construct more cooperative and equitable forms of reproduction. Chapter 11 investigates the contradictory significance of digital technology in students' learning. The digitization of higher education is radically transforming learning and teaching relations, including the content of learning and the students' conduct of life. Based on a refined concept of learning it shows how the digitalization of students' learning environment reconfigures the structures of participation and how it can catalyze but also freeze the fluidity of learning and teaching.

Finally, the last part of the book is focused on how social psychology can enhance our understanding of our lives, and provide the possibilities for collective work to solve social conflict. The penultimate chapter explores the relationship between theory and everyday understanding as a basic challenge in the study of the conduct of life (p. 226). The chapter introduces memory-work as a possible approach to deal with this challenge and presents its individual steps, theoretical foundations, and possibilities for an empirical inquiry into everyday living. In the closing chapter, the authors expand the methodological discussion of how to empirically explore

everyday living by focusing on the interconnections of subjective and structural aspects of persons conducting their everyday life in and across social practices (p. 241). This chapter elucidates the possibilities for arranging participatory research collaboration that enables the development of knowledge about common problems and contradictory life conditions in their meanings to different persons.

This book provides a basic introduction to the psychological research of the conduct of everyday life in contemporary society. Throughout the book, working with the "conduct of everyday life" and refining this concept can support an understanding of psychological phenomena as they unfold in the reality of everyday living, and promote a fundamental renewal of psychological theory, methodology, and practice. The importance of the conduct of everyday life for psychology lies in its conceptual relevance in exploring and understanding the everyday activities of individual subjects to organize, integrate, and make sense of the multiplicity of social relations and contradictory demands in and across the different contexts in which they are engaged in their daily life (p. 1). In a sense, the above content of this book is so extensive that some fascinating details, such as reflecting on the new methodologies and research practices facilitating the empirical investigations of the everyday realities and problems in people's lives, cannot be specifically presented. In this context, there is a growing need for psychology to investigate and understand how people confront and experience local changes in relation to social systems, institutions, technologies, and daily life practices in the course of their everyday life. Psychological theory and research, in turn, thus have to relate their understanding of human sensuous activities and experiences to the social practices and structures in which people live and experience their problems.

AUTHOR CONTRIBUTIONS

BL and KL wrote the manuscript, with larger contributions by BL. KL then provided edits and suggestions for revision. Both authors contributed to the article and approved the submitted version.

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China Public Psychology Analysis About COVID-19 Under Considering Sina Weibo Data

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COVID-19 not only poses a huge threat to public health, but also affects people's mental health. Take scientific and effective psychological crisis intervention to prevent large-scale negative emotional contagion is an important task for epidemic prevention and control. This paper established a sentiment classification model to make sentiment annotation (positive and negative) about the 105,536 epidemic comments in 86 days on the official Weibo of People's Daily, the test results showed that the accuracy of the model reached 88%, and the AUC value was greater than 0.9. Based on the marked data set, we explored the potential law between the changes in Internet public opinion and epidemic situation in China. First of all, we found that most of the Weibo users showed positive emotions, and the negative emotions were mainly caused by the fear and concern about the epidemic itself and the doubts about the work of the government. Secondly, there is a strong correlation between the changes of epidemic situation and people's emotion. Also, we divided the epidemic into three period. The proportion of people's negative emotions showed a similar trend with the number of newly confirmed cases in the growth and decay period, and the extinction period. In addition, we also found that women have more positive emotional performance than men, and the high-impact groups is also more positive than the low-impact groups. We hope that these conclusions can help China and other countries experiencing severe epidemics to guide publics respond.

Keywords: public psychology, COVID-19, Sina Weibo data, China, sentiment classification model

INTRODUCTION

A novel coronavirus was first reported in Wuhan, Hubei in early December 2019 (Li Q. et al., 2020; Zhu et al., 2020), followed by a series of outbreaks around the world in the following months. On February 11, 2020, WHO announced the official designation of the virus as "COVID-19." In response to the COVID -19 epidemic, the Chinese government has adopted a series of active and effective strategies, and achieved the basic control of the epidemic by March 2020. However, the epidemic situation outside of China is still severe. As of May 21, 2020, the cumulative number of infections in the world has exceeded 5 million and the number of deaths has exceeded 300,000. the cumulative number of infections in the world has exceeded 5 million and the number of deaths has exceeded 300,000. This public health emergency not only jeopardizes people's physical health, but also affects people's mental health (Holmes et al., 2020; Moccia et al., 2020; Wang et al., 2020). On January 26, the National Health Commission of China issued the guiding principles for COVID-19

emergency psychological crisis intervention (Liu et al., 2020), incorporating psychological crisis intervention into the overall deployment of epidemic prevention and control, so as to reduce psychological harm caused by the epidemic and promote social stability. Some scholars have also analyzed the negative emotions revealed by people during the epidemic, such as fear, sadness, anxiety, depression, etc. (Bitan et al., 2020; Brooks et al., 2020; McKay et al., 2020; Wallace et al., 2020). Most of these studies use questionnaires and scales to analyze the mechanism of people's negative emotions.

However, how widespread are negative emotions? How do people's emotions change with the development of the epidemic? Such problems have not yet been studied. It cannot be ignored that emotion can be transmitted just like any other type of information, which is called emotional contagion (Barsade, 2002; Del Vicario et al., 2016; Zhang G. et al., 2018), and this phenomenon is especially obvious in social networks (Kramer et al., 2014). Therefore, exploring the changing laws of online public opinion has a positive effect on preventing the spread of negative emotions. After the outbreak of COVID-19, the growing social network platform has become the main place for people to pay attention to the epidemic and express their emotional appeals. In China, Sina Weibo is the most representative online social media (Li and Xu, 2014; Yuan and Gao, 2016), through which people can know the real-time dynamics of the epidemic and freely comment on the news and topics. These comments contain the subjective feelings of the reviewers, which can be divided into two different dimensions of positive and negative in psychology (Cacioppo et al., 1999; Watson et al., 1999). Understanding the evolution of public emotion is helpful for the government to effectively respond to online public opinions (Li S. et al., 2020). China is the country with the earliest outbreak of COVID-19, and it has gone through a complete process from the beginning, outbreak to control. We hope that by analyzing the evolution of online public opinion of COVID-19 in China, we can provide some reference and help to other countries experiencing severe epidemic to prevent large-scale negative emotional contagion and ensure people's mental health.

The recognition and division of comment information is the premise of analyzing the law of public emotion evolution. Therefore, we have to mention the concept of text sentiment analysis, which is a process of analyzing, processing and extracting subjective text with emotional color by using natural language processing and text mining technology (Bakshi et al., 2016). At present, the research on text sentiment analysis is mainly divided into semantic-based emotion dictionary method (Al-Thubaity et al., 2018; Jha et al., 2018; Zhang S. et al., 2018; Xing et al., 2019) and machine learning method (Catal and Nangir, 2017; Abdi et al., 2019; Zhang et al., 2019; Xu F. et al., 2020). The former is mainly based on the existing emotion dictionary or semantic database to weighted sum the words with emotion or polarity in the text, while the latter is mainly to build feature vectors with category representation meaning in the text, and then use machine learning algorithm to classify based on these feature vectors. Some scholars believe that the semantic-based emotion dictionary method should be combined with the specific context, and its effectiveness needs to be further verified

(Kumar et al., 2020). Therefore, the machine learning method is more flexible and applicable.

The main work of this paper is to explore the emotional evolution of Weibo users during the epidemic in China through text sentiment analysis. First of all, through the technology of web crawler, users' comments on the epidemic in the People's Daily official Weibo from December 31, 2019 to March 31, 2020 were obtained. Secondly, part of the data was randomly selected for artificial sentiment annotation, and the marked data set was divided into training set and test set. Thirdly, based on the SnowNLP module in Python, the naive Bayesian algorithm in machine learning was used to build sentiment classification model, and the automatic recognition and division of the remaining comment information was completed. Finally, the annotated data set was used to explore the potential law between the changes of emotion and epidemic situation.

MATERIALS AND METHODS

Data Acquisition

Our data comes from the comments on the daily epidemic data released on the official Weibo of People's Daily from December 31, 2019 to March 31, 2020, as shown in the example in **Figure 1**. During this time period, China's COVID-19 epidemic experienced the entire process from outbreak to being controlled. People's Daily is the most authoritative and influential official media in China, and its Weibo has a high degree of concern. Moreover, it is timely and continuous for the update of the epidemic development, and people often express their emotional appeals and opinions on their weibo. Therefore, this paper chooses the People's Daily as the carrier to obtain comments. The requests library in python is used to simulate logging into Sina Weibo for web crawler to obtain data. The information crawled includes comment date, comment content, reviewer gender, number of fans, etc. In the early stage of the epidemic in China, no data was released for some certain dates (2020/01/01, 2020/01/04, 2020/01/07, 2020/01/09, 2020/01/010, 2020/01/14). After deleting these dates, 112588 original comments within 86 days were crawled and stored in an Excel table.

Data Preprocessing

Text data is an unstructured data. Due to different habits, people usually use a variety of complex emoji, symbols and expressions in their comments, which greatly increase the difficulty of text recognition. Data preprocessing is the key to improving the accuracy of text recognition. Its processing method is different from that of structured data. In addition to the processing of missing and repeated values, it also includes the cleaning of text content.

Missing Value and Duplicate Value Processing

Since the data in this paper is obtained by web crawlers, there are almost no missing values in the data set. But some comments contain only an emoji, symbol, or character, which are invalid information and are deleted as missing values. We

FIGURE 1 | Weibo user comments.

TABLE 1 | Comments after preprocessing.

Date	Content	Fans	Gender
2019/12/31	不传谣不信谣希望平安	2,069,206	Female
	(Do not spread rumors, do not believe the rumors, hope it is safe)		
2019/12/31	最后一天武汉人民平安	108	Female
	(Hope people in Wuhan are safe on the last day of 2019)		
2019/12/31	天佑武汉天佑中华	84	Male
	(God bless Wuhan, God bless China!)		
2019/12/31	希望是虚惊一场愿平安	548,370	Female
	(Hope this is a false alarm!)		
2019/12/31	希望这次可以用上最美的词虚惊一场	167	Female
	(Hope I could use the most beautiful word this time: false alarm)		
…….	…….	…….	…….

TABLE 2 | Emotion classification principles.

Sentiment classification	Definition	Label
Positive emotions	Emotions arising from an increase in positive value or a decrease in negative value, such as pleasure, trust, gratitude, rejoicing, expectation, praise, etc.	1
Negative emotions	Emotions arising from a decrease in positive value or an increase in negative value, such as pain, anxiety, anger, frustration, hatred, jealousy, irony, doubt, etc.	−1

also eliminated duplicate values in the data set to ensure the uniqueness of the data.

Text Content Cleaning

The comment text contains some noise information unrelated to the study, such as URL, punctuation, symbol, forwarding, picture, etc., which cannot reflect the user's emotional inclination and will interfere with the recognition of the text. Therefore, we use regular expressions to locate and delete this information, ensuring the consistency and readability of all comments in the format.

After data preprocessing, this data set covers 105,536 comments on epidemic data released by People's Daily, which are stored in chronological order, including comment date, comment content, number of fans and commentator gender, as shown in **Table 1**.

Artificial Sentiment Annotation and Data Set Division

For the pre-processed data set, we randomly selected part of the data for artificial sentiment annotation, and divided the reviewer's comments into three categories: Positive, negative and neutral. However, during the labeling process, we found that most of the comments focused on the positive and negative categories, and there are very few comments actually classified as neutral emotions (less than 5%). The small sample size makes it difficult for the machine learning model to identify neutral emotions well, and it also affects the overall fitting effect of the model. Therefore, after comprehensive consideration, we only divided the comments into two categories: positive (non-negative, including neutral) and negative. The specific annotation rules are shown in **Table 2**. We randomly marked 6,500 comments, of which 5,000 were used as training sample set (2,500 positive and 2,500 negative emotions) to construct the model, and 1,500 were used as the test set to verify the accuracy of the model. Some of the annotated comments are shown in **Table 3**.

SnowNLP Sentiment Analysis

SnowNLP is a class library developed by Python, which is mainly used to process Chinese text content. Its main functions include word segmentation, part-of-speech tagging, sentiment analysis,

TABLE 3 | Artificial sentiment annotation comments.

Date	Content	Label
2019/12/31	不传谣不信谣，希望平安无事	1
	(Do not spread rumors, do not believe the rumors, hope it is safe.)	
2020/3/12	苦尽甘来，坚持就是胜利	1
	(Perseverance is victory.)	
2020/2/20	新增数字在减少，希望很快可以看到	1
	(New confirmed cases are decreasing.)	
2020/2/9	今天的数字很感动，辛苦了一线的白衣天使	1
	(Today's numbers are very moving. Thanks for the angels in white!)	
	武汉根本不止那么点，政府压着不上报很多医院都满了，传染的人满	
2020/1/25	大街跑	−1
	(Wuhan is more than that. The government has suppressed the report, many hospitals are full and infected people are all over the street)	
2020/2/4	看着数据想到马上就要上班了，好难受	−1
	(Looking at the data and thinking about going to work soon, so terrible)	
2020/2/2	涨了两千呢，越看越揪心。	−1
	(It's up 2,000 cases. I'm really worried)	
2020/3/29	不是，这有完没完了	−1
	(There's no end to it.)	
…..…	…..…	…..…

TABLE 4 | Fitting results.

	Precision	Recall	F1-score	Support
−1	0.89	0.92	0.90	922
1	0.86	0.82	0.84	578
Accuracy		0.88		1,500
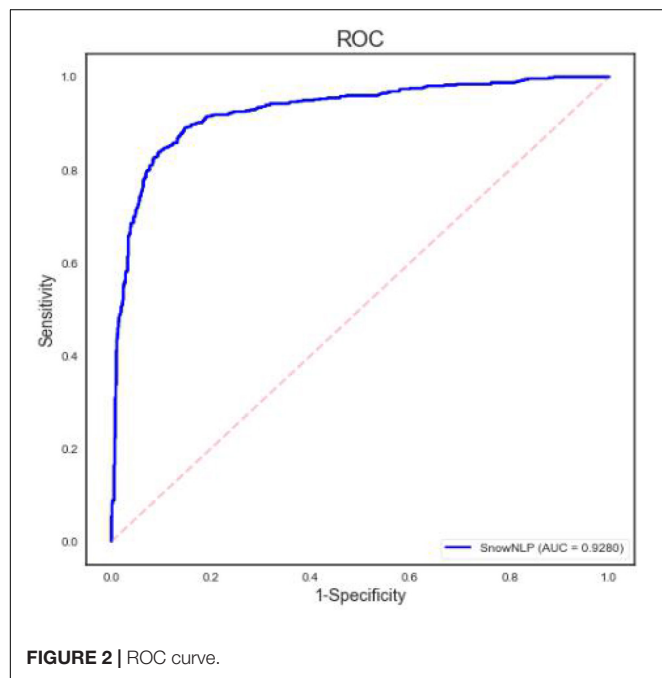
FIGURE 2 | ROC curve.

keyword extraction, etc. This paper mainly uses the sentiment analysis function to construct a sentiment classification model based on the marked 6,500 comments to complete the marking of the remaining comments. The typical steps of this kind of labeling task include word segmentation processing for comments, then removing stop words, and finally using a polynomial Bayes classifier to classify emotions. The specific steps are as follows.

Step 1: Word Segmentation

Chinese word segmentation technology refers to dividing a sequence of Chinese characters into individual words according to their semantics. Existing word segmentation algorithms can be divided into three categories: based on string matching, based on understanding and based on statistics. The word segmentation of the SnowNLP library is implemented through the Character-Based Generative Model (Wang et al., 2009), which is one of the statistical word segmentation methods. The model adopts the maximum joint probability to model the optimal word segmentation scheme. For a sentence c_1^n with n characters, the optimal word segmentation $WSeq = w_1^m = w_1, w_2 \cdots, w_m$ shall meet the following requirements:

$$WSeq^* = \arg \max_{WSeq} P(wseq \,|\, c_1^n)$$

Word segmentation can also be used to count the frequency of vocabulary appearing in the text and generate a visual word cloud image, so as to analyze the common concerns and psychological characteristics of Weibo users during the epidemic.

Step 2: Remove stop words

Stop words refer to the words that appear frequently in the text but have little practical significance. It mainly includes modal particles, adverbs, prepositions and conjunctions. They usually have no specific meaning of their own, and are useful only when put into a complete sentence, such as "of," "in," "and" and," "then," etc. These words not only cannot be used as the recognition feature of text classification, but also cause some interference. Therefore, it is necessary to manually define the stop word list to delete the stop words in the word vector after word segmentation.
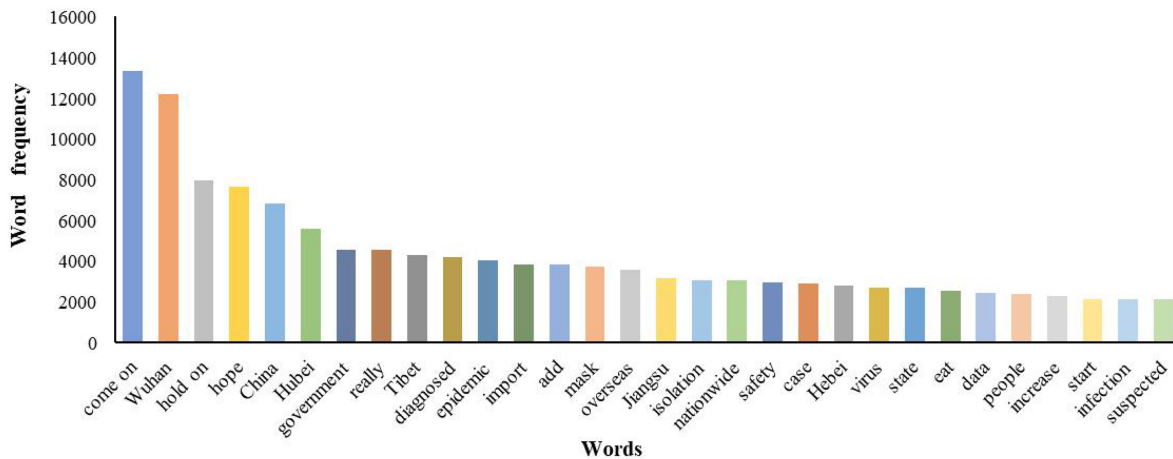
FIGURE 3 | Word frequency statistics.

Positive emotion word cloud   Negative emotion word cloud
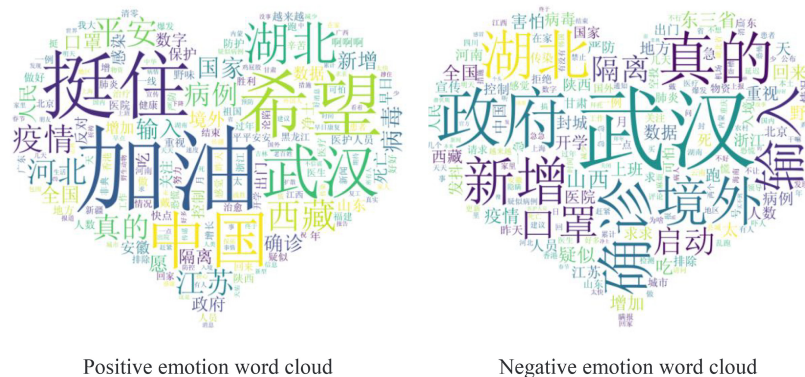
FIGURE 4 | Word cloud of positive and negative comments.

Step 3: Naive Bayes classification

The basic model of SnowNLP sentiment classification is the Naive Bayes model, which is one of the most commonly used text classification models. Word vectors can be obtained by word segmentation, and the category of the text is related to the words and frequencies appearing in the text. The text is represented by a set of feature vectors $T(t_1, t_2, \cdots, t_n)$ that can distinguish its category. For a binary classification problem with two categories c_1 and c_2, to calculate which category the eigenvector T belongs to, the conditional probability $P(c_i|T)$ of each category should be calculated:

$$P(c_i|T) = \frac{P(T|c_i) \cdot P(c_i)}{P(T)}$$

Where:

$$P(T) = P(T|c_1) \cdot P(c_1) + P(T|c_2) \cdot P(c_2)$$

SnowNLP can divide sentiment by setting a probability threshold. The text whose conditional probability calculated by a certain category exceeds a given threshold is divided into this category, and those whose probability is less than the threshold will be divided into another category.

Evaluation of the Model

To ensure that the sentiment classification model has good performance, we use the following metrics: accuracy (Acc), area under the ROC curve (AUC).

Accuracy: It can be expressed as the proportion of the correctly classified samples to the total sample, which is the most representative evaluation method. The calculation is as follows:

$$Accuracy = \frac{TP + TN}{TP + FN + TN + FP}$$

AUC: The area under a receiver operating characteristic (ROC) curve. The x-axis of the ROC curve is the false positive rate and the y-axis is the true positive rate. In a proportionally unbalanced data set, this is a more comprehensive measure than accuracy.

Evaluation of the Model

In this paper, we also use analysis of variance to test the significant differences between Weibo users after grouping. The basic idea of the analysis of variance is to divide the total variation (i.e., total variance) of the measurement data into processing (between groups) effects and error (within groups) effects according to the
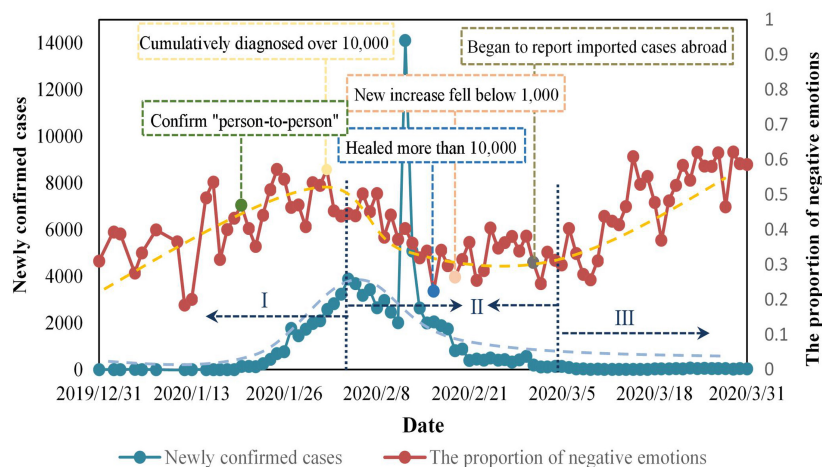
FIGURE 5 | Changes in the proportion of people's negative emotions and the number of newly confirmed cases.
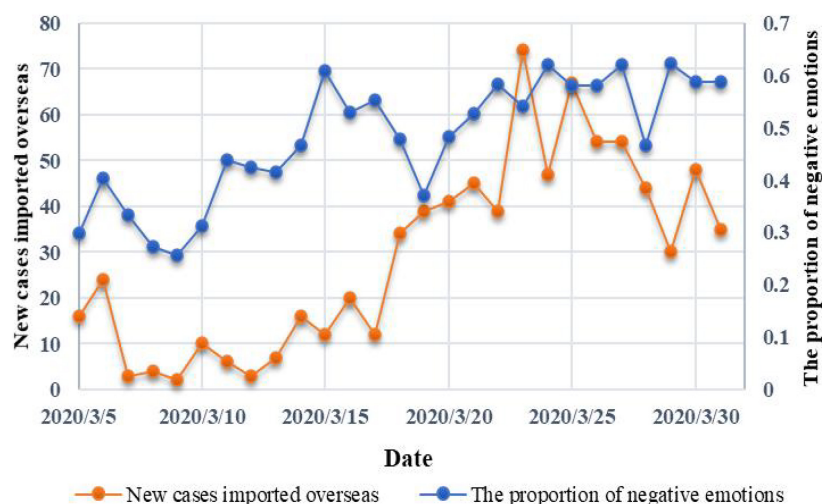
FIGURE 6 | Changes in the proportion of people's negative emotions and the number of newly imported cases abroad.

sources of variation, and then to determine the main source of differences through comparison.

The main steps of analysis of variance are:

(1) Decomposition of the total sum of squares
(2) Decomposition of total degrees of freedom
(3) F inspection.

If the F-test is significant, reject the null hypothesis that there is no significant difference.

RESULTS

SnowNLP Data Annotation Results

Based on the SnowNLP module in python and the 6,500 comments manually annotated, we have completed the annotation of the remaining samples. In the process of model

TABLE 5 | Correlation between epidemic indicators and the proportion of negative sentiments.

Stage	Newly cured	New deaths	Newly imported	Newly confirmed
Stage I	−0.13	0.02	\	0.67
Stage II	−0.09	−0.06	\	0.55
Stage III	−0.23	−0.13	0.73	−0.23

parameter debugging, we found that the model reach best fitting effect when the probability threshold of positive emotion was set to 0.7, and the fitting results of the model verified by 1,500 comments of the test set are shown in **Table 4**. It can be seen that the accuracy of the model has reached to 88%. The ROC curve in **Figure 2** also shows that the value of AUC exceeds 0.9, proving that the training model has good generalization ability and can be used to predict the remaining sample labels. After
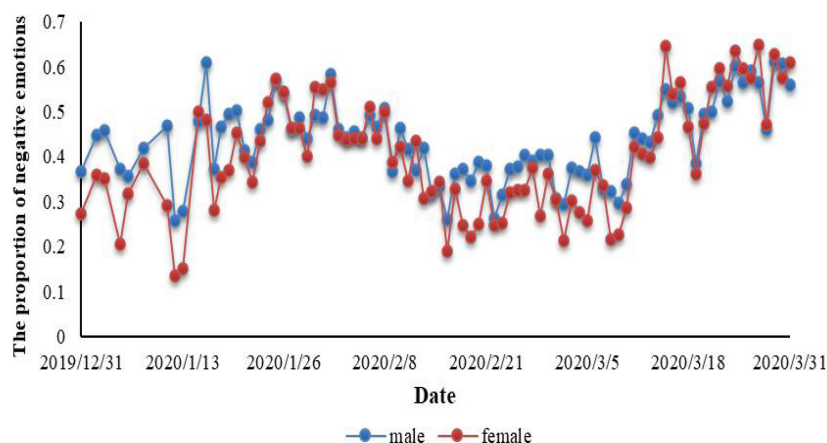
FIGURE 7 | Gender differences in the proportion of negative emotions.

SnowNLP completed the prediction, we got 105,536 comments with "positive" and "negative" tags, including 59,293 positive comments and 46,243 negative comments. Our subsequent research is based on the analysis of this data set.

Public Opinion Focus and Sentiment Expression

Figure 3 depicts the 30 words with the highest frequency in Weibo users' comments. The words "come on" and "Wuhan" appear much more frequently than other words. "Wuhan" reflects the focus and discussion center of the epidemic in China, while "come on" indicates that people generally show positive emotions of support and encouragement in the face of the epidemic. In addition, words like "hold on," "hope," "safety" also express the people's good wishes and expectations for the epidemic. The geographical terms "Wuhan," "Hubei," "Tibet," "Jiangsu," and "Hebei" express their concern about the spatial spread of the epidemic. The words "confirmed," "add," "data," and "increase" express their concern about the changes in the number of COVID-19 cases. The words "China," "government" and "state" reflect the public's concern about the government's response to the epidemic. The words "mask," "isolation," and "eat" reflect people's concern about life security in the epidemic.

Figure 4 shows the word cloud image of comment information marked as positive and negative emotions. The larger the font, the higher the word frequency. It can be seen that the words "come on," "hold" and "hope" are more prominent in the word cloud of positive emotions, while the words "Wuhan," "government" and "really" in the word cloud of negative emotions are more frequent. As Wuhan was the first city to find covid-19 cases in China, and the epidemic situation was the most severe, the negative emotions of the people were mostly related to it. The high frequency of the word "government" in negative emotions indicates that some people still doubts the government's work. "Really" is mostly used to emphasize people's negative emotions and the doubts about the epidemic data, such as "it's really scary," "it's really hard to see the rising figures" and "is the data true."

In general, according to the statistics of high-frequency words, the positive emotions of Weibo users are the majority during the epidemic, but it is undeniable that there are still some negative emotions, which mainly come from the epidemic itself and the work of the government.

Epidemic Development and Public Sentiment Change

Statistics data of the epidemic is a direct way for the public to understand the development of the epidemic. The epidemic data released by the People 's Daily includes the newly added and cumulative "confirmed cases," "cured cases," "deaths," "suspected patients," "critically ill patients," etc. Among them, the number of newly confirmed cases is one of the most concerned data indicators, which directly reflects the severity and development trend of the epidemic. According to the changes in the number of newly confirmed cases, the epidemic in China can be divided into three stages: Stage I (epidemic began—2020/02/04), the number of newly confirmed cases in this stage shows a clear upward trend, and we define it as the growing period of the epidemic; Stage II (2020/02/05—2020/03/05), the number of newly confirmed cases in this stage shows a significant downward trend. We define it as the decay period of the epidemic. Among them, the reason for the sharp increase on the day of 2020/02/12 is that the

TABLE 6 | Variance analysis of gender differences.

Group	N	Sum	Mean		Variance
Male	86	37.94	0.44		0.008
Female	86	34.90	0.41		0.016

Source of difference	SS	df	MS	F	P-value	F-crit	Effect size (η^2)
Between groups	0.05	1	0.05	4.40	0.04	3.90	0.03
Within groups	2.08	170	0.01				
Total	2.13	171					
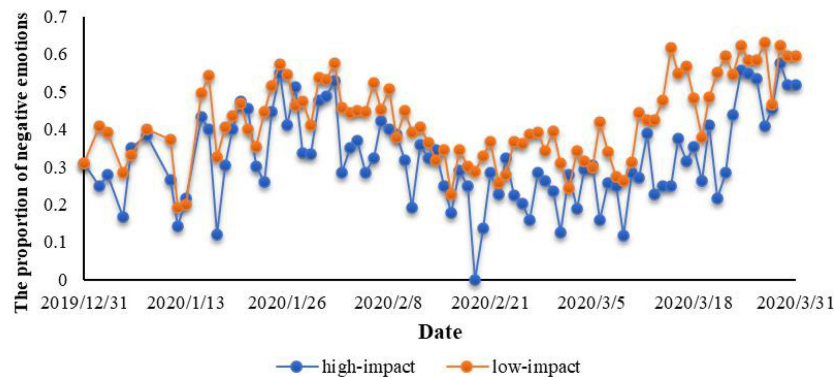
FIGURE 8 | Difference in the proportion of negative emotions between high-impact and low-impact groups.

TABLE 7 | Variance analysis of differences between high-impact and low-impact groups.

Group	N	Sum	Mean	Variance
High-impact	86	27.80	0.32	0.014
Low-impact	86	36.75	0.43	0.012

Source of difference	SS	df	MS	F	*P*-value	F-crit	Effect size (η^2)
Between groups	0.47	1	0.47	35.08	1.71E-08	3.90	0.17
Within groups	2.25	170	0.01				
Total	2.72	171					

statistical caliber has changed. The statistical agencies included the number of clinically diagnosed cases into the number of confirmed cases, and the sharp change in the value does not represent the inflection point of the epidemic; Stage III (after 2020/03/05), the characteristic of this stage is that the number of newly confirmed cases per day tends to be stable, and no more than 100 newly confirmed cases a day, the proportion of new cases imported from abroad gradually increases. We define it as the extinction period of the epidemic.

Figure 5 depicts the changes of new confirmed cases and the proportion of negative emotions of Weibo users over time. As can be seen from their trend lines, during the growth period and decay period of the epidemic, the proportion of negative emotions of Weibo users has a similar trend with the number of new confirmed cases. The number of newly confirmed cases increased during the growth period and the proportion of people's negative emotions also increased, while both decreased during the decay period. At some important epidemic nodes, the proportion of people's negative emotions will also show similar changes. For example, the proportion of people's negative emotions at the time points of "confirm person to person" and "cumulatively diagnosed over 10,000" was at the peak. Besides, the proportion was at a lower level at the time points of "new increase fell below 1,000" and "healed more than 10,000." However, in the extinction period of the epidemic, the proportion of people's negative emotions and the number of

newly confirmed cases have different patterns of change, showing an obvious upward trend. Through observation and analysis of the review information, we find that people's discussion points at this stage have changed from newly confirmed cases to imported cases abroad. Moreover, the increase in the proportion of negative emotions was roughly consistent with the time when People's Daily began to publish statistics on imported cases from abroad. Therefore, we speculate that the change in people's emotions at this stage may be related to the number of new cases imported overseas. **Figure 6** depicts the trend of them over time, and we can see that there is a high similarity between people's emotions and the number of new cases imported overseas. We calculated the correlation between some statistical indicators of the epidemic and the proportion of negative sentiments in these three stages, and the results are shown in **Table 5**, which further validates our above conjecture.

In summary, we conclude that changes in the epidemic situation will indeed affect the emotions of Weibo users. The proportion of negative emotions of Weibo users showed a similar trend with the number of newly confirmed cases in the growth and decay period of the epidemic, and the same trend with the number of newly imported cases in the extinction period. And a better control of the epidemic would help the public to convey positive emotions.

Gender Difference

In addition, we have drawn some interesting conclusions. **Figure 7** depicts the change in the proportion of male and female negative emotions over time during the epidemic. It can be seen that in the three stages of the epidemic, the proportion of negative emotions in men was generally higher than that in women. We conducted variance analysis on them, results are shown in **Table 6**. The *P*-value of significance test was 0.03748 < 0.05, effect size (η^2) = 0.03 > 0.01, indicating that there is a strong significant difference between them, but the difference amplitude is small.

High Influence Groups and Low Influence Groups

Another interesting conclusion is that high-influence people show more positive emotions than low-influence people. We

divide the users with $\geq$ 10,000 fans in the data set into a high-impact group. On the contrary, users with less than 10,000 fans are classified as low-impact groups. The reason for this segmentation is that we found that the number of fans = 10,000 is a mutation point through the data distribution, which has the most obvious difference after grouping. **Figure 8** depicts the change in their negative emotional proportion over time. It can be seen that the proportion of negative emotions of people with low influence is significantly higher than that of people with high influence. In the same way, ANOVA was conducted on them, the results are shown in **Table 7**. The test statistic P = 1.71E-08 < 0.01, effect size (η^2) = 0.17 > 0.14, indicating that the difference between them has strong significance and magnitude.

DISCUSSION

COVID-19 is the most serious public health incident in recent years. Standardizing and guiding public emotions and ensuring people's epidemic prevention and control is a core task. During the epidemic in China, social media such as WeChat and Sina Weibo played a vital role in disseminating government information and public activities (Xu W. et al., 2020). This paper analyzes the comments on Weibo to explore the emotional changes of the Chinese people during the epidemic.

First of all, from the perspective of word frequency statistics, government work is the topic of most concern to the public. The fear of illness, the "blocked" situation, the high degree of uncertainty about the future, and the sense of financial insecurity exacerbate the stress, anxiety, and depression experienced by people (Király et al., 2020). In addition, the research results of Dong et al. (2020) prove that public sentiment is related to rumors spread on the Internet. Therefore, the government should reassure the people in a timely manner and maintain the security of online public opinion.

Second, our research found that there is a strong correlation between changes in the epidemic and changes in people's emotions. Chen et al. also constructed the relationship model between the dominant public opinion and entity behavior in each stage of epidemic situation by using the frequency and probability of keywords in the emotion category (Chen et al., 2020). These findings may help to predict the emotional swings people are likely to experience in advance, and to develop effective coping strategies. In addition, according to the emotional characteristics of different groups, the government can better transmit positive energy. For example, use the positive attitude and social attention of high-influence groups to guide people to relieve anxiety and psychological pressure.

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Our research also has some limitations. First of all, this paper only divides emotions into positive and negative categories without further subdivision, and cannot identify the specific emotions expressed by user comments, such as happiness, sadness, anxiety, fear, etc. Secondly, we just found the potential regularity between the trend of epidemic change and emotional change, and did not conduct in-depth quantitative research on how the development of the epidemic affects people's emotions. Finally, the changes of public opinion reflected by a single social network platform may lack some representativeness. In the future, we plan to conduct more in-depth research to explore the more specific and close internal relationship between the epidemic and emotional changes.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author/s.

ETHICS STATEMENT

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. Written informed consent for participation was not required for this study in accordance with the national legislation and the institutional requirements.

AUTHOR CONTRIBUTIONS

WP and S-jL contributed to study design. W-qD, GH, R-jW, W-lP, and CH collected and analyzed the data. W-qD interpreted results. WP, W-qD, GH, and S-jL wrote the manuscript. All authors revision of the manuscript and the final approval of the version to be published.

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How Does House Demolition Affect Family Conspicuous Consumption?

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Family conspicuous consumption behavior is affected by many factors. Existing pieces of literature seldom focus on the impact of house demolition on family conspicuous consumption and its underlying mechanism. Based on the mental accounting theory and conservation of resources theory, this study uses the micro-data of the 2011 China Household Finance Survey to empirically examine the relationship between house demolition and family conspicuous consumption. Robustness results suggest that house demolition positively affects household conspicuous consumption, which is not only reflected in the overall consumption level but also in the level of average consumption. Further analysis finds that household wealth and materialism value have a significant positive moderating effect on the relationship of the main effect. In addition, in order to clarify the relationship between conspicuous consumption and luxury consumption, this study finds that conspicuous consumption and luxury consumption are not completely equivalent through in-depth theoretical analysis and exploratory investigation. There are similarities in both consumption motivation and pattern, but with differences on consumer subject and object. The contribution of this research is to enrich the theory of decision-making in consumer behavior, which also has certain significance in deepening the understanding of the relationship between conspicuous consumption and luxury consumption.

Keywords: house demolition, family conspicuous consumption, household wealth, materialism value, luxury consumption

INTRODUCTION

According to official data, the total consumption of goods market in China reached 10.7 billion dollars in 2011, which accounts for a quarter of the global share, and China has become the second largest luxury consumption country in the world. By 2020, the sales of luxury goods in China still soared by 48%, reaching 53.5 billion dollars; the share of luxury consumption of China in the global market has almost doubled, and more than half of the growth of the global luxury market since 2020 has come from China (almost 65%). Therefore, China has always been a main force in the international luxury market. Veblen (1899) proposed the concept of conspicuous consumption and defined conspicuous consumption as showing off the wealth and status of oneself to others by purchasing and displaying expensive and luxurious products (Sundie et al., 2011). Therefore, behind the massive luxury consumption of Chinese consumers, it also shows the widespread phenomenon of conspicuous consumption in China.

Most of the existing pieces of literature on conspicuous consumption discuss the influence of individual motivations on conspicuous consumption, such as seeking symbolic social status and wealth signal, highlighting the identity they pursue, attracting romantic partners, and obtaining the threshold to enter the high social status circle (Sundie et al., 2011; Bellezza et al., 2017; Cannon and Rucker, 2019). However, few studies have explored the impact of external events that happen to individual consumers on the conspicuous consumption motivation of people. Our study introduces the concept of house demolition to explore the impact of house demolition on family conspicuous consumption.

Since the reform and opening up, with the development of the economy and society in China, the number and scale of house demolition have become larger. House demolition refers to the needs for national construction, urban renovation, city appearance rectification, and environmental protection; the construction unit or an individual demolishes the houses on the existing construction land, relocation, and resettlement of house owners or users, and gives relatively large amounts of economic compensation as appropriate[1] (Wong, 2015; Cai et al., 2018; Li et al., 2019). Compared with the regular income of people, the demolition compensation is more likely to be regarded as irregular and unexpected income (Li and Xiao, 2020). Mental account theory is a theoretical framework used to explain how people evaluate and track their income through classification or labeling (mental account), and then produce different consumption tendencies according to the accounting system (Thaler, 1980, 1985; Hossain, 2018). This theory suggests that when people classify money as unexpected and windfall income in mind, they will be more inclined to use this income for hedonic consumption and spend more (Arkes et al., 1994; Hossain, 2018). Therefore, we infer that when the demolition households receive the compensation, they will have a greater willingness to choose conspicuous consumption.

One of the main purposes of conspicuous consumption is to show the status through the consumption of specific products. Early studies focus on luxury goods, high-priced products, such as luxury cars, jewelry, and other products as status signals (Veblen, 1899; Wang and Griskevicius, 2014; Ward and Dahl, 2014). In recent years, scholars have increasingly discussed some new signals that can show their identity, such as lack of leisure time, buying cool and unusual products (Warren and Campbell, 2014; Bellezza et al., 2017; Bellezza and Berger, 2020). Bellezza et al. (2017) find that a busy and high workload lifestyle is also a way for a person to show off his or her status because it represents the capable, ambitious, and indispensable status of a person. So, whether a person is really busy or not, choosing time-saving services (such as Peapod, an online grocery delivery service) and products (such as Bluetooth headsets)

can also be used as signals that highlight identity. Therefore, when people choose conspicuous consumption, it may not be necessary to purchase luxury goods. This extends another important issue that is trying to inquire in this study, that is, whether conspicuous consumption and luxury consumption are equivalent. Combined with the above analysis, we suggest that, most of the existing studies regard conspicuous consumption and luxury consumption as concepts with the same connotation and do not distinguish them (Wang and Griskevicius, 2014; Garcia et al., 2019; Martinez Alfaro, 2020). However, there are still differences between conspicuous consumption and luxury consumption. For example, although the two consumption patterns are to seek the symbolic signal of status, the specific consumption choices can be different.

In summary, aiming at several research gaps in conspicuous consumption, we carry out two studies. Study 1 is a large sample empirical analysis based on the survey data China Household Finance Survey, which mainly discusses two problems: first, the impact of house demolition on conspicuous consumption; second, it further studies the boundary effect of house demolition on conspicuous consumption, that is, to explore whether the level of household wealth and materialism value moderates the main effect. What is more, we construct the robustness test with four different methods to ensure the robustness of the research results. Study 2 is an exploratory study based on the theoretical deduction of the connotation of conspicuous consumption and luxury consumption; we analyze the similarities and differences between them by using an exploratory questionnaire survey to clarify the relationship. A series of new research findings on conspicuous consumption in our study provides positive theoretical and practical enlightenment for consumers, enterprises, and the government.

STUDY 1: THE EFFECT OF HOUSE DEMOLITION ON FAMILY CONSPICUOUS CONSUMPTION

Theoretical Analysis and Research Hypothesis

House Demolition and Family Conspicuous Consumption

Veblen (1899) proposes the concept of conspicuous consumption, which describes that people achieve the purpose of highlighting their social status by obtaining and displaying expensive and luxury products. Through conspicuous consumption, people will feel their power and social self-identification improvement (Cannon and Rucker, 2019). Therefore, attracting the attention of others and showing their identity, power, and image to others are the main motivations for people to choose conspicuous consumption (Belk, 1988; Rucker and Galinsky, 2008; Lee and Shrum, 2012). In addition, relevant studies also find that luxury consumption of people may also meet many motivations, such as attracting the partner(s), entering a high-level social circle, reflecting the comparative advantage with competitors

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[1]The 27th of the regulations on "Expropriation and Compensation Ordinance of House on State-Owned Land" clearly stipulates that no unit or individual may resort to violence, threats, or illegal methods, such as interrupting water supply, heating, gas, power supply, and road traffic to force the expropriated person to relocate. Thus, house demolition in the administrative region of China is a voluntary behavior of each citizen, and is not compulsory. In the China context, house demolition is an exogenous variable.

(Griskevicius et al., 2007; Rivera, 2010; Sundie et al., 2011; Wang and Griskevicius, 2014; Bellezza et al., 2017). According to the above research, people choose conspicuous consumption mostly for hedonic motivation. Therefore, we believe that conspicuous consumption can well meet the hedonic needs of people.

According to mental account theory, people will use a series of cognitive labels or mental accounts to track and evaluate income and resources, and these accounts further influence their consumption attitudes and behaviors (Kahneman and Tversky, 1984; Thaler, 1985; Vana et al., 2018). Consumers usually classify their money according to the scenario of income they received and choose a matching consumption mode according to the source of wealth (Levav and McGraw, 2009; Reinholtz et al., 2015). Among many classification labels, a group of classification labels that is often explored in previous studies divides income into regular income and windfall income according to the source of income. Regular income is the part of the income from individual labor, which is "hard-won" and is actually expected income. In contrast, windfall income is individual non-labor income, which is closer to "getting without work" and is really unexpected (Kivetz, 1999). There are significant differences in calculation rules between two different mental accounts (Thaler, 1985). The calculation rule of regular income is "utilitarian processing," which focuses more on "utility" in the calculation process and pursues the maximization of rational cognitive utility. However, the calculation rule of windfall income is "hedonistic processing," which pays more attention to "emotion" in the calculation process and pursues the maximization of emotional satisfaction (Li et al., 2007). According to the consumers' classification of income from the source, consumers tend to use regular income (such as wage income) to buy daily necessities and use windfall income (such as lottery income) for hedonic consumption and spend more on this part of the income (Hossain, 2018).

For consumers, obtaining relatively large economic compensation due to house demolition is a kind of irregular and unexpected income (Li and Xiao, 2020). As a result, consumers tend to classify this income as windfall income and have a higher willingness to spend more windfall income, which, in turn, drives them to pursue hedonic consumption such as conspicuous consumption. Thus, we infer that, compared with non-demolished households, demolished households may be more prone to conspicuous consumption due to windfall income of demolition compensation, that is, house demolitions have a positive effect on conspicuous consumption. In addition, we believe that the stimulation of house demolition on the level of conspicuous consumption is not only reflected in the overall consumption level but also in the average consumption level. So, here are the following two hypotheses:

H1: House demolition significantly improves the overall level of family conspicuous consumption;
H2: House demolition significantly increases the average level of family conspicuous consumption.

House Demolition Household Wealth and Family Conspicuous Consumption

As discussed above, a mental account of people for the division of money will affect their consumption attitude toward the money. There is no doubt that families with different economic conditions will naturally affect how people classify and label money. Therefore, we suggest that household wealth will play a moderator role in the relationship between house demolition and family conspicuous consumption. Based on the resource conservation theory, which suggests that the behavior of people is a function of resources, they will try to reserve, protect, and obtain resources that are valuable, and also prevent potential and actual loss of resources by investing resources (Hobfoll, 1989, 2011; Xu et al., 2021). Valuable resources include money resources, physical resources, motivation resources, social resources, et al. (Wang et al., 2011; Gao et al., 2013; Zhu et al., 2017). According to the differences in the perceived importance of resources, people will try their best to reduce the loss of resources in the threat situation and invest abundant resources to further obtain additional resources (Hobfoll, 2011; Ye et al., 2019).

Therefore, we expect that demolished households with a high-wealth level will have a stronger incentive to spend the extra income on conspicuous consumption than demolished households with a low-wealth level. Relatively large economic compensation due to house demolition will be an important wealth resource for households. For households with a high-wealth level, the importance of this windfall income is much low than that of households with a low-wealth level. Therefore, households with a low-wealth level will pay more attention to economic compensation due to house demolition, since it is an important resource and can more effectively improve the overall quality of life from many aspects. According to the resource conservation theory, when people have more abundant resources, they are less susceptible to the loss of this part of resources and more likely to invest this part of resources to obtain additional resources (Hobfoll, 2011; David et al., 2021). Therefore, households with a low-wealth level will regard economic compensation due to house demolition as valuable resources to a higher extent they will spend relatively less money to avoid psychological pressure and loss caused by resource loss. For those with a high-wealth level, they have relatively rich wealth resources, so they will have a stronger willingness to invest this part of resources, such as conspicuous consumption. In addition, due to the relatively high-wealth level, it has little impact on them to use this part of economic compensation from house demolition for consumption, and the corresponding sense of loss is weak. Based on the above analysis, we make the following inferior: the household wealth level will moderate the impact of house demolition on family conspicuous consumption. Specifically, for a household with a high-wealth level, house demolition has a stronger positive impact on conspicuous consumption; conversely, the above effect is weaker for households with a low-wealth level. Therefore, we propose Hypothesis 3 and Hypothesis 4:

H3: The level of household wealth moderates the main effect between house demolition and the overall level of family conspicuous consumption. In specific, a high level of household wealth (vs. a low level of household wealth) significantly increases the overall level of conspicuous consumption of the demolished household; a low level of household wealth (vs. a high level of household wealth) significantly decreases the overall level of conspicuous consumption of non-demolished households.

H4: The level of household wealth moderates the main effect between house demolition and the average level of family conspicuous consumption. In specific, a high level of household wealth (vs. a low level of household wealth) significantly increases the average level of conspicuous consumption of the demolished household; a low level of household wealth (vs. a high level of household wealth) significantly decreases the average level of conspicuous consumption of non-demolished households.

House Demolition, Materialism Value, and Family Conspicuous Consumption

In addition to the level of household wealth, we believe that individual materialism value is also an important moderator variable affecting the relationship between house demolition and family conspicuous consumption. Fournier and Richins (1991) define materialism value as a value orientation, which highly emphasizes the realization of important goals in life through acquisition or possession. Richins and Dawson (1992) further summarize three dimensions of materialism value, possession and acquisition are the core concerns of life, obtaining more quantity and more types of things will increase happiness, and possession is the definition of success. Although different scholars have differences in the specific definition of materialism value (Csikszentmihalyi and Halton, 1981; Belk, 1985; Kasser and Ryan, 1996; Yoo et al., 2021), it has gradually derived that scholars explore materialism value from the perspective of individualism and culture (Belk, 2015). In recent years, scholars have even discussed the perception of materialism value in the consumption of virtual products, such as digital products (Atanasova and Eckhardt, 2021). However, scholars generally believe that materialism value is a kind of consumption logic in which people show their identity, establish images, pursue happiness, and obtain self-value by possessing objects and acquiring experiences (Belk, 2015; Huang et al., 2018; Atanasova and Eckhardt, 2021).

In view of the connotation of materialism value, we believe that materialism value will further enhance the willingness of demolition households to use economic compensation from demolition for conspicuous consumption. On the one hand, consumers with materialism tendencies will regard possession and acquisition as the means to obtain happiness and the standard of happiness in life and will have a stronger willingness to increase the quantity and types of goods (Richins, 2017). Conspicuous consumption is an effective way for people through consumption to show status and increase their sense of happiness and worth. Therefore, conspicuous consumption is an ideal choice for consumers with materialism value, and these consumers will have a stronger willingness to use economic

compensation for conspicuous consumption to improve their happiness. On the other hand, people with materialistic values are more likely to make impulsive purchases, preferring to sacrifice long-term benefits for immediate pleasure (Yoon and Hyeongmin, 2016; Huang et al., 2018). Therefore, compared with consumers with non-materialistic values, when consumers with materialistic value receive economic compensation from house demolition, they will have a stronger willingness to use the money to increase consumption for happiness, which also promotes their choice of conspicuous consumption. To sum up, we infer that materialism value will moderate the effect of house demolition on family conspicuous consumption. Specifically, for demolition households with materialism value, house demolition has a stronger positive impact on family conspicuous consumption; conversely, the above effect was weaker for demolition households with non-materialism value. Based on this judgment, we propose Hypotheses 5 and 6:

H5: Materialism value significantly moderates the main effect between house demolition and the overall level of family conspicuous consumption. In specific, materialism value (vs. non-materialism value) significantly increases the overall level of conspicuous consumption of demolished households; non-materialism value (vs. materialism value) significantly decreases the overall level of conspicuous consumption of non-demolished households.

H6: Materialism value significantly moderates the main effect between house demolition and the average level of family conspicuous consumption. In specific, materialism value (vs. non-materialism value) significantly increases the average level of conspicuous consumption of demolished households; non-materialism value (vs. materialism value) significantly decreases the average level of conspicuous consumption of non-demolished households.

Research Design

Data

We used the China Household Finance Survey (CHFS) data in 2011. CHFS (2011) is a survey organized by the Survey and Research Center for China Household Finance of Southwestern University of Finance and Economics. It interviews respondents by random sampling, covers respondents in 25 provinces (autonomous regions and municipalities), 80 counties, and 320 communities. We extracted information about family conspicuous consumption, household characteristics, and the area where the household is located from the survey. Finally, we obtained more than 6,000 samples.

Variable Definition

There is still not a consensus about the definition of conspicuous consumption of the explained variable in academics. However, these different opinions can be roughly divided into two categories. The first type of viewpoint is represented by Veblen, who believes that conspicuous consumption is the exclusive consumption mode of the "leisure class" (Veblen, 1899). However, with the rapid development of society and the deepening of academics, more and more scholars have gradually adopted the view that "conspicuous consumption is a

universal mode of consumption" (Zhu, 2001; Charles et al., 2009). Taking China as the research background, we support the second view that conspicuous consumption is applicable to consumers of all classes combined with the phenomenon of conspicuous consumption in daily life. Similarly, our study supports the following point of view: the scope of conspicuous consumption is not limited to luxury goods or expensive goods, and consumers can spend money on both high-price and low-price goods to achieve conspicuous purposes (Bagwell and Bernheim, 1996). Since conspicuous consumption must be a kind of visible consumption (Charles et al., 2009), conspicuous consumption of people can rely on visible ordinary clothes, shoes, and other non-expensive commodities in life (Frank, 1985). In view of the above, referring to the existing literature (Charles et al., 2009; Meng et al., 2010), we used the total consumption of the family buying clothes to measure the family conspicuous consumption. The specific definition methods and corresponding data processing methods are as follows:

Dependent Variables

The *overall level of family conspicuous consumption* and the *average level of family conspicuous consumption* are two dependent variables set in this study. First, we used the total household consumption of clothes purchased in the CHFS (2011) questionnaire survey (unit: 1,000 RMB) to measure the overall level of family conspicuous consumption. Among them, the total family consumption for buying clothes mainly includes "consumer expenditures for buying clothes for themselves," "consumer expenditures for buying clothes for spouses," and "consumer expenditures for buying clothes for children." Then, we used the ratio of the total consumption of clothes purchased by the family to the number of family members to measure the average level of family conspicuous consumption.

Core Independent Variable

The core independent variable select in our study is *house demolition*. Referring to the existing literature (Chai, 2014; Yuan and Huang, 2018), we defined the families who have experienced house demolition in the CHFS (2011) questionnaire as the demolished households and assigned them the value of 1. On the contrary, families who have not experienced house demolition are defined as non-demolished households and assigned the value of 0.

Moderator Variables

The level of *household wealth* and the *materialism value* are the two moderator variables in our study. We adopted the most commonly used method in current academic research to define the household wealth, that is using the average value of the whole household's wealth as the criterion. If the household wealth is higher than the average, it is regarded as a household with high-level wealth and assigned the value 1; if the family wealth value is lower than the average, it is regarded as a household with low-level wealth and assigned the value of 0. Among them, household wealth mainly includes two parts: financial assets and non-financial assets.

Materialism Value. We use the items in CHFS (2011) questionnaire, "When your family assets rise, will you spend more money?" 1 means high willing, willing, and general; 0 means unwilling and quite unwilling. Thus, 1 is also defined as a household (family) with materialism value; in contrast, 0 is defined as a household (family) with non-materialism value.

Control Variables

Besides variables discussed above and in prior literature, we mainly set the following control variables: (1) Household income. Household income mainly includes wage income, transfer income, and other income. We added 1 to the household income and then took the natural logarithm; (2) the number of houses. The number of houses mainly refers to the specific number of houses with property rights. If the family does not own a house with property rights, then it is assigned the value of 0; (3) gender of the head of household. If the head of the household is male, then we assigned the value of 1. If the head of the household is female, then we assigned the value of 0; (4) age of the head of a household. The age of the head of the household mainly refers to the actual age of the head of the household; (5) the education level of the head of the household. The education level of the head of the household mainly refers to the education years received by him or her. Among them, 0 stands for never going to school, 6 stands for elementary school, 9 stands for junior high school, 12 stands for high school, 13 stands for technical secondary school or vocational high school, 15 stands for college or higher vocational school, 16 stands for university undergraduate, 19 stands for master degree, and 22 stands for doctoral degree; (6) marital status. Marital status mainly refers to the marital status of the head of the household. If the marriage status is "married," "divorced," or "widowed," it is defined as "married" and assigned a value of 1. If the marriage status is "unmarried" or "cohabiting together," it is defined as "unmarried" and assigned a value of 0; (7) health situation: We used the item in CHFS (2011) questionnaire to measure a health situation; the item is "Compared with your peers, how is your physical condition?"; 1 means very poor, 2 means poor, 3 means general, 4 means good, and 5 means very good; (8) Social insurance: In Lin et al.'s (2017) study, if a family has at least any one of social pension insurances, retirement wages, corporate annuities, social medical insurances, unemployment insurances, or housing provident funds, it is regarded as a family with social insurance and is assigned the value of 1; otherwise, it will be regarded as a family that does not have social insurance and assigned the value of 0.

Model Setting

In order to investigate the relationship between house demolition and the overall level of family conspicuous consumption, we constructed the following model on the basis of controlling the household characteristics and the family characteristics:

$$Con\_all_i = \beta_0 + \beta_1 Dem_i + \Gamma X_i + \varepsilon \qquad (1)$$

where Con_all_i indicates the overall level of family conspicuous consumption, which is a continuous variable; the core

independent variable Dem_i is a dummy variable for house demolition; and X_i captures the control variables; β_0 and β_1 are the regression coefficients, Γ is the corresponding regression coefficient matrix; i indicates each household; in addition, ε represents the error term.

In order to investigate the relationship between house demolition and the average level of family conspicuous consumption, we constructed the following model (2) based on controlling the household characteristics and the family characteristics:

$$Con\_average_i = \beta_0 + \beta_1 Dem_i + \Gamma X_i + \varepsilon \qquad (2)$$

Among them, $Con\_average_i$ is the average level of family conspicuous consumption, which is also a continuous variable; Dem_i and X_i are set as the model (1).

In order to analyze whether the household wealth and materialism value significantly moderate the main effect between house demolition and family conspicuous consumption, we included the interaction between house demolition and household wealth, and the interaction between house demolition and materialism value in the model (3) and model (4) to avoid the problem of multicollinearity; we centralized the three variables: house demolition, household wealth, and materialism value.

$$Con\_all_i = \beta_0 + \beta_1 Dem\_z_i + \beta_2 Wea\_z_i + \beta_3 Dem\_z_i \times$$
$$Wea\_z_i + \beta_4 Mat\_z_i + \beta_5 Dem\_z_i \times Mat\_z_i + + \Gamma X_i + \varepsilon$$
$$(3)$$

$$Con\_average_i = \beta_0 + \beta_1 Dem\_z_i + \beta_2 Wea\_z_i + \beta_3 Dem\_z_i \times$$
$$Wea\_z_i + \beta_4 Mat\_z_i + \beta_5 Dem\_z_i \times Mat\_z_i + + \Gamma X_i + \varepsilon$$
$$(4)$$

Dem_z_i indicates the house demolition after centralized processing, Wea_z_i indicates the household wealth after centralized processing, and Mat_z_i indicates the materialism value after centralized processing. The setting of other variables is the same as the model (1).

Descriptive Statistics and Correlation Analysis

Table 1 shows the results of the descriptive statistics of the main variables. The results show that the average of the overall family conspicuous consumption level is 3.079, the average of the family conspicuous consumption level is 0.868, and the average of house demolition is 0.111. The mean of the interaction between house demolition and materialism value is −0.004, and the mean of the interaction between house demolition and household wealth is −0.002. From the results of the correlation analysis in **Table 1**, house demolition is significantly positively correlated with the overall level of family conspicuous consumption ($p < 0.05$) and the average level of family conspicuous consumption ($p < 0.05$); the interaction between house demolition and materialism value is significantly positively correlated with the overall level of family conspicuous consumption ($p < 0.01$), and the average level of family conspicuous consumption ($p < 0.01$); the interaction between house demolition and a household wealth level is

significantly positively correlated with the overall level of family conspicuous consumption ($p < 0.1$), and the average family conspicuous consumption ($p < 0.05$). Further tests will analyze the relationship between the above variables in depth.

Empirical Results
The Main Effects
Table 2 shows the regression results between house demolition and family conspicuous consumption. Model 1 and Model 5 are basic models both including core independent variables, moderator variables, and control variables at the overall level and the average level, respectively. Model 2 and Model 3 examine the moderating effect of household wealth and materialism value on the main effect between house demolition and family conspicuous consumption at the overall level. Model 6 and Model 7 test the moderating effect of household wealth and materialism value on the main effect between house demolition and household conspicuous consumption at the average level. Model 4 and Model 8 are the full models with all variables at the overall level and the average level, each model has significant explanatory power.

The result of Model 1 shows that there is a significant positive correlation between house demolition and the overall level of family conspicuous consumption (beta = 0.977, $p < 0.01$). The result is still robust in subsequent Model 2, Model 3, and Model 4. Therefore, H1 is supported, that is, house demolition significantly increases the overall level of family conspicuous consumption. The result of Model 5 shows that there is a significant positive correlation between house demolition and the average level of family conspicuous consumption (beta = 0.316, $p < 0.01$). This result is still robust in subsequent Model 6, Model 7, and Model 8. So, H2 is also supported, that is, house demolition significantly increases the average level of family conspicuous consumption.

The Moderating Effects
The result of Model 2 shows that the interaction between house demolition and household wealth is significantly positively correlated with the family's overall conspicuous consumption (beta = 1.457, $p < 0.05$). This result is still robust in the full Model 4. Therefore, H3 is supported, that is, the level of household wealth plays a significant positive role in moderating the relationship between house demolition and the overall level of family conspicuous consumption. The result of Model 3 shows that the interaction between house demolition and materialism value is significantly positively correlated with the overall level of family conspicuous consumption (beta = 3.533, $p < 0.01$). This result is still robust in the full Model 4. Therefore, Hypothesis 5 is supported, that is, materialism value plays a significant positive role in moderating the relationship between house demolition and the overall level of family conspicuous consumption. The result of Model 6 shows that the interaction between house demolition and household wealth is significantly positively correlated with the average family conspicuous consumption (beta = 0.503, $p < 0.05$). This result is still robust in the full Model 8. Therefore, H4 is supported, that is, the level of household wealth has a significant positive effect on the relationship between house demolition and the average level of family

TABLE 1 | Descriptive statistics and correlation analysis.

Variable	Number	1	2	3	4	5	6	7	8
The overall level of family conspicuous consumption	1	1							
Average level of family conspicuous consumption	2	0.985***	1						
House demolition	3	0.034**	0.040**	1					
Interaction 1	4	0.049***	0.054***	−0.073***	1				
Interaction 2	5	0.031*	0.036**	−0.031**	0.110***	1			
Materialism value	6	0.089***	0.082***	−0.031**	0.034***	0.001	1		
Household wealth	7	0.229***	0.208***	−0.013	0.001	−0.003	0.114***	1	
Male	8	−0.067***	−0.074***	−0.023*	0.002	0.015	0.021*	0.094***	1
Age	9	−0.154***	−0.158***	0.066***	−0.003	−0.009	−0.197***	−0.157***	0.090***
Education level	10	0.266***	0.270***	0.025*	−0.015	−0.005	0.164***	0.258***	−0.001
Married	11	0.015	0.014	−0.003	0.006	−0.017	−0.040***	−0.029**	−0.014
Number of family members	12	−0.137***	−0.207***	−0.047***	0.010	0.013	0.051***	0.098***	0.132***
Number of houses	13	0.123***	0.108***	0.017	0.008	0.038***	0.041***	0.207***	0.070***
Household income	14	0.297***	0.298***	−0.028**	−0.004	−0.018	0.132***	0.213***	0.042***
Health situation	15	0.080***	0.074***	−0.018	−0.023*	−0.028**	0.090***	0.174***	0.070***
Social insurance	16	0.021	0.017	0.051***	0.012	−0.008	−0.005	0.040***	0.020
Mean		3.079	0.868	0.111	−0.004	−0.002	0.751	0.434	0.666
Standard deviation		5.839	1.854	0.314	0.142	0.155	0.432	0.496	0.472
Observation		3,331	3,331	6,132	6,132	6,132	6,134	6,134	6,133

Variable	Number	9	10	11	12	13	14	15	16
Age	9	1							
Education level	10	−0.412***	1						
Married	11	0.311***	−0.167***	1					
Number of family members	12	−0.094***	−0.096***	0.189***	1				
Number of houses	13	−0.001	0.060***	0.086***	0.156***	1			
Household income	14	−0.366***	0.411***	−0.134***	−0.092***	0.066***	1		
Health situation	15	−0.229***	0.177***	−0.087***	−0.015***	0.037***	0.173***	1	
Social insurance	16	0.142***	0.028**	0.127***	0.026*	0.065***	0.011	−0.051***	1
Mean		50.146	9.424	0.947	3.340	1.063	0.513	3.411	0.940
Standard deviation		14.487	4.328	0.224	1.558	0.576	0.696	0.945	0.238
Observation		6,133	6,072	6,064	6,133	6,134	6,133	5,152	5,117

Interaction 1 refers to the centralized interaction between house demolition and materialism value, and Interaction 2 refers to the centralized interaction between house demolition and household wealth.

* p < 0.1; ** p < 0.05; *** p < 0.01.

conspicuous consumption. The result of Model 7 shows that the interaction term between house demolition and materialism value is significantly positively correlated with the average family conspicuous consumption (beta = 1.220, $p < 0.01$). This result is still robust in the full Model 8. Therefore, H6 is supported, that is, materialism value plays a significant positive role in moderating the relationship between house demolition and the average level of family conspicuous consumption. In sum, we verified that the level of household wealth and materialism value plays significant moderating roles in the main effect between house demolition and family conspicuous consumption from the overall and average levels, respectively.

Robustness Checks
Endogenous Test
The previous part has discussed and confirmed that house demolition significantly affects family conspicuous consumption

behavior. However, the level of family conspicuous consumption may also affect the decision of family house demolition. Specifically, whether a family needs to rely on house demolition to obtain compensation for supporting the family conspicuous consumption behavior, to a certain extent, determines the house demolition decision of the family. If necessary, the family may choose to obey the demolition plan of the government department and become a demolished household; on the contrary, if it is not necessary, the family may refuse to obey the demolition plan of the government department and become a non-demolished household. It can be seen that there may be a reverse causality relationship between house demolition and family conspicuous consumption.

However, reverse causality may lead to an endogenous problem, which may lead to the bias of the results. In order to alleviate this problem, we referred to the method of Yuan and Huang (2018) and used the number of households to be

TABLE 2 | Results of house demolition on family conspicuous consumption.

Dependent variable	The overall level of family conspicuous consumption				The average level of family conspicuous consumption			
Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
House demolition	0.977***	0.829**	1.108***	0.938**	0.316***	0.264**	0.361***	0.302**
	(0.371)	(0.378)	(0.371)	(0.378)	(0.118)	(0.120)	(0.118)	(0.120)
House demolition × household wealth		1.457**		1.749**		0.503**		0.604**
		(0.739)		(0.740)		(0.235)		(0.235)
House demolition × materialism value			3.533***	3.736***			1.220***	1.291***
			(0.900)	(0.904)			(0.287)	(0.288)
Male	−0.976***	−0.967***	−0.982***	−0.971***	−0.306***	−0.303***	−0.308***	−0.304***
	(0.245)	(0.245)	(0.245)	(0.245)	(0.078)	(0.078)	(0.078)	(0.078)
Age	−0.007	−0.007	−0.009	−0.008	−0.001	−0.001	−0.001	−0.001
	(0.011)	(0.011)	(0.011)	(0.011)	(0.004)	(0.004)	(0.004)	(0.004)
Education level	0.166***	0.168***	0.167***	0.170***	0.048***	0.049***	0.049***	0.049***
	(0.032)	(0.032)	(0.032)	(0.032)	(0.010)	(0.010)	(0.010)	(0.010)
Married	1.751	1.751	1.663	1.658	0.511	0.511	0.481	0.479
	(3.966)	(3.964)	(3.956)	(3.952)	(1.262)	(1.262)	(1.259)	(1.258)
Number of family members	−0.195**	−0.194**	−0.192**	−0.192**	−0.174***	−0.174***	−0.173***	−0.173***
	(0.088)	(0.088)	(0.088)	(0.088)	(0.028)	(0.028)	(0.028)	(0.028)
Number of houses	0.792***	0.777***	0.801***	0.783***	0.223***	0.218***	0.226***	0.220***
	(0.185)	(0.185)	(0.185)	(0.185)	(0.059)	(0.059)	(0.059)	(0.059)
Family income	1.575***	1.574***	1.559***	1.557***	0.491***	0.491***	0.485***	0.485***
	(0.173)	(0.173)	(0.173)	(0.172)	(0.055)	(0.055)	(0.055)	(0.055)
Household wealth	1.720***	1.749***	1.722***	1.757***	0.494***	0.504***	0.495***	0.507***
	(0.223)	(0.224)	(0.223)	(0.223)	(0.071)	(0.071)	(0.071)	(0.071)
Materialism value	0.290	0.287	0.225	0.218	0.073	0.072	0.050	0.048
	(0.267)	(0.267)	(0.267)	(0.267)	(0.085)	(0.085)	(0.085)	(0.085)
Health situation	0.040	0.043	0.029	0.032	0.003	0.004	−0.001	0.001
	(0.120)	(0.120)	(0.120)	(0.120)	(0.038)	(0.038)	(0.038)	(0.038)
Social insurance	−0.011	−0.004	0.044	0.056	−0.018	−0.016	0.001	0.005
	(0.462)	(0.461)	(0.461)	(0.460)	(0.147)	(0.147)	(0.147)	(0.146)
F-value	38.78***	36.14***	37.17***	34.97***	40.50***	37.79***	39.01***	36.77***
R^2	0.1432	0.1444	0.1479	0.1496	0.1486	0.1500	0.1542	0.1561
Observations	2,797	2,797	2,797	2,797	2,797	2,797	2,797	2,797

*$p < 0.1$; **$p < 0.05$; ***$p < 0.01$.*
The values in parentheses are standard errors.

demolished in each region as an instrumental variable for house demolition. For the number of demolished households in each region, we used the number of demolished households in each province in the CHFS (2011) survey data, plus 1, and then took the natural logarithm to measure. The reason for using the number of demolished households in each region as an instrumental variable for house demolition are: on the one hand, whether households in each region experience house demolition or not had a decisive effect on the number of demolished households in the region, indicating that house demolition and the number of demolished households in each region are highly related. On the other hand, factors related to individual or family characteristics, such as the years of education, gender, family income, and family assets, may directly affect the level of family conspicuous consumption. However, the number of households to be demolished in each region, as a nonindividual or family characteristic factor at the provincial and municipal levels, may

not directly affect the family conspicuous consumption. It can be seen that the number of households to be demolished in each region meets the two requirements of the instrument variable. In addition, through the weak tool identification test and the exogenous test, we confirmed that the number of households to be demolished in each region is an effective and strong instrument variable.

Modify the Model Setting

Based on the empirical evidence of the existing literature and the principle of data availability, we controlled a number of variables related to individual and family characteristics in the model setting. However, in order to avoid bias in research results due to the selection of control variables, we added additional control variables to the original model settings for the robustness test. Considering the fact that ethnicity, whether a Communist Party of China (CPC) member, household debt

status, and urban dummy variables may all affect household consumption decisions. In this regard, the four variables of "ethnicity," "whether they are members of the Communist Party of China, "household debt," and "urban dummy variables" are used as new control variables in the model. Among them, for the ethnicity, we used 1 to represent the Han ethnicity and 0 to represent others; for whether a member of the Communist Party of China, we used 1 to represent a member of the Communist Party of China and 0 to represent others; for family debt, we defined the family with debts as indebted families, and assigned the value of 1; defined family without debts as non-debt families, and assigned the value of 0; for the definition of urban dummy variables, we mainly referred to Lin et al. (2017).

Change the Measurement of the Key Variable

In order to avoid the difference in indicator definitions from affecting the empirical results, we used the "demolition area" as the proxy variable of "house demolition." The reason for choosing the demolition area as the proxy variable is that the demolition area is usually highly correlated with the amount of house demolition, which meets the requirements of selecting the proxy variable. For the demolition area, we used the items "What is the acreage to be demolished?" in the CHFS (2011) questionnaire to measure the variable "demolition area." For the data processing of the variable "demolition area," we firstly assigned 0 to this variable for families that have not experienced demolition, and then added 1 to the newly obtained data and then took the natural logarithm transformation.

Delete the Demolition Samples Without Compensation

In real life, there may be cases that have experienced house demolition but have not received any financial compensation. In order to avoid this situation affecting the accuracy of the research results, we removed those families who have not received compensation for demolition from our research sample and conducted a robustness test on this basis.

Table 3 shows the above four independent robustness test results of the basic research part obtained by using different research methods. The results of the robustness test consistently show that (1) House demolition positively affects the overall level of family conspicuous consumption; (2) House demolition positively affects the average level of family conspicuous consumption; (3) Household wealth positively moderates the relationship between house demolition and the overall level of family conspicuous consumption; (4) Household wealth also positively moderates the relationship between house demolition and the average level of family conspicuous consumption; (5) Materialism value positively moderates the main effect between house demolition and the overall level of family conspicuous consumption; (6) Materialism value positively moderates the main effect between house demolition and the average level of family conspicuous consumption.

Through the above robustness tests, it can be considered that the research conclusions of our study are reliable. The conclusions show that house demolition not only significantly improves the overall level of family conspicuous consumption but also significantly increases the average level of family conspicuous consumption. What is more, the above main effects are moderated by the level of household wealth and materialism value.

STUDY 2: THE RELATIONSHIP BETWEEN CONSPICUOUS CONSUMPTION AND LUXURY CONSUMPTION

At present, scholars have different opinions on the relationship between conspicuous consumption and luxury consumption. We find that it can be roughly divided into two categories: The first category of view regards conspicuous consumption as luxury consumption and emphasizes that the most essential feature of conspicuous consumption is expensive. Veblen is the main representative of the first category of view, who innovatively proposed that conspicuous consumption is the exclusive consumption way of the "leisure class." It is a way of consumption for consumers to show their economic strength to others by purchasing expensive goods and then achieve the goal of declaring, obtaining, or promoting social status (Veblen, 1899). Subsequently, many scholars put forward insights into conspicuous consumption based on Veblen's views, for example, some scholars point out that conspicuous consumption is multidimensional, and it is a way for consumers to purchase many expensive goods to achieve eye-catching behavior (Marcoux et al., 1997). Some scholars also believe that conspicuous consumption is the behavior of consumers relying on luxury spending to show their wealth and strength to society (Lancaster, 1966). On the contrary, the second category of view believes that conspicuous consumption is not completely equivalent to luxury consumption and emphasizes that conspicuous consumption of consumers not only relies on expensive goods. For example, some scholars believe that conspicuous consumption and luxury consumption are highly compatible, but the two are not completely equivalent (Frank, 1985). In certain situations, conspicuous consumption of people can rely on non-expensive commodities, such as ordinary clothes and shoes. Other scholars also suggest that the scope of conspicuous consumption is not limited to luxury goods or precious goods. Consumers can spend money to purchase high-price or low-price goods to achieve conspicuous purposes (Bagwell and Bernheim, 1996). Jin and Cui (2013) point out that conspicuous consumption has universal characteristics.

Based on the above analysis, it can be found that researchers have reached a consensus on conspicuous consumption on the following two points: first, conspicuous consumption is to meet the specific psychological needs of consumers (Sivanathan and Pettit, 2010); second, conspicuous consumption is a kind of visible consumption (Charles et al., 2009). However, scholars have not reached a consensus on the object (expensive/non-expensive) and subject (the leisure class/all classes) of conspicuous consumption. However, the two parts with controversy are exactly the focus of debate of scholars on whether conspicuous consumption is equivalent to luxury consumption. Therefore, to judge their specific relationships, it

TABLE 3 | Results of the robustness test.

Method	1. Endogenous test		2. Modify model setting	
Dependent variable	Overall level of family conspicuous consumption	Average level of family conspicuous consumption	Overall level of family conspicuous consumption	Average level of family conspicuous consumption
Model	1	2	3	4
House demolition	0.766**	0.261**	0.886**	0.292**
	(0.384)	(0.122)	(0.384)	(0.122)
House demolition × household wealth	1.434*	0.511**	1.836**	0.633***
	(0.751)	(0.239)	(0.749)	(0.238)
House demolition × materialism value	3.656***	1.270***	3.761***	1.294***
	(0.924)	(0.294)	(0.911)	(0.290)
F value	34.49***	36.31***	27.01***	27.95***
R^2	0.0492	0.1545	0.1532	0.1577
Observation	2,797	2,797	2,706	2,706
Method	**3. Change the measurement of the key variable**		**4. Delete the demolition samples without compensation**	
Model	5	6	7	8
House demolition	0.213**	0.069**	0.780*	0.249*
	(0.090)	(0.028)	(0.413)	(0.131)
House demolition × household wealth	0.370**	0.128**	2.483***	0.832***
	(0.173)	(0.055)	(0.806)	(0.256)
House demolition × materialism value	0.824***	0.287***	4.815***	1.649***
	(0.212)	(0.067)	(0.972)	(0.309)
F value	34.79***	36.58***	35.85***	37.58***
R^2	0.1489	0.1554	0.1549	0.1612
Observation	2,798	2,798	2,753	2,753

*$p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.*
The values in parentheses are standard errors.
Due to space issues, the results of other control variables are not reported in our study. If necessary, they can be obtained from the authors.

is necessary to clarify whether there are differences between the two in terms of "object" and "subject."

The object of luxury consumption is named the luxury goods by society. Luxury goods are commodities (including services) with high demand-income elasticity; there are three most notable features as expensive and rare, exquisite quality, and hedonic experience (Lancaster, 1966). These salient features of luxury goods show that luxury consumption places a high demand on the economic foundation of consumers. This demand fundamentally determines the main scope of luxury consumption, that is, luxury consumption is more suitable for the "leisure class" with a strong economic foundation and less suitable for ordinary consumers with a weak economic foundation. It can be seen that luxury consumption relies on expensive goods in terms of objects. According to subjects, luxury consumption is more suitable for the "leisure class" and less applicable to the "non-leisure class." But conspicuous consumption does not necessarily rely on expensive commodities, judging from the specific phenomenon of conspicuous consumption in our current social life. Consumers can achieve conspicuous purposes by spending

money on high-price or low-price goods (Bagwell and Bernheim, 1996). For example, in real life, the conspicuous consumption of people can rely on non-expensive commodities, such as ordinary clothes and shoes (Frank, 1985), and for many ordinary families, their family economic foundation can bear appropriate conspicuous consumption behavior (Zhu, 2001). It suggests that, in terms of objects, conspicuous consumption can rely not only on expensive commodities but also on low-price commodities; in terms of subjects, conspicuous consumption is not only a consumption mode of the "leisure class" but also a consumption mode of "middle class" or "low class" (Charles et al., 2009).

In summary, conspicuous consumption and luxury consumption are similar in consumption motivations and patterns; while conspicuous consumption and luxury consumption are different in terms of the subject and the object of consumption. Therefore, conspicuous consumption and luxury consumption are not exactly the same. The two are both related but different.

In order to verify the above theoretical analysis results, following that of Gao et al. (2020), we used the questionnaire platform WJX.com to conduct an exploratory survey on

conspicuous consumption. Its purpose was to reveal the differences between conspicuous consumption and luxury consumption by clarifying the definition of conspicuous consumption. Specifically, the interviewees were asked to fill out the following six questions: (1) What specific psychological needs do you think people want to meet when they engage in conspicuous consumption? (2) What characteristics do you think conspicuous products should have? (3) In your mind, which kind of products are conspicuous commodities? (4) From a price perspective, which do you think conspicuous products can be? (multiple choice questions) A. The price is low; B. The price is medium; C. The price is high, (5) From a morphological point of view, what kind of features do you think should be on conspicuous products? A. Visibility features (that is, features that can be directly observed by eyes); B. Invisible features (that is, features that cannot be directly observed by eyes); C. Both of the above are acceptable. (6) From the perspective of social class, which do you think is the object of conspicuous consumption? (multiple choice questions) A. Lower class B. Middle class C. Senior class; In addition, in the questionnaire, we also measured demographic characteristics and statistical variables. A total of 183 respondents participated in this survey (74 women, M_{age} = 29, SD = 7.41). The statistical results and discussion are as follows:

(1) Respondents suggest that conspicuous consumption behaviors of people are mainly to meet the following psychological needs: "comparison," "vanity," "show off," "enjoyment," "building self-confidence," "self-certification," face awareness," "self-satisfaction," "pursue balance," "social recognition," and "social superiority." The above textual information reflects that conspicuous consumption is one of the conscious behaviors of consumers, with the purpose of satisfying certain specific psychological needs through this behavior.

(2) The respondents believe that conspicuous goods have "high prices" (68%), "high brand awareness" (42%), "unique and rare" (27%), and "strong design sense" (15%), and "weak functionality" (accounting for 5%) and other characteristics. To further clarify whether conspicuous goods must have expensive characteristics, then this study asked respondents about the price of conspicuous goods (multiple choice questions). In this issue, about 12% of the respondents believe that it can be a low-price commodity; about 26% of the respondents believe it can be a medium-price commodity, and about 96% of the respondents believe it can be a high-price commodity. Based on this information, we believe that expensive goods, such as luxury goods, can be conspicuous goods, but medium-price or low-price goods can also be conspicuous goods. The reason is that, in certain specific scenarios, consumers can publicly show others purchasing non-expensive goods, which can also meet certain specific psychological needs, for example, posting the gifts of Valentine's Day (such as flowers, chocolates, and cards) from boyfriends on Facebook or WeChat. In this scene, non-expensive flowers, chocolates, and cards are all conspicuous goods. Therefore, we suggest that conspicuous goods should not be constrained by price.

(3) For the subjects of conspicuous consumption (multiple choice questions), about 22% of the respondents think they can be the lower class; about 69% of the respondents think they can be the middle class; about 61% of the respondents think they can be the upper class. It can be seen that conspicuous consumption is no longer an exclusive form of consumption for the "leisure class" in today's social era; it is also applicable to the non-leisure class (including the lower and middle classes). Based on the survey results of the abovementioned questions, and referring to the existing literature, we believe that conspicuous consumption mainly refers to the behavior of consumers who consciously display the purchased or consumed goods to others publicly to meet their own specific psychological needs.

(4) When exploring what kind of products are conspicuous goods, the answers given by respondents can be roughly summarized into the following categories: "watches," "mobile phones," "clothes," "shoes," "bags," "houses," "vehicles," "jewelry," and "cosmetics." Based on this text information, it can be seen that conspicuous goods have strong visibility characteristics.

In summary, the results of the exploratory survey confirm the results of the theoretical analysis above, that is, conspicuous consumption and luxury consumption are not completely equal. Specifically, the two have similarities in consumption motivation and consumption patterns. For example, conspicuous consumption and luxury consumption can meet certain specific psychological needs of consumers, and both meet these needs through visible consumption carriers. However, there are heterogeneous aspects in both the subject and the object of consumption. For example, conspicuous consumption is applicable to all classes and is not limited to price; while luxury consumption is more applicable to the "leisure class" and is limited to price (expensive).

RESULTS AND DISCUSSION

House demolition and conspicuous consumption are two topics that have been hotly discussed since the twenty-first century. We connect house demolition and conspicuous consumption for the first time in the context of the rapid advancement of the urbanization process and the increasing conspicuous consumption of China. First, we adopted the 2010 CHFS micro-survey data, took the household as our research object, and built the corresponding model setting based on the control variables on family characteristics, household head characteristics, and regional characteristics, which aim to examine the relationship between house demolition and family conspicuous consumption from the overall level and the average level. Then, in order to deepen the theoretical and practical significance of the research, we further examined the moderating effects of household wealth and materialism value on the main effect between house demolition and family conspicuous consumption. Finally, considering that the current academic research is still in the status of inadvertently clarifying the relationship between conspicuous consumption and luxury consumption, in order to

further clarify the relationship between the two and deepen the understanding of the research and the public, we investigated their relationship from a theoretical perspective. And we used exploratory investigation methods to verify the results.

We have obtained three main conclusions through a series of studies. First, house demolition has a significant positive impact on family conspicuous consumption, which is not only reflected in the overall consumption level but also in the average consumption level. Second, the main effects are all positively moderated by the level of household wealth and materialism value. Third, conspicuous consumption and luxury consumption are not completely equal. They are similar in the consumption motivation and consumption pattern, but there are differences in the consumption subject and the consumption object.

This study puts forward the following practical suggestions based on the above research conclusions to improve the situation of increasing conspicuous consumption in China. First, house demolition is already an unavoidable fact in the process of rapid urbanization. When the government organizes house demolition, it should promptly transmit correct consumption concepts to demolition households to ease their conspicuous consumption motivation. For families that have completed demolition, the government also needs to pay attention to their conspicuous consumption dynamics and should provide timely advice or guidance when necessary. Second, materialism value significantly increases the main effect between house demolition and family conspicuous consumption. In this regard, the government should devote itself to cultivating residents to establish a correct world outlook and value, and dilute the desire of the residents for possession of the material. Third, conspicuous consumption is essentially an irrational consumption (Li et al., 2016). We confirmed that the level of household wealth positively moderates the relationship between house demolition and family conspicuous consumption. Therefore, the government can establish a corresponding social security system in order to prevent certain wealthy families from falling into financial distress due to excessive engagement in conspicuous consumption, which will cause a series of unnecessary social troubles.

Our study also has the following shortcomings, which are also research directions that can further explore in the future. First, through theoretical analysis, we conclude that processing fluency may be the psychological mechanism of house demolition affecting the conspicuous consumption of families. Limited to the data, we do not verify this. In future research, scholars

can use other valid data to verify it and further enrich the existing research results. Second, we studied the impact of house demolition on family conspicuous consumption. Due to the particularity of the core independent variable (house demolition), we based on a micro survey database and used micro empirical methods, which are a more appropriate choice compared with choosing other research methods (such as experimental research methods). However, this choice leads to the following problems in the definition of variables: limited to research data, the definition method used in our study can effectively measure materialism value to a certain extent, but there are gaps between this method and experimental research methods to some extent. In the future, we can use unique data and adopt better definition methods to further verify the influence of materialism value on the relationship between house demolition and family conspicuous consumption.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding authors.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by China National Knowledge Infrastructure (CNKI) Ethics Committee. Written informed consent to participate in this study was provided by the participants' or participants' legal guardian/next of kin.

AUTHOR CONTRIBUTIONS

All authors listed have made a substantial, direct and intellectual contribution to the work, and approved it for publication.

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Influence of Interpersonal and Institutional Trust on the Participation Willingness of Farmers in E-Commerce Poverty Alleviation

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To explore the influence of interpersonal trust and institutional trust on the participation willingness of farmers in e-commerce poverty alleviation in China, a questionnaire survey of 320 farmers in Chongqing Ecological Tourism District was adopted for data collection, and a binary logistic model was used for data analysis. The results showed that (1) both interpersonal trust and institutional trust had a positive influence on the participation behavior of farmers in e-commerce poverty alleviation, and the priority ranking from high to low was: trust in government, trust in relatives, trust in neighbors, and trust in village cadres. (2) Institutional trust had a greater impact on the participation behavior of farmers than interpersonal trust, especially in the poverty-stricken areas where economic development was relatively backward. (3) Individual attributes, household attributes, and rural resource attributes had a significant positive impact on the participation intention of farmers. Among these, the role of rural e-business service platform was particularly important. The role of institutional trust at the village level still did not perform well in promoting the participation willingness of farmers. Based on empirical analysis, the suggestions for promoting the active cooperation of farmers and participating in the cooperation of e-business were put forward, such as enhancing the interpersonal network of farmers, improving the rural e-commerce information service platform, and strengthening the construction of the rural business environment.

Keywords: interpersonal trust, institutional trust, e-commerce poverty alleviation, social trust, participation willingness

INTRODUCTION

Poverty eradication is a common mission of all mankind. Since 1978, China has achieved great success by lifting more than 600 million people out of poverty and the poverty incidence has dropped from 97.5% in 1978 to 1.7% in 2017 (He and Wang, 2019), which was called the fast large-scale poverty reduction in human history. However, according to the statistics of the Chinese National Rural Revitalization Bureau, by the end of 2019, there were 2,707 poor villages and 5.51 million people still lived in poverty in China (Liang et al., 2020). These people mainly lived in the mountain area of western China, most of which lack basic living conditions. Under the circumstances, the government of China, therefore, adjusted the direction of poverty alleviation and adopted the targeted e-commerce poverty alleviation strategy (Han et al., 2019).

Furthermore, with the rapid spread and growth of the Internet, the process of rural informatization is accelerating constantly. Rural e-commerce provides effective assistance for the implementation of targeted poverty reduction programs (Cui et al., 2017), and points out a new direction for promoting rural revitalization (Fosu, 2017). Particularly in recent years, the number of Taobao villages has increased from 20 in 2013 to 5,425 in 2020, which fully demonstrated the great potential of rural e-commerce poverty alleviation (Wang H. et al., 2020). Promoting E-commerce poverty alleviation plays an important role in accelerating the rural infrastructure construction, improving the marketization level of agricultural products as well as increasing the income of farmers (Han et al., 2019).

Therefore, this research aimed to explore and investigate the factors stimulating the participation of farmers in rural e-commerce poverty alleviation from a socioeconomic perspective. The existing studies have shown that social capital plays a significant role in the development of rural e-commerce poverty alleviation (Portes, 1998). While social capital covers multiple dimensions, huge differences exist between them (Kuang et al., 2019; Deng et al., 2020). Considering this, the present research chose "trust" as an independent variable, conducted a field survey, and finally analyzed the role of interpersonal trust and institutional trust in the participation of farmers in e-commerce poverty alleviation.

The previous research shows that there is a positive relationship between trust and cooperation (e.g., Lewicki and Bunker, 1996; Stern and Coleman, 2015; Zand, 2016). Lewicki and Bunker (1996) stated that trust is beneficial for reducing uncertainty and conflict among individuals. According to Luhmann (2000), trust is considered as the premise of cooperation and coordination interaction, and it can strengthen cooperation among individuals. In addition, when living in a high trust society, individuals will have a strong willingness for business, which can reduce the transaction costs and subsequently enhance the stability of cooperation (Wang and Wan Wart, 2007; Vries, 2014). Then, what is the role of social trust during the participation of farmers in e-commerce poverty alleviation, and what is the relationship between them? This study will address the issue by analyzing the cooperative participation behavior of farmers from the perspective of social trust, and reveal the internal relationship between the social trust and participating behavior of the farmers. It is expected to be beneficial for understanding the influencing factors of the participation of farmers in e-commerce poverty alleviation, enriching and improving academic literature in the related fields, and also providing a reference for the promotion of new rural construction.

The structure of this paper is organized as follows: Literature review and research hypothesis comprehensively reviewed the literature on the relationship between interpersonal and institutional trust and the cooperative participation of farmers in e-commerce operation, and put forward the research hypothesis, research methodology and data analysis described the data source, model selection, variables, and data processing. Results analysis analyzed the empirical research results of this paper and discussion, limitation, and recommendations presented a discussion of the findings and made a brief recommendation for the study. The last part concluded the whole research.

LITERATURE REVIEW AND RESEARCH HYPOTHESIS

The establishment of interpersonal trust is based on family membership, blood relationships, neighborhood relations, etc., and it can be divided into two types, such as trust in relatives and trust in neighbors (Rus and Iglič, 2005; Lewicki et al., 2006). In recent years, scholars have made huge progress on the research of interpersonal trust and the e-commerce participation behavior of farmers (Kong et al., 2014). First, Feng et al. (2016) stated that interpersonal trust could reduce transaction costs and promote cooperation. In rural society, the interpersonal relationships among the individual farmers are of highly geographically characteristics, and information transmission is mainly realized through the non-institutional channels, such as village meetings (Feng et al., 2016), communication of neighbors (Hoell, 2004), and media networks (Evans and Revelle, 2008). Interpersonal trust can enhance the communication and sharing of information between the different social groups, and promote farmers to accept e-commerce (Sønderskov, 2011). Second, interpersonal trust has a positive influence on the e-commerce operation decisions of farmers (Wang et al., 2019). This mutual trust among the farmers can promote their communication and cooperation, which is beneficial for forming the mechanism of risk-sharing and benefit-sharing, and makes the cooperation more efficient (Six, 2007). During rural e-commerce business development, getting assistance from relatives and friends can significantly improve the production efficiency of farmers (Zeng and Xia, 2019). Based on this, this research proposes the following hypotheses:

> Hypothesis 1: Interpersonal trust has a significant impact on the participative behavior of farmers in e-commerce operations. The higher the level of interpersonal trust, the stronger the participating enthusiasm of the farmer becomes.

According to Daskalopoulou (2019), the formation of institutional trust is based on the contract institutional environment, and institutional trust is established on the "non-interpersonal" relationship. Institutional trust affects the decision-making of the participation willingness of farmers through the internal constraint mechanism (Hudson, 2006). Moreover, it can usually be divided into two types, such as trust in the government and trust in village cadres (Hudson, 2006; Fuglsang and Jagd, 2015).

The past research has confirmed the role of institutional trust in improving the participation intention of farmers. Hudson (2006) found that the trust and reciprocity between the farmers and governmental departments are conducive to the market promotion of agricultural products in the European Union (EU). Chen et al. (2019) discussed the relationship between village social capital and the participation of rural households in e-commerce, and they found that general trust and institutional trust had a positive impact on the participation intention.

Sharp and Smith (2003) found that the social trust mechanism has a positive impact on the willingness of individuals to participate in e-commerce. Based on the above, this paper proposes the following hypotheses:

> Hypothesis 2: Institutional trust has a significant impact on the participative behavior of farmers in e-commerce operations. The higher the level of institutional trust is, the stronger the participating enthusiasm of farmers becomes.

Xin and Zhou (2012) proposed that under the diversity-orderly structure of Chinese native soil society, emotion can effectively promote the initial participation of farmers. However, as the interpersonal relationships became estranged, the role of the mechanism and the institutional system becomes more and more important (de Vries et al., 2019). At the same time, Domanski and Artur (2021) found that policy and institutional trust plays a much more important role than interpersonal trust in promoting the participation willingness of farmers, especially in the poverty-stricken region. Therefore, this paper proposes the following hypotheses:

> Hypothesis 3: Institutional trust has a greater impact on the participation intention of farmers than interpersonal trust. Especially in the poverty-stricken region with an underdeveloped economy, the role of institutional trust is particularly important.

As to the study of the participation behavior of farmers, Lastra-Bravo et al. (2015) and Riley et al. (2018) reveal that the individual attributes of farmers, such as educational background, risk appetite, and perception of e-commerce project indeed have a relation with the participation behavior. Lee and Ihm (2020) stated that gender has a relation with the participation willingness of farmers, and they added that male farmers were more likely to participate in group activities while the female farmers preferred private activities. Another survey conducted by Shi et al. (2010) proposed that the participation willingness was a predictor of participation behavior, and it was also affected by gender. Men tended to have a stronger willingness to participate in rural business activities, for they were considered as the main contributor of family income (Wang et al., 2019). Besides, the surveys conducted by Song (2016) have shown that individual attributes, such as age and educational level, had an impact on their participation intention. And the level of education was found to be positively related to the participation willingness of farmers, the experience of by-business also affected their participation behavior (Zepeda, 2009). Kong et al. (2019) proposed that by-business farmers were less willing to participate in rural e-commerce actively for they had more ways to increase the income. Huang (2012) also added that the understanding of rural e-commerce was also a significant predictor of the participation intention of farmers. Above all, the previous studies discussed individual dimensions just from one or two attributes, lack of comprehensive and systematic review. Thus, this research integrates four attributes together, such as gender, age, education level, and perception of e-commerce. We thus propose the following hypotheses:

> Hypothesis 4a: Individual attributes have a significant positive impact on the participation intention of farmers, and with the increase of the proportion of male, age, educational level, and understanding of e-commerce poverty alleviation, the participation willingness of farmers becomes stronger.

The studies had shown that the participation willingness was also influenced by family agricultural acreage, annual household income, and the number of the labor force, and there was a significant positive relation among them (Liu and Song, 2002; Liu and Lai, 2016). The larger the family agricultural acreage was, the easier it was to realize economies of scale, and the more willing the farmer was to participate in e-commerce business (Hu, 2010). Similarly, Smithers et al. (2008) found that the number of labor forces had a positive relation with the family participation willingness. In general, the families with a high proportion of e-commerce income depended more on e-commerce poverty alleviation, spent more time on learning e-commerce technologies, and were more likely to participate in e-commerce poverty alleviation (Hou and Ding, 2016). Based on the above, we thus propose the following hypotheses:

> Hypothesis 4b: Household attributes have a significant positive impact on the participation intention of farmers, and with the increase of family agricultural acreage, annual household income, and the number of the labor force, the participation willingness of farmers becomes stronger.

The previous studies mostly focus on these endogenous resources, while neglecting the influence of external rural resources (Wang J. et al., 2020). The distance to the market (Menapace et al., 2016), road accessibility (Liu, 2013), allocation of village officials (Lienhoop and Brouwer, 2015), and the situation of the e-business service station (Christensen et al., 2011; Jin et al., 2015), all these factors have posed an influence on the participation intention of farmers. Accessibility is the foundation for developing rural commercial circulation (Wu and Zhang, 2012), such as both road accessibility and informational service accessibility, especially the latter one. Incomplete and missing information would reduce the enthusiasm of farmers for the online transaction (Van Weele et al., 2016). Therefore, the timelier information farmers attained, the smoother their transaction was, and the greater the likelihood of participation was. Besides, as the leader of rural grassroots organizations, college-graduate village officials owned advanced information technology and market information, they were also proved to be positively related to the participation intention of farmers (Morris et al., 2017). Thus this paper put forward the following hypotheses:

> Hypothesis 4c: Rural resource attributes have a significant positive impact on the participation intention of farmers.

In summary, the social trust and human and physical resource dimension may have an influence on the participation intention of farmers. **Figure 1** describes the relationship among them and presents the research framework of this study.
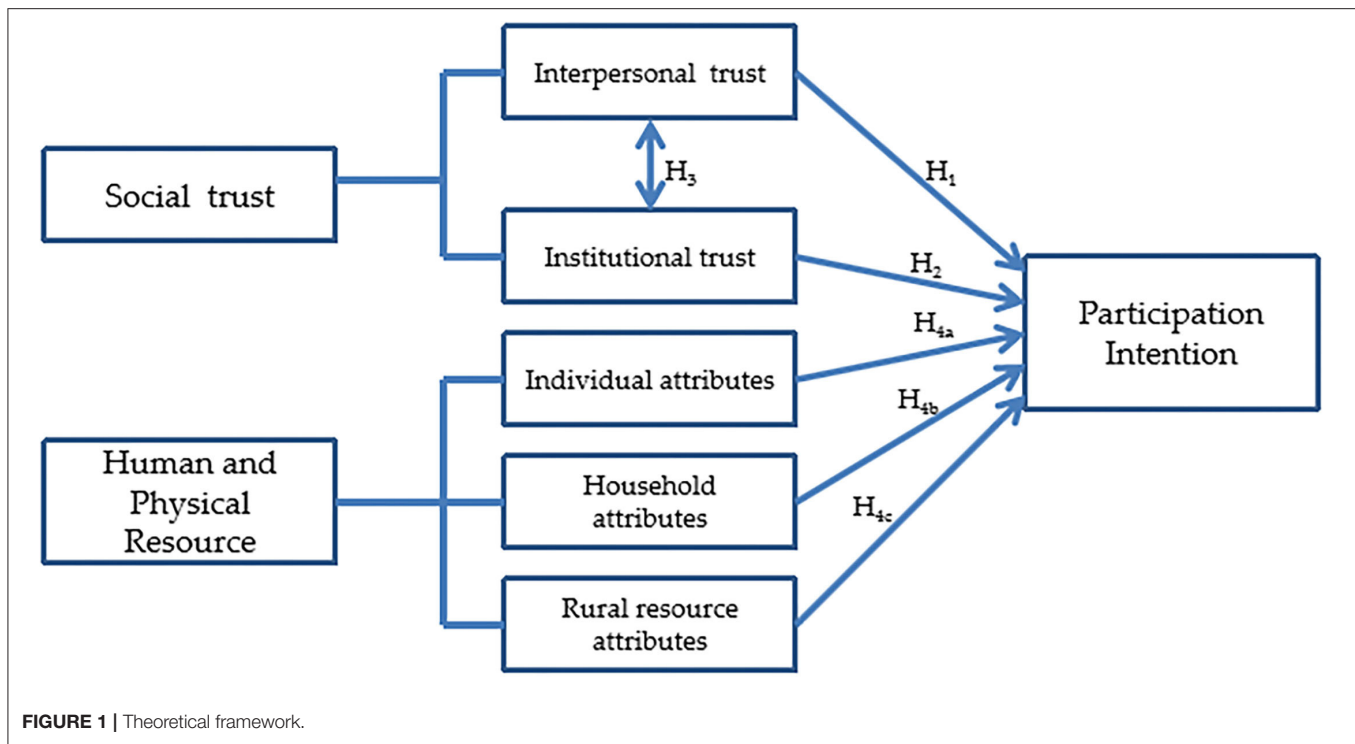
FIGURE 1 | Theoretical framework.

RESEARCH METHODOLOGY AND DATA ANALYSIS

Research Sample and Method

Wanzhou District is located in the northeast of Chongqing, China (Zou et al., 2018), with abundant agricultural resources and advantaged eco-tourism conditions, making it suited for developing featured e-commerce agricultural products (Peng et al., 2017). A series of electric commodity brands, such as Yuquan pickled cabbage, Master Ran beef jerky, and Wanzhou Guhong orange, are well-known in China [Zhang and Deng, 2010; CQS (Chongqing Statistics), 2019]. Given this, to examine whether the social trust has significantly affected the participation behavior of farmers, the research group conducted an on-spot survey of 26 villages in Wanzhou from July 16 to August 25, 2020. In the survey, 320 farmers participated of which 295 valid questionnaires were collected.

The sample had the following characteristics: the majority of households were male, accounting for 73.2%; the average age of the respondents was 53.4 years old, the youngest was 28 years, and the oldest was 79 years old. Their education level is mainly junior high school, accounting for 43.4%, followed by the primary school or below, accounting for 40%, and the rest are of senior high school or above degree, accounting for 16.6%. The respondents were all married.

Research Modeling

A discrete choice model was derived from the study of animal binary reflection conditions by Fecher in 1860 (Hall et al., 2002). In the 1970s and 1980s, this model was widely used in the research of economic decision-making, such as economic

layout, firm location, traffic problem, employment problem, and purchase decision (Hall et al., 2002; de Bekker-Grob et al., 2013). This study mainly discusses the influence of social trust on the participation behavior of farmers. Therefore, the dependent variable of this study is "behavior of farmer," that is "whether to participate in e-business or not," which belongs to a 0–1 variable. According to the outcomes of model fitting, the binary logistic model based on the individual level was selected to analyze the key factors affecting the behavior of farmers. As to the participation behavior of farmers in e-commerce poverty alleviation, the following equation is:

$$\log it(Behavior, = 1) = \phi(\alpha_i trust_i + \beta_i individul_i + \gamma_i household_i + \delta_i village_i)$$

In the formula, the subscript i represent the farmer been surveyed. Behavior is a dependable variable ranging from 0 to 1, which described the cooperative participation of farmers in e-commerce operations. If farmers cooperate in e-commerce operation, its value is 1; otherwise, it is 0.

Variables and Data Processing
Dependent Variable: Participation Behavior of Farmers

The dependent variable of this study is "whether farmers participate in e-commerce poverty alleviation." Among the 295 valid samples obtained, 55 participated in e-commerce, accounting for 18.64%, and 240 were non-participants, accounting for 81.36%. Therefore, the cooperative participation of farmers in e-commerce operations is relatively low. **Table 1** shows the results of the cooperative participation of farmers in

Index	All farmers	Sex		Household income		Education	
		Male	Female	High income	Low income	Highly educated	Lowly educated
Participation	18.64	21.3	15.19	16.27	21.36	49.49	11.19
Non-participation	81.36	78.7	84.81	83.73	78.64	50.51	88.81

	Index	Items	Participation	Non-participation	Total
Interpersonal trust	Trust$_1$	Not at all	0	100	100
		No trust	4.15	95.85	100
		Normal	5.63	94.37	100
		Trust	18.76	81.24	100
		Fully trust	50.17	49.83	100
	Trust$_2$	Not at all	0	100	100
		No trust	0	100	100
		Normal	6.73	93.27	100
		Trust	21.72	78.28	100
		Fully trust	41.18	58.82	100
Institutional trust	Trust$_3$	Not at all	0	100	100
		No trust	2.36	97.64	100
		Normal	13.74	86.26	100
		Trust	37.82	62.18	100
		Fully trust	63.76	36.24	100
	Trust$_4$	Not at all	0	100	100
		No trust	1.15	98.85	100
		Normal	6.42	93.52	100
		Trust	33.52	66.48	100
		Fully trust	67.12	32.88	100

e-commerce operations. It is found that the participation rate of male farmers is higher than that of female ones. Similarly, the participation rate of highly educated farmers is higher than that of low-educated ones. In contrast, the participation willingness of high-income farmers is weaker than that of low-income ones.

Independent Variable: Trust

Trust was an independent variable in this study. According to the measurement of trust variables in the study of Bitmiş and Ergeneli (2013) and Asveld et al. (2015), this research chose two variables to measure interpersonal trust, they trust in relatives (trust$_1$) and trust in neighbors (trust$_2$), and the two variables to measure institutional trust, they trust in village cadres (trust$_3$) and trust in the government (trust$_4$). The respondents were asked to fill in the blanks with the Likert scale, namely, "strongly disagree," "disagree," "generally," "agree," and "strongly agree," which were assigned 1–5 points, respectively. The size and significance of α_i are the core of this study. If trust can indeed enhance the participation behavior of farmers, the significance of α_i is positive. **Table 2** presented the result of the influence of

social trust on the participation of farmers. It can be seen from **Table 2** that trust$_1$, trust$_2$, trust$_3$, and trust$_4$ have the same trend. That is to say, the higher the degree of trust was, the higher the participation intention of farmers was.

Control Variable

To explore the role of trust in the participation of farmers in e-commerce operations, the construction of control variables is indispensable. Based on the previous research, this study constructed five variables related to the individual attributes of the farmers, three variables about household attributes, and three variables of rural resource attributes, and finally formed the required control variables system. The specific variables involved in this study and their processing methods are shown in **Table 3**.

RESULTS ANALYSIS

The SPSS 22.0 statistical software (IBM, NY, USA) was used in this study for empirical analysis. Since the dependent variable is 0–1, this study adopts a binary logistics regression model to fit and analyse the factors affecting the participation behavior of farmers. Moreover, the second-order regression was chosen to study the influence of social trust, which can describe the outcomes clearly. As to the research procedure, first, all the control variables were introduced into the regression equation to test the significance of the regression coefficients (Johnson and Onwuegbuzie, 2004), and Model 1 was obtained. Then, on this basis, four variables of social trust were introduced into the regression equation (Georgakopoulos et al., 2020), and the significance test of the regression coefficients of all variables was carried out to obtain Model 2. Finally, the overall explanatory power gap between the two models was compared and analyzed in **Table 4**.

The regression results showed that both Model 1 and Model 2 had passed the test at the significance level of 1%, and Nagelkerke R^2 of each model reached 49.2 and 72.4%, respectively, and the correct prediction rate reached 89.6 and 93.2%, respectively. After adding the dimensions of social trust, Nagelkerke R^2 of Model 2 increased by 20.8% and the correct prediction rate also increased by 3.6%. These data showed that social trust indeed enhanced the Nagelkerke R^2 of each variable. The regression results of Model 2 indicated that trust$_1$, trust$_2$, trust$_3$, and trust$_4$ all have a significant correlation with the participation willingness of the farmers. It can be seen that both interpersonal trust and institutional trust play a very important role in the decision-making of participation of farmers.

TABLE 3 | The descriptive statistics of variables.

Variable	Definition and assignment	Mean	Std. Err.
Dependent Variable			
—-Participate in e-commerce business nor not	Yes = 1,no = 0	0.186	0.373
Independent Variable			
— $Trust_1$	1 = Not at all, 2 = no trust, 3 = normal,4 = trust, and 5 = fully trust	3.710	0.857
— $Trust_2$	1 = Not at all, 2 = no trust, 3 = normal,4 = trust, and 5 = fully trust	3.609	0.867
— $Trust_3$	1 = Not at all, 2 = no trust, 3 = normal,4 = trust, and 5 = fully trust	2.969	0.971
— $Trust_4$	1 = Not at all, 2 = no trust, 3 = normal,4 = trust, and 5 = fully trust	3.212	1.012
Control Variable			
Individual attributes	sex	1 means male and 0 means female	0.715	0.459
	age	1 means 30 ∼ 39, 2 = 40 ∼ 49,3 = 50 ∼ 59,4 = 60 ∼ 69, 5 = 70 ∼ 79	2.811	0.511
	education	1 = primary school,2 = junior, 3 = high school,4 = college or above	1.856	0.827
	by-business	1 = yes 2 = No	0.621	0.493
	Cognition of rural e-commerce	1 = Not at all, 2 = no, 3 = normal,4 = understand, and 5 = fully understand	2.711	0.974
Household attributes	Family agricultural acreage	The size of family agricultural acreage	0.389	0.416
	Labor force amount	the number of labor force 5 = 70 ∼ 79	2.953	1.183
	Household income	Annual household income	3.532	1.783
Rural resource attributes	Road accessibility	1 = worst, 2 = worse, 3 = normal,4 = better, and 5 = best	3.516	1.899
	Rural information service station	1 = yes 0 = No	0.278	0.478
	College student village officer	1 = yes 0 = No	0.296	0.431

TABLE 4 | The regression results of different models.

Variable		Model 1			Model 2		
		B	S.E.	Exp(B)	B	S.E.	Exp(B)
Trust	$Trust_1$				0.913**	0.395	2.536
	$Trust_2$				0.797**	0.390	2.242
	$Trust_3$				0.723**	0.312	2.101
	$Trust_4$				1.285***	0.457	3.763
Individual attributes	sex	1.243*	0.745	3.456	1.413***	0.567	4.558
	Age	−0.04	0.398	0.912	−0.017	0.276	0.983
	Education	1.136***	0.399	3.141	1.006***	0.298	3.012
	By-business	−0.986***	0.254	1.956	−0.913***	0.313	2.012
	Perception of rural E-business	0.187***	0.291	1.216	0.615	0.217	1.728
Household attributes	Family agricultural acreage	1.075***	0.359	2.929	1.139***	0.251	3.123
	Labor force amount	−2.098*	1.165	0.142	−2.003**	0.867	0.135
	Household income	−0.419***	0.191	0.658	−0.611***	0.156	0.543
Rural resource attributes	Road accessibility	0.32***	0.301	1.410	0.311***	0.221	1.359
	Rural E-business service platform	1.326**	0.651	3.776	1.505***	0.451	4.643
	College student village officer	0.72	0.847	2.038	1.415	0.515	4.351
Constant		−18.718	3.659	0	−6.508	1.801	0.001
Chi-Square		107.159			169.559		
-2 log likelihood		171.033			108.632		
Nagelkerke R^2		0.492			0.724		
% Correct prediction rate		89.600			93.2		

*, **, and *** respectively indicated significant at 10, 5, and 1% levels.

Specifically, trust in relatives ($trust_1$) passed the test at the significance level of 5%. That is, with other conditions unchanged, the probability of the participation willingness of farmers will be 2.536 times than before, while $trust_1$ doubles. The reason underlying this is that frequent visits between relatives can communicate and share information and reduce

the cost of searching for cooperative partners (Sønderskov, 2011; Van Oortmerssen et al., 2014). At the same time, under the mutual trust of relatives, the cooperative contract is easy to be reached and tends to be stable, which can also effectively avoid opportunistic behaviors (Sønderskov, 2011). Therefore, trust in relatives has a significant positive influence on the e-commerce participation willingness of farmers.

Trust in neighbors ($trust_2$) passed the test at the significance level of 5%. That is, with other conditions unchanged, the probability of the participation willingness of farmers will be 2.242 times than before while $trust_2$ doubles. The explanation may be that frequent interactions of rural villagers lead to form an atmosphere of mutual understanding (Ajenaghughrure et al., 2020). According to Özcan and Bjørnskov (2011), it not only increased the mutual sense of identity but also reduced the transaction costs of business cooperation, thus strengthened their desire to cooperate. With the continuous improvement of the trust of farmers in their neighbors, their cooperation willingness gradually becomes clear, and finally, a cooperation mechanism of risk-sharing and benefit-reciprocity is also formed (Kwak et al., 2019).

The above two sets of data indicate that interpersonal trust (the trust of relatives and neighbors) has a significant impact on the decision-making of participation of farmers. The higher interpersonal trust is, the higher the participation willingness of farmers will be. So H_1 is supported.

The trust in village cadres ($trust_3$) passed the test at the significance level of 5%. That is, with other conditions unchanged, the probability of the participation willingness of farmers will be 2.101 times than before while $trust_3$ doubles. A possible explanation may be that with the constant improvement of the trust of farmers in village cadres, the rural community gradually formed a kind of trust relations (Li et al., 2019), this can reduce the risk and uncertainty, and enhance the confidence of farmers through policy support and technical guidance from village cadres. The existing studies have confirmed that as agents of grass-roots political power (Tang and Zhu, 2020), the village governing organizations communicated and implemented national policies during e-commerce poverty alleviation (Tang and Zhu, 2020; Wang H. et al., 2020), and had posed influence on the e-business implementation practice.

The trust in government ($trust_4$) passed the test at the significance level of 1%. That is, with other conditions unchanged, the probability of the participation willingness of farmers will be 3.763 times than before while $trust_4$ doubled. Li et al. (2019) proved that trust in government has a positive influence on the participation willingness of farmers.

The above two sets of data indicate that institutional trust (trust in village cadres and trust in the government) has a significant influence on the behavioral decisions of farmers' participation. The higher the level of institutional trust becomes, the higher the participation willingness of farmers will become. H_2 is supported.

In addition, among the four dimensions of trust, $trust_3$ has the lowest score, indicating that village cadres and governance have not played a great role in the development of rural trust. The underlying reason was that the rural governance had undergone

significant changes in the post-agricultural tax era, then the carrier of state power in the countryside became weakened (Tatarko, 2014), and the connection between the farmers and the village-level government was getting more and more looser (Lumineau et al., 2015). This kind of flat organizational structure (Seppänen et al., 2007) prompted farmers to directly communicate with the national policy and state regulations, thus weakened the discretionary power of village cadres. Especially in recent years, with the implementation of favorable policies, such as "new rural cooperative medical care" (Li et al., 2019) and "direct grain subsidy" (Hu et al., 2019), which directly connected the farmers with the central government, thus the influence of village cadres became weaker and weaker. Thus, H_3 is true.

The influence of other control variables on the participation willingness of farmers is analyzed below.

(1) From the perspective of individual attributes of farmers: both the variables, such as gender and education level, all have passed the significance test at the confidence level of 1%, and both coefficients were positive, indicating that male farmers are more likely to participate in e-commerce operation in comparison with the female farmers. The higher level of education of the farmers increased the possibility to participate. In addition, the variable of by-business has a significant influence on the participation willingness of farmers; the number of farmers without by-business is 21.52% higher than those with by-business. The underlying reasons are that farmers without multiple occupations depend more on local development (Lastra-Bravo et al., 2015; Hu et al., 2019), and they actively participate for increasing income. In addition, the perception of rural e-commerce of farmers also passed the test at the significance level of 5%, that is, the higher understanding of rural e-commerce farmers have, the greater possibility of participation will become. However, the variable of age did not pass the significance test. So, hypothesis H_{4a} is partially supported.

(2) From the perspective of household attributes: family agricultural acreage and family annual income pass the significance test at the confidence level of 1%, and the regression coefficient of family agricultural acreage is positive, indicating the family that has more arable land area is more likely to participate in e-commerce cooperation. The coefficient of annual family income is negative, indicating that low-income farmers are more inclined to participate in e-commerce operations than high-income farmers. In addition, the labor force passes the test at the 5% significance level. So, hypothesis H_{4B} is partially supported.

(3) From the perspective of rural resource attributes: rural e-business service platform, traffic accessibility, and college student village officer, all pass the test at the significance level of 1%, and the coefficient is positive, which indicate that they all have a significant positive influence on the participation willingness of farmers. So H_{4c} is supported.

It is worth noting that, after adding the factors of social trust, the variable of "village officer" and "perception of rural e-commerce" were proved to have no significant correlation with

TABLE 5 | The cluster regression results.

Variable	Low-income		Lowly-educated	
	B	Exp(B)	B	Exp(B)
$Trust_1$	1.585** (0.474)	4.706	0.902 (0.587)	2.548
$Trust_2$	1.386*** (0.533)	4.051	0.601 (0.489)	1.783
$Trust_3$	1.083*** (0.497)	2.962	1.065* (0.445)	2.843
$Trust_4$	0.889 (0.565)	1.993	1.298** (0.574)	3.686
Control variable	YES		YES	
Chi-square	133.531		87.789	
−2 log likelihood	74.815		67.963	
Nagelkerke R^2	0.737		0.622	

*, **, and *** respectively indicated significant at 1, 5, and 10% levels.

the participation willingness of farmers. The Nagelkerke R_2 of the overall model increased by 20.7%. This indicates that social trust plays a greater role in the decision-making of the participation of farmers than other factors.

Table 5 shows the regression results of the two groups, the low-income group and the low-education group. The results indicated that (1) farmers of the low-income group are affected by $trust_1$, $trust_2$, and $trust_3$. (2) Farmers of the low-education group were affected by $trust_3$ and $trust_4$, and neither $trust_1$ nor $trust_2$ has any influence on their participation willingness. It can be concluded that social trust can increase the likelihood of participation of farmers, and institutional trust has a greater impact on the decision-making of farmers than interpersonal trust. Moreover, the population of the poverty-stricken region mainly consisted of low-education and low-income ones. Therefore, it can be inferred that institutional trust plays a particularly important role in the poverty-stricken region of an underdeveloped economy. So, hypothesis H_3 is also supported.

DISCUSSION, LIMITATION, AND RECOMMENDATIONS

Discussion

What remains to be answered is how social trust contributes to the participation willingness of farmers in e-commerce poverty alleviation. Therefore, in this study, we attempted to reveal the underlying mechanism of the influence of interpersonal trust and institutional trust on the participation willingness of farmers in e-commerce poverty alleviation in China. Based on the questionnaire survey of 295 farmers in Chongqing eco-tourism district, the results showed that (a) both interpersonal trust and institutional trust all had a significant influence on the participation of farmers in e-commerce poverty alleviation, (b) compared with interpersonal trust, the institutional trust had a greater impact on the participation intention of farmers in China, and (c) rural resource dimensions all had a significant

positive influence on the participation willingness of farmers, while individual attributes and household attributes did not pass the significance test.

First, this study explored whether social trust, such as institutional trust and interpersonal trust promoted the participation intention of farmers. The result revealed the positive influence of both institutional and interpersonal trust on the participation intention. This result is consistent with the previous research conducted by Sønderskov (2011) and Wang et al. (2019). These findings stated that kinship between the relatives and frequent interactions between rural neighbors increased the mutual sense of identity and reduced the cost of searching for cooperative partners. In addition, the governments gradually performed well in policy communication and information service (Chen et al., 2019), some local governments had recruited college-graduate village officials for providing e-commerce technical support, all these increased the confidence of farmers in e-commerce poverty alleviation, thus, it can be concluded that the higher the level of social trust is, the stronger the participating enthusiasm of farmers becomes.

Second, the study compared the influence of institutional and interpersonal trust and revealed that institutional trust has a greater impact on the participation intention of farmers. This finding is in line with the previous research, which stated that the institutional trust had a significant effect on the participation willingness of farmers for its increasingly influence on the rural governance structure and normative expectations of individual farmers (Fuglsang and Jagd, 2015; Chen et al., 2019). Especially in the remote poverty-stricken areas with scarce resources, most people were low-education and low-income ones, the farmers depended more on the government to obtain business opportunities and preferential policies. Therefore, the role of institutional trust was much more important in the mind of farmers. In addition, from the perspective of Hofstede's national cultural dimension, China belongs to a society of high collectivism and huge power distance (Gelfand et al., 2006). Gelfand et al. (2011) had supplemented that the individuals in tight societies when compared with the loose ones, tended to rely more on the institutional norms with clear expectations enforced through national authority. Therefore, it is not surprising in China that the rural farmers depended more on national institutions and state governments for resource-seeking and problem-solving. Thus, compared with interpersonal trust, institutional trust had a greater impact on the participation intention of farmers.

Third, this study integrated human and physical resource dimensions into this theoretical framework and explored their influence on the participation intention of farmers. The results showed that (a) with the increase of the proportion of male farmers, educational level, by-business, and understanding of e-commerce poverty alleviation, the participation willingness of farmers became stronger. The research found that the participation rate of highly educated was 38.3% higher than the lower ones. This can be explained as following: the operation of e-business requires farmers to master the basic knowledge of internet technology and software applications (Xu, 2016), and a higher level of education and understanding enhances their

online service competence, thus increasing their willingness to participate. Besides in a traditional agricultural society, men assumed more financial responsibility for the family (Huang, 2012), and thus, they were more likely to adopt e-commerce for family income than women. The farmers of by-business had more ways for increasing income (Kong et al., 2019), their participation rate is relatively low than the ones with no other choice. (b) The dimensions of household attributes had a significant positive impact on the participation intention of farmers, with the increase of family agricultural acreage and the number of the labor force, the participation willingness of farmers became stronger. A possible explanation was that both family labor force and land resources were important resources for e-commerce production (Liu and Lai, 2016). These resources enhance their confidence and willingness to participate. Besides, the research found that the participation rate of high family income was 38.3% lower than that of low ones. A possible reason was that the high family-income families may have more ways for increasing their income, thus, their participation willingness was lower. (c) Rural resource dimensions, such as rural e-business service platform, traffic accessibility, and College student village officer, all had a significant positive influence on the participation willingness of farmers. Among these, the role of rural e-business service platforms was particularly important. The underlying reason may be that it is an informational infrastructure for business development. It not only brought advanced technology and operation experience but also an opened-up huge market for the poor rural areas (Hou and Ding, 2016), thus greatly enhanced the participation willingness of the farmers.

Last, the result of the presented study highlighted that the institutional trust at the village level did not perform well in promoting the participation willingness of farmers. Among all the four independent variables, trust in village cadres (trust$_3$) is the weakest. It is, therefore, necessary and urgent to improve the administrative service skills of rural grassroots organizations in the future.

Limitation and Policy Implications

There are many limitations that may be addressed by further research. First, 320 farmers in Chongqing province were selected for investigation; the representativeness of the research population is limited. The scope of the sample should be expanded to another agricultural province of China. Second, under the influence of COVID-19, the frequency of face-to-face communication and interviews was reduced, thus, a questionnaire survey was adopted for data collection. Insufficient data could lead to result bias. Further research could integrate the questionnaire survey and experimental design with archival data to enrich the data source. Third, this study mainly focused on the influence of social trust on the participation willingness of farmers in e-commerce poverty alleviation, however, the mediating paths of attitude and subjective norms should also be investigated in the future. In addition, other influencing factors, such as human capital and physical capital should be investigated in the future study.

Based on the above, the following implications were made for encouraging the participation of farmers: (1) interpersonal trust:

on the one hand, the rural government should initiatively carry out series of activities to strengthen the interpersonal relationship network of farmers, such as establishing the rural community organizations and holding informational exchange meetings regularly. On the other hand, rural wealth-leader or opinion leaders should be selected and trained. The rural government should formulate a policy to identify, train, and develop these talents with leadership competence, entrepreneurial spirit, and relevant professional skills. The aim is to stimulate them to play a leading and exemplary role in e-commerce participation and operation. (2) Institutional trust: it is necessary to improve the disclosure system of rural government information about e-business operation, and it is of great urgency to establish some non-governmental organizations to lead and supervise the behavior of village cadres (Han and Yan, 2019). At the same time, the farmers should be encouraged to actively participate in the village public affairs, and keep frequently in contact with the village cadres, thus their trust in the local government and village cadres will be enhanced. (3) Rural physical resource: strengthen the construction of rural infrastructure and create a good condition for rural e-business. First, the rural infrastructure construction, such as rural logistics, wireless networks, and rural information service stations should be strengthened. Second, it is necessary to transform the traditional household small-scale workshop into large-scale mass production for reducing the production cost as well as improving the product quality. Finally, the construction of a rural public security environment should be strengthened, thus the willingness of farmers to participate in e-commerce operations will be enhanced.

CONCLUSION

The study emphasized the role of social trust in promoting the participation willingness of farmers in e-commerce poverty alleviation. The findings showed that both institutional and interpersonal trust had a significant positive impact on the participation intention of farmers. The higher the level of social trust was, the stronger the participation willingness of farmers becomes. In addition, compared with interpersonal trust, institutional trust has a greater impact on the participation intention of farmers. Especially in poverty-stricken areas where economic development is relatively backward, the role of institutional trust is particularly important. Furthermore, the role of institutional trust at the village level still did not perform well in promoting the participation willingness of farmers. It is urgent and necessary to take measures to improve the trust of farmers in village cadres. It is expected that these findings will enrich the existing literature of social trust, enhance the participation enthusiasm of farmers, thus promoting the development of rural e-commerce.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

ETHICS STATEMENT

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

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The Stressful Life of the Urban Consumers: The Case of Dhaka City Residents

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The present research examines the metropolitan mental life of consumers of Dhaka, which is one of the most densely populated and least livable cities in the world. Though mental life encompasses a range of factors, the study considered the dynamic interplays of the most pertinent ones, such as perceived stress, the sense of control, materialistic values, and religiosity. These variables were measured and quantified by commonly used measurement tools; a recursive structural equation model was constructed to unearth the causal connections among those variables. By using a 57-item questionnaire, the study surveyed 1,068 shoppers living in 10 different zones of the city. The estimated covariance by the multivariate structural equation model indicates that perceived stress is significantly associated with the sense of control, while religiosity and materialistic value-orientation were negatively associated. However, there are no significant relationships between religiosity and sense of control, and materialism and sense of control. Perceived stress and religiosity are found to be positively associated. The estimated independent sample t-tests showed that while no significant difference is found in sense of control by gender, women were more religious, less materialistic, but perceive their lives as more stressful than the men. The findings help to interpret both the cognitive and affective responses of the consumers of urban residents.

Keywords: perceived stress, materialistic value-orientation, locus of control, religiosity, structural equation model, urban consumers, Bangladesh

INTRODUCTION

The last decade has been a period of multi-level consumer revolution because of the presence of social media that form public relationships at various levels (Quesenberry, 2020). While sustained economic growth leads to a surge in discretionary expenditure on globally branded consumer items, the income distribution has become more and more unequal at the same time (Davis, 2005). The purchase process in urban retail chains affects the psychic state or the mental life of the consumers (Halkin, 2018). Consumers adjust their buying habits to cope with the stress that comes with the transitions in urban life (Lee et al., 2001). While from the social and cultural perspective, cities

always generate some unpleasant feelings such as stress, discomfort, and animosity (Mubi Brighenti and Pavoni, 2019), retail crowding (i.e., consumer response to human density) has also been an intriguing area of study by marketing science (Eroglu et al., 2005). Particularly, Neuromarketing, the emerging discipline in marketing science, emphasizes studying the cognitive and affective responses of consumers (Lee et al., 2007). Consumer dispositions affect the linkages between stress-related appraisals, consumption feelings, and the coping process (Duhachek and Iacobucci, 2005). Stress can exacerbate detrimental tendencies, such as materialism and compulsive purchase (Burroughs and Rindfleisch, 2002). Nonetheless, the mental life, particularly the perceived stress of the consumers, has received little attention in studying consumer behavior (Moschis, 2007). The present research examines the metropolitan mental life of consumers of Dhaka by focusing on the dynamic interplays of the most pertinent psychosocial factors, such as perceived stress, sense of control, materialistic values, and religiosity.

The mental life of urban consumers reflects a set of organized attitudes and sentiments that may differ from one person to another in countless obvious ways, but their metropolitan "mental life" requires them to embrace and maintain the objective existence against the overwhelming forces of the city (Tole, 1993). Like most of the megacities, Dhaka is not merely "a physical mechanism and an artificial construction but the vital processes of the people who compose it; it is a product of nature, and particularly of human nature" (Park et al., 1984, p. 01). The residents, like the residents of other megacities, require maintaining the autonomy and uniqueness of their human nature in the face of constant and overwhelming transformation of the urban social structure (Mridha and Moore, 2011). Perhaps, the rapid transformation of Dhaka encourages the urbanites to liberate themselves from the shackles of all historical bonds, be it religious, political, economic, or moral (Bertuzzo, 2009). They may live in "a mosaic of little social worlds which touch but do not interpenetrate" (Park et al., 1984, p. 26). Perhaps, the major problem may not be the absence of social solidarity or the loss of communal values, but the sense of powerlessness (Seeman, 1971, p. 140). That powerlessness may lead the Dhaka residents to adopt a collaborative approach, with the fellow residents and with the divine (Pargament, 1997). Religious beliefs and commitment help them in self-preservation and retrain them from committing any destructive social conduct (Pargament et al., 1998). All these, with the unifying motives in the narrower sense of survival, form the inseparable whole of the metropolitan mental life of the consumers. Therefore, there should be a shared internal means by which they deal with their immediate external social environment. Their unique escalated awareness and a predominance of intelligence lead them to respond with "their heads instead of their hearts" (Simmel and Wolff, 1950, p. 01). However, it remains a question of what essentials elements of their mental life could be, and what is the nature of the dynamic interplays of those elements.

We are inclined to believe that the urban environment shapes the cognitive characteristics of the consumers; their sense of control, which is either internal (high) or external (low), manifests their assessment of personal control over outcomes

(Fiori et al., 2006). Because of the ever-increasing complexity of the urban environment, the urban consumers require confronting "the latent, and often unintended, consequences of one's actions" (Geyer, 2001, p. 388). Since the complexities of urban lives are appearing to be perceived as arbitrary and unpredictable, the urbanites determine their social priorities to preserve their sense of selfness and powerlessness (Ross et al., 2001). This sense of powerlessness denotes their view toward their capability to affect and regulate outcomes of their life experiences (Foulk et al., 2020). However, the confidence of handling the social problems of urban lives, controlling irritations of social lives, and the feelings that social life is heading in a favorable direction enhances self-efficacy and reduces the sense of helplessness (Cohen et al., 1993, 1994). Here, religion becomes a socially determined means that helps them not to be terrified of their imponderable urban social conditions (Hancock and Srinivas, 2008).

Religion in the urban environment is more of a perspective and less of the strict codes of conduct; religion seems to be "the heart of the heartless" (Marx, 1844) urban life, and the means to express the mild aversion, reciprocal strangeness, and repulsion by the residents. Religious organizations, such as mosques, offer the opportunity to interact in a way that the urbanites feel that they have positive social relations with everyone all around (Durkheim, 1915). Particularly, in religious ceremonies, they interact with those who have been the neighbors for years and yet are often not even identified by sight in everyday interaction (Durkheim, 1915). However, any metropolis is based upon an integration of several distinctive phenomena, and the market economy is the most pronounced one (Simmel and Wolff, 1950). "A city is a state – of mind, of taste, of opportunity. A city is a marketplace – where ideas are traded, opinions clash and eternal conflict may produce eternal truths" (Caen, 1967, p. 08). The urban environment favors the practice of reciprocity, where material items have a social meaning and value beyond their functional use (McFarlane, 2011). Materials become the objective measurable achievement of self-esteem whereby the metropolitan citizen reckons with whom he must have social ties (Reeves et al., 2012). Since the multiplicity and concentration of economic transactions emphasize the means of exchange and the value it generates, money becomes the shared concern (Sirgy, 1999). With a very distinct sensation to the materialistic urban lives, the psychic behavior always reacts to almost any perception of the materialistic values. Therefore, the current research hypothesized that the urban environment of Dhaka offers a greater opportunity to form materialism and yet religion remains the essential aspect of social lives. The interplays between materialistic values and religiosity were hypothesized to be critically related to perceived stress and the sense of control.

BACKGROUND AND HYPOTHESES

Perceived stress is the perceptions or ideas of an individual about the amount of stress they are experiencing at any particular time or during a specified period (Phillips, 2013, p. 1453). Perceived stress includes sentiments of the uncontrollability and

imprevisibility of life, how often one faces annoying troubles, how many changes one makes in his or her life, and how confident he or she is to address the hurdles or problems faced (Asberg and Renk, 2014). It is not the measurement of types or frequencies of a person when it comes to strained events, rather how a person feels about the overall stress of life and the ability to cope with these stresses (Phillips, 2013). Because of factors including personality, coping resources, and support, people perceive the effect or severity of comparable life events differently (Asberg and Renk, 2014). Perceived stress thus reflects the interplay between an individual and their environment that they view as threatening or exhausting their resources (Lazarus and Folkman, 1987). Perceived stress is frequently quantified using a questionnaire such as the Perceived Stress Scale (PSS-10) to determine the frequency of such feelings (Cohen et al., 1993). While perceived stress was once thought to be a one-dimensional assessment, the academic community now considers it to be two-dimensional (Taylor, 2015); the negatively phrased items implying perceived helplessness, and the positively phrased things implying perceived self-efficacy (Hewitt et al., 1992). There is some evidence that the degree of psychological and biological responses to stress is influenced by the impression of control over stressful circumstances (Maes et al., 1998). Some research looked at the impact of stressor control perception on both subjective and physiologic stress responses (Bollini et al., 2004). Sense of control is the belief that one has control over their own life rather than external influences (Ross et al., 2001). The sense of control can be understood as internal, i.e., the belief that one can control their life, or external, that is the view that life is controlled by external elements that the person have no impact on or that chance or destiny rules his or her life (Rotter, 1966). The internal locus of control tends to praise or criticize oneself; the external locus of control tends to praise or blame external causes (Anderson, 1976). Based on these key self-evaluation dimensions, the following hypothesis was made:

H1: Consumers with high perceived stress have a low sense of control.

The perceived power to control life events and outcomes are shaped by religious beliefs and actions (Fiori et al., 2006). Religiosity is a defining factor of social lives, wherein the preferences of people when it comes to apparel, foods, social gatherings, and decision-making often depend on their religious beliefs and religious commitment (Sethi and Seligman, 1993). It is "the degree to which beliefs in specific religious values and ideals are held and practiced by an individual" (Delener, 1990). People assess the significance of their religion in a variety of ways that range from inclusive (beliefs and spirituality) to exclusive (rituals and practices) (Büssing, 2017). Religious people are less inclined to regard difficulties as threats as their religious beliefs help them cope with undesirable life events (Ellison, 1991). Their faith in divine power or God strengthen the function of creating a sense of security; they believe that God will ensure that "all goes well," or at the very least will go well in the future; this reduces stress and contributes to general well-being (Ellison and Burdette, 2012). The conviction that one is loved and treasured by God is linked to

self-worth (Crocker and Nuer, 2003). Therefore, we hypothesize the following:

H2: Consumers with high religiosity have low perceived stress.

It is important to note that there are two competing theories to explain the effect of religion on the sense of control. The relinquished control thesis argues that religious belief will reduce the sense of control of an individual because heavenly creatures govern life occurrences and results (Jackson and Coursey, 1988). To believe in God as an active agent, one must give up personal or internal control (Jackson and Coursey, 1988). Relying on supernatural intervention can diminish mastery by distracting from problem-solving attempts (Ferraro and Kelley-Moore, 2001). Invoking God to cope with stress may reduce self-efficacy (Pargament, 1997). Conversely, for the personal empowerment thesis, religion and mastery are linked positively. Belief in an omnipotent supernatural being may increase human power and lessen uncertainty (Pargament, 1997). The fact that God is on their side does not lessen their sense of efficacy or mastery, wherein those who lack power may not need to rely on other kinds of self-efficacy (Jackson and Coursey, 1988). Along with religious beliefs, private religious practice can enhance a sense of stability and coherence. Praying is essential to creating a relationship with the divine (Demir, 2019). The relationship with God provides hope, control, and general peace (Ellison et al., 2012). Prayer can help people feel more valued and in control, as they are appreciated and helped by a divine force (Ellison, 1991). Personal prayer influences to reduce depressive symptoms and anxiety, as well as enhance self-esteem (Maltby et al., 1999). Furthermore, reading religious writings may help explain why religiousness is linked to higher levels of life satisfaction, in which readers may feel connected to the characters in the literature, especially if they share difficulties (Ellison, 1991). Individuals may also feel "less alone" in battling their challenges if they relate them to a biblical figure (Levin, 2008). Religious role-taking might provide ideas about how to behave and think to overcome challenges (Ellison et al., 2012). Therefore, the following prediction can be made:

H3: There is a significant association between religiosity and the sense of control.

The market economy, which is intrinsically connected to the mentality of the urbanites, forms materialistic value-orientation. Materialism is a state of mind that expresses an obsession with acquiring and spending (Rassuli and Hollander, 1986). It is the forming experiences of those who regard their belongings as an extension of themselves (Belk, 1985). To the materialist, possession is a goal of life, and they develop "Acquisition Centrality," where "possessions assume a central place in life of a person and are believed to provide the greatest sources of satisfaction and dissatisfaction" (Belk, 1985; p. 291). Possessions have social significance not only through their utilitarian function in supporting daily life, but also as symbols of identity, personality, and self-expression (Dittmar and Pepper, 1994). Financial prosperity, admirable assets, the perfect impression made by consumer goods, and

a high standing measured by the size of the wallet of an individual are all culturally sanctioned aspirations of materialistic values (Kasser et al., 2004). When materialism becomes a dominating normative value, people prioritize material comfort over core requirements such as social life quality or a sense of belongingness (Richins, 1994b). Profit, power, efficiency, and competitiveness have emerged as the primary motivators in the daily lives of people (Belk, 1985). The beliefs of an individual, their dedication to, and reverence of a divine are affected by materialistic value-orientation (Gallagher and Tierney, 2013). Materialism and Religiosity are two of the most incompatible yet dominating components of normative value-systems that are constantly in confrontation with each other (Masoom and Sarker, 2017a). It is found that religious individuals are less materialistic (Burroughs and Rindfleisch, 2002) because if religious people adopted materialistic principles, they would begin to perceive their lives as less meaningful (Dorn, 2014). Tangible objects are perceived as barriers to spiritual transcendence (Kavanaugh, 1997; Smith et al., 2003). However, religion remains a powerful factor in changing economic times and states of conflict, and it may have a major effect on materialistic value-orientation (Rakrachakarn et al., 2015). Therefore, the following hypothesis was proposed:

H4: Highly religious consumers have low materialistic value-orientation.

The quantity and nature of the possessions are one of the most noticeable ways in which people appear affluent (Dittmar, 1992). However, the materialists did not necessarily feel that they can regulate the outcomes of their life events; they may suffer from lower levels of well-being, spend money on a range of non-required purchases, have high debt, and low financial savings (Watson, 2003), problematic interpersonal relationships (Richins and Dawson, 1992), and high levels of substance use (Vansteenkiste et al., 2007). Materialists try to make up for their inability to achieve their desired self-esteem by emphasizing material accomplishment that eventually prevents them from concentrating on more intrinsically satisfactory goals. Arguably, the pursuit of material possessions is a self-defeating cycle (Richins, 1994a); when an individual buys something that has some materialistic values, it satisfies his or her desire. However, a new desire is spawned as he or she acclimatizes to it, and a more prestigious and thus potentially costlier purchase may now be needed to fulfill the desire. The desire will then be revived, and the self-defeating process repeats until the individual can no longer fulfill it or assumes a great deal of debt to do so. In either case, the leverage of the person over fulfilling the urge to benefit is gradually becoming weaker. A dependence on possessions to build self-worth solidifies the vulnerability of individuals to factors such as social acceptance (Kashdan and Breen, 2007); they often become reluctant to be in touch with negatively assessed thoughts and emotions, and thereby strive to escape circumstances. Besides, materialism was inversely linked to competence and autonomy, where these two constructs are linked to feelings of power (Eisenberger et al., 1999). Materialism was positively linked to negative feelings but was not linked to positive feelings (Kashdan and Breen, 2007). Hence, we can hypothesize the following:

H5: Highly materialistic consumers have high perceived stress.

H6: Highly materialistic consumers have a low sense of control.

The hypotheses mentioned above are tested in a recursive model in which the effects flow in one direction with no feedback loops, indicating that the effects are sometimes also the causes. The recursive model is estimated in structural equation modeling (SEM) by examining variances and covariances to find interrelationships among the four proposed latent variables. Besides, men and women differ by their perceived stress, sense of control, religiousness, and materialistic value-orientation. Several studies reported that compared with men, women experience higher levels of chronic and daily pressures (Culhane et al., 2001; Gentry et al., 2007; Anbumalar et al., 2017). It was found that compared with men, women view their interpersonal relations and life events were more controlled by external factors (Sherman et al., 1997). Regardless of the religious background, it was found that women were more religious than men (Schnabel, 2015; Masoom, 2020). Likewise, studies indicate that men are more likely than women to believe that having material possessions boosts their pleasure and allows them to express themselves more freely (Browne and Kaldenberg, 1997; Segal and Podoshen, 2013). Hence, we can hypothesize the following:

H7: Compared with men, women are more religious, less materialistic, have less sense of control, and perceive a higher level of stress.

The proposed hypotheses are being tested in the context of Dhaka city, which is the city that is one of the most densely populated (23,234 inhabitants per km^2 in a gross surface of 300 km^2) metropolises in the world. Approximately 75% of the residents are literate, about 23% are unemployed, and approximately 90% are Muslims and their life expectancy is nearly 71 years[1]. Due to its historical significance, Dhaka can be considered a classic example of a metropolis. Once, it was the capital of the Mughal Empire, an administrative province of eastern India, and famous for its cotton industries. By the early 18th century, Dhaka had lost its status as the provincial capital, and by the second half of the 18th century, the city lost its position as a significant center of administration, commerce, and development (Ahmed and Islam, 2021). Dhaka became the capital of eastern Pakistan after the partition of India-Pakistan in 1947. After the liberation war of Bangladesh, the shape of Dhaka approached that of a conurbation in the late 1970s in the sense that its external growth began to connect with outlying suburbs (Bertuzzo, 2009). The expansion of the city from the 1980s onward meant filling up the adjacent empty spaces to meet the needs. The iconic parliament complex, palaces, mosques, temples, roads, bridges, gates, gardens, aqueducts, tanks, and modern markets are the pronounced features of the present Dhaka city. Here, the life of the ordinary people, commonly

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[1] worldpopulationreview.com

termed as middle-class, is non-eventful and invariably the same within the limited opportunities offered by the city (Lefebvre et al., 1996). Most of the residents are Muslims, and Islam is a faith that is presumed to have strong effects on Muslim culture (Kavoossi, 2000). The enforcement of religious rules and regulations in the legal structures of many Islamic countries has a clear and profound impact on the lifestyles and consumption habits of Muslims (Cyril De Run et al., 2010). For example, a study in Bangladesh showed that increasing materialistic values have a decreasing impact on the level of religiosity (Masoom and Sarker, 2017b).

MATERIALS AND METHODS

Research Design and Sampling

To unveil that latent mechanism of the mental life of the urban consumers, the study quantified the four variables, namely, perceived stress, sense of control, religiosity, and materialistic values, in a way that facilitated the statistical procedure. No new item was generated, and the Likert-scale format was used, as proposed by the relevant established scales used in the research. IBM SPSS Statistics (Version 23.0. Armonk, NY: IBM Corp) and IBM SPSS Amos graphics (Version 24. Chicago: IBM Corp) were used to perform the statistical analysis.

The study used *superpopulation* model as an alternate way of random sampling (Isaki and Fuller, 1982). By *superpopulation* model, the population could be attributed as a finite number and the sample could be attributed as unbiased predictors to meet the requirement to make any statistical inferences. Out of a total of 50 sub-offices for the postal service in Dhaka city, 10 were selected by lottery. From the selected postal zones, the prominent shopping malls were enlisted, and one was selected by lottery. To formulate the *superpopulation*, the surveyors counted the number of people visiting the selected malls to make a rough estimation of the number of shoppers. After the population was counted, each kth shopper had been considered as the respondent if consent was given. At least 100 respondents were considered from the selected shopping malls of each postal zone. The value of k was determined by the total number of shoppers of a particular shopping mall divided by 100. The target sample size was no less than 384 men and 384 women since the size would be adequate by 95% confidence level (CL) and 5% CI. The targeted total sample size was at least 1,000 respondents as that would be adequate by 99% CL and 5% CI. At the time of the survey, the surveyors informed the participants that their participation is voluntary, and no personal information will be disclosed at any point in time. It took about 20 weeks for 10 surveyors to complete the survey by using pencils and printed questionnaires.

Instruments and Procedure

There were three demographic information-related questions (gender, age, and education), and 57-items included in the structured questionnaire corresponding to four segments to elicit the response from the target population. It would be prudent to include variables like monthly income or employment in the questionnaire. However, being mall intercept, it cannot be ensured that all participants had a sample job and a fixed income, hence, including only the basic demographic variables could reduce non-response error (Bush and Hair, 1985). While selecting the scales and the items, the internal reliability and cross-cultural validity reported in the previous studies were taken into consideration. The research used the PSS-10 (Cohen et al., 1993) to address the level of stress suffered by urban consumers. Perceived self-efficacy and perceived helplessness were treated as two-factor formative constructs because of their validity and reliability in cross-cultural contexts (Siqueira Reis et al., 2010), including the sample from Dhaka city (Masoom and Hoque, 2018). The scale is one of the most reliable (Cronbach's alpha > 0.7) measurement tools to address perceived stress (Andreou et al., 2011; Maroufizadeh et al., 2014).

To measure sense of control, which is sometimes termed as the locus of control in social sciences, the study considered the Locus of Control of Behavior Scale (LCB) (Craig et al., 1994) because it was reported not to be affected by social desirability problems, and also found to yield strong internal reliability (Cronbach's alpha > 0.8) (Hooley, 1998; Sagone and De Caroli, 2014). Recent research argues that two dimensions, namely perceived powerlessness and perceived control, increased the psychometric properties for the LCB scale (Bright et al., 2013). The study of Richins and Dawson (1992) most successfully measured the degree of "Materialistic Value-Orientation" by three constructs, which were acquisition centrality, material-driven success, and materialistic happiness with the 18-item scale (Richins and Dawson, 1992). Since previous research (cf. Masoom and Sarker, 2017b) indicated that the items corresponding to constructs of the materialism scale did not load in the developing economy context like the original scale prescribed, the present research changed the association of the items of the relevant constructs when required. The study has selected 12 items (five items for religious beliefs and seven items for religious commitment) to measure religiosity from the "Religiousness Scale" (Sethi and Seligman, 1993). It was one of the most comprehensive tools to investigate the level of religiosity of people with different faiths, and was found to be a valid measure for the Bangladesh Sample (Masoom, 2020).

Religiosity and materialism were measured on a 7-point Likert scale, and sense of control was measure on a 6-point Likert scale, where 1 indicated responses such as Strongly Disagree, Not at all influential, or Strongly Disbelieve, whereas the maximum value (6 or 7) indicates Strongly Agree, Extremely Influential, or Strongly Believe. The higher values of these three constructs indicate the lower sense of control, higher religiosity, and higher materialism. Perceived stress was measured on a 5-point Likert scale, where 0 indicated never and 4 indicated very often. We measured the construct validity of the four variables by confirmatory factor analysis (CFA) before estimating the dynamic interplays among the four variables. All four variables were considered as two-dimensional second-order formative constructs in the multivariate recursive model. In addition, we measured the means and *SD* of the items, construct-wise grand means, and calculated the independent sample *t*-test to explore the factor-wise and item-wise differences by gender.

RESULTS

Participants

A total of 1,068 Dhaka city consumers participated in the survey, approximately 36.2% of the surveyed were women, and about 80% of the participants were less than 30 years old. Less than 5% of the surveyed were above 50 years old. Approximately 30% of the respondents were undergrad students. Please consider **Table 1** for the demographic detail of the respondents.

Psychometric Properties

A two-factor solution (perceived self-efficacy and perceived helplessness) to address PSS-10 was found valid. The validity of the scale as unidimensional measurement [CFA = 0.83; root mean square error of approximation (RMSEA) = 0.06] was less that of two-dimensional measurement (CFA = 0.94; RMSEA = 0.04). Likewise, the internal consistency of the scale as unidimensional (Cronbach's alpha = 0.59), did not reach the acceptance level. While the reliability of perceived self-efficacy (Cronbach's alpha = 0.40) was poor, whereas the reliability of perceived helplessness (Cronbach's alpha = 0.66) was satisfactory. Perceived Helplessness could explain 48% of the total variation, and perceived self-efficacy could explain 56% of the variation. Hence, perceived stress was treated as a two-factor formative construct in the recursive model. The most effective item to measure helplessness was (S1) "becoming upset because of something happened unexpectedly" (β = 0.62) and to measure efficacy was (S4) "confidence of handling personal problems" (β = 0.52).

About seven items of the LCB scales were loaded poorly (<0.3) in the structural equation model, hence, those items were deleted. These items were (L2) emphasizing the matter of chance, (L3) considering luck as the determinants of future, (L10) believing that people are victims of circumstance, (L12) indicating some biological dispositions such as tightness in muscles, or (L14) irregular and fast breathing are beyond their control. Furthermore, some positively worded items such as

TABLE 1 | Demographics of the sample (*n* = 1068).

Factor	Category	Frequency	Percent
Gender	Male	681	63.8
	Female	387	36.2
	Total	1068	100.0
Age	Less than 20	69	6.5
	20–29	802	75.1
	30–39	104	9.7
	40–49	48	4.5
	50–59	34	3.2
	Above 60	11	1.0
	Total	1068	100.0
Level of Education	Higher Secondary	406	38.0
	Undergrad	321	30.1
	Graduate	216	20.2
	Post-grad	125	11.7
	Total	1068	100.0

(L13) believing that a person can really be the master of his/her fate, and (L15) indicating that why problems vary so much from one occasion to the next, yielded poor regression co-efficient. The comparative-fit index (CFI) (0.93), and RMSEA (0.03) showed that two factors (powerlessness and control) with a total of 11 items could be treated as valid. Powerlessness could explain 54% of the total variation, and control could explain 57% of the variation. Items such as (L9) attributing the outside actions and events controlling life (β = 0.53) and (L16) confidence to deal successfully with future problems (β = 0.56), were mostly influencing to measure the sense of control. The estimated indices [CFI = 0.93; goodness of fit index (GFI) = 0.98; RMSEA = 0.04] showed the validity of the construct.

Religiosity was addressed by adopting common items from the scale (Sethi and Seligman, 1993). It was a two-factor construct, namely religious beliefs (five items) and religious commitment (seven items). The importance of religious beliefs in life (RQ2) (β = 0.62) and the influence of religion on apparel wearing (RQ8) (β = 0.75) were the two influencing items that corresponded to the constructs measuring religiosity. The primary indices [i.e., CFI, GFI, and adjusted GFI (AGFI)] reached the thresholds (>0.9). The internal consistency for religious beliefs (Cronbach's alpha = 0.64) and religious commitment (Cronbach's alpha = 0.78) was satisfactory.

The CFI of Richins and Dawson (1992) proposed measurement for materialistic value-orientation was poor (CFI = 0.55), and the standardized regression co-efficient of five items were negligible (<30% of variation explained). Hence, a new two-factor measurement tool was constructed by exploratory factor analysis. Internal consistency of the two factors, namely, acquisition centrality (seven-item factor; Cronbach's alpha = 0.70) and acquisition simplicity (6-item factor; Cronbach's alpha = 0.67) was satisfactory. While the CFI (0.87) was very close to the threshold, the other primary indices (i.e., GFI and AGFI) reached the thresholds (>0.9) for materialism. The most influencing item to measure acquisition centrality was (M2) "Some of the most important achievements in life include acquiring material possessions" (β = 0.57), and to measure Acquisition simplicity was (M8) trying "to keep life simple, as far as possessions are concerned" (β = 0.69).

Overall, all four variables were two-dimensional formative constructs, while the CFI for materialism was close to the threshold, all other three variables yielded acceptable values. The normal chi-square (CMIN/DF) values of these four constructs were ranging from above 2 but not exceeding 5.5. RMSEA for all four variables was good (<0.06), while the standardized root means square residual (SRMR) of all the constructs did not exceed 0.05. Therefore, all four constructs were valid measures to explore the dynamic interplays among the variables of interest. For more results, refer to **Table 2**.

Recursive Model Estimates

The estimated covariance by the recursive structural equation model showed few significant and few non-significant

TABLE 2 | Validity and reliability of the measurements.

Variable(s) and its validity	Associated constructs, corresponding items, and their reliability	β
Perceived stress	**Helplessness (AVE = 0.26; CR = 0.66; Cronbach's alpha = 0.66)**	0.48
CMIN/DF = 2.66	S1. how often have you been upset because of something that happened unexpectedly?	0.62
CFI = 0.94	S2. how often have you felt that you were unable to control the important things in your life?	0.57
GFI = 0.98	S3. how often have you felt nervous and "stressed"?	0.47
AGFI = 0.97	S6. how often have you found that you could not cope with all the things that you had to do?	0.31
RMSEA = 0.04 (p = 0.96)	S9. how often have you been angered because of things that were outside of your control?	0.46
SRMR = 0.04	S10. how often have you felt difficulties were piling up so high that you could not overcome them?	0.54
	Efficacy* (AVE = 0.15; CR = 0.41; Cronbach's alpha = 0.40)	0.56
	S4. how often have you felt confident about your ability to handle your personal problems?	0.52
	S5. how often have you felt that things were going your way?	0.37
	S7. how often have you been able to control irritations in your life?	0.31
	S8. how often have you felt that you were on top of things?	0.34
Locus of control	**Powerlessness (AVE = 0.22; CR = 0.56; Cronbach's alpha = 0.57)**	0.54
CMIN/DF = 2.48	L4. I can control my problem(s) only if I have outside support	0.30
CFI = 0.93	L6. My problem(s) will dominate me all my life	0.52
GFI = 0.98	L9. My life is controlled by outside actions and events	0.53
AGFI = 0.97	L11. To continue to manage my problems I need professional help	0.52
RMSEA = 0.04 (p = 0.98)	L17. In my case maintaining control over my problems is due mostly to luck	0.41
SRMR = 0.03	**Control* (AVE = 0.19; CR = 0.54; Cronbach's alpha = 0.53)**	0.57
	L1. I can anticipate difficulties and take action to avoid them	0.44
	L5. When I make plans, I am almost certain that I can make them work	0.41
	L7. My mistakes and problems are my responsibility to deal with	0.43
	L8. Becoming a success is a matter of hard work; luck has little or nothing to do with it	0.33
	L16. I am confident of being able to deal successfully with future problems	0.56
Religiosity	**Beliefs (AVE = 0.25; CR = 0.61; Cronbach's alpha = 0.64)**	0.72
CMIN/DF = 5.06	RQ2. How important would you say religion is in your life	0.62
CFI = 0.93	RQ12. Do you believe that there a heaven?	0.58
GFI = 0.96	RQ14. Do you believe there are miracles?	0.40
AGFI = 0.94	RQ15. Do you believe your suffering will be rewarded?	0.52
RMSEA = 0.06 (p = 0.01)	RQ16. Do you believe that in the future your children will be able to lead a better life than yourself?	0.32
SRMR = 0.04	**Commitment (AVE = 0.36; CR = 0.79; Cronbach's alpha = 0.78)**	1.07
	RQ4. How often do you pray?	0.32
	RQ6. How much influence do your religious beliefs have on the important decisions of your life?	0.65
	RQ7. Would you support to marry someone of another religion?	0.47
	RQ8. How much influence do your religious beliefs have on what you wear?	0.75
	RQ9. How much influence do your religious beliefs have on what you eat and drink?	0.73
	RQ10. How much influence do your religious beliefs have whom you associate with?	0.55
	RQ11. How much influence do your religious beliefs have on what social activities you undertake?	0.62
Materialism	**Acquisition Centrality (AVE = 0.24; CR = 0.69; Cronbach's alpha = 0.70)**	1.00
CMIN/DF = 5.11	M1. I admire people who own expensive homes, cars, and clothes	0.46
CFI = 0.87	M2. Some of the most important achievements in life include acquiring material possessions	0.57
GFI = 0.96	M4. The things that I own say a lot about how well I'm doing in life	0.48
AGFI = 0.93	M5. I like to own things that impress people	0.41
RMSEA = 0.06 (p = 0.01)	M11. Buying things give me a lot of pleasure	0.50
SRMR = 0.05	M12. I like a lot of luxury in my life	0.49
	M18. It sometimes bothers me quite a bit that I can't afford to buy all the things I like	0.50
	Acquisition Simplicity* (AVE = 0.27; CR = 0.68; Cronbach's alpha = 0.67)	1.00
	M3. I don't place much emphasis on the amount of material objects, people own as a sign of success	0.48
	M6. I don't pay much attention to the material objects other people own	0.44
	M7. I usually buy only the things I need	0.56
	M8. I try to keep my life simple, as far as possessions are concerned	0.69
	M13. I put less emphasis on material things than most people I know	0.51
	M14. I have all the things I really need to enjoy life	0.39

Items reverse coded for the model.
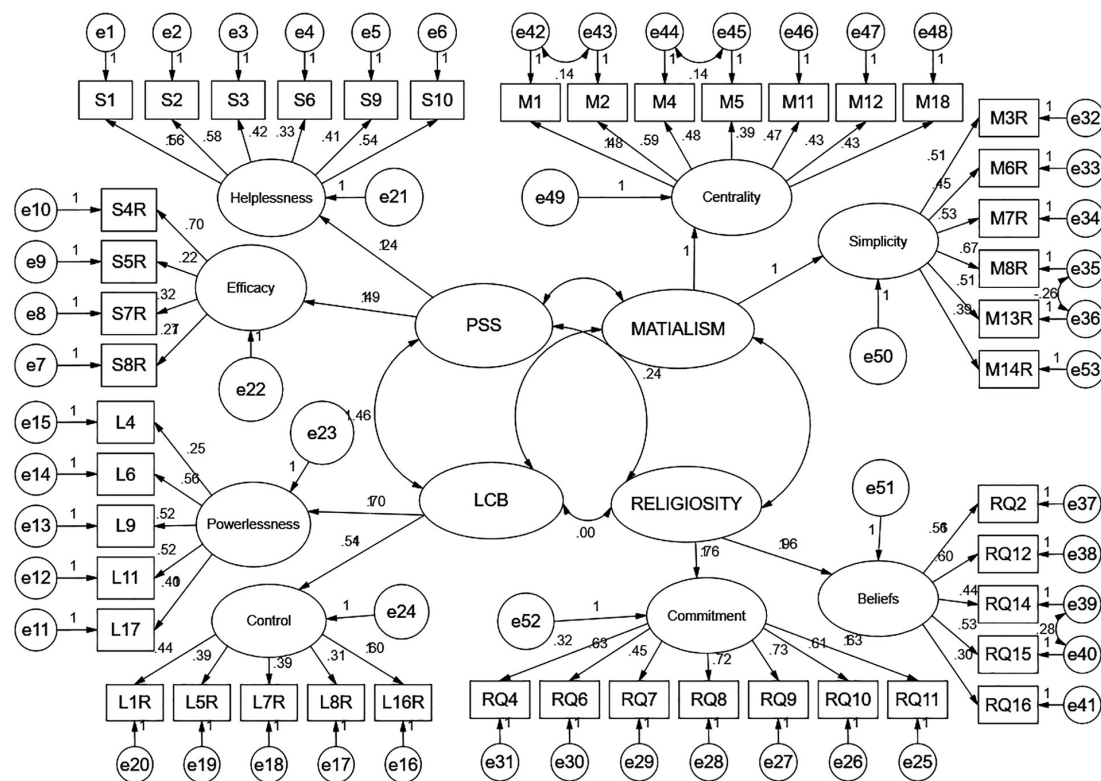*All estimates are significant, p < 0.001.*

FIGURE 1 | Recursive model of second-order formative constructs. Minimum iteration was achieved; chi-square = 6295.60; degrees of freedom = 2,793; and probability level = 0.001.

relationships. Perceived stress and sense of control were covarying significantly (t = 7.02, p = 0.001). Likewise, religiosity was covarying with perceived stress (t = 2.49, p = 0.013), but religiosity did not covary with the sense of control (t = −0.25, p = 0.805). While materialistic values covaried with the religiosity (t = −6.44, p = 0.001), neither perceived stress (t = 0.97, p = 0.466) nor sense of control (t = 0.26, p = 0.793) covaried with materialism. For the path-diagram of the constructed structural equation model, see **Figure 1**. For the degree of covariance, see **Table 3**.

Gender-Wise Mean Differences

The comparative mean values ($\bar{x}$) of the responses unveiled some basic patterns of the mental life of the consumers living in Dhaka.

TABLE 3 | Estimated covariance in the recursive model.

Variable	Variable	Regression coefficient	Standard error	t	p
Perceived stress	Sense of control	0.093	0.013	7.02	0.001
Religiosity	Sense of control	−0.005	0.007	−0.25	0.805
Materialism	Sense of control	0.003	0.010	0.26	0.793
Perceived stress	Religiosity	0.034	0.014	2.49	0.013
Perceived stress	Materialism	0.007	0.007	0.97	0.338
Religiosity	Materialism	−0.112	0.017	−6.44	0.001

The estimated mean scores (2.05 < $\bar{x}$ < 2.54) of the items and constructs of perceived stress implied that the life of the Dhaka city consumers was sometimes (values around 2) stressful. While compared with men ($\bar{x}$ = 2.21), women ($\bar{x}$ = 2.31) perceived helplessness (t = −2.196, df = 1,066, p = 0.028). There were hardly any differences between men ($\bar{x}$ = 2.24) and women ($\bar{x}$ = 2.22) as far as self-efficacy was concerned (t = 0.362, df = 1,066, p = 0.718). However, there were no significant differences by gender in the degree of sense of control, and neither the two constructs such as powerlessness and control nor any of the 10 items used to address the variable showed any gender-wise significant differences. The mean values (3.41 < $\bar{x}$ < 3.92) of the negatively worded items corresponding powerlessness indicated that they were not feeling highly powerless. Conversely, the mean values (4.18 < $\bar{x}$ < 4.71) of the positively worded items corresponding control indicated that the consumers of Dhaka city perceived their life be controlled by their own decisions.

The mean values (4.05 < $\bar{x}$ < 6.22) of the items of religiosity indicated that consumers of Dhaka city were religious. Not only the religious commitment of women ($\bar{x}$ = 5) was significantly (t = −4.059, df = 1,066, p = 0.001) higher than the men ($\bar{x}$ = 4.71), but also the religious beliefs of women ($\bar{x}$ = 5.83) were significantly (t = −4.041, df = 1,066, p = 0.001) higher than the men ($\bar{x}$ = 5.57). Women ($\bar{x}$ = 4.46) were more likely than men ($\bar{x}$ = 4.05) to pray (t = −3.601, df = 1,066, p = 0.001), the religious beliefs of women ($\bar{x}$ = 5) influenced more than men ($\bar{x}$ = 4.53)

on what to wear ($t = -4.135$, $df = 1,066$, $p = 0.001$), the religious beliefs of women ($\bar{x} = 5.58$) influenced more than men ($\bar{x} = 5.30$) on what to eat or drink ($t = -2.594$, $df = 1,066$, $p = 0.01$). Likewise, women ($\bar{x} = 6.22$) gave more importance than men ($\bar{x} = 6.03$) did on their religious beliefs ($t = -2.309$, $df = 1,066$, $p = 0.021$). Men ($\bar{x} = 4.9$) believed less in miracles than the women ($\bar{x} = 5.29$) did ($t = -3.172$, $df = 1,066$, $p = 0.002$), and women ($\bar{x} = 6.48$) believed more in the existence of heaven than the men ($\bar{x} = 6.13$) did ($t = -4.318$, $df = 1,066$, $p = 0.001$). Finally, the religious beliefs of men ($\bar{x} = 5.06$) influenced less than women ($\bar{x} = 5.33$) when it comes to their decision making ($t = -2.783$, $df = 1,066$, $p = 0.005$).

While there were no significant differences between men ($\bar{x} = 3.97$) and women ($\bar{x} = 3.88$) by acquisition simplicity ($t = 1.7$, $df = 1,066$, $p = 0.089$), men ($\bar{x} = 3.76$) scored high on acquisition centrality than women ($\bar{x} = 3.59$) indicating the significant gender differences ($t = 3$, $df = 1,066$, $p = 0.003$). Compared with women ($\bar{x} = 3.24$), men ($\bar{x} = 3.5$) admired people who own expensive homes, cars, and clothes ($t = 2.598$, $df = 1,066$, $p = 0.010$). Likewise, men ($\bar{x} = 3.87$) liked a lot of luxury in life than the women ($\bar{x} = 3.65$) did in their lives ($t = 2.388$, $df = 1,066$, $p = 0.017$). Women ($\bar{x} = 3.12$) scored less than men ($\bar{x} = 3.43$) considering the acquisition of properties as a significant accomplishment ($t = 3.255$, $df = 1,066$, $p = 0.001$). Compared with women ($\bar{x} = 3.63$), men ($\bar{x} = 3.82$) were more positively inclined to not emphasizing material objects as a sign of success ($t = 2.402$, $df = 1,066$, $p = 0.018$). Similarly, compared with men ($\bar{x} = 3.92$), women ($\bar{x} = 3.74$) were less positively inclined to not paying attention to the material objects other people own ($t = 2.062$, $df = 1,066$, $p = 0.042$). Women ($\bar{x} = 3.99$) scored low than men ($\bar{x} = 4.2$) on the assertion that they buy only the things that are needed ($t = 2.137$, $df = 1,066$, $p = 0.035$). For more results, see **Table 4**.

DISCUSSION

The study intended to unveil some cognitive characteristics of the urban consumers by quantifying the four variables, which were perceived stress, sense of control, religiosity, and materialistic values. It was hypothesized that consumers with high perceived stress have a low sense of control (H1), while consumers with high religiosity have low perceived stress (H2), and religiosity and a sense of control have a considerable relationship (H3). It was also predicted that highly religious consumers have a low materialistic value orientation (H4), whereas consumers with high materialistic value orientation have a high degree of perceived stress (H5), and a low sense of control (H6). Finally, it was argued that compared with men, women are more religious, less materialistic, have less sense of control, and perceive a higher level of stress (H7). These hypotheses were tested in a single recursive model by formulating an SEM and by surveying 1,068 shoppers living in 10 different zones of Dhaka city, one of the most densely populated metropolises of the world. The results suggested perceived stress was significantly associated with the sense of control, while religiosity and materialistic value-orientation were negatively associated with each other. There were no significant relationships between religiosity and sense

of control, as well as materialism and sense of control. Perceived stress and religiosity were found to be positively associated. While no significant difference was found in sense of control by gender, women were more religious, less materialistic but perceive their lives as more stressful than the men. Particularly, while there was no gender-wise difference in perceived self-efficacy, the perceived helplessness of women was higher than the men. The findings of the present research squared with a range of previously known bivariate associations.

The current study suggested that consumers with high perceived stress had a low sense of control, while religiosity has no significant associations with a sense of control, consumers with high perceived stress were highly religious. Similar findings were reported in previous studies. For instance, a high level of perceived stress led to a high degree of helplessness, which contributed to the association between the sense of control and perceived stress (Asberg and Renk, 2014). Failing to control the external social environment was also found to be an important contributor that could generate stress (Sadowski and Blackwell, 1985). While perceived control did not affect biological and subjective stress responses, the acute sense of powerlessness could increase stress by reducing perceived control (Bollini et al., 2004). Materialistic individuals are not less likely to encounter positive affective states than less materialistic individuals, but they are more likely to only experience stronger negative affective states. Likewise, materialistic individuals are also more likely to perceive a high degree of powerlessness, but not necessarily perceiving a low degree of control (Christopher et al., 2009). Perhaps the actual pursuit of possessions could lead to periodic benefits in feelings of perceived control and positive effect when possessions were originally acquired. Because of this, no significant association was found between materialism and perceived stress, and materialism and sense of control. It was found that highly materialistic consumers were less religious, wherein the differences in materialism were derived from differences in religious values and devotion (Wuthnow, 2002; Bryant-Davis and Wong, 2013). With economic growth leading to conspicuous consumption, the social value of religion decreases (McCleary and Barro, 2006).

The degree of sense of control, perceived stress, religiosity, and materialistic values differ by gender. First, women are made to feel powerless through informal cycles of power and powerlessness that influence the relative availability of opportunities and resources (Atkinson and Delamont, 1990). While gender affects the status of women and their access to decision-making power, it also affects the types of expectations, perceptions, and reactions to emotional displays that keep women from advancing and gaining power in their relationships (Ryan and Haslam, 2007). The emotions of women, such as compassion, kindness, and nurturing, have less interpersonal strength than the emotions of men, such as confidence and pride (Sinaceur and Tiedens, 2006; Overbeck et al., 2010). Those in positions of power can express emotions that increase their authority in professional relationships, perpetuating the cycle of gender power disparities in the workplace (cf. Gibson and Schroeder, 2002). Second, women are compelled by social relationships to be "submissive, meek, obedient, and

TABLE 4 | Mean (*SD*) and the *t*-test statistics of men-women differences.

Item no.	Factors and items (Response points)	Mean (Standard deviation)			Test statistics		
		Total	Male	Female	t	df	p
PSS	**Helplessness** (Minimum = 0, Maximum = 4)	2.25 (0.69)	2.21 (0.68)	2.31 (0.70)	−2.21	1,066	0.028
S1	Upset by something unexpectedly	2.32 (1.14)	2.26 (1.15)	2.42 (1.13)	−2.22	1,066	0.027
S2	Unable to control life's important things	2.25 (1.10)	2.24 (1.11)	2.26 (1.09)	−0.23	1,066	0.815
S3	Feeling nervous and stressed	2.46 (1.08)	2.43 (1.09)	2.50 (1.07)	−0.93	1,066	0.354
S6	Finding Hard time dealing with the amount of things to do	2.05 (1.08)	2.03 (1.05)	2.09 (1.12)	−0.92	1,066	0.359
S9	Angry at things that were beyond control	2.29 (1.15)	2.26 (1.15)	2.34 (1.13)	−1.06	1,066	0.291
S10	Finding Overwhelming number of difficulties piled up	2.13 (1.22)	2.06 (1.26)	2.25 (1.14)	−2.50	1,066	0.013
PSS	**Efficacy** (Minimum = 0, Maximum = 4)	2.23 (0.65)	2.24 (0.65)	2.22 (0.67)	0.36	1,066	0.718
S4	Feeling confident of the ability to handle personal problems	2.54 (1.09)	2.55 (1.11)	2.53 (1.04)	0.30	1,066	0.766
S5	Feeling that things were going in favor	2.09 (1.08)	2.08 (1.07)	2.12 (1.11)	−0.69	1,066	0.490
S7	Ability to control irritations in life	2.25 (1.07)	2.28 (1.06)	2.20 (1.09)	1.16	1,066	0.244
S8	Feeling of being on top of things	2.05 (1.14)	2.05 (1.15)	2.05 (1.11)	0.11	1,066	0.914
LCB	**Powerlessness** (Minimum = 1, Maximum = 6)	3.64 (0.88)	3.64 (0.88)	3.65 (0.88)	−0.16	1,066	0.872
L4	Problems can be controlled only by outside support	3.91 (1.42)	3.92 (1.41)	3.89 (1.43)	0.41	1,066	0.679
L6	Problems dominate the entire life	3.59 (1.51)	3.58 (1.49)	3.63 (1.53)	−0.52	1,066	0.604
L9	Life is controlled by outside actions and events	3.50 (1.45)	3.48 (1.44)	3.53 (1.47)	−0.58	1,066	0.565
L11	Professional help is needed to continue to manage problems	3.41 (1.49)	3.44 (1.50)	3.36 (1.47)	0.84	1,066	0.403
L17	Maintaining control over problems is due mostly to luck	3.83 (1.41)	3.81 (1.44)	3.87 (1.36)	−0.658	1,066	0.511
LCB	**Control** (Minimum = 1, Maximum = 6)	4.38 (0.77)	4.38 (0.77)	4.37 (0.78)	0.10	1,066	0.865
L1	Anticipating difficulties and taking action to avoid them	4.24 (1.35)	4.20 (1.37)	4.32 (1.30)	−1.46	1,066	0.144
L5	After plans are made, things usually turn out well	4.31 (1.23)	4.34 (1.22)	4.26 (1.24)	1.08	1,066	0.278
L7	Own mistakes and own problems are own responsibilities	4.71 (1.29)	4.69 (1.28)	4.73 (1.31)	−0.45	1,066	0.655
L8	Hard work brings success where luck has little/nothing to do	4.18 (1.39)	4.20 (1.37)	4.14 (1.43)	0.62	1,066	0.537
L16	Confident to deal with future challenges effectively	4.47 (1.24)	4.49 (1.25)	4.43 (1.23)	0.79	1,066	0.429
REL	**Beliefs** (Minimum = 1, Maximum = 7)	5.66 (1.03)	5.57 (1.05)	5.83 (0.96)	−4.04	1,066	0.001
RQ2	Importance of religious beliefs	6.10 (1.39)	6.03 (1.45)	6.22 (1.27)	−2.31	1,066	0.021
RQ12	Believing on the existence of heaven	6.26 (1.39)	6.13 (1.51)	6.48 (1.11)	−4.32	1,066	0.001
RQ14	Believing on the miracles	5.05 (1.94)	4.90 (1.94)	5.29 (1.92)	−3.17	1,066	0.002
RQ15	Believing on the reward for sufferings in afterlife	5.56 (1.61)	5.50 (1.65)	5.68 (1.54)	−1.79	1,066	0.073
RQ16	Believing in better tomorrow for the children	5.35 (1.63)	5.28 (1.64)	5.45 (1.62)	−1.61	1,066	0.107
REL	**Commitment** (Minimum = 1, Maximum = 7)	4.81 (1.16)	4.71 (1.16)	5.00 (1.13)	−4.06	1,066	0.001
RQ4	Frequency of prayer	4.20 (1.77)	4.05 (1.74)	4.46 (1.80)	−3.60	1,066	0.001
RQ6	Influence of religious beliefs on decision-making	5.16 (1.51)	5.06 (1.49)	5.33 (1.53)	−2.78	1,066	0.005
RQ7	Supporting interfaith marriage	5.22 (2.03)	5.05 (2.07)	5.54 (1.91)	−3.91	1,066	0.001
RQ8	Influence of religious beliefs on apparels	4.70 (1.78)	4.53 (1.82)	5.00 (1.67)	−4.13	1,066	0.001
RQ9	Influence of religious beliefs on what to eat and drink	5.40 (1.73)	5.30 (1.77)	5.58 (1.67)	−2.59	1,066	0.010
RQ10	Influence of religious beliefs on whom to associate with	4.37 (1.84)	4.33 (1.83)	4.43 (1.87)	−0.91	1,066	0.364
RQ11	Influence of religious beliefs on social activities	4.66 (1.61)	4.63 (1.62)	4.69 (1.59)	−0.57	1,066	0.570
MAT	**Acquisition Centrality** (Minimum = 1, Maximum = 7)	3.70 (0.88)	3.76 (0.84)	3.59 (0.93)	3.00	1,066	0.003
M1	Admire people who own expensive homes, cars, and clothes	3.41 (1.62)	3.50 (1.55)	3.24 (1.71)	2.60	1,066	0.010
M2	Acquisition of properties is a significant accomplishment	3.32 (1.53)	3.43 (1.51)	3.12 (1.54)	3.25	1,066	0.001
M4	Material belongings say a great deal of people's whereabouts	3.20 (1.55)	3.23 (1.52)	3.15 (1.60)	0.77	1,066	0.440
M5	Like to own things that impress people	3.64 (1.53)	3.66 (1.54)	3.60 (1.53)	0.64	1,066	0.523
M11	Buying things give a lot of pleasure	3.99 (1.46)	3.99 (1.44)	3.99 (1.49)	0.05	1,066	0.962
M12	Like a lot of luxury in life	3.79 (1.43)	3.87 (1.41)	3.65 (1.46)	2.39	1,066	0.017
M18	Unaffordability of the liked things bothers quite a bit	4.00 (1.42)	4.05 (1.41)	3.90 (1.44)	1.59	1,066	0.112
MAT	**Acquisition Simplicity** (Minimum = 1, Maximum = 7)	3.94 (0.84)	3.97 (0.82)	3.88 (0.86)	1.70	1,066	0.089
M3	Not emphasizing material objects as a sign of success	3.75 (1.25)	3.82 (1.22)	3.63 (1.28)	2.40	1,066	0.018
M6	Not paying attention to the material objects other people own	3.86 (1.36)	3.92 (1.35)	3.74 (1.40)	2.06	1,066	0.042
M7	Buying only the things that needed	4.13 (1.51)	4.20 (1.48)	3.99 (1.55)	2.14	1,066	0.035
M8	Trying to keep life simple, as far as possessions are concerned	4.17 (1.35)	4.19 (1.38)	4.14 (1.32)	0.53	1,066	0.591
M13	Putting less emphasis on material things that most known people	3.87 (1.26)	3.87 (1.26)	3.87 (1.26)	−0.01	1,066	0.996
M14	I have all the things I really need to enjoy life	3.86 (1.42)	3.84 (1.41)	3.91 (1.43)	−0.82	1,066	0.413

caring," qualities that are associated with higher degrees of religion (Mol, 1985). Religious participation is viewed as a household activity that is primarily carried out by the woman out of care for the well-being of a family (Glock et al., 1967). Women are more religious as a result of their lower participation in the workforce and more responsibility for the upbringing of their children. Moreover, women with lower labor force involvement not only have more time for religious activities but also have a personal identity, which may compensate for their lack of social influence (Luckmann, 1967). Rejecting religious ideas is risky behavior, and because women are exposed to more danger in almost every aspect of life, they are less inclined to engage in such behavior (Bromiley and Curley, 1992). Likewise, daughters are subjected to more parental monitoring in patriarchal societies, whereas sons are comparably free to engage in risky activities. Third, the self-monitoring characteristics of men make them more materialistic than women (Cass, 2001; Lim and O'Cass, 2001). While women are more interested in fashion than men, research shows that men are more interested in durable things like cars (Bloch, 1981). Men acquire instrumental and recreational items that enhance independence and activity on the spur of the moment (Dittmar et al., 1995). Women, on the other hand, purchase symbolic and self-expressive objects that represent their appearance and emotional elements (Dittmar et al., 1995). Men indicated more functional, instrumental, and activity-related reasons, whereas women gave more emotional and relationship-oriented reasons (Dittmar, 1989). Men report higher convenience and time-consciousness, whereas women report higher shopping delight, brand awareness, pricing awareness, and shopping confidence (Seock and Bailey, 2008). Therefore, men were found to have more acquisition centrality than women.

The findings of the present research contribute to the multidisciplinary approach toward interpreting social dilemmas and extend our understanding of consumer psychology. Besides its physiological and psychological effects, perceived stress influences consumer behavior in a variety of ways (Celuch and Showers, 1991). For instance, perceived stress can make consumers immobile or passive, which reduces their intention of purchasing products that previously felt as necessary (Torres and Nowson, 2007). Conversely, stress can lead to impulsive buying (O'Guinn and Faber, 1989), changes in brand preferences (Mathur et al., 2003); it can lead to the consumption of alcohol and drugs (Heatherton and Baumeister, 1991), or a high level of fatty food intake (Oliver et al., 2000), an increase in the frequency of comparison shopping behaviors (Anglin et al., 1994), or the number of unintentional purchases (Park et al., 1989). Considering that many stressful events result from external factors outside the control of the consumer, it leads to a low sense of control over the surroundings or the consequences of actions (Cutright, 2012). Loss of control has several behavioral implications, including compensatory behavior to regain control (Cutright et al., 2013). One such activity is ratifying religious commitment, which gives people a sense of power over a divine plan (Kay and Eibach, 2013). Religious beliefs, like superstitions, provide meaning to random events (Whitson and Galinsky, 2008). Thus, if stressful circumstances caused a sense of loss of control over the environment of an individual, consumers might respond by regaining control with their religious beliefs. Another type of compensatory behavior was consumers could use their financial resources to regain control in stressful situations. For instance, saving money gives one a sense of control because it ensures that money will be there when needed. Likewise, spending money on only essentials and not on non-necessities could provide a sense of control by making essential products readily available (Durante and Laran, 2016). With hoarding behavior, consumers may engage in behavior that could make them saving money to an unhealthy extreme (Klontz et al., 2012). However, when the sense of control of consumers was challenged, they could also seek comfort and control by amassing belongings (Hartl et al., 2005). These could be physical goods gained in the past or the present monetary possessions; this could lead them to the ideology of acquisition centrality (Richins, 1994b). Therefore, consumers could seek to restore control as a response to a stressful event by either religiosity or materialistic possessions.

There is no way but to agree that it is virtually impossible to pinpoint the coherent way of the metropolitan mental life of the consumers, but it is very much possible to outline the dynamic interplays among its essential aspects. The metropolitan mental lives of urban consumers can be expressed by the dynamic interplays among perceived stress, sense of control, materialistic value-orientation, and religiosity. While the research provides an account of the modes of experiences in terms of the reactions of the inner life to the external urban conditions, we should acknowledge the limitations as far as the external validity of the findings is concerned. First, the mall intercept was a less effective method of selecting the target population, although it benefited us to select the non-poor, non-disadvantaged solvent urban consumers in quick time. Particularly, the mall intercept was less useful if we were to collect the older aged respondents. Second, we were inclined to keep the response points as the established scales deliver, but a homogenous response category, be 5-point or 7-point, could have increased the internal validity of the research. Despite the limitations, we were inclined to believe that the research findings are valid as far as the general picture of the mental life of the urban consumers is concerned. What appears explicitly as dissociation in the metropolitan style of life was the dilemma faced by residents of the metropolis that centered on the self-schema they form. The research has portrayed the degree and the mixture of this style of life, the pace of its emergence and disappearance, and the forms in which the urban life was lived by the consumers in the Dhaka metropolis.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/**Supplementary Material**, further inquiries can be directed to the corresponding author/s.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by the Institute of Advanced Research (IAR),

AUTHOR CONTRIBUTIONS

MM: study conception and design, data collection, analysis and interpretation of results, and draft manuscript preparation.

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SUPPLEMENTARY MATERIAL

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Neural Responses to Mandatory and Voluntary Donation Impact Charitable Giving Decisions: An Event-Related Potentials Study

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The present study aimed to explore the influence of donation amounts on donation decisions in different donation contexts and to reveal the psychological mechanisms. Furthermore, we focused on how to enhance individuals' intention to donate voluntarily. We designed an experiment on donation decisions, employing event-related potentials (ERPs) to probe the effect of psychological mechanisms on donation decisions by detecting the neural basis of donation decision-making. Based on S-O-R (stimulus-organism-response) theory, we used donation contexts and donation amounts (stimuli) to induce psychological activity in the participants (organism) and then influence individual donation decision behaviors (response). Moreover, we applied psychological reactance (PR) theory to discuss the effect of donation context on decisions and the corresponding psychological process. The behavioral results showed that donation contexts (mandatory vs. voluntary) were significantly related to the donation amounts (i.e., less vs. more money that the charity received than money that the participants donated). At the ERP level, compared with mandatory donation, voluntary donation evoked a larger P2 amplitude when the charity received less money. In addition, a larger mean amplitude of LPP was elicited by voluntary donation compared to mandatory donation. This study provides practical implications for charity organizers to guide people to donate voluntarily.

Keywords: charitable giving, donation context, donation amount, ERP, P2, LPP

INTRODUCTION

Charitable donation is an important part of modern civil society and is a necessary supplement to the government in the public sector (Strang and Park, 2016). Voluntary contributions are vital for some programs (such as art, health care, social welfare, and higher education) in modern society (Mayr et al., 2009). However, people's intention to donate to charity is not high in most countries. For example, voluntary donation accounted for only 0.14% of the GDP in China in 2019 (Charity alliance, 2019). Therefore, it is critical to explore how to increase people's willingness to donate voluntarily. To solve this problem, it is necessary to investigate individuals' motivation to make voluntary donations.

In previous studies, scholars have focused on donation decisions under different donation contexts. For example, Harbaugh et al. (2007) probed the motives for charitable donations, in which they divided donation contexts into mandatory giving (in a passive, tax-like manner) and voluntary giving. They found that subjective satisfaction ratings were higher (on average) in voluntary conditions (Harbaugh et al., 2007). Moreover, some studies have used donation amount as a dimension of donation decision to address the multidimensional nature of the donation decision (Fajardo et al., 2018; Paramita et al., 2020), as well as further study of the need for its interaction with donation contexts. For example, Mayr et al. (2009) indicated that donation amount played an important role in people's decision to give voluntarily. They suggested it was to confirm that under voluntary conditions, as the amount of donations increases, so does the level of activation and intention to donate (Mayr et al., 2009). However, few studies have focused on the psychological process of donation decisions although it plays a very important role in decision-making (Moon et al., 2015; George and Dane, 2016; Gangl et al., 2017; Tao et al., 2020).

The S-O-R (stimulus-organism-response) theory, which is an extensively applied framework to understand human behavior, posits that environmental stimuli impact human cognitive and affective reactions, thereby influencing behavior (Mehrabian and Russell, 1974). According to S-O-R theory, the donation context and amount, which serve as environmental stimuli, may influence individuals' psychological processes and subsequent decisions. In addition, psychological reactance (PR) may be another theory that fits our current research questions. PR theory is widely used to address certain phenomena of social influence. According to this theory, if individuals feel that any of their free behaviors is eliminated or threatened with elimination (e.g., in a coercive context), the motivational state of psychological reactance will be aroused (Brehm, 1993; Miron and Brehm, 2006). Thus, the mandatory donations in this study may also induce participants' psychological mechanisms and corresponding decision-making behaviors. Therefore, in the current study, we intended to apply the S-O-R framework and the PR theory to examine and discuss the effect of donation context and amount on decisions and the corresponding psychological process. Specifically, we focus on two donation contexts, mandatory donation and voluntary donation, as well as the interaction with high and low donation amounts.

For the research method, since psychological scales (e.g., emotional valence and arousal scales) and conventional research methods (e.g., questionnaires, interviews) are not always accurate or objective, neuroscientific methods were employed. Event-related potentials (ERPs) are a neuroscientific method using non-invasive technology that has been repeatedly used to gain insights into social decision-making. Its high temporal resolution enables the mental chronometry of decision-making to be understood in detail (Gangl et al., 2017; Jin et al., 2018). As such, the current study employed ERPs to explore the effect of individual psychological mechanisms on donation decisions as the donation amount changes under different donation contexts.

Many researchers have used ERPs to study related cognitive neural mechanisms (Yoder and Decety, 2014; Jin et al., 2020;

Xu et al., 2020). These studies have identified two emotion-related ERP components that have been frequently studied in previous decision neuroscience studies, which are closely related to the processing of attention allocation (P2) and emotional arousal (late positive potential, LPP).

Among ERP components, early components refer to those that appear in the first 300 ms after the onset of a stimulus and have been reported to show the initial sensory encoding of the significant emotional stimulus (Junghöfer et al., 2001; Schupp et al., 2007). Existing ERP studies have proposed that P2 is an attention-related component that indicates early rapid automatic activity. It has been shown that negative stimuli can attract more attention resources and elicit greater amplitudes of P2 than positive stimuli (Carretié et al., 2001; Huang and Luo, 2006; Wang et al., 2012). For example, Zhan et al. (2018) found that a larger P2 was elicited when subjects decided whether to help a stranger compared to a friend during moral decision-making. This was confirmed by the positive correlation between P2 amplitudes and subjective unpleasure (Sarlo et al., 2012; Pletti et al., 2015). Regarding donation, Harbaugh et al. (2007) found that increases in the amounts going to the charity increased the likelihood that a voluntary giving was accepted. They also examined subjective satisfaction ratings as a function of payoffs to the subject and charity in voluntary and mandatory conditions. The results showed that subjective satisfaction increased as the charity received more money than they gave away and, satisfaction was higher in the voluntary conditions than in the mandatory conditions (Harbaugh et al., 2007). This finding suggested that individuals tended to prefer when the charity received more money than they expected. Moreover, previous studies have indicated that people allocate more attentional resources to cost-relevant information when conducting charitable donations, which is reflected by P2 (Gasiorowska et al., 2016; Li et al., 2021). In the current study, subjects might compute more deliberately involving personal costs (money they gave away) and benefits (their final monetary benefits allocated to the charity) under voluntary conditions. We predicted that subjects were unsatisfied when the charity received less money than they gave away, which might induce more negative emotion and capture more attention resources. For mandatory conditions, based on PR theory, participants would be motivationally aroused to engage in control-averse behavior to restore freedom when their freedom of choice was restricted (Brehm, 1993). However, recent studies have also found that social coercion may reduce the sense of agency and the neural processing of the outcomes of one's own actions (Caspar et al., 2016; Caspar et al., 2018; Villa et al., 2021). In our experimental setting, participants were told that the donation would happen whether they chose "acknowledge," which might reduce their sense of agency and affect their control-aversion. Thus, we suspected that subjects might not allocate more attention resources regardless of how much money the charity received in these conditions. Therefore, in the current study, we predicted that under voluntary donation, charities receiving less money will attract more attention resources and thereby elicit a larger P2 amplitude (positive polarity) compared to the mandatory donation context.

The other component is late positive potential (LPP), which is a late positive-going component mainly located in the centro-parietal regions of the brain (Cuthbert et al., 2000; Schupp et al., 2007). Moreover, Solomon et al. (2012) demonstrated that the emotional effect on LPP reached significance not only in the posterior region but also in the central and anterior regions. A series of studies have shown that LPP is sensitive to emotional stimuli (Schmitz et al., 2012; Solomon et al., 2012). Therefore, researchers take the difference of LPP amplitude as a marker of emotional regulation processing, reflecting the extent to which individuals can adjust the influence brought by emotional stimulus, the magnitude of which reflects emotional regulation ability (Hajcak et al., 2010). For example, Xu et al. (2020) investigated whether human gifting behavior and brain activity are affected by inequity aversion. They found that the participants were more likely to reject an unfair donation proposal and that the LPP elicited by fair offers was more positive than unfair offers (Hu et al., 2014; Xu et al., 2020). A sense of unfairness reduces charitable giving to a third party (Xu et al., 2020). In this experiment, voluntary donation allowed subjects to choose whether to donate by pressing the "accept" and "reject" buttons, which was a "softer" appeal compared to mandatory behavior. However, for mandatory trials, the donation would happen whether they selected "acknowledge." As mentioned above regarding PR theory, since their freedom was restricted, they might take action to restore it. However, their sense of agency might be reduced in the mandatory context of this study, further influencing control-averse behavior (Caspar et al., 2017; Caspar et al., 2018; Villa et al., 2021). Hence, participants might be more receptive to the process of voluntary contributions and express a higher level of emotional arousal. We hypothesized that voluntary donation accentuates the emotional impact of donation, as reflected in a larger LPP amplitude, compared to the mandatory condition.

As described above, P2 and LPP may reflect different facets of information processing and intention from the perspective of ERP components. Grounding on S-O-R framework and PR theory, we expected that the impact of donation context and amount on donation willingness would be reflected in the processing of attention allocation (P2) and emotional arousal (late positive potential, LPP).

MATERIALS AND METHODS

Participants

The participants of the current experiment consisted of 28 volunteers (13 males, 15 females). They were undergraduate and graduate students from Ningbo University. Their ages ranged from 19 to 24, with a mean age of 21.46 (SD = 1.55). All participants were native Chinese speakers without any history of neurological or psychiatric disorder. They were right-handed and had normal or corrected-to-normal vision. All participants gave written informed consent prior to the experiment. The study was conducted in accordance with the Declaration of Helsinki (WMA, 2009). The protocol was approved by the Academy of Neuroeconomics and Neuromanagement at Ningbo

University. Data from one male participant were discarded because of excessive artifacts during electroencephalogram (EEG) recordings. Thus, valid data from 27 participants were entered into the final analysis.

Materials

This money raised in the experiment on donation decisions was given to the China Youth Development Foundation (CYDF), which is a national charity that helps the growth and development of underprivileged youth through funding services, interest expression and social advocacy. CYDF actually asked for donations through the internet.

To manipulate donation, the experiment developed two donation contexts: mandatory donation, which described giving made by individuals under the pressure of human feelings, or tax-like donation made by entrepreneurs, and voluntary donation. To allow a direct comparison of the effect of both conditions, a within-subjects design was used in which all participants were presented with both conditions. There were 50 different stimuli (2 donation contexts × 25 amount combinations), and all the stimuli were repeated four times. Thus, the whole experiment consisted of 200 trials. Half of the trials were mandatory donations, while the other half were voluntary donations.

The amount combinations represented the amount of money that the participant donated and the amount that the charity received, which were 10 combinations of the charity receiving less money than subjects donated, 5 combinations of the charity receiving as much money as the subjects donated, and 10 combinations of the charity receiving more money than the subjects donated (see **Figure 1**). This experimental design was adapted from the experiment of Harbaugh et al. (2007). According to their experimental design,

Subject -¥25	Subject -¥25	Subject -¥25	Subject -¥25	Subject -¥25
CYDF +¥5	CYDF +¥10	CYDF +¥15	CYDF +¥20	CYDF +¥25
Subject -¥20	Subject -¥20	Subject -¥20	Subject -¥20	Subject -¥20
CYDF +¥5	CYDF +¥10	CYDF +¥15	CYDF +¥20	CYDF +¥25
Subject -¥15	Subject -¥15	Subject -¥15	Subject -¥15	Subject -¥15
CYDF +¥5	CYDF +¥10	CYDF +¥15	CYDF +¥20	CYDF +¥25
Subject -¥10	Subject -¥10	Subject -¥10	Subject -¥10	Subject -¥10
CYDF +¥5	CYDF +¥10	CYDF +¥15	CYDF +¥20	CYDF +¥25
Subject -¥5	Subject -¥5	Subject -¥5	Subject -¥5	Subject -¥5
CYDF +¥5	CYDF +¥10	CYDF +¥15	CYDF +¥20	CYDF +¥25

FIGURE 1 | Combinations of the amount of money the participant donated and the amount the charity received.

there were six combinations of less money, four combinations of equal amounts, and six combinations of more money. The main purpose of these manipulations was to provide sufficient variation in the "amount of giving" to elicit a range of individual responses and to reduce participant fatigue (Harbaugh et al., 2007).

After the experiment, subjects were asked to self-report their independence. We designed an independence scale containing seven items, some of which were adapted from the Catell 16 Personality Factor Test (Catell et al., 1970) and Proactive Personality Scale (PPS) (Bateman and Crant, 1993), e.g., "I love being a champion for my ideas, even against others' opposition," "I love to plan alone, don't like interference from others," and "I do not like to be forced when I do things." All items were graded on a scale of 1~5: 1 was strongly disagree, and 5 was strongly agree. We used Cronbach's α coefficient to test the internal consistency reliability of the scale and applied exploratory factor analysis (EFA) to test the validity of the scale. The results showed that it was reliable and valid (see section "Questionnaire Results").

Procedure

Participants were tested individually in a sound-attenuated, shielded chamber, and they were asked to sit 100 cm away from a computer-controlled monitor on which the stimuli were presented. Before the experiment started, participants browsed the material about CYDF's mission and the experimental instructions for approximately 5 min.

A personal endowment of CNY¥60 was made available for each participant in the ERP experiment, which corresponded to the maximum amount they could obtain for themselves during the experimental task. Participants were told that their decisions on each trial would ultimately affect their final payoff and the monetary benefits allocated to the charity; one mandatory and one voluntary combination would be randomly chosen and implemented after the experiment. They were also told that they were participating in a real donation and that the donation amount would actually be sent through the CYDF website in front of participants. Before the experiment began, the participants were all asked a few questions to ensure that they understood the experiment. They were encouraged to make free choices and were guaranteed anonymity.

Participants were provided with a keypad to report their donation intention for each condition. Events for each trial occurred as presented in the timeline shown in **Figure 2**. After a 600~800 ms fixation cross against a gray background, a blank screen lasting for approximately 400~600 ms followed. Then, the screen revealed whether this trial was mandatory or voluntary for 1,000 ms. After a blank screen appeared for 400~600 ms, the screen showed how much participants donated and how much CYDF received below mandatory or voluntary for 2,000 ms. Afterward, a blank screen appeared again for 400~600 ms. Finally, two horizontally arranged labels were added to the lower portion of the screen. For mandatory trials, one of the labels read "acknowledge" (press key "1") and the other "invalid button" (press key "3"). Participants were told whether they chose to "acknowledge" or not the donation would happen. For voluntary trials, one of the labels read "accept" (press key "1") and the
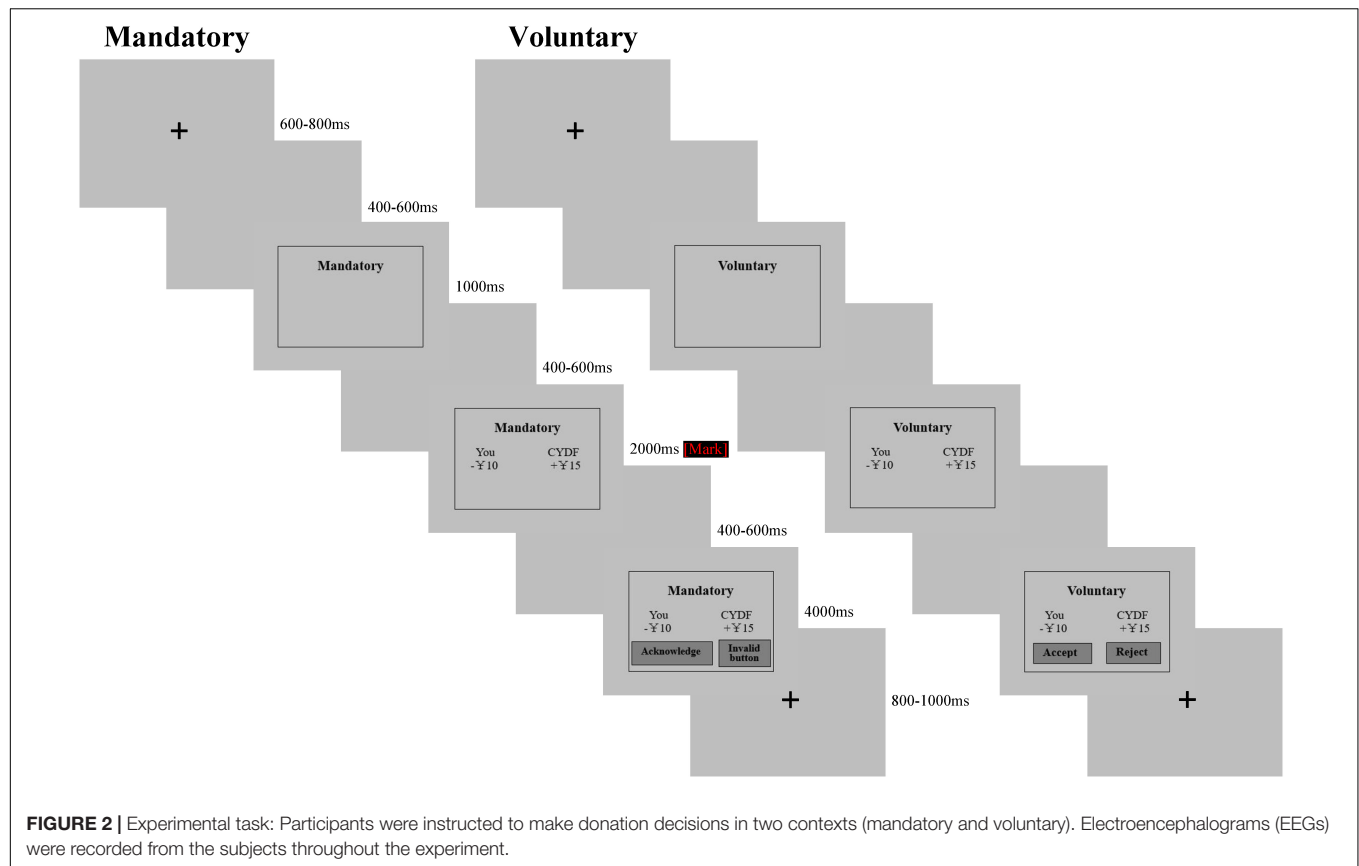
other "reject" (press key "3"). The participants were asked to make a decision by pressing keys with keypads for 4,000 ms, or the next round would automatically run. Afterward, there was a blank screen with a fixation cross for an intertrial period that was randomly jittered for 800~1,000 ms (shown in **Figure 2**). Each subject participated in four 7-min runs of 50 trials. After the experiment, participants completed the self-report questionnaire about independence. Stimuli, recording triggers and response data were presented and recorded using E-Prime 2.0 (Psychology Software Tools, Pittsburgh, PA, United States). The participants were asked to minimize blinks, eye movements, and muscle movements during the whole experiment. The formal experiment started after 6 practice trials.

Electroencephalogram Recording and Analysis

EEG data were recorded with a cap containing 64 Ag/AgCl electrodes and a Neuroscan Synamp2 Amplifier (Curry8, Neurosoft Labs, Inc.). Its sampling rate was 500 Hz, and channel data were recorded from 0.01 Hz to 100 Hz. The experiment started only when electrode impedances were reduced to below 5 kΩ. A cephalic (forehead) location between FPz and Fz was used as the ground, and the left mastoid served as a reference. To measure eye movements, electrooculograms (EOGs) were recorded from electrodes placed 10 mm from the lateral canthi of both eyes (horizontal EOG) and above and below the left eye (vertical EOG), and EOG artifacts were off-line corrected for all subjects using the method proposed by Semlitsch et al. (1986).

EEG data were off-line transformed based on the average of the left and right mastoid references. EEG recordings were digitally filtered with a low-pass filter at 30 Hz (24 dB/Octave). For ERP analysis, the data were segmented for the epoch from 200 ms before the onset of stimulus on the video monitor to 800 ms after its onset, with the first 200 ms pretarget interval as a baseline. The stimulus was the screen that showed how much participants donated and how much CYDF received below mandatory or voluntary for 2,000 ms. Trials containing amplifier clippings, bursts of electromyography activity, or peak-to-peak deflections exceeding $\pm$ 100 µV were excluded. For each participant, EEG recordings were averaged for the four experimental conditions (mandatory-less, mandatory-more, voluntary-less, voluntary-more) over each recording site.

Based on visual observation and the guideline proposed by Picton et al. (2000), we chose the time window of 230~270 ms for the analysis of P2. Five electrodes (AF3, AF4, F3, Fz, and F4) in the frontal-central area were included in the statistical analysis. A 2 (donation contexts: mandatory vs. voluntary) × 2 (comparison of amount that the charity received: less vs. more) × 5 (electrodes) ANOVA was performed for the P2 analysis. The Bonferroni correction was used for multiple comparisons. We applied Greenhouse-Geisser corrections to determine significance (Greenhouse and Geisser, 1959), and partial eta-squared values (η^2_p) are reported to demonstrate the effect sizes in ANOVA models (Cohen, 1988). Spearman correlation analysis was conducted between the P2 amplitude and participants' independence of scales in the postquestionnaire.

FIGURE 2 | Experimental task: Participants were instructed to make donation decisions in two contexts (mandatory and voluntary). Electroencephalograms (EEGs) were recorded from the subjects throughout the experiment.

The time window of 580~800 ms was chosen from visual inspection of the grand averaged waveforms for the analysis of LPP (Solomon et al., 2012; Hua et al., 2014). We performed the statistical analysis of six electrodes (C3, Cz, C4, CP3, CPz, and CP4). Afterward, a 2 (donation contexts: mandatory vs. voluntary) × 2 (comparison of amount that the charity received: less vs. more) × 6 (electrodes) ANOVA was conducted for the LPP analysis. The Bonferroni correction was used for multiple comparisons. Greenhouse-Geisser corrections were used to determine significance (Greenhouse and Geisser, 1959), and partial eta-squared values (η^2_p) are reported to demonstrate the effect sizes in ANOVA models (Cohen, 1988).
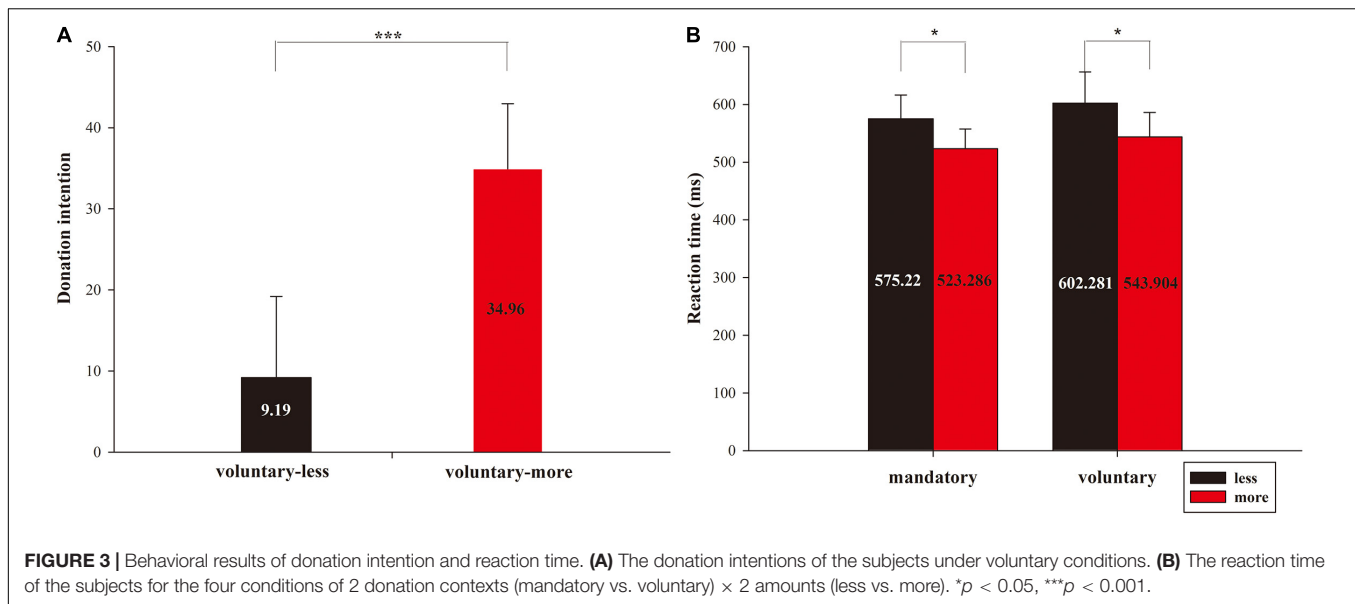
RESULTS

Behavioral Results

The donation intention of participants and the reaction time between different conditions were analyzed. Participants were told that the donation would happen whether they chose the "acknowledge" or "invalid" button for the mandatory condition; hence, analyzing mandatory donation decisions was unnecessary. However, for the voluntary condition, participants were free to choose "accept" or "reject," so we measured voluntary donation intention by a frequency of accept/reject responses. Behavioral results are shown in **Figure 3A**. The pairwise *t*-test was performed

for donation intention between comparison of amount that the charity received (less vs. more) under the voluntary condition, and the results showed a significant effect [$t(1, 26) = -12.947$, $p < 0.001$]. This result indicated that the subjects had a higher donation intention when the charity received more money than they donated ($M = 34.96$, S.E. = 8.017) compared to when the charity received less money ($M = 9.19$, S.E. = 10.012) under the voluntary condition.

The reaction time (RT) between different conditions was also analyzed. We conducted a 2 (donation contexts: mandatory vs. voluntary) × 2 (comparison of amount that the charity received: less vs. more) repeated measures ANOVA for the reaction time. As to the multiple comparisons, we performed the Bonferroni correction. Moreover, Greenhouse-Geisser corrections were used to determine significance (Greenhouse and Geisser, 1959), and partial eta-squared values (η^2_p) are reported to demonstrate the effect sizes in ANOVA models (Cohen, 1988). The results showed a significant main effect under different amounts [$F_{(1,26)} = 8.107$, $p = 0.008$, $\eta^2_p = 0.238$], which indicated that the subjects had a longer reaction time when the charity received less money ($M = 588.251$ ms, S.E. = 46.379) compared to more money ($M = 533.595$ ms, S.E. = 35.816) (shown in **Figure 3B**). However, there was no significant RT difference between the mandatory and voluntary conditions [$F_{(1,26)} = 1.002$, $p = 0.326$, $\eta^2_p = 0.037$], and the interaction effect between donation context and donation amount was also not significant [$F_{(1,26)} = 0.058$, $p = 0.812$, $\eta^2_p = 0.002$].

FIGURE 3 | Behavioral results of donation intention and reaction time. **(A)** The donation intentions of the subjects under voluntary conditions. **(B)** The reaction time of the subjects for the four conditions of 2 donation contexts (mandatory vs. voluntary) × 2 amounts (less vs. more). *$p < 0.05$, ***$p < 0.001$.

Event-Related Potential Results

P2 Analysis

As shown in **Figure 4A**, we conducted a 2 (donation contexts: mandatory vs. voluntary) × 2 (comparison of amount that the charity received: less vs. more) × 5 (electrodes) repeated measures ANOVA for P2 amplitude. The results suggested that donation context significantly interacted with the amount that the charity received [$F_{(1,26)} = 7.186$, $p = 0.013$, $\eta^2_p = 0.217$]. *Post hoc* comparisons with Bonferroni correction indicated that voluntary conditions ($M = 1.695$ µV, S.E. = 0.615) elicited a larger P2 amplitude than mandatory conditions ($M = 0.655$ µV, S.E. = 0.644) when the charity received less money ($p = 0.015$, 95% *CI* of the difference = 0.222–1.860). However, this difference was not significant when the charity received more money ($p = 0.928$). In addition, there was a significant main effect of electrode [$F_{(4,104)} = 13.714$, $p = 0.000$, $\eta^2_p = 0.345$], but we did not find a significant main effect of donation context [$F_{(1,26)} = 2.065$, $p = 0.163$, $\eta^2_p = 0.074$] or the main effect of donation amount [$F_{(1,26)} = 0.044$, $p = 0.835$, $\eta^2_p = 0.002$]. Moreover, the interaction effect between donation context and electrode was not significant [$F_{(4,104)} = 2.091$, $p = 0.142$, $\eta^2_p = 0.074$], neither between donation amount and electrode [$F_{(4,104)} = 0.820$, $p = 0.472$, $\eta^2_p = 0.031$] nor between donation context, donation amount and electrode [$F_{(4,104)} = 1.267$, $p = 0.291$, $\eta^2_p = 0.046$].

We chose the average of all the electrodes (i.e., AF3, AF4, F3, Fz, and F4) and illustrated their neural dynamic activity under different donation's contexts and the amount of money received by the charity in **Figure 4A**. The mean of the four conditions in P2 is displayed in **Figure 4B**. Meanwhile, the brain topography is shown in **Figure 4C**, which shows the interactive difference between the four conditions in the frontal-to-central region.

Late Positive Potential Analysis

A 2 (donation situation: mandatory vs. voluntary) × 2 (comparison of amount that the charity received: less vs.

more) × 6 (electrodes) ANOVA for LPP amplitude is shown in **Figure 5A**, which suggested a significant main effect of donation context [$F_{(1,26)} = 5.751$, $p = 0.024$, $\eta^2_p = 0.181$], indicating that a smaller mean amplitude of LPP was elicited under mandatory condition ($M = 1.234$ µV, S.E. = 0.568) compared to voluntary condition ($M = 1.928$ µV, S.E. = 0.497). We also observed a significant main effect of electrode [$F_{(5,130)} = 25.826$, $p = 0.000$, $\eta^2_p = 0.498$]. However, we did not find a significant main effect of different donation amount [$F_{(1,26)} = 0.601$, $p = 0.445$, $\eta^2_p = 0.023$]. In addition, the interaction effect between donation context and donation amount was not significant [$F_{(1,26)} = 0.162$, $p = 0.691$, $\eta^2_p = 0.006$], neither between donation context and electrode [$F_{(5,130)} = 0.625$, $p = 0.599$, $\eta^2_p = 0.023$] nor between donation amount and electrode [$F_{(5,130)} = 0.894$, $p = 0.449$, $\eta^2_p = 0.033$]. There was also no significant interaction effect between donation context, donation amount and electrode [$F_{(5,130)} = 0.334$, $p = 0.779$, $\eta^2_p = 0.013$].

We chose the average of all the electrodes (i.e., C3, Cz, C4, CP3, CPz, and CP4) and illustrated their neural dynamic activity under different donation conditions in **Figure 5A**. The mean of the four conditions in LPP is displayed in **Figure 5B**. Meanwhile, the brain topography is shown in **Figure 5C**, which shows the main difference between the four conditions in the central-to-parietal region.

Questionnaire Results

We used Cronbach's α coefficient to test the internal consistency reliability of the independence scale in the questionnaire before analysis. The results showed that the α coefficient was 0.662. Hair et al. (1998) indicated that Cronbach's α coefficient, which is greater than zero, shows that the scale is more reliable. In exploratory research, the coefficient can be less than 0.7 but should be greater than 0.6. The Cronbach's α coefficients of independence were greater than 0.6, indicating that the independence scale was reliable. Moreover, we applied EFA
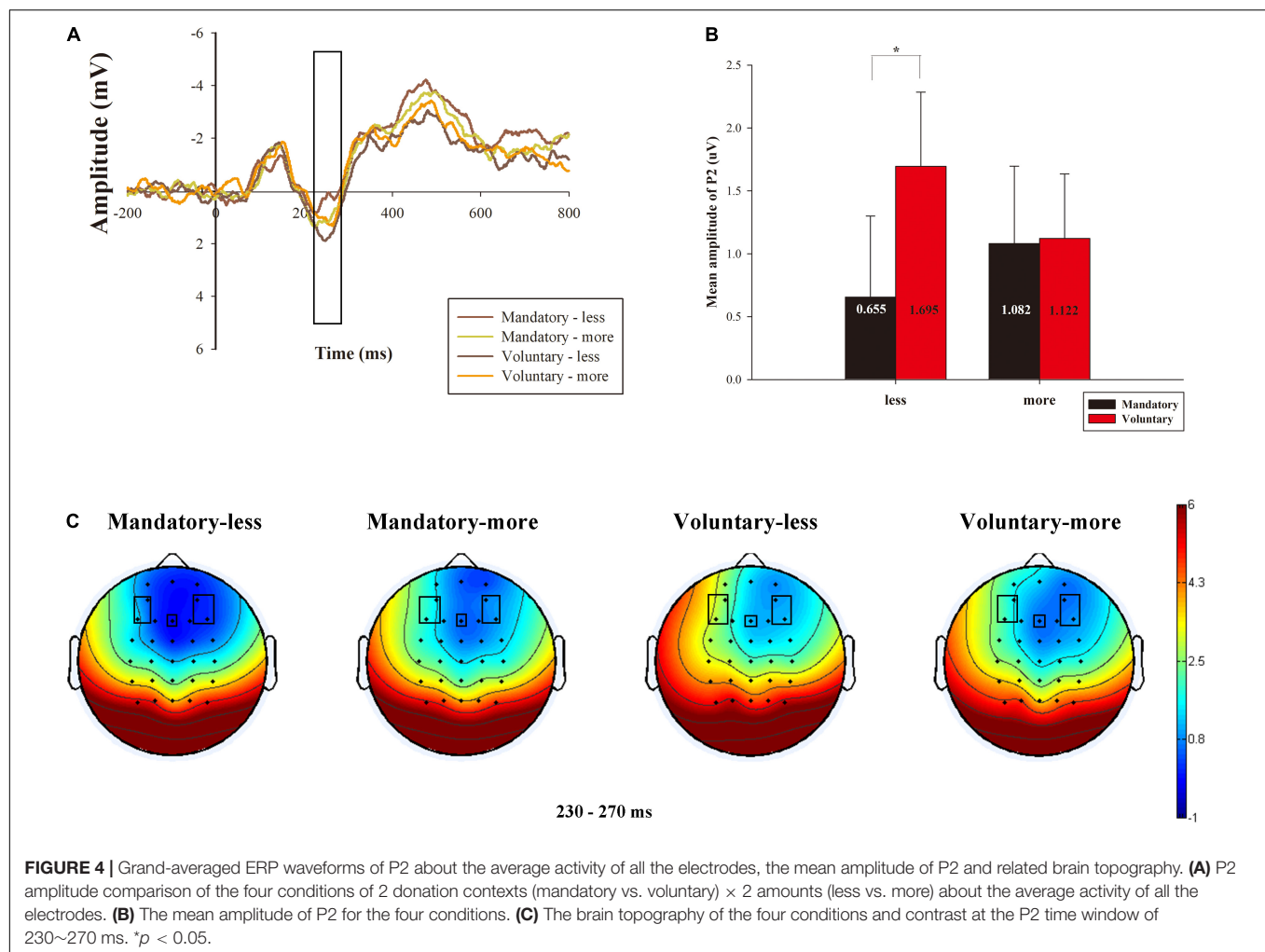
FIGURE 4 | Grand-averaged ERP waveforms of P2 about the average activity of all the electrodes, the mean amplitude of P2 and related brain topography. **(A)** P2 amplitude comparison of the four conditions of 2 donation contexts (mandatory vs. voluntary) × 2 amounts (less vs. more) about the average activity of all the electrodes. **(B)** The mean amplitude of P2 for the four conditions. **(C)** The brain topography of the four conditions and contrast at the P2 time window of 230~270 ms. *$p < 0.05$.

to test the validity of the scale. The results showed that the KMO value was 0.628, and Bartlett's test of sphericity was significant ($p = 0.000$). It has been suggested that only KMO values above 0.60 are acceptable for applying EFA (Kaiser, 1970; Dziuban and Shirkey, 1974), indicating that this independence scale was adequate.
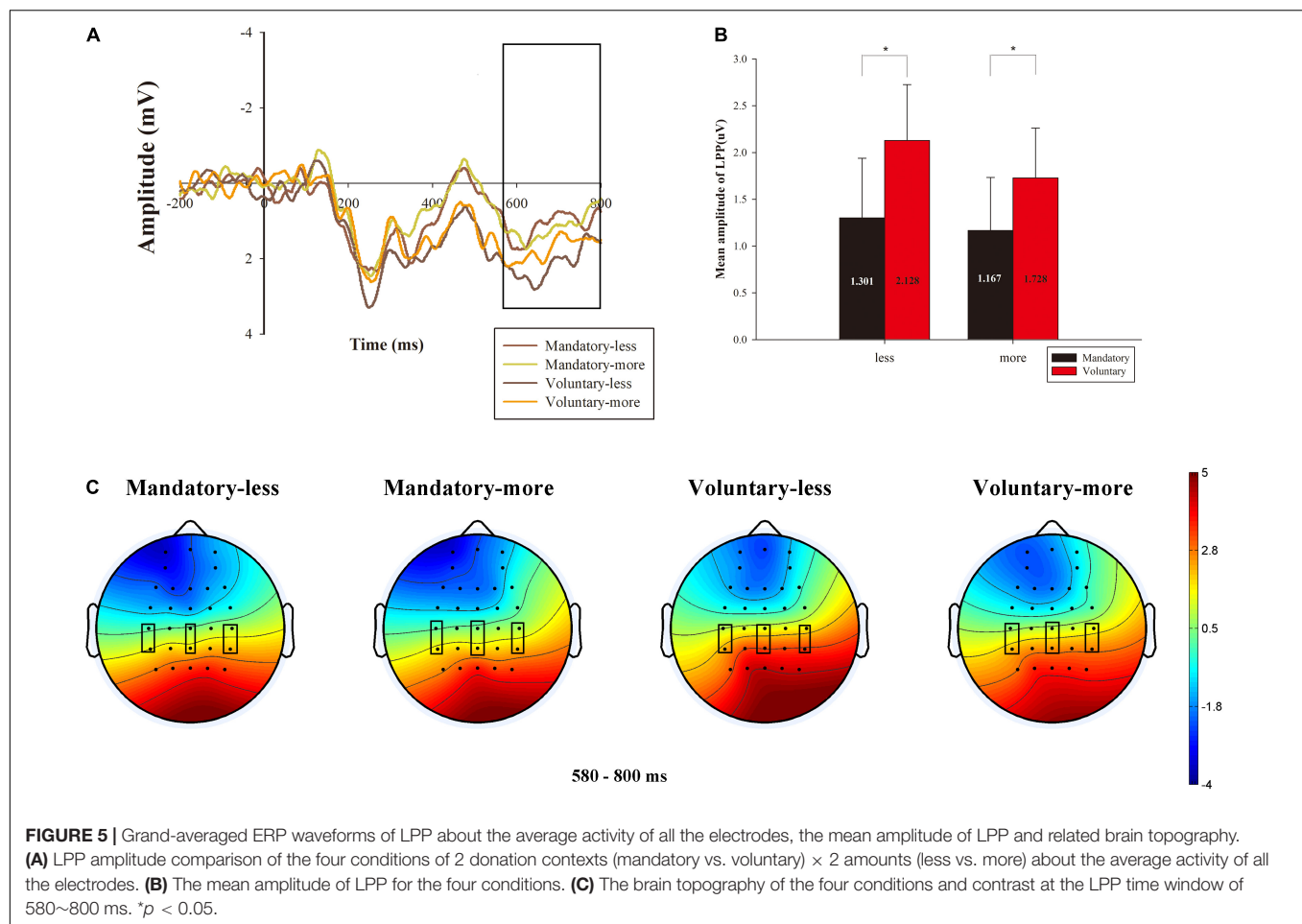
A Spearman correlation analysis between ERP components and independence in the postquestionnaire in four conditions was also conducted. In the mandatory donation condition, there was a significant negative correlation between the mean P2 amplitude and the mean independence when the charity received less or more money (see **Figure 6**). However, under voluntary conditions, the mean P2 amplitude was not significantly correlated with independence when the charity received less or more money, as shown in **Table 1**.

DISCUSSION

Our study emphasized examining whether the donation context and donation amount affect individuals' donation decisions by detecting the corresponding neural basis. Behaviorally, the

donation intention results showed that the subjects in voluntary context had a higher donation intention when the charity received more money compared to when the charity received less money, which supports the findings of previous studies, i.e., when the charity receives more money, people are more likely to donate (Harbaugh et al., 2007). Furthermore, the behavioral result of the reaction time revealed that subjects reacted quicker when the charity received more money than less money, regardless of the mandatory or voluntary donation condition. Previous studies suggested that the task completion time (i.e., reaction time) is positively related to task difficulty and cognitive load (Wang et al., 2015; Jin et al., 2017). Thus, the differential reaction time may indicate that participants required extra cognitive effort when the charity received less money (less level). Thus, when the charity received less money, they might take more time to decide whether to donate. This is consistent with the donation intention results.

Building on the S-O-R theory, we found a significant interaction effect between donation context and donation amount on P2 amplitude at the brain level. The results showed that when the charity received less money, the decision made in the voluntary condition elicited a larger P2 amplitude than that in the mandatory condition. As stated in the introduction, the

FIGURE 5 | Grand-averaged ERP waveforms of LPP about the average activity of all the electrodes, the mean amplitude of LPP and related brain topography. **(A)** LPP amplitude comparison of the four conditions of 2 donation contexts (mandatory vs. voluntary) × 2 amounts (less vs. more) about the average activity of all the electrodes. **(B)** The mean amplitude of LPP for the four conditions. **(C)** The brain topography of the four conditions and contrast at the LPP time window of 580~800 ms. *$p < 0.05$.

P2 component is considered to reflect early emotional processes (Zhan et al., 2018). Furthermore, a larger P2 amplitude can reflect automatic mobilization of attention resources to negative stimuli (Carretié et al., 2001; Huang and Luo, 2006; Wang et al., 2012; Jin et al., 2017). Thus, the current findings showed that the charity receiving less money in voluntary donation conditions was a negative stimulus for subjects, leading to greater attention allocation and emotional arousal. This can be explained by the fact that participants paid more attention to the cost-relevant donation information (Gąsiorowska and Hełka, 2012; Li et al., 2021) and they expected the benefits to equal or exceed the costs in the voluntary conditions. When the charity received more money under voluntary donation conditions, participants were satisfied with the amount and decisively accompanied by weaker negative emotional experiences (Sarlo et al., 2012; Pletti et al., 2015). However, when the charity received less money than they gave away, they were reluctant to accept the amount due to beyond expected outcomes, arousing a stronger negative emotional experience (Zhan et al., 2018). Our behavioral results also indicated that the subjects had a lower donation intention when the charity received less money in voluntary contexts. These results were consistent with those reported in Sarlo et al. (2012) and Pletti et al. (2015). More important,

existing studies have suggested that emotions are not always beneficial to moral behavior (Panasiti and Ponsi, 2017; Zhan et al., 2018), e.g., anger enhances immoral behavior (Colasante et al., 2016). Our behavioral results indicated that the subjects had a lower donation intention when the charity received less money in voluntary contexts. This may be because they were not satisfied with the amount of money the charity received, which triggered strong emotions, i.e., more unpleasure made participants engage in less altruistic decisions (Sarlo et al., 2012; Zhan et al., 2018). Thus, there is dissonance between moral content and discrete emotions (Cameron et al., 2015). In addition, participants who behave more morally might tend to donate less to charities (Rahwan et al., 2018), e.g., moral identity decreases donations (Lee et al., 2014). For mandatory conditions, the subjects were asked to donate the money whether they chose "acknowledge," which restricted their freedom of choice. According to PR theory, the subjects would be aroused to engage in control-averse behavior to reinstate the threatened freedom. However, in the mandatory situation of this study, it's impossible for subjects to restore eliminated freedom, or it's pointless to engage in control-averse behavior, so they would reduce their sense of agency (Caspar et al., 2016). If the person realizes that it is impossible to restore freedom,

FIGURE 6 | The correlation between amplitudes of P2 in four conditions and independence. Correlation between **(A)** P2 in the mandatory-less condition and independence; **(B)** P2 in the mandatory-more condition and independence; **(C)** P2 in the voluntary-less condition and independence; **(D)** P2 in the voluntary-more condition and independence.
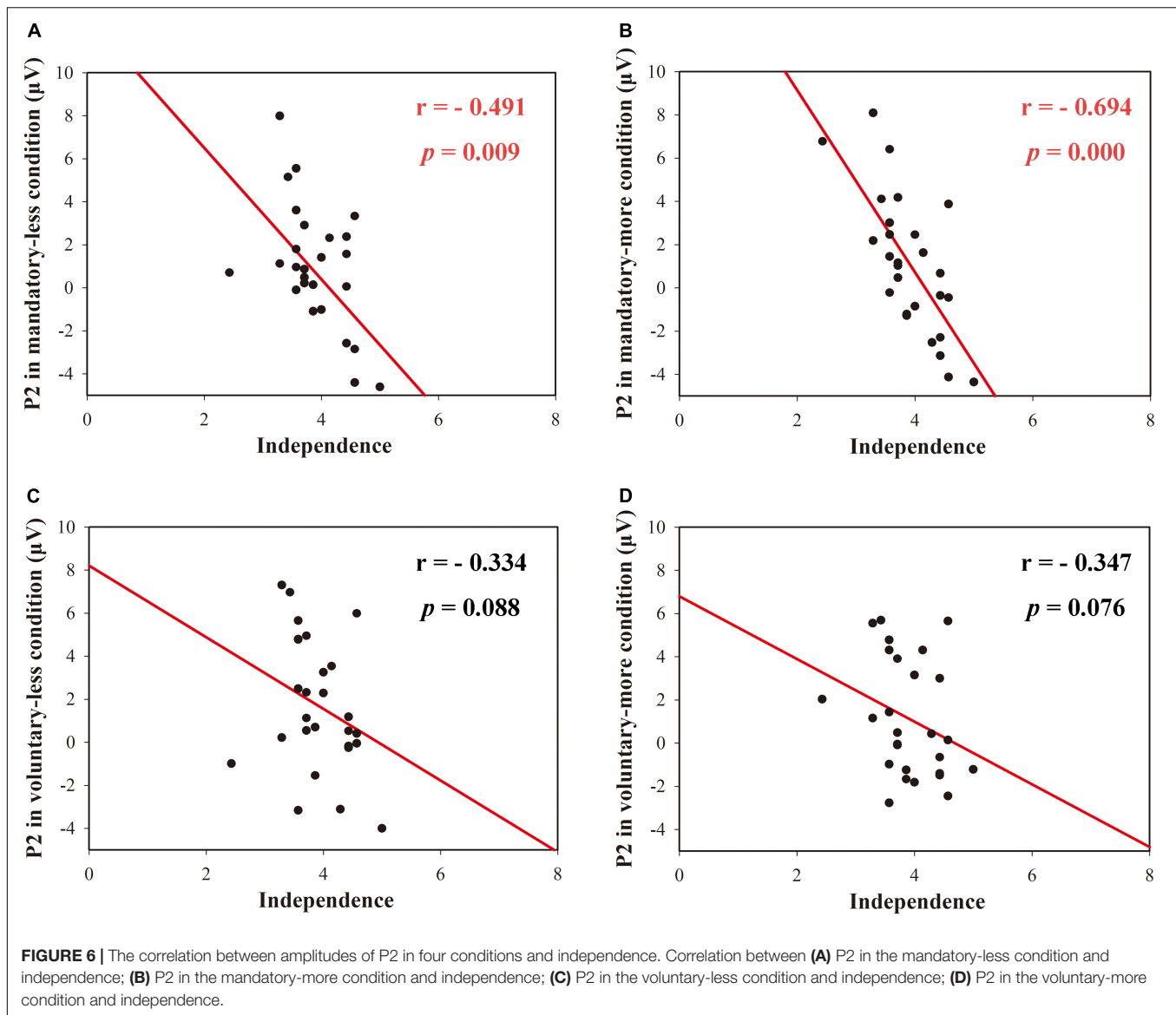
reactance motivation would become low (Miron and Brehm, 2006). Thus, the subjects might pay less attention to the outcomes of their donations. In addition, we also observed that the P2 amplitude in mandatory contexts was negatively related to subjects' independent personality, indicating that the greater the independence, the lower the P2 amplitude, and the weaker negative emotion participants showed. The subjects paid less attention to how much the charity received because they did not like being forced to donate (i.e., mandatory donation), so they did not allocate more attention resources to negative stimuli in mandatory donations.

We also observed that donation decisions under voluntary conditions elicited a larger LPP amplitude than those under mandatory conditions. The LPP component was believed to be linked to several psychological processes, including attention resource allocation (Hajcak et al., 2010) and emotional arousal (Cuthbert et al., 2000). Here, we argue that the larger LPP

component elicited by the voluntary conditions reflects higher emotional arousal than mandatory conditions. As people are more inclined to choose freely according to their own will, participants might tend to voluntarily donate money to the charities, which were considered fair and reasonable, expressing higher emotional arousal, as reflected by a larger LPP amplitude. In mandatory situations that reduced the participants' freedom to choose donations, based on PR theory, the participants might restore their restricted freedom of choice. Our experimental setting only allows subjects to choose the "acknowledge" in the mandatory condition. Thus, the impossibility of achieving the expected goal reduced their sense of agency and made them give up control-averse behavior (Miron and Brehm, 2006; Caspar et al., 2016), reflecting a lower emotional arousal. Owing to the higher emotional arousal, participants had a higher donation intention in voluntary contexts than in mandatory contexts.

TABLE 1 | Correlation results.

	P2-mandatory		P2-voluntary	
	Less	**More**	**Less**	**More**
Independence	$r = -0.491^{**}$	$r = -0.694^{**}$	$r = -0.334$	$r = -0.347$
	$p = 0.009$	$p = 0.000$	$p = 0.088$	$p = 0.076$

The correlation results amplitudes of P2 in four conditions and independence.
$^{**}p < 0.01$.

Although both P2 and LPP demonstrate sensitivity to emotional stimuli (Olofsson et al., 2008), their cognitive significance are different. The P2 is an attention-related component that reflects early emotional arousal processing (Carretié et al., 2001; Junghöfer et al., 2001; Schupp et al., 2007; Wang et al., 2012). The LPP is a later component that reflects more sustained processing of emotion (Hajcak et al., 2010; Schmitz et al., 2012; Solomon et al., 2012; Dickey et al., 2021). Thus, P2 and LPP reflect the emotional processing in different cognitive stages. The results of the current study showed that in the early stages of emotional processing (P2), donation context significantly interacted with the amount that the charity received, so there were interactions. However, in the late stages of emotional processing (LPP), the results suggested a significant main effect of donation context, and the interaction effect between donation context and donation amount was not significant. ERP research on developmental changes in emotion regulation is still relatively limited, highlighting a critical direction for future research (Dickey et al., 2021).

The findings of the current study have several implications. First, from the perspective of individual psychological mechanisms, we explored the interactive effect of donation amount and donation context on donation decisions. More importantly, we found that a smaller P2 amplitude would be induced in mandatory conditions than in voluntary conditions when the charity received less money, and voluntary donations would elicit a larger LPP amplitude than mandatory donations. This result provides insight into increasing the willingness to donate voluntarily. Second, we applied ERP technology to examine the effect of S-O-R theory, which provided neuropsychological evidence for individuals' attentional resources and emotions toward donation contexts. It helps researchers better understand the donation decision-making process and reveals the underlying neural and psychological mechanisms (Camerer and Yoon, 2015; Shen et al., 2018). In addition, the current study also has practical implications for charity organizers. Based on our research, the behavioral results showed that the subjects in voluntary conditions had a higher donation intention when the charity received more money. Additionally, ERP results displayed that when the charity received less money, the decision made in the voluntary condition elicited a larger P2 amplitude, which induced negative emotion. This indicated that participants preferred to more money received by charity. Moreover, we also found that voluntary donations (compared with mandatory situations) lead to higher emotional arousal. To sum up, both in terms of behavioral results and neural responses to donations, voluntary donations are preferred and encourage people to donate more money. Therefore, charity organizers should guide people to donate voluntarily and should not take the form of coercion.

There are some limitations that should be acknowledged. First, the current study did not discuss gender differences. Previous behavioral evidence suggests greater price sensitivity to giving in females (Andreoni and Vesterlund, 2001; Andreoni and Miller, 2002). Women are more likely to donate money to charitable organizations than men (Visser and Roelofs, 2011; Willer et al., 2015; Van Rijn et al., 2019). Thus, it would be valuable to measure the charitable behaviors of female participants and compare their neural activity to those of male participants in future studies. Second, it would be interested to explore the potential role of individual differences in modulating behavior/ERPs in the future research. Although a large number of previous studies on prosocial/altruistic behaviors was conducted from a group-level perspective (Wittek and Bekkers, 2015; Kawamura and Kusumi, 2018; Lee et al., 2021), individual differences are still worth exploring, which is helpful to understanding the individual heterogeneity of prosocial/altruistic behaviors. Third, the sample size for the correlation analysis was relatively small. Although the number of subjects in the current study is sufficient (the effect size of a 2×2 repeated-measures ANOVA with 27 subjects can be calculated by G*power to be 0.95), a larger sample size may improve the robustness of the current results, which would further validate the present basic findings.

CONCLUSION

In summary, by using the ERP approach, the present study provided electrophysiological evidence for the interactive effect of the donation amount and donation context on individuals' donation decisions and examined the corresponding psychological process under the S-O-R framework and PR theory. We found that the donation context and the money received by the charity interacted with each other to influence the donation decision at the early stage of rapid automatic processing (P2 amplitude). Especially when the charity received less money, more attentional resources were allocated to obtain voluntary donations compared to mandatory donations and resulted in greater emotional conflict (larger P2 amplitude). In the late stages of emotional processing, compared with mandatory donations, with voluntary giving, participants had a better feeling about the donation scenario, and a higher emotional arousal level was obtained (larger LPP amplitude). This study has several implications for researchers and charity organizers to understand individuals' willingness to donate voluntarily.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

AUTHOR CONTRIBUTIONS

HZ and DC conceived the idea. HZ wrote the draft of the manuscript. YL, HD, and XW prepared the experimental stimuli and collected the data. HZ and HD ran the data analysis and wrote the "Results" section. DC supervised the project. All authors made intellectual contributions to this project and gave approval to the final version of the manuscript for submission.

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Integrating Social Presence With Social Learning to Promote Purchase Intention: Based on Social Cognitive Theory

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Consumers mainly acquire information through social learning in online shopping environment, and social presence as a media attribute generated by real-time interactions in live streaming commerce is more conducive for consumers' social learning. Therefore, it is worth investigating the roles of social presence and social learning on consumers' purchase intention (PI) in the strong interactive environment. Based on social cognitive theory (SCT) framework and drawing on social presence theory and social learning theory, this study investigates the relationships among social presence, social learning process, and PI. Social presence is operationalized into social presence of others (SPO) and social presence of interactions (SPI), whereas social learning process contains external interaction process [exploitative learning (ETL) and exploratory learning (ERL)] and internal psychological process [cognitive appraisal (CAP) and affective appraisal AAP)]. The results from a survey of 372 consumers of live streaming commerce indicate that SPO and SPI positively affect ETL and ERL and then contribute significantly to the building of CAP and AAP, which can lead to PI. The findings also provide guidance for brand managers and retailers in building more effective interactive atmosphere and promoting consumers' positive attitude toward brands in live streaming marketing.

Keywords: live streaming commerce, social presence, social learning, vicarious learning, purchase intention, social cognitive theory

INTRODUCTION

The live streaming industry has been booming in recent years and is even more common and popular in China, especially during the coronavirus pandemic. Up to December 2020, the number of live streaming commerce users in China is 388 million (CNNIC, 2021). As a typical representative of digital economy, live streaming commerce reshapes consumers' consuming patterns and decision-making process. Marketers are gradually aware of the unique features of live streaming commerce, such as live stream and real-time interactions, and have adopted live

streaming marketing to attract consumers' attention and promote their purchase intention (PI). For example, by the end of 2020, more than 90% of brands have launched live streaming marketing on Tmall, according to the 2020 Taobao Live Streaming Ecological Development Report (Taobangdan, 2020). Due to the fierce competition, high cost and low premium ability in live streaming marketing strategy cooperating with internet celebrities, an increasing number of brands start "brand live streaming" to enhance brand autonomy and long-term development. However, compared with internet celebrity live streaming, brand live streaming lacks fans' advantage and user stickiness, resulting in a large gap in sales transformation with the former. In this case, how can brands consider other aspects to promote the sales transformation in brand live streaming? This is one of the vital problems in the operation and development of brand live streaming marketing.

Recently, the drastically growing live streaming commerce practice has also attracted the attention of academic society. The existing research related to consumers' behavior mainly focuses on platform technology, broadcaster's characteristics, perceived value, etc. (Gefen and Straub, 2004; Ang et al., 2018; Osei-Frimpong and Mclean, 2018). Compared with traditional e-commerce, the characteristics of real-time video and real-time interactions in live streaming commerce bring a high degree of social presence. In internet marketing research, scholars believe that social presence, as a media attribute, is a critical factor for consumers' purchase decision. However, social presence created by three-dimensional and real-time interactions in live streaming commerce has been ignored. It is worthwhile to learn more about the mechanism of consumers' behaviors in live streaming commerce, which is significant for brand sustainability in the cruel market competition.

In online shopping environment, consumers mainly obtain information about products or services through social learning, especially vicarious learning. Consumers that acquire more knowledge about brand or products will have a more positive attitude toward the brand, therefore promoting brand loyalty and brand trust and affecting PI afterward (Zhao et al., 2019). Myers (2018) proposed the concept of coactive vicarious learning (CVL), which refers to "individuals learn others' experience and knowledge in communication and interaction." Live streaming commerce provides a more convenient, more efficient, and more real learning platform for consumers (Li et al., 2020). For instance, the particular affordances of live streaming commerce enable consumers to share experience or consult problems with others, especially with the sellers (Chen and Lin, 2018), which is consistent with CVL. Therefore, consumers' CVL in live streaming commerce provides a new perspective to explore the influence mechanism of social presence on PI.

Furthermore, social presence has a positive effect on online learning performance and satisfaction in e-learning situation (Richardson et al., 2017), and consumers' social learning in network environment can also be regarded as online learning. However, the black box between social presence which enables vicarious learning and the subsequent psychology and behavior in live streaming commerce also remains unclear. Prior studies highly emphasize the significance of social presence in distance learning and the importance of CVL in interactive environment as well. However, many points are also unclear, such as the dimensions of CVL, the impact of social presence on CVL, and the subsequent effects on consumers' psychology and behavior.

To address these problems, this work tries to explore three research questions of (1) How does social presence affect CVL? (2) What internal psychological process would be influenced by CVL? (3) How internal psychological process affect PI?

Using social cognitive theory and social learning process framework, we build a model to explain the influential mechanism of social presence on PI, considering the mediating role of CVL and internal psychological process. The paper proceeds as follows. The first section provides theoretical background, including discussing social presence, social learning theory, and CVL. Next, we construct the research model and the hypotheses. In the subsequent sections, the paper presents the research methodology and study results. Finally, we discuss the research findings and implications, and also the limitations and future research prospects.

LITERATURE REVIEW AND THEORETICAL BACKGROUND

Social Cognitive Theory

Social cognitive theory (SCT) was first proposed by Bandura (1986). Then, scholars widely applied the ideas and methods of this theory and carried out a large number of empirical studies. Traditional behavioral theory points out that individual behavior depends entirely on external environmental stimuli. However, this view ignores the interrelationship between environmental stimuli and behavior. Bandura believes that the emergence of individual behavior does not completely depend on the external environment and puts forward SCT. This theory analyzes the influencing factors of individual behavior in detail and holds that the generation or change of individual behavior is not only affected by external environmental factors, but also influenced by their own internal psychological factors (Bandura, 1986).

Social cognitive theory is widely used by researchers to analyze the influencing factors of individual behavior (Sumak et al., 2011; Chiu and Tsai, 2014; Zhou et al., 2020). Thus, SCT also provides a theoretical basis for this paper to study the factors for consumers' PI. As a media attribute of the live streaming commerce, social presence is the external environment that affects individuals' social learning process and then affects their behavior intention.

Social Presence Theory

Social presence was initially conceptualized by Short et al. (1976) and was defined as the salience of other members and the resulting salience of interpersonal interactions in a mediated conversation. Walther (1992) and Rice (1993) continued this definition in their studies afterward. Biocca et al. (2003) also emphasize that social presence refers to the degree to which an individual feels access to other people's intentions and sensory impressions through mediated communication. The majority of definitions of social presence indicated that social presence is the psychological evaluation of other people's real presence by

media users (Shen, 2012; Lee and Shin, 2014) and interpersonal connection (Lowenthal, 2010).

Social presence is considered as an attribute of a communication medium and closely related to intimacy and psychological closeness (Short et al., 1976). In previous e-commerce studies, social presence has been adopted as a unidimensional concept which is often measured by perceived warmth, sociability and sensitivity (Rice and Case, 1983; Gefen et al., 2003). Shen et al. (2010) subdivided the construct of social presence into three dimensions of awareness, cognitive social presence, and affective social presence. In online learning environment, Sung and Mayer (2012) explored five factors representing facets of social presence, namely social respect, social sharing, open mind, social identity, and intimacy. However, these dimensions mostly focus on human warmth conveyed by the computer-mediated medium or interpersonal connections, without distinguishing the salience of others' presence and interpersonal interactions. Tu (2002) proposes three-dimensional model of social presence in online learning communities, namely social context, online communication, and interactivity. Furthermore, Lu et al. (2016) propose a three-dimensional model of social presence in social commerce context, namely social presence of web, social presence of others (SPO), and social presence of interactions (SPI), respectively. Live streaming commerce is one form of social commerce; thus, social presence in live streaming commerce should also be a multidimensional construct.

The real-time interactive characteristic in live streaming commerce can bring consumers a high degree of social presence with regarding as a media attribute (Tafesse, 2016). Differentiating with online learning conditions, consumers in live streaming environments mainly interact with streamer and other consumers, rather than the computer-mediated medium. Therefore, our conceptualization of social presence is akin to the model of Lu et al. (2016), but only considering two dimensions of SPO and SPI. SPO, also called awareness, means the extent to which other members appear to exist or respond to members in a virtual community (Shen et al., 2010). In live streaming commerce, various social cues generated by consumers such as textual information on bullet screen including reviews or referrals, and also prompt message thrown by the system such as the number of viewers, followers, likes, and purchasing behavior and information, will increase perception of other online consumers and their actions. Another dimension is SPI. Both Tu (2002) and Caspi and Blau (2008) emphasized that interactivity is one important dimension of social presence. In live streaming commerce, computer-mediated communication forms (e.g., real-time video and bullet screen) have been employed as efficient means for interactions between sellers and customers.

Social Learning Theory

Bandura and McClelland (1977) proposed social learning theory, which emphasizes social factor. Social learning is essential learning information by observing the behaviors of other members (Bandura and McClelland, 1977; Lorenzo et al., 2012). In social networking environments, one important social psychology is social learning, with learning from the experience

and actions from others. Consumers can not only observe the information displayed by other customers, such as reviews and recommendations but also have access to social experiences and actions by communicating with streamers and other customers in live streaming commerce (Li et al., 2020). Individuals would become clear about whether the products meet their demand, what are worth buying, and how is the shopping experience. The learning behavior may positively affect customers' attitude and influence their PIs afterward (Lorenzo et al., 2012).

Social learning theory underlines that social learning should first obtain new information and behavior patterns through observation and then internalize the observed information, which can be regarded as a process of internal processing of the external information. From this standpoint, social learning process involves two processes: an external interaction process and an internal psychological process (Illeris, 2003). The external interaction process is a social level, such as observation, participation, communication, and cooperation, which promotes the integration of social environment and individual. The internal psychological process is two equal psychological functions, including the cognitive function dealing with the learning information, and the emotional function representing psychological response (Illeris, 2003). Accordingly, the internal psychological process can be separated into two dimensions, namely cognitive dimension and affective dimension.

In our research, the external interaction process involves consumers' interaction with streamers and other customers, namely CVL, whereas the internal psychological process involves cognitive response and emotional response after interacting with others, introducing cognitive appraisal (CAP) and affective appraisal (AAP), respectively. CAP refers to the utilitarian aspect of attitude which is an evaluation based on beliefs and knowledge structures, whereas AAP is an estimation based on emotions, feelings, and reactions (Lee et al., 2012).

Coactive Vicarious Learning

Since learning from experience of other people has long been regarded as an essential factor for success, Gioia and Manz (1985) proposed the concept of vicarious learning and emphasized that vicarious learning means an individual learns from others' experience and actions, rather than from his/her own behavior or experience. Furthermore, Myers (2018) proposed the concept of CVL, which emphasizes on a learning process in which learners and others consciously share and participate together and learn others' experience through interpersonal interactions, so as to jointly construct a situated understanding of objects. CVL includes three elements of experience, analysis, and support (Myers, 2018). Experience refers to the "raw material," providing the essential information for engaging in a CVL interaction that contains both interpersonal sharing and reflecting on multiple experiences. In addition, analysis means individuals evaluate and investigate the experience obtained in interactions to form new understanding, taking the forms of questions, judgments, or requests for elaboration. The third component of CVL is support, namely an individual's social support or emotional support in the interpersonal interactions. Compared with traditional e-commerce, live

streaming commerce provides more opportunities for CVL, owing to its distinctive affordances (Chen and Lin, 2018; Sun et al., 2019). When a streamer shows products, it is available for consumers to communicate with the streamer and other customers in real time by giving comments for further analysis and comparison.

Although Myers (2018) has put forward the concept of CVL and its components, the dimensions of this construct are not clarified. In organizational learning context, Brady and Davies (2004) showed a model of project capability-building consisting of exploratory learning (ERL) and exploitative learning (ETL) which are related to unfamiliar activities and routine activities, respectively. Drawing upon Brady and Davies (2004), this study attempts to divide CVL into two dimensions of ETL and ERL, from the perspective of ambidextrous learning (Gibson and Biekinshaw, 2004). ETL is characterized by refining, screening, selecting, etc., whereas ERL is characterized by searching, attempting, discovering, and innovating, etc. On the one hand, consumers can learn information by refining or choosing the content of the products that currently showed and experienced by sellers through interactions, which is consistent with ETL. On the other hand, customers are also able to gain information by attempting or discovering new knowledge of products or skills that meet their need or preference through interactions, which is in accordance with ERL.

RESEARCH MODEL AND HYPOTHESES

Social Presence and Coactive Vicarious Learning

When shopping online, consumers are able to perceive the existence of other customers based on a variety of social cues (Cialdini, 2001), such as online review, product recommendations, and transactional history. The perception of SPO helps consumers to learn the experience of other members (Dunlap and Lowenthal, 2009), and consumers' attitudes and behaviors tend to be affected by persuasion from similar individuals (Cialdini, 2001). Particularly, in live streaming commerce, buyers can easily learn interactive and behavioral information of other buyers, such as others' comments, consultations, purchasing behaviors, and so on. If social cues release positive signals, consumers will have more confidence in the seller's ability and integrity, and their trust toward the seller will also increase. According to Mardsen (2010), consumers can learn from and influenced by the experiences and behaviors of other people who they trust.

In social commerce environments, Lu et al. (2016) suggest that perception of others has a positive impact on trust in online sellers. Meanwhile, customers tend to be promoted to participate and interact with others once they perceive high trustworthiness with others (Wongkitrungrueng and Assarut, 2020). When an individual has doubts or confusion about product introduced by seller, he/she would be more willing to interact with the seller, thus further and clearly understanding other aspects of the product, such as maintenance knowledge, using skills, and purchase process. Besides, if consumers prefer to search or

discover the information of new products meeting their needs or preferences, they could also communicate with the seller to obtain new related knowledge. Therefore, we have the following hypotheses:

H1a. SPO positively affects ETL.
H1b. SPO positively affects ERL.

Meanwhile, social presence theory emphasizes that the high interactivity of medium can produce high social presence and enhance the perception of interaction with others (Fulk et al., 1987). Live streaming commerce is based on the interactions between consumers and others (especially the sellers) to learn more real experience and evaluation of products and brands. These interactions can be regarded as parasocial interaction, which reflects the mutual interaction perceived by both sides (Hartmann and Goldhoorn, 2011). In online learning condition, text-based online discussion, as an interactive media tool, will positively affect online learning (Caspi and Blau, 2008). The chat tools in live streaming commerce convey a sense of communication. Consumers can also understand the attitude and integrity of sellers through these tools, thus building trust, which is conducive for consumers to learn more relevant information from the seller. Social presence plays a significant role in social interaction and is also a factor to promote members' engagement behavior (Shen et al., 2010). If the seller replies quickly and targeted to buyers' consultations in product introduction in live streaming commerce, consumers would be more satisfied with and trust in the seller, which will contribute to interactions between consumers themselves and the seller. Meanwhile, the timely and effective response from sellers to consumers' questions will make consumers perceive a high degree of interactivity. Furthermore, perceived interactivity conveys a high sense of social presence and then promotes interactions such as information exchange and two-way response (Song and Zinkhan, 2008).

As previously mentioned, consumers could get more accurate knowledge about products presented by sellers or explore new information in accord with their own requirements through interacting with sellers in live streaming commerce. This discussion informs the following hypotheses:

H2a. SPI positively affects ETL.
H2b. SPI positively affects ERL.

Coactive Vicarious Learning and Internal Psychological Process

Social interaction is the basis of cognitive development (Lee and Kozar, 2009). Previous studies have shown that social interactions with others often affect their own beliefs, attitudes, and behaviors (Godes et al., 2005). In live streaming commerce, brand sellers help consumers to form a preliminary understanding of the product experience that is more real than traditional e-commerce through interactions, thus promoting positive attitude toward the seller (Chen and Lin, 2018). Researchers stressed that social commerce is not only limited to the dissemination and sharing of product information, but also provides a way

to continuously interact with sellers and share experience to deepen the relationship between them (Ashley and Tuten, 2015). Therefore, as a special form of social commerce, live streaming commerce bridges the gap between consumers and sellers.

Live streaming commerce enables consumers to interact with sellers in real time to acquire more detailed product knowledge. It allows consumers to analyze the experience of the product currently introduced by consulting or commenting, and to further compare with the information obtained previously, and then to interact with sellers again or more. In this in-depth interaction process, consumers could gain more accurate information to form their own understanding of product experience. In addition, if the product introduced by the seller does not meet consumers' needs or preferences, they can also interact with the seller directly and propose their targeted demands for products, such as product basic parameters, product efficacy, and personal budget. After receiving consumers' requirements, the seller shall directly recommend products or assist them to gather new information they need. Such interaction process is more targeted, so that consumers obtain new knowledge of the products they prefer more efficiently, comprehensively and timely.

Overall, sellers' interactions provide utilitarian knowledge and help consumers with their cognition of the purchasing decision. Additionally, Illeris (2003) suggested that the external interaction process affects the internal psychological process of information acquisition and refinement. Therefore, we have the following hypotheses:

H3a. ETL positively affects CAP.
H3b. ERL positively affects CAP.

In the meantime, sharing experiences with others can have a positive impact and commitment in the relationship and develop emotional ties by supporting (Myers, 2018). Sellers can provide corresponding support to consumers through rewards or activities, and consumers can also give the seller support like clicking "attention" or "likes." Social support is important for both sides to establish trust and to promote consumers' emotional commitment toward the seller (Chen and Shen, 2015). In live streaming commerce, if the products introduced by the seller match their own needs, consumers will conduct in-depth interactions for the products introduced. Consumers can receive emotional support in interpersonal interactions, which will bring them warmth and satisfaction, and further enhance their positive emotion toward the seller. If the products introduced by the seller are not consistent with their demands, they can directly state their own needs or preferences. This kind of interaction can exactly meet the needs of consumers, thus providing better consumption experience and making them feel more valuable. Furthermore, the better experience of the interaction process, the more satisfied for consumers with sellers, thus generating higher emotional attachment (Chen A. H. et al., 2017). Therefore, we make the following presumptions:

H4a. ETL positively affects AAP.
H4b. ERL positively affects AAP.

Internal Psychological Process and Purchase Intention

According to ABC attitude theory, cognition and affect are two dimensions of attitude (Illeris, 2003). Attitude plays an indispensable role in customers' purchase decision. Researchers believe that there is direct relationship among consumers' cognition, affect, and behavioral intention (Lee and Chen, 2011). Specifically, both technology acceptance model (TAM) and theory of planned behavior (TPB) emphasize that cognition and affect are two important predictors of consumer behavior. Consumers always evaluate the utilitarian value and hedonic value, and such appraisals can make their purchase decisions more reasonably (Chen et al., 2013). When the perceived utilitarian value and perceived hedonic value are high, consumers are more willingly to purchase from this seller rather than other sellers (Wang et al., 2013). Through appraising social information and affective experiences, consumers would have better understanding of product quality, seller quality, and also the level of experience satisfaction, so as to increase trust toward the seller. Further, trust in seller has positive effect on brand trust and affects consumer's PI (Zhao et al., 2019). Based on the above discussion, we propose the following hypotheses:

H5a. CAP positively affects PI.
H5b. AAP positively affects PI.

The research model proposed in this study is illustrated in **Figure 1**.

METHODOLOGY

Samples and Procedures

In this paper, we used two samples to empirically test the theoretical model. Initially, 30 graduate students with engagement experience of brand live streaming commerce participated in the pilot test. Prior to the survey, we invited one marketing processor and three Ph.D. students to check the wording, legibility, and applicability and to validate the questionnaire to assure its accuracy and effectiveness. The results indicated that the structure and content of the questionnaire were available to conduct a large-scale empirical examination. Next, the formal investigation was carried out by Sojump.com which is a professional company providing questionnaire services in China. To ensure that all the participates were conformed to the research target, the respondents were asked to recall a recent or most impressive shopping experience of brand live streaming in Taobao and to complete the questionnaire according to this experience. We also controlled that only one response could be submitted in each IP address. In total, 372 available responses were collected, after deleting invalid and incomplete answers.

Among the participants we surveyed, about seventy percent of consumers are women ($n = 261$; 70.2%) and the rest ($n = 111$; 29.8%) are men. In terms of shopping experience of live streaming commerce, approximately 97.6% of the participants indicated that they shopped in live streaming commerce one

FIGURE 1 | Research model.
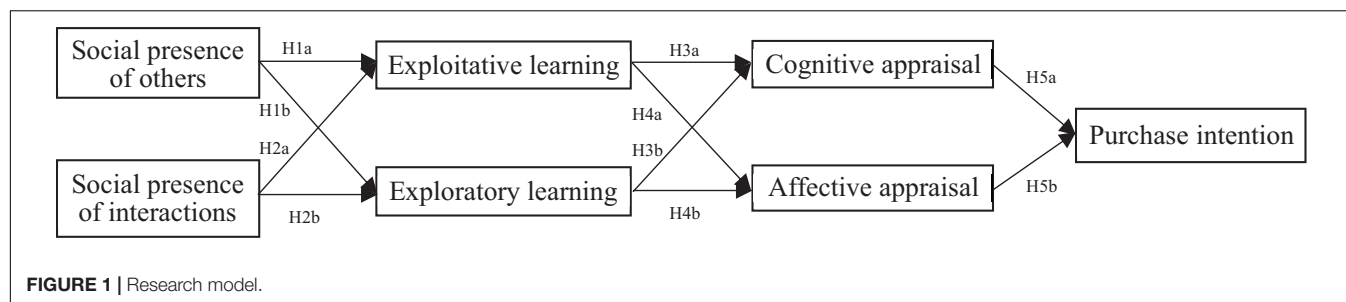
or more times within half a year. About 90% of respondents are aged between 20 and 35 years old, and the education level of respondents is relatively high, with 51.6% from college and 44.6% from graduate school. The respondents' demographic information is summarized in **Table 1**.

Questionnaire and Measures

Questionnaires were developed to estimate the relationships among social presence, CVL, CAP, AAP, and PI. The items were adapted from the previous studies and modified properly to fit this research context. The measurement scales of SPO and SPI were derived from Gefen and Straub (2004) and also those designed by Lu et al. (2016), with being slightly revised in light of live streaming commerce environment. We developed the items of ETL and ERL based on the scales of exploitation and exploration from Zhou and Wu (2010) for this study. The scales of CAP and AAP were measured using four and five questions separately, adapted from Lee and Chen (2011) and Lee et al. (2012). We revised the three items from Prentice and Loureiro (2018) to assess PI. The measurement items are shown in **Table A1**. All these measures followed a seven-point Likert

TABLE 1 | Descriptive statistics of respondents.

Category	Item	Frequency	Percentage
Gender			
	Male	111	29.8%
	Female	261	70.2%
Shopping frequency			
	1 or more times in a month	260	69.9%
	1 time in a quarter	88	23.7%
	1 time in half a year	15	4.0%
	1 time in a year	6	1.6%
	Never	3	0.8%
Age			
	<20	4	1.1%
	20–25	122	32.8%
	26–30	103	27.7%
	31–35	110	29.6%
	>35	33	8.9%
Education			
	High school and below	14	3.8%
	College	192	51.6%
	Graduate school	166	44.6%

scales from 1 (not agree at all) to 7 (absolutely agree). As the data were collected in China, and to ensure that the meanings of questions were precisely captured, a back-translation process was conducted following the method used by Lu et al. (2016). Meanwhile, following the pilot test, the wordings of some items were slightly modified in Chinese questionnaire.

DATA ANALYSIS AND RESULTS

We adopted the partial least squares (PLS) method and used Smart-PLS software to evaluate the measurement model and structural model. Since PLS method has minimal demands on measurement scales, sample size, and also model complexity, so we made these selections. Based on two-step data analysis process, we first conducted the assessment of the measurement model with the evaluation of reliability, convergent validity, and discriminant validity and then tested the structural model to evaluate the hypotheses (Henseler et al., 2009).

Measurement Model

We evaluated the reliability of the constructs with Cronbach's alpha (α) and composite reliability (CR). As shown in **Table 2**, the Cronbach's alpha (α) for all concepts ranged from 0.709 to 0.774, and the composite reliabilities were all above 0.7, which means a favorable reliability (Chin, 1998). In addition, we evaluated convergent validity using the factor loadings and the average variance extraction (AVE). As shown in **Table 2**, all factor loadings were more than 0.6, and all AVEs were above 0.5, indicating satisfactory convergence validity (Chin, 1998). Finally, we evaluated discriminant validity using two methods. First, according to Fornell and Larcker (1981), we contrasted the square roots of the AVEs with construct correlations. Results showed that all the square roots of the AVEs were greater than the corresponding construct correlations (**Table 3**). Second, we also examined the heterotrait-monotrait ratio (HTMT) (Henseler et al., 2015). According to **Table 3**, the values of HTMT were all lower than 0.85. Thus, it was concluded that the discriminant validity was adequate.

In addition, as shown in **Table 2**, the variance inflation factors (VIFs) for all the variables were below 4.00, and thus, it did not exist a serious multicollinearity problem (Hair et al., 2009). Common methods variance (CMV) is one of the sources of the measurement error caused by the characteristics of data sources (Luo et al., 2010). The extent of CMV was estimated in two tests. We first used Harman's one-factor test by including all items with

TABLE 2 | The assessment of measurement model for constructs.

Constructs	Items	Mean	S.D.	VIF	Loading	α	CR	AVE
Social presence of others	SPO1	6.10	0.884	1.178	0.721	0.724	0.800	0.572
	SPO2	5.91	0.887	1.279	0.771			
	SPO3	6.14	0.903	1.265	0.775			
Social presence of interactions	SPI1	5.73	1.037	1.431	0.739	0.730	0.832	0.552
	SPI2	5.86	1.013	1.365	0.734			
	SPI3	5.72	1.117	1.453	0.767			
	SPI4	5.73	1.082	1.300	0.733			
Exploitative learning	ETL1	5.94	1.070	1.406	0.731	0.712	0.822	0.536
	ETL2	5.80	1.086	1.284	0.724			
	ETL3	5.64	1.118	1.301	0.731			
	ETL4	5.79	1.135	1.380	0.752			
Exploratory learning	ERL1	5.87	1.151	1.435	0.758	0.731	0.832	0.553
	ERL2	5.87	1.081	1.380	0.738			
	ERL3	6.72	1.156	1.315	0.723			
	ERL4	6.07	0.955	1.386	0.755			
Cognitive appraisal	CAP1	5.74	1.076	1.519	0.820	0.774	0.869	0.688
	CAP2	5.44	1.325	1.611	0.839			
	CAP4	5.68	1.097	1.657	0.830			
Affective appraisal	AAP1	6.01	0.933	1.286	0.707	0.709	0.821	0.534
	AAP2	5.78	0.973	1.366	0.718			
	AAP4	5.80	1.101	1.418	0.781			
	AAP5	6.00	0.886	1.278	0.715			
Purchase intention	PI1	6.04	0.900	1.236	0.707	0.723	0.828	0.546
	PI2	5.89	0.954	1.422	0.763			
	PI3	5.95	0.950	1.401	0.740			

α, Cronbach's alpha; CR, composite reliability; AVE, average variance extracted; VIF, collinearity statistics.
Some items were deleted because of the lower factor loadings.

principal component factoring. The variance explained by the largest factor was 34.995%, lower than the critical value of 50%. Second, the correlation matrix among latent variables (**Table 3**)

TABLE 3 | Discriminant validity analysis.

Constructs	SPO	SPI	ETL	ERL	CAP	AAP	PI
SPO	0.756						
SPI	0.514	0.743					
ETL	0.496	0.629	0.732				
ERL	0.469	0.657	0.641	0.744			
CAP	0.399	0.512	0.589	0.569	0.830		
AAP	0.524	0.610	0.581	0.559	0.634	0.731	
PI	0.459	0.580	0.482	0.553	0.597	0.726	0.739
Heterotrait-monotrait ratio (HTMT)							
SPO							
SPI	0.794						
ETL	0.740	0.713					
ERL	0.723	0.559	0.818				
CAP	0.575	0.672	0.786	0.778			
AAP	0.786	0.839	0.809	0.785	0.765		
PI	0.681	0.794	0.667	0.777	0.796	0.825	

SPO, social presence of others; SPI, social presence of interactions; ETL, exploitative learning; ERL, exploratory learning; CAP, cognitive appraisal; AAP, affective appraisal; PI, purchase intention.

showed that the correlation coefficients among the variables were less than 0.9, indicating that CMV was not serious (Pavlou et al., 2007). Thus, we concluded that the CMV was improbably to misrepresent the results.

Structural Model and Hypotheses Testing

As shown in **Figure 2**, the coefficients of determination (R^2-values) were 0.441 for ETL, 0.464 for ERL, 0.474 for CAP, 0.506 for AAP, and 0.559 for PI, indicating an acceptable level of predictive power. In this study, the standardized root mean square residual (SRMR) of the structural model was 0.065, which is less than the 0.08 proposed by Hair et al. (2014). Besides, we evaluated the model's predictive relevance using Stone-Geisser's Q^2-value as well. The Q^2-values of ETL, ERL, CAP, AAP, and PI were all above 0, with 0.226, 0.221, 0.314, 0.255, and 0.299, respectively, suggesting that the model has predictive relevance (Hair et al., 2014). All these results demonstrate a satisfactory level of explanatory power and a good model fit.

According to the results shown in **Figure 2** and **Table 4**, several findings were obtained. Specifically, SPO was found to have positive influences on both ETL ($\beta = 0.209$; $p < 0.001$) and ERL ($\beta = 0.144$; $p < 0.01$), in support of H1a and H1b. SPI was also found to be positively related to ETL ($\beta = 0.501$; $p < 0.001$) and ERL ($\beta = 0.554$; $p < 0.001$), thus supporting H2a and H2b. In addition, ETL ($\beta = 0.245$; $p < 0.001$) and ERL ($\beta = 0.235$; $p < 0.01$) significantly affected CAP, and thus, H3a and H3b were

FIGURE 2 | Structural model testing results. **Significant level 0.01; ***Significant level 0.001.
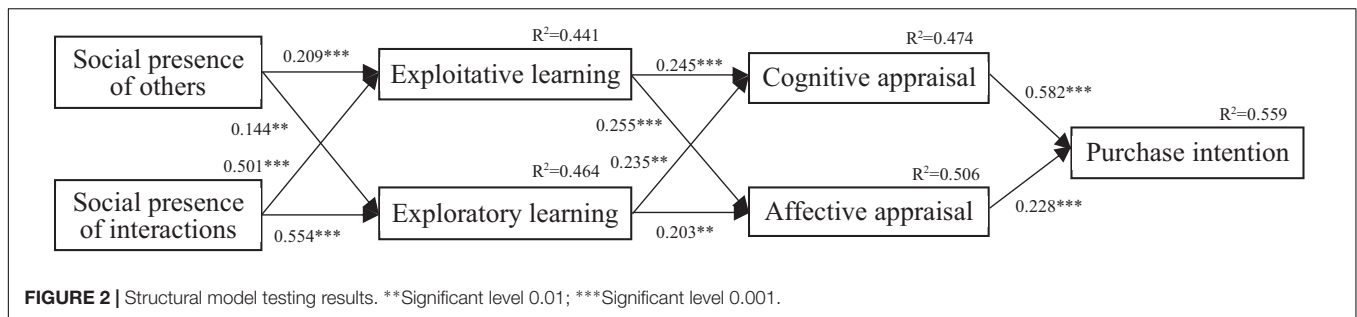
supported. Meanwhile, both ETL ($\beta = 0.255$; $p < 0.001$) and ERL ($\beta = 0.203$; $p < 0.01$) were also positively associated with AAP, supporting H4a and H4b. Moreover, CAP ($\beta = 0.582$; $p < 0.001$) and AAP ($\beta = 0.228$; $p < 0.001$) had significant influences on PI, and thus, H5a and H5b were supported.

The study hypotheses imply several mediation paths, with social learning external and internal process mediating the relationship between social presence and PI. We further analyzed whether social learning process played an intermediary role with Bootstrap method (Lau and Cheung, 2012). The chain mediation effect is significant if 95% confidence interval does not include zero (Preacher and Hayes, 2008). The results suggested that zero was not included in 95% confidence interval for all mediations, showing the existence of mediation influence (see **Table 5**).

DISCUSSION

Discussion of the Empirical Results

The objective of this study was to explore the influence mechanism of social presence on PI in brand live streaming commerce, to help brand marketers and sellers to achieve sustainability in live streaming marketing. We sought to this objective by integrating social cognition theory, social presence theory, and social learning theory. Through collecting data from qualified participants, the research showed that social

presence was significantly related to social learning process which promoted PI. Our study represents several findings as follows.

First, both SPO and SPI positively influence ETL and ERL. Social presence is favorable to establish mutual trust between users in medium (Ou et al., 2014). The social cues such as real-time comments, consultations, and also their "purchasing" and "like" behaviors in live streaming space make consumers' perception of the existence of others. Additionally, live chat tool conveys a sense of interactions. Both of the perception of others' presence and interactions in social commerce environments can increase consumers' trust on sellers (Lu et al., 2016) and then affect their engagement behaviors such as interpersonal communications (Wongkitrungrueng and Assarut, 2020). Consumers can understand the ability and integrity of the seller according to others' information and through interactions, which is further conductive for consumers to learn more information from the seller. Specifically, consumers may have questions or doubts on products experienced by streamer, or they may prefer to learn new information about other products or other aspects. The higher degree of others' presence or interactions is, the more probably for consumers to interact with sellers to learn information they need. Therefore, SPO and SPI in live streaming commerce can affect interpersonal interactions between consumers and sellers, thus generating more external learning process of ETL and ERL.

Second, both ETL and ERL have significant influences on CAP and AAP. This is consistent with previous studies which suggested that members engage in social environment mainly because the content of social networks can provide informational

TABLE 4 | Results of path analysis.

Paths	Path coefficient	*t*-value	Support
SPO → ETL	0.209***	3.585	H1a supported
SPO → ERL	0.144**	2.572	H1b supported
SPI → ETL	0.501***	8.025	H2a supported
SPI → ERL	0.554***	8.564	H2b supported
ETL → CAP	0.245***	3.839	H3a supported
ERL → CAP	0.235**	3.347	H3b supported
ETL → AAP	0.255**	3.902	H4a supported
ERL → AAP	0.203**	2.922	H4b supported
CAP → PI	0.582***	12.236	H5a supported
AAP → PI	0.228***	3.725	H5b supported

***Significant at the 0.001 level; **significant at the 0.01 level.
SPO, social presence of others; SPI, social presence of interactions; ETL, exploitative learning; ERL, exploratory learning; CAP, cognitive appraisal; AAP, affective appraisal; PI, purchase intention.

TABLE 5 | Results for mediation testing.

Mediation paths	95% confidence interval	Path coefficient
SPO → ETL → CAP → PI	[0.012, 0.060]	0.030
SPO → ERL → CAP → PI	[0.007, 0.044]	0.020
SPO → ETL → AAP → PI	[0.004, 0.026]	0.012
SPO → ERL → AAP → PI	[0.002, 0.020]	0.007
SPI → ETL → CAP → PI	[0.029, 0.122]	0.071
SPI → ERL → CAP → PI	[0.034, 0.146]	0.076
SPI → ETL → AAP → PI	[0.013, 0.053]	0.029
SPI → ERL → AAP → PI	[0.008, 0.060]	0.026

SPO, social presence of others; SPI, social presence of interactions; ETL, exploitative learning; ERL, exploratory learning; CAP, cognitive appraisal; AAP, affective appraisal; PI, purchase intention.

support and emotional support (Chen et al., 2013). The utilitarian information that conveyed in live streaming commerce will contribute to reduce uncertainty in consumers' decision-making process. Besides, Habibi et al. (2014) point out that consumers can feel themselves as part of the brand through interactions and directly promote positive emotions toward the brand. Social environment is favorable for the information sharing and exchanging (Ashley and Tuten, 2015). In live streaming commerce, consumers can gain the experiential information of streamer and other customers and also explore more new information that meets their own needs and preferences by deeply consulting or making comments. Such process can positively influence consumers' psychological process of cognitive and affective evaluations toward sellers.

Third, both CAP and AAP have impacts on consumers' PI, which is in line with prior studies (Chen A. H. et al., 2017). Consumers always make their purchase decision based on both knowledge structures and feelings (Lee et al., 2012). Zhao et al. (2019) also demonstrate that the positive attitude toward the seller and brand also significantly affects consumers' PI.

Theoretical Contributions

This study contributes to research in several ways. First, the study increases understanding on consumers' purchase decision in live streaming commerce context from social presence perspective, although previous studies have investigated the factors affecting customers' PI in live streaming commerce from perspectives of IT affordance, atmosphere clues, interact celebrity characteristics, etc. (Sun et al., 2019; Xu et al., 2019; Li et al., 2020). In addition, Ang et al. (2018) also show that live streaming is more beneficial to generate social presence than prerecorded video and further affects information search and subscription intention toward the platform. However, compared with traditional e-commerce, the interaction in live streaming commerce is real time and multidirectional, and these characteristics have not been adequately reflected in previous social commerce research. Thus, from this perspective, this study enriches and deepens the application of social presence theory in new marketing environment.

Second, this paper introduces social learning theory and perspective in the field of organizational learning into marketing research domain, extending the application scope of social learning theory. Most of the studies on the influence mechanism of social presence on PI were from the perspectives of trust, perceived value, experience, perceived uncertainty, and perceived usefulness (Ang et al., 2018; Osei-Frimpong and Mclean, 2018). Meanwhile, the relationship between social presence and social learning is mostly discussed in e-learning research (Tu, 2000), with rarely explored in online marketing environments. This study empirically tests the roles of social learning process (external interaction process and internal psychological process) in the relationship between social presence and consumers' behavior intention.

Third, this study focuses on CVL conceptualized by Myers (2018) and considers two dimensions of CVL according to ambidextrous learning (Gibson and Biekinshaw, 2004). Live streaming commerce provides a new way for consumers to obtain information, and social learning process will occur by both observing and interacting (Li et al., 2020). Most previous research examined observational learning, such as learning from reviews and comments, recommendations and referrals, others' purchase behaviors, and so on. Additionally, these studies basically emphasize the impact of independent learning on consumers' passive behavior like PI, without deeply exploring its influence on consumers' active interactions with sellers. This study makes up this research gap to some extent with focusing on the effects of perception of others on consumers' active interactions, especially their CVL. Moreover, since perceived interactivity has a positive effect on parasocial interaction (Labrecque, 2014), the influence of perception of interaction with sellers on customers' CVL is also examined. Additionally, this study proves the positive effect of CVL as an external learning process on consumers' internal psychological process and PI as well.

Practical Implications

This study also has practical significance. First, it is necessary for brand marketers to motivate consumers' PI by attaching importance to factors that stimulate their cognitive and affective status. This paper suggests that both CAP and AAP positively affect consumers' PI. Although many sellers have tried to stimulate consumers' perceived emotional value through promotions or cooperating with internet celebrities in live streaming marketing strategies, they also need to pay enough attention to customers' utilitarian value after attracting them. That is, useful content and interactions need to be taken into account for brands to make consumers to obtain necessary knowledge and better emotional experience in live streaming.

Second, the results in this paper show the social learning process mechanism which provides brand marketers a practical guidance. For online sellers, it can stimulate consumers' AAP and maintain their loyalty through communicating with consumers and making them interact with other members (Chen A. et al., 2017). Chen and Lin (2018) also point out that interactions have significant impact on positive attitude toward the seller. Marketers can motivate consumers to learn product knowledge through favorable interactions, so as to stimulate consumers' positive CAP and AAP, and promote their PI, which is conducive to the sustainable development of brand live streaming marketing.

Third, the technological characteristics in live streaming commerce provide consumers with more opportunities and conditions for vicarious learning (Sun et al., 2019). Both SPO and SPI have significant influences on consumers' CVL. On the one hand, it is necessary to attach importance for brands to the existence and interactions of consumers such as "likes," product evaluations and consultations, and purchase behavior. For instance, sellers could carry out various kinds of interactive activities or encourage consumers to participate in topics linked with products to increase SPO. Furthermore, perception of others may foster trust toward the seller and originate herd behavior like learning brand knowledge through active interactions with the seller where CVL would happen. On the other hand, the interactivity conveyed by the seller is

also critical, since the higher degree of perception of interactions with seller, the more tendency for consumers to talk about products and their demands more deeply and comprehensively. For example, besides the streamer, an additional professional may be necessary to reply consumers' questions and consultations timely and effectively.

Limitations and Future Research

This paper has several limitations. First, it may limit the generality of the findings since this study only considered consumers who had experience of watching brand live streaming in Taobao which only stands for one category of live streaming commerce (i.e., adding live streaming tools in e-commerce website). Future studies could be conducted focusing on other types of live streaming commerce platforms (e.g., Instagram, Facebook, Twitter, Douyin) to extend current research scope. Second, there is no distinction between product types in this study. For various product categories (e.g., hedonic and utilitarian items, search and experience products, and goods and services), the relationships among social presence, social learning process, and PI may be different. Third, social presence can be regarded as a media attribute conveyed by social technologies, and Zhang et al. (2014) confirmed that technological features in social commerce have positive impact on social presence. Based on the various antecedents that impact social presence proposed by Oh et al. (2018), future research could explore the influences of other factors on different dimensions of social presence in

live streaming commerce. Finally, Myers (2018) divided vicarious learning into two categories of independent vicarious learning and CVL, and this research only focused on the latter type. Independent learning from different sources in social commerce can affect users' psychological process and PI (Chen A. H. et al., 2017). Since observing comments and social behaviors delivered by others can be regarded as independent vicarious learning, it would be very interesting to investigate and compare the two different types of vicarious learning in live streaming commerce, namely accepting information independently and passively and also obtaining information by interacting actively.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author/s.

AUTHOR CONTRIBUTIONS

ML and YH designed the research, wrote the manuscript, conducted the literature review, and built the conceptual model. ML analyzed the data. YH wrote the discussion and conclusion. Both authors contributed to the article and approved the submitted version.

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APPENDIX

TABLE A1 | Measurement scales.

Measurement scales

Social presence of others
SPO1. There are many others feel interested with the products in live streaming.
SPO2. There are many others sharing product-related information in live streaming.
SOP3. There are many others who "are buying" the products in live streaming.
Social presence of interactions
SPI1. I can make sense of the attitude of sellers by interacting *via* live streaming.
SPI2. I can imagine what are they like by interacting *via* live streaming.
SPI3. There is a sense of human touch to communicate with sellers *via* live streaming.
SPI4. Communication *via* live streaming was warm.
Exploitative learning
ETL1. Upgraded current knowledge for products introduced.
ETL2. Upgraded experience knowledge for products introduced.
ETL3. Enhanced abilities in solving problems occurrence in product application.
ETL4. Strengthened the knowledge and skills to improve the efficiency of purchase decision.
Exploratory learning
ERL1. Acquired basic knowledge of new products.
ERL2. Acquired experience knowledge of new products.
ERL3. Learned totally new skills in using skills of products.
ERL4. Strengthened skills in areas where it has no prior experience.
Cognitive appraisal
CAP1. The live streaming conducted by the seller was effective for achieving the goal of your visit.
CAP2. The live streaming conducted by the seller was convenient for attaining the goal of your visit.
CAP3. You felt comfortable *via* live streaming conducted by the seller to achieve the goal of your visit.
CAP4. The live streaming conducted by the seller was helpful for achieving the goal of your visit.
Affective appraisal
Your overall experience with the live streaming conducted by the seller was as follows:
AAP1. Happy
AAP2. Good
AAP3. Relaxed
AAP4. Likable
AAP5. Satisfactory
Purchase intention
PI1. I would purchase products from the seller in the future.
PI2. The seller is my first choice to buy relative products.
PI3. I would do more businesses with this seller in the next few years.

Check for
updates

Influence of Streamer's Social Capital on Purchase Intention in Live Streaming E-Commerce

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The virtual display of products in e-commerce brings new problems of information asymmetry, and the overload of digital information also increases the difficulty of consumers' purchasing decisions. The real-time interaction between the streamer and the consumer during live streaming e-commerce will promote consumers' understanding of the product, reduce information asymmetry, and increase consumers' purchase intention. However, why do people trust the untouchable and unfamiliar streamers from live streaming e-commerce to purchase online? To understand this phenomenon, based on the perspective of the information asymmetry theory and parasocial relationship theory, this research identified how social capital affected purchase intention in live streaming e-commerce. Through a questionnaire survey of live viewers, the purchase intention model constructed by empirical testing was used. The findings showed that the streamer's professionalism, the reciprocal expectation of live streaming, and the viewer's parasocial relationship could effectively increase the viewer's purchase intention. The occurrence of a streamer's negative public events could significantly reduce the viewer's purchase intention. The scale of live streaming and the streamer's commitment had no significant impact on the viewer's purchase intention. Trust played an intermediary role between the streamer's professionalism and parasocial relationship and the viewer's purchase intention.

Keywords: live streaming commerce, information asymmetry, social capital, trust, purchase intention

INTRODUCTION

The emergence of e-commerce has changed the way of exchanging traditional transaction information, fundamentally breaking the limitation of time and space, and providing traders with a powerful information search function. Buyers can obtain thousands or even more symbolic product information in a very short period (Bauboniene and Guleviciute, 2015). However, in e-commerce, there is the separation of information and physical objects, the separation of commodities and sales websites, and the separation of traders and physical spaces, which hinder the direct perception of trust between the two parties in the product quality and interpersonal relationship (Pavlou et al., 2007). In the network environment of e-commerce transactions, consumers' purchasing decisions not only depend on the final product quality but also depend on the network sales scene, environment, and content presentation form (Wongkitrungrueng et al., 2020). Based on the

e-commerce commodity transaction process, it is necessary to solve the problem of the inability to transmit the actual product information caused by online sales, product quality information display fraud, and information overload, which prevents the bounded rational buyers from making deterministic judgments, which are different from the information asymmetry problem of traditional markets (Jones and Leonard, 2014). To increase consumers' purchase intention, e-commerce has continuously updated information release and transaction methods to reduce the information asymmetry of products, forming traditional transaction e-commerce, social e-commerce, content e-commerce, video content e-commerce, live streaming e-commerce, and other online sales patterns. E-commerce merchants use advertising, branding, celebrity endorsements, product trials, consumer reviews, 7 days of unreasonable returns, and other "signaling" methods to disclose their product information to gain consumers' purchase approval (Mavlanova et al., 2012; Filieri, 2015; Manes and Tchetchik, 2018). Live streaming e-commerce, as the advanced and the latest form of e-commerce, enables consumers to obtain virtual perceptions of commodities such as smell, taste, and touch through the alternative experience of the streamer. Live streaming e-commerce reduces consumers' transaction decision time through the "signaling" method of the streamer's narration of the product to a certain extent, solves the problem of the product quality perception and information overload, and effectively reduces information asymmetry between buyers and sellers (Wang et al., 2021).

The streamer is a connection point between the product and the consumer in live streaming. The streamer's image and word-of-mouth affect the live viewer's perception of the product. Live streaming viewers can easily derive trust in product quality based on the streamer's good reputation, which can effectively increase their purchase intention (Ang et al., 2018; Wongkitrungrueng et al., 2020). However, in actual purchases, it is found that "exaggerated words," "exaggerated propaganda," "false propaganda," "use of advertising limit words," and "difficult return and exchange" have become high-frequency words in consumer complaints (Hu and Chaudhry, 2020). Some studies found that in the process of live streaming, the emotional preference of the fan group for the streamer during live streaming will dilute the fact that the streamer is suspected of false propaganda. The actual product price, quality, etc., are not the main factors that affect consumers' purchases. Celebrity streamers are fundamental to attracting users (Clement Addo et al., 2021). Why consumers trust and buy the products sold by unfamiliar streamers in the virtual world of the network has become a hot issue of research. However, current research tends to focus on the information display and social interaction forms of live broadcast, as well as consumers' motivation to watch live streaming or purchase, and there is a lack of research on the reasons for the purchase intention of live streaming viewers (Han et al., 2018).

This research focuses on the perspective of information asymmetry combined with the social capital theory, reveals the role of the live streaming sales model and the streamer's social influence on reducing information asymmetry in the

consumer purchase process and explains the impact of the streamer's social capital on the viewer's purchase intention to better understand the bond relationship of the streamer in live streaming. First, this research introduces the basic concepts of live streaming and discusses the mechanism of information asymmetry in live streaming commerce and the role of pseudosocial relations. Then, the social capital theory is used to establish a model to test how social capital promotes consumers' purchase intention, and empirical testing of this model is conducted through the survey data collected from consumer questionnaires who have participated in live streaming purchases. Finally, how the empirical results can contribute to the development of information asymmetry theory is discussed and the understanding of how the social capital of the streamer can promote consumers' purchase intention is improved.

LITERATURE REVIEW

Information Asymmetry in Live Streaming E-Commerce

Information asymmetry is the content of information economics. Compared with the traditional market, e-commerce has improved information efficiency and reduced information asymmetry in terms of the information that is suitable for digital transmission (Liang and Huang, 1998). However, for the product quality information in e-commerce, it is not suitable for digital delivery. Because quality information is closely related to the product itself, it can only be obtained by watching, touching, using, or testing. Due to the reproducibility of digital products, empirical digital products are also unable to convey their quality information (Chatterjee and Datta, 2008). Therefore, from the perspective of quality information transmission, the information efficiency of e-commerce relative to traditional markets has not improved, and information asymmetry still exists (Jones and Leonard, 2014). Based on the characteristics of physical distance and easy copying of digital information, e-commerce merchants have much more information about the products they sell than consumers, and the product is prone to cross-regional low-price competition and sell seconds at best quality prices among e-commerce merchants (Bakos et al., 2005). Consumers buy similar products of "high quality" and "bad quality" at lower prices. Buyers are only willing to pay according to the average price of the products on the market under the premise of being unable to distinguish the quality of the products. The final result is that "high-quality" products have been withdrawn from the market due to low profits, and "poor-quality" products flood the e-commerce market. Consumers' adverse selection leads to the phenomenon of "bad money drives out good" (Wei et al., 2011).

The e-commerce market is not only due to a new problem of information asymmetry brought about by the sales method, but also the digital information overload, which increases the time cost of consumers' purchase decisions under limited rationality (Cromer, 2011; Chen, 2019). The combination of e-commerce and live broadcasting is regarded as a way to solve these problems. The streamer recommends products in real time through on-site explanations, evaluations, etc., interacts with users in real

time through the comment area, and uses the advantage of "face-to-face" communication to create a shopping experience close to offline, which greatly breaks the invisible, intangible, and unfeeling experience and information barriers with opaque prices (Zhang et al., 2020). The marketing model before the emergence of live streaming has standardized and one-way transmission of commodity information to consumers' purchase intention. The streamer can establish an emotional connection with consumers through personalized personality and infectious expressions, thus increase consumers' trust in the streamer and its recommended products (Wongkitrungrueng and Assarut, 2018). Trust also promotes the reliability of information transmission between the two parties in the market economy activities and reduces the moral hazard and adverse selection caused by information asymmetry in market transactions (Liu et al., 2019). Live streaming e-commerce can be understood as the online sales behavior of live streaming using their influence and a certain viewer base. The net connection between "people" and "consumers" can effectively promote consumers' willingness to watch. The streamer has an important dominant position in live streaming e-commerce (Hu et al., 2017). Live streaming solves the problem of information overload to a certain extent. As an intermediary between sellers and consumers, streamers understand the product's efficacy in advance and make recommendations after the trial screening, which will reduce the asymmetry of information between buyers and sellers and reduce the time cost for consumers to purchase (Xu et al., 2020). As an upgraded model of traditional e-commerce, live streaming e-commerce can overcome the trust problem caused by information asymmetry in the traditional model and facilitate transactions. When understanding the influence of the streamer in live streaming e-commerce, we need to have an understanding of the role of the social capital theory in sales promotion.

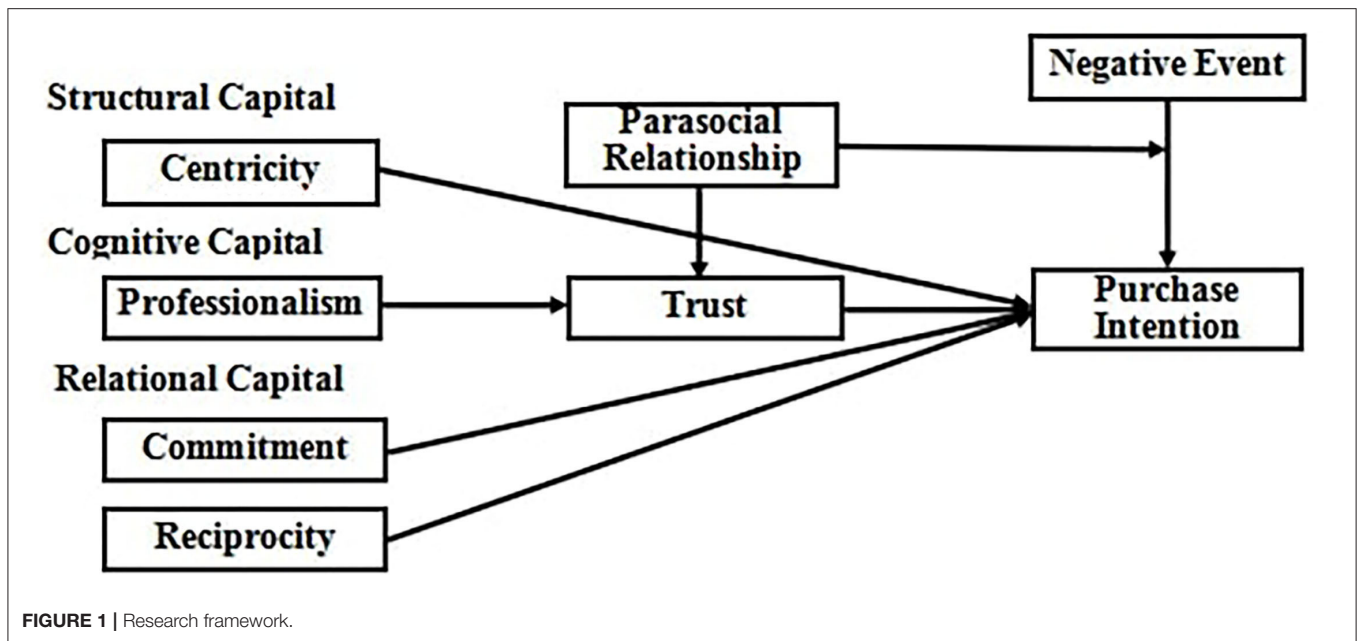## Live Streaming E-Commerce and Social Capital

Social capital is usually defined as "resources embedded in the social structure that can be accessed or mobilized in purposeful actions" (Lin, 2001). The concept of social capital has been provided as an explanation for various pro-social behaviors, including the concept of collective action, community participation, and differential social achievement, which is based on personal capital (such as human or financial capital) that cannot be explained (Coleman, 1990). Social capital that is embedded in the social realm is a key difference from other forms of capital. Social capital is widely considered to be dualistic: at the group level, it reflects the nature of emotions and the quality of relationships, while at the individual level, it promotes the actions of actors and reflects their access to social network resources (Putnam, 1995). From an individual's perspective, social capital is the position and identity that an individual occupies in the social network of the social structure. These positions and identities play an important role in the actual goals of an individual.

Live streaming e-commerce is in radiant communication with the streamer as a central node. The streamer plays an important role in live streaming e-commerce, highlighting, and responding to the importance of people as a central node of communication (Hu and Chaudhry, 2020). The streamer and the viewer may be "never knew each other at all." The streamer's personality charm, social influence, and interactive communication during live streaming have become the core link to maintain consumer relations. The social capital of the streamer's position and identity in the entire social network plays an important role in consumers' trust. Nahapiet and Ghoshal (1998) demonstrated that social capital with shared functions, high interdependence, frequent interaction, and closed structure is more likely to develop in the collective. Therefore, the user interacts with the streamer by launching or watching live streaming, expressing emotions similar to others, and showing similar experiences, to achieve emotional resonance and form a sense of group identity (Lin et al., 2021). From the perspective of theoretical logic, the social capital level of the streamer can easily establish trust in a relationship with the viewer to facilitate the purchase, which has a significant effect. The current research does not involve the correlation between significant levels of social capital and consumers' purchase intentions in live streaming. Therefore, the key question that this research attempts to solve is whether streamers in live streaming can improve their social influence and the emotional rendering ability in the live broadcast process can promote consumers' purchase intentions. How to improve the influence of the streamer in a virtual social network, to build a close relationship with consumers, should focus on the pseudosocial relationship factor.

Live Streaming E-Commerce and Parasocial Relationship

The concept of parasocial relationships was first proposed by Horton and Wohl (1956). At that time, they observed that people began to interact with TV characters in mass media such as TV, and most people felt that there was a real social relationship. This "phantom of one-way social relationship" was called a parasocial relationship. In psychology, the most common scenario of parasocial relationships is used to describe fans' admiration for celebrities, which can also be understood as the "star effect." According to this logical extension, scholars mostly pay attention to the "virtual" existence in one-way relationships and call the phenomenon of virtual intimacy a parasocial relationship (Rubin and Step, 2000). Celebrities are widely promoted because of their achievements in their respective fields. The parasocial relationship groups of celebrities often imitate the style and taste of celebrities and are more willing to trust the opinions of celebrities. At the same time, users of parasocial relationships will actively use media channels to obtain information about intimate relationships and engage in interactive activities as much as possible to pursue satisfaction (Palmgreen et al., 1980). The development of internet media incorporates the concept of parasocial relations, and its social and broadcast media applications have produced some new pseudosocial relations vocabulary, such as idols, internet celebrities, clout, and popularity. The parasocial relationship is directed to followers with virtual intimacy. They admire individuals who have a certain degree of influence in a virtual platform. From the perspective

FIGURE 1 | Research framework.

of social structure, parasocial relationships belong to the social capital of such "star" groups.

Streamers are the central figures of live streaming commerce programs, their flow rate and popularity can quickly gather consumers and achieve higher sales performance (Clement Addo et al., 2021). Therefore, celebrities, online celebrities, key opinion leaders, MCs, celebrity entrepreneurs, government officials, etc., who have a large number of pseudosocial relationship users, have used live broadcast platforms to recommend products to promote sales (Li et al., 2020). Consumers with parasocial relationships not only trust the streamer due to their strong emotional connection but also evaluate the streamer's credibility through the media and netizens outside live streaming (Bapna et al., 2017). If there are negative events such as "False propaganda" and "Poor quality" related to the product during live streaming of the streamer, or an even negative social public opinion that has nothing to do with the delivery activity, it will reduce consumers' trust and perception of the streamer and directly affect consumer's willingness to watch live streaming, consumers' trust, and repurchase rate. People will predict future behavior based on previous behavior. These beliefs form the basis of reputation, which is also regarded as the result of long-term consistent evaluation based on behavior. In normal interpersonal relationships, the parasocial relationship of the streamer is the performance of consumers based on a comprehensive review of their long-term accumulation of reputation information. How consumers who watch live streaming choose between the streamer's occasional negative events and the long-term parasocial relationship, and whether the streamer's social capital can form the mitigation of a few negative events have become other topics of this research. Based on the theoretical model proposed by Nahapiet and Ghoshal (1998), this research proposes a series of hypotheses to test

how three forms of social capital (cognition, structure, and relationship), parasocial relationships, and negative events affect viewers' buying intentions in live streaming.

HYPOTHESIS

Social capital proposed by Nahapiet and Ghoshal (1998) includes structural links or connections between individuals (structural capital), personal cognitive ability to understand and apply knowledge (cognitive capital), strong relationships between them, and positive characteristics (relational capital).These forms of social capital constitute an aspect of the social structure and promote the exchange of information between individuals within the structure. Although the model of Nahapiet and Ghoshal (1998) focuses on social capital factors at the group level, research has found that social capital can also explain the sales promotion relationship at the individual level in live streaming e-commerce. Live streaming e-commerce brings goods through the technology platform to integrate the individuals and collectives participating in the interaction and sales relationship in live streaming as a whole. These personal relationships are the main sources of the social capital of the streamer, which affects how consumers trust the streamer's behavior to have a purchase relationship and promote the sales performance of live streaming e-commerce. Structural capital evaluates the network density and centralization of the entire organization and applies it to the personal level of the streamer. The degrees of centralization and neutralization of the streamer in live streaming e-commerce are used to measure the purchase intention formation due to the influence of the streamer. At the same time, it evaluates how the degree of the streamer's cognitive capital and the perception of relationship capital affect purchase intention of live streaming viewers. The research hypothesis model is shown in **Figure 1**.

Each structure and its relationship with purchase intention are described in Section Structural Capital Hypothesis.

Structural Capital Hypothesis

Structural capital is a structural link created by personal connections in a network through social interactions and is an important predictor of collective action (Burt, 1992). When the social network is dense, the more individuals are in constant contact, the more likely it is to conduct collective actions and obtain more information exchange (Marwell and Oliver, 1988). In a group, individuals embedded in the group at the center have a higher proportion of direct contact with other members. These individuals are more likely than others to understand and abide by group norms and expectations and to gain the recognition and trust of others (Rogers and Kincaid, 1981). The centrality measurement evaluates how many unique individuals (consumers) are connected to a focal individual (streamer), and the structural capital is evaluated by determining the degree of centrality (scale) of an individual streamer to a network. Therefore, the centrality of the streamer's structural position in live streaming is reflected in the number of viewers that the streamer has attracted. Judging from the fact that celebrities, government officials, and other public figures with a high social influence have resorted to living streaming platforms to recommend products for sale, the size of the streamer represents its popularity. In the process of live e-commerce, public figures rely on their strong influence and popularity to help live e-commerce complete the trust "endorsement," dispel some consumers' doubts about live e-commerce and greatly improve the credibility of live streaming e-commerce. An all-around display of products with live streaming and the communication and interaction between consumers and streamers greatly increase the disclosure of product information. The larger the live streaming, the smaller the asymmetric information of the product, the higher the trust of consumers in the product and the streamer, and the stronger their willingness to buy. At the same time, "celebrities" with a high social influence carry out product recommendations and sales. The parasocial relationship they bring to consumers maximizes the social value of products, which has a positive impact on product sales and stimulates consumers' purchase intention (Park and Yang, 2010). The higher the streamer's parasocial relationship, the larger the broadcast scale, the more comprehensive the supervision of the platform and all sectors of the society, the more positive the media or the netizens outside the live broadcast room, the more consumers' trust in the streamer, and the more trustworthy it is. It acts as a bridge in enhancing the purchase intention of the product. Hypotheses 1–3 are listed as follows.

H1: Streamers with a high level of centrality in live streaming increase the willingness of live streaming viewers to purchase intention.
H2: Streamers with a higher parasocial relationship in live streaming increase the purchase intention of live streaming viewers.

H3: Trust has an intermediary effect in the influence of the parasocial relationship of live streaming viewers on purchase intention.

Cognitive Capital Hypothesis

Cognitive capital refers to the resources that enable information to have a shared interpretation in the collective (Taegoo et al., 2013). Engaging in a meaningful knowledge exchange requires at least some degrees of shared understanding between the parties, such as shared language and vocabulary. Individuals' cognitive capital develops along with the time they interact with others to share the same or practice of learning skills, knowledge, and professional discourse. That is, cognitive capital includes both personal professional knowledge and experience in applying professional knowledge. During the live streaming e-commerce process, the streamer plays a full-scale role in the consumer's purchase experience, such as shopping guides, model trials, and customer service teaching. The full range of online merchandise marketing is mapped to the consumption scenarios of offline physical stores, and consumers' sense of experience and satisfaction has been greatly improved. The streamer's comprehensive and detailed introduction to the product reflects "professionalism." The streamer explains product function and its usage information in a short period, which not only reduces the time and cost for consumers to understand the product on their own but also ensures the "credibility" of the product quality, and increases consumers' favorability and trust in the streamer and its recommended products. The dissemination situation and activities of live streaming commerce stimulate the viewers' emotional response and purchase behavior, and the emotional transmission of the streamer has also become a basic ability and skill (Douglas Pugh, 2001). Some researchers have elaborated the influence of the streamer's emotions on the viewer's emotions in interactive and dynamic business settings. For example, the use of symbolic images, virtual personas, and carefully constructed relationships can enhance viewers' consumption behavior (Lin et al., 2021). Therefore, the higher the streamers' professional knowledge or emotional skills, the more they can gain the trust of live streaming viewers, thereby increasing their willingness to buy. Hypotheses 4 and 5 are listed as follows.

H4: The streamer with a higher level of professionalism in live streaming e-commerce will significantly increase consumers' purchase intention.
H5: Trust has an intermediary effect in the influence of the professionalism of the streamer on the purchase intention of consumers.

Relational Capital Hypothesis

Relationship capital refers to the collective emotional relationship (Wasko and Faraj, 2005). When members have a strong sense of identity with the group, they will trust other people in the group, believe that they are obliged to participate in the group and recognize and abide by its cooperation norms. Relationship capital is formed finally (Lewicki and Bunker, 1996). Coleman (1990) proposed that the relational aspect of social capital is the

structure that promotes individual action. Relationship capital is an important asset, which is conducive to an emotional connection between community groups and their members. This research studies the content related to live streaming, including two dimensions in relational capital: commitment and reciprocity (Arli et al., 2018).

The commitment represents a responsibility or an obligation to participate in future actions and is generated by a frequent interaction (Hess and Story, 2005). Although commitment is often described as a direct expectation that arises in a specific personal relationship, it can also be accumulated into a collective organization. The goods-carrying streamer plays the role of artificially screening products, while live streaming viewers can easily derive trust in product quality based on the good reputation of the streamer. The related performance of the streamer during live streaming directly affects consumers' pre-purchase expectations. If there is a big difference between the experience after purchase, the streamer's reputation will be reduced. On the contrary, if the trust of the streamer is damaged, the first thing that will be affected is the lowered perception of the quality of the products that the streamer carries. Based on this, the streamer pays more attention to the sense of responsibility and moral obligation and often adopts the way of promise during the live streaming process to strengthen the live streaming viewer's understanding of the product and trust in themselves. If the live streaming streamer shows a strong sense of commitment during the live streaming process, it is more likely to increase purchase intention of the live streaming viewers. However, in reality, the live broadcast e-commerce industry has an uneven quality of streamers. Some live streaming e-commerce companies will conduct false propaganda and use consumers' trust to mislead consumers to make purchases. After such negative incidents broke out, consumers believed that they had been deceived and produced a strong resistance to the streamer, which seriously affected consumers' willingness to buy. The emotional identification of the fan group has a parasocial relationship with the streamer in the live streaming, which causes the fan group to adopt the "problem transfer" method to seek explanations for the idol streamer (Liebers and Schramm, 2019). Hypotheses 6–8 are listed as follows:

H6: The streamer shows the obligation of commitment during the live streaming process will further enhance the purchase intention of the live streaming viewers.

H7: Negative incidents of the streamer in live streaming commerce will reduce the purchase intention of live streaming viewers.

H8: The parasocial relationship between viewers and the streamer regulates the relationship between the negative events of the streamer and the viewer's purchase intention.

A basic norm of reciprocity is a sense of mutual indebtedness so that individuals usually reciprocate the benefits they receive from others, ensuring ongoing supportive exchanges (Shumaker and Brownell, 1984). Even though exchanges in live streaming e-commerce occur through weak ties between the streamer and viewer, there is evidence of reciprocal supportiveness (Wellman and Gulia, 1999). As the development form of e-commerce,

live streaming e-commerce has captured the user's mentality of pursuing low-price and high-quality goods from the beginning of its rise (Wu et al., 2008). From the perspective of a communication strategy, real-time interaction is a significant feature of live streaming. In addition to the regular product explanation, Q&A, and lottery interactions, the streamer will also participate in the SecKill, grab red envelopes, and give gifts to the viewer to obtain support from live viewers (Rodriguez et al., 2014). There are always large numbers of statements such as "If you don't buy the products sold in live streaming e-commerce, you will lose the money." The streamer recommended product "inexpensive and good in quality" has also strongly attracted live viewers to purchase. Therefore, when there is a strong standard of reciprocity in live streaming commerce, live streaming viewers believe that the products they buy are the most favorable, and thus have a higher purchase intention. This leads to the final hypothesis below.

H9: Under the guidance of the reciprocity rule, the live streaming e-commerce activity will increase the consumer's purchase intention.

RESEARCH DESIGN

Sample Selection

The sample of research came from consumers who have watched live streaming. The data were collected through the internet and social networks in the form of questionnaire surveys. Since it was impossible to accurately confirm whether the respondent has watched the live streaming show, one question item "Have you ever watched the live streaming show" was placed next to the basic information of the respondent. If the respondent chose not to watch the live streaming, the following items will be hidden and displayed, and the respondent can choose to submit the questionnaire. Finally, the data of respondents who have watched live streaming were used for analysis. To solve the potential limitations of occupational categories brought about by the questionnaires issued by social groups, the questionnaires were distributed for different occupational groups in a purpose-based sampling method, focusing on the company teams and student groups that can be reached. Participants in the survey were all voluntary, and the questionnaire was spread and filled out in social applications such as WeChat and QQ. The questionnaire survey lasted for 1 week. After the time was over, the questionnaire data were collected and checked for validity.

A total of 551 questionnaires were collected, and no missing data or abnormal observations were found, and all were confirmed to be valid. The number of people who watched live streaming was 230, accounting for 41.74% of the total sample; the number of people who did not watch live streaming was 321, accounting for 58.26% of the total. Among the survey participants, there are 219 men and 332 women. The proportion of viewers was 46.69% for women, which is higher than 34.25% for men. The occupational categories of the respondents were more comprehensive, and the number of respondents was mainly concentrated in professional and technical positions (102 people), business units (66 people), government departments

TABLE 1 | Demographic information of respondents (*N* = 551).

Item		Whether to watch		Item		Whether to watch		Item		Whether to watch	
		No	Yes			No	Yes			No	Yes
Gender	Male	144	75	**Education level**	High school and below	3	20	**Work experience**	Less than 3 years	122	76
	Female	177	155		College Degree	130	96		0–3 year	93	71
Occupation category	Technical position	54	48		Bachelor Degree	108	65		3–5 year	16	22
	Service position	4	8		Master Degree	66	35		5–8 year	26	21
	Worker	6	4		Doctoral Degree	14	14		More than 8 years	64	40
	Corporate employee	39	27	**Age**	20 year-old below	60	44	**Salary**	Less than ¥1,000	100	57
	Government staff	31	21		21–30 year-old	183	127		¥1,000–3,000	105	77
	Freelance	21	17		31–40 year-old	69	44		¥3,000–5,000	46	48
	Entrepreneur	7	8		41–50 year-old	6	11		¥5,000–10,000	39	32
	Student	159	97		51 year-old above	3	2		More than ¥10,000	31	11

(52 people), and student groups (252 people). Although the number of service positions was the smallest, the proportion of watching live streaming was the highest, reaching 66.67%. A slight deviation from our understanding was that 37.89% of the student population watched live streaming, which was the lowest level among all categories. Respondents' education levels were mainly concentrated in colleges (226), undergraduates (173), and masters (101), while groups with education levels below high school have the highest percentage of watching live streaming, reaching 86.96%, followed by doctoral groups, as 50%.

The age group was relatively concentrated among the respondents. In the 21–30 age group, there were 310 people and 40.97% of them watched live broadcasts. Although the 41–50-year-old group (64.71%) has the highest percentage of watching live broadcasts, the total number was relatively small, only 17 people. No work experience (198 people), 0–3 years of work experience (164 people), and more than 8 years of work experience (104 people) accounted for 33.04, 30.87, and 17.39%, respectively, of the total number of viewers. However, judging from the viewing ratio of each category, it was smaller than the other two groups. Respondents' salary survey data, shows that the proportions of viewers in each category were 36.31, 42.31, 51.06, 45.07, and 34.04%, respectively. The proportion of people watching live streaming first rose and then started to decline with an increase in income. The overall sample composition is shown in **Table 1**. In a subsequent analysis of this study, the sample data (*n* = 230) of watching live streaming e-commerce programs were chosen.

Variable Measurement

The measurement of the variables in this study was mainly based on the published measurement scales and items, and combined with the characteristics of live streaming e-commerce, the measurement items of each variable was designed. The measurement of centricity index adopted the Social Interaction Connection Scale of Chiu et al. (1993). According to the situation prevailing in live streaming e-commerce, the more viewers watching the streamer, the more consumers are connected to the streamer, and the higher the neutralization

of the streamer, a single-item scale is designed to measure live viewers. The professionalism index adopted the scale of common language and a common vision of Kate (2010) and Cohen and Prusak (2001) combined the application context of live streaming e-commerce and designed a professionalism measurement scale including two items that describe the language expression and empathy ability of the streamer when explaining products. The scale for measuring commitment was adapted from the existing research results of Mowday et al. (1997) including three items. The reciprocity measurement was adapted from the scale used by Wasko and Faraj (2005) including two items.

The measurement of trust was adapted from the trust scale of McAllister (1995). The eight-item scale had two parts: cognitive trust and emotional trust. In the process of structural equation confirmatory factor analysis, according to the modification indices (MI) value of the initial model, to revise and adjust. Finally, the four items related to this research were retained. The measurement of parasocial relationships adopted the six-item questionnaire of Kim et al. (2015). In the confirmatory factor analysis, two items were deleted to modify the model. Negative incidents were designed with two-value variables for questionnaire design, mainly to obtain respondents' negative perceptions of whether there was false propaganda on the streamer. In this study, purchase intention was a dependent variable. The two-item scale from the purchase intention scale by Jiang et al. (2010) was adapted to include enquiring about the purchase intention and purchase decision of the viewer during live streaming, to measure the viewer's possibility of purchase during live streaming commerce.

According to the potentially influencing relationship of purchase intention, this research used gender, age, monthly disposable income, and platform heterogeneity as control variables. The current live streaming commerce platform was divided into five levels, from 1 to 5 representing the degree from weak to strong based on factors such as platform popularity, operating time, platform scale, platform background, and platform positioning. Except for gender and negative events, which use the binary measurement of accidents, other variables

TABLE 2 | Descriptive statistics and correlation coefficients of the variables.

Variables	1	2	3	4	5	6	7	8	9	10	11	12
1. Gender	—											
2. Age	0.222**	—										
3. Income	0.189**	0.441**	—									
4. Platform	−0.349**	−0.109	−0.030	—								
5. Centricity	−0.117	−0.154*	0.081	0.244**	—							
6. Professionism	−0.205**	0.063	0.047	0.154	0.245**	**0.727**						
7. Commitment	−0.047	−0.005	0.040	0.073	0.124	0.093	**0.623**					
8. Reciprocity	−0.053	−0.039	0.128	0.232**	0.118	0.066	0.545**	**0.637**				
9. Trust	−0.112	0.013	−0.051	−0.010	0.149*	0.486**	−0.093	0.016	**0.793**			
10. Parasocial	0.003	0.084	−0.062	−0.003	0.075	0.303**	−0.050	−0.067	0.560**	**0.805**		
11. Non-event	0.096	0.038	0.041	−0.010	−0.033	−0.212**	0.174**	0.215**	−0.194**	−0.137*	—	
12. Intention	−0.099	0.133*	−0.058	0.138*	0.141*	0.366**	0.015	0.110	0.556**	0.552**	−0.187**	**0.731**
M	0.326	2.130	2.448	4.108	4.583	3.261	2.938	2.980	2.991	2.842	0.517	3.109
SD	0.470	0.804	1.202	0.857	2.198	0.660	0.858	0.966	0.650	0.651	0.500	0.767

N = 230, α-coefficient is bolded along the diagonal; **p < 0.01, *p < 0.05.

are measured using Likert's five-level scoring method, using 1–5 points as a scale to measure the degree of the consent of live broadcast viewers to the problem or the increase in age and income. Among them, 1 point represents a very low level and 5 points represent a very high level.

DATA ANALYSIS

Model Measurement

As the questionnaire survey belongs to self-reported data, it is necessary to conduct a series of confirmatory factor analyses of latent variables to determine their validity. This study applied the Maximum Likelihood Estimation method to analyze the multifactor correlation between items by using the variance adjustment estimator in Mplus. Previous studies have used this method to perform a CFA analysis on Likert-type data (Luksyte et al., 2020). Based on this method and the suggestion of a suitable fitting index, the fitting data of the six-factor model were: $x^2 = 517.75$; $df = 215$; $p < 0.01$; Root Mean Square Error of Approximation (RMSEA) = 0.078, 90%; CI = [0.07, 0.09]; Comparative Fit Index (CFI) = 0.87; and Tucker Lewis Index (TLI) = 0.85. Since the value of x^2/df < 3, RMSEA < 0.05 indicates that the model fits well, 0.08–0.10 fits well, >0.10 fits poorly, while CFI and TLI >0.95 and >0.90 indicate a good fitness level and an acceptable fit, respectively.

It could be seen from the model fitting results that the model fitting was not ideal and the model needed to be revised. As the data are linked, changing any one parameter will cause the entire variance–covariance matrix to change. Therefore, in the process of model modification, only one parameter was modified at a time, usually starting with the largest modification index. According to the maximum value of MI of the initial model, it was adjusted sequentially, and some items of parasocial relationship and trust were deleted. Finally, the model fitted values were $x^2 = 155.64$; $df = 89$; $p < 0.01$; RMSEA = 0.05, CI = [0.04, 0.07]; CFI = 0.94; and TLI = 0.92. The model showed a good fit.

Table 2 shows the descriptive statistics and correlation coefficients of the variables. As the reliability coefficient of the total scale is preferably more than 0.8, with the acceptable limit being 0.7–0.8; the reliability coefficient of the subscale is preferably more than 0.7, with the acceptable limit being 0.6–0.7. The Cronbach's alpha coefficient of each scale in this study was >0.6, and the coefficient of the total scale was 0.806, indicating that the scale of this study has good reliability.

Hypothesis and Model Testing
Main Effect and Moderating Effect Test

Table 3 shows the regression analysis results of the estimated main effects and moderating effects. Model 1 was the parasocial relationship without a moderating variable; Model 2 was the moderating variable added; and Model 3 was an interaction item with the addition of negative events and parasocial relationship. Since it was assumed that the parasocial relationship had a significant impact on the purchase intention of live streaming viewers, the main effect test was mainly based on the regression results of Model 2. The adjusted R^2-value of the model is 0.384, indicating that the model has a certain explanatory power. H1 proposed a positive connection between the streamer's centrality and purchase intention of live streaming viewers. The hypothesis testing results of H1 were not significant ($\beta = 0.032$, SE = 0.26, $t = 1.42$). H2 proposed a positive connection between the streamer's parasocial relationship and the purchase intention of live streaming viewers. The hypothesis testing results of H2 showed that the streamer's parasocial relationship significantly affected the purchase intention of viewers ($\beta = 0.556$, SE = 0.065, $p < 0.01$). H4 proposed that the professional level of the streamer affected the purchase intention of live streaming viewers. The regression results of H4 showed that the professionalism of the streamer positively affected the purchase intention of live viewers ($\beta = 0.343$, $SE = 0.076$, $p < 0.01$).

TABLE 3 | Regression analysis of estimated main effects and moderating effects.

Independent variable	Dependent variable: purchase intention (Inten)		
	Model 1	Model 2	Model 3
Gender	−0.010	−0.059	−0.054
	(−0.09)	(0.095)	(0.095)
Age	0.221**	0.168**	0.161**
	(0.066)	(0.058)	(0.059)
Income	−0.123**	−0.082*	−0.082*
	(0.044)	(0.039)	(0.039)
Platform	0.045	0.054	0.051
	(0.75)	(0.052)	(0.052)
Centricity	0.032	0.024	0.023
	(0.026)	(0.020)	(0.020)
Professionism	0.343**	0.179**	0.185**
	(0.076)	(0.068)	(0.069)
Commitment	−0.085	−0.063	−0.058
	(0.065)	(0.056)	(0.056)
Reciprocity	0.146*	0.154**	0.152**
	(0.059)	(0.052)	(0.052)
Non-event	−0.221*	−0.175*	0.191
	(0.097)	(0.084)	(0.372)
Parasocial		0.556**	0.626**
		(0.065)	(0.095)
Noneparasocial			−0.128
			(0.127)
Constant	1.417**	0.289	0.089
	(0.374)	(0.351)	(0.403)
Observations	230	230	230
R-squared	0.216	0.411	0.414
F-test	0	0	0
r2_a	0.184	0.384	0.384
F	6.751	15.27	13.98

N = 230, Values in parentheses refers to standard errors. **p < 0.01, *p < 0.05. nonepara-Product of negative events and pseudo-social relations.

H6 and H9 proposed a connection between the dimension of relational capital and purchase intention. The hypothesis testing results of H6 showed that there was no significant relationship between the streamer's commitment and live streaming commerce viewers' purchase intention ($\beta = -0.085$, $SE = 0.065$, $t = -1.31$). The hypothesis testing results of H6 showed a positive and significant connection between consumer reciprocal promotion and purchase intention in live streaming commerce ($\beta = 0.146$, $SE = 0.059$, $p < 0.05$). H7 proposed that the streamer's negative events are negatively related to the live streaming viewer's purchase intention. The hypothesis testing results are shown ($\beta = -0.221$, $SE = 0.097$, $p < 0.05$). H8 proposed that the streamer's parasocial relationship will negatively regulate the influence of the streamer's negative events on the purchase intention of live streaming viewers. Although Model 1 had significant regression results for negative events and Model 2 also had significant regression results on negative events and parasocial relationships, the interaction regression results

TABLE 4 | Bootstrap analysis of trust mediation effect.

	Observed' Coef.	Bootstrap SE	Normal-based [95% Conf. interval]	
Parasocial relationship and purchase intention				
Indirect effect (ab)	0.170**	0.050	0.072	0.268
Direct effect (c')	0.420**	0.092	0.240	0.600
Professionalism and Purchase Intention				
Indirect effect (ab)	0.031**	0.011	0.010	0.053
Direct effect (c')	0.016	0.026	−0.034	0.067

N = 230. **p < 0.01.

between negative events and parasocial relations in Model 3 ($\beta = -0.128$, $SE = 0.127$, $t = -1.01$) were not significant, indicating that parasocial relations did not have a moderating effect on negative events and purchase intentions.

Mediating Effect Test

H3 and H5 proposed that trust has an intermediary effect in the influence of the streamer's parasocial relationship and professionalism on the viewer's purchase intention, respectively. This study adopted the Bootstrap method of indirect effects to directly test the mediation effect of ab (Preacher and Hayes, 2008). The Bootstrap method has no prerequisite requirements for the normality of the sampling distribution. The test principle is to randomly select the number of samples from the original samples to iterate and calculate an introductory effect with a new bootstrapped sample. At the same time, a 95% CI of the deviation correction is calculated. If the interval does not contain zero, it means that a mediating effect is significant. The results of testing an indirect influence of the streamer's parasocial relationship and professionalism on the viewer's purchase intention through a trust using the Bootstrap method for 5,000 iterations are shown in **Table 4**.

From the results of an analysis in **Table 4**, it can be seen that the indirect influence of trust on the streamer's parasocial relationship and the viewer's purchase intention was positive and significant. The 95% bias correction CI was (0.072, 0.368) excluding zero, and the mediation effect (ab) was 0.170. The direct effect (c') of the parasocial relationship on purchase intention was 0.420, and the 95% bias-modified CI is (0.240, 0.600) and excluding 0. After controlling the intermediate variable trust, a direct influence of the independent variable parasocial relationship on purchase intention was still significant. Therefore, trust played a partial mediating role between parasocial relationship and purchase intention. The mediation effect accounted for 40.48% of a direct effect and 28.81% of the total effect. An indirect influence of trust on the streamer's professionalism and the viewer's purchase intention was also positive and significant. The 95% deviation correction CI was (0.010, 0.053) excluding zero, and a mediating effect (ab) was 0.031. A direct effect (c') of professionalism on purchase intention was 0.016. The 95% deviation-modified CI was (−0.034, 0.067)

including zero. That is, after controlling the intermediate variable trust, a direct effect of the independent variable professionalism on purchase intention was not significant. Therefore, trust played a completely intermediary role between professionalism and purchase intention. In summary, the Bootstrap test supported the mediation hypothesis proposed in this study.

DISCUSSION AND IMPLICATIONS

The social capital theory explains the nature of personal emotions and the quality of relationships in social networks. As the linker of the virtual network, the purpose of this research was whether the streamer could find the main reason for the live purchase from social capital. The findings support the theoretical model of social capital and also strongly support the most hypothetical relationships. The findings showed that the streamer's centrality level, which means that the scale of live streaming e-commerce could not increase viewers' purchase intention. The results were inconsistent with our general understanding. In reality, the larger the scale of live streaming, the better the sales of live streaming. However, this seems to give us a revelation from another point of view. The larger the scale of live streaming, the larger the base of the viewer. Under the same purchase ratio, the number of viewer purchases will be higher. Because the data reflected the self-understanding of live broadcast viewers, it also reflected that viewers did not agree that the scale of live broadcast promoted their purchases. This fact was also confirmed by the feedback of consumers who often watch live broadcasts: people who watch live broadcasts will not buy becasue the number of people in the live streaming room is large, and more consideration was about viewers' own needs and the streamer's description of products.

Both the centrality of the streamer and the parasocial relationship of the viewer to the streamer can affect the scale of live streaming e-commerce, but the findings showed that the parasocial relationship of the viewer to the streamer significantly positively affects the viewer's purchase intention. Trust plays a part of the intermediary role between the two variables. This result confirmed that people with high viewer groups such as streamers, celebrities, and internet celebrities can achieve higher sales. When the streamer establishes personal popularity and gains the viewer's virtual intimacy recognition, live streaming viewers will trust the streamers that they believe to have a parasocial relationship, which will help promote product sales. Therefore, from the perspective of structural capital, the higher the streamer's centricity does not mean that it will increase the viewer's purchase intentions. However, if a trust relationship with viewers can be established outside live streaming, the streamer's centrality is similar to the result of parasocial relationship, which can effectively enhance the consumer's purchase intention. Therefore, if the streamer wants to improve the sales performance of their live streaming room, they can consider measures to establish an effective trust relationship with consumers outside the live streaming room.

The findings showed that the impact of negative events on viewers' purchase intentions was consistent with the real ones. If the streamer has a negative public event, it will significantly affect the viewer's purchase intentions. When the streamer's reputation is damaged, the viewer's purchase intentions are still greatly reduced due to the impact of such negative events, and they even arise not to watch the streamer's live show. Although it seems that the "star effect" makes viewers with parasocial relations adopt thinking methods such as problem transfer to weaken the influence of negative events on purchase intentions, the actual result has the opposite situation. That is, consumers' parasocial relations still cannot compensate for a negative impact of negative events, which means that even if the streamer is a public figure or celebrity, the audience still cannot tolerate their negative events.

The findings also showed that the professional performance of the streamers in cognitive capital significantly improved viewers' purchasing intentions. Trust played a full intermediary role in professionalism and purchasing intentions. Streamers' experience in sales practice is an important predictor of consumer purchases. Since live streaming commerce is still a sales task, it tests the streamer's sales ability. The more professional the streamer is, the more the streamer's introduction to the product will be recognized and trusted by the live viewer because viewers believe that streamers are experienced in their careers. Only when viewers trust the streamer's description of the product's functions and various ways of its use, as well as the streamer's reasons for recommending the product, will they be an intention to buy.

Contrary to expectations, the results showed that high-level relationship capital did not fully reflect the increase in viewers' purchase intention. There was a significant positive relationship between reciprocity expectations and the viewer's purchase intention. Promises are not related to purchase intentions. As the Chinese saying goes, "One spit, one nail," "A word is once spoken cannot be overtaken even by a team of four horses," which means that "if you promise somebody, you must keep it" or "a promise is weightier than one thousand bars of gold." Therefore, the promise is generally a technique used by the streamers, and it can effectively enhance the trust of viewers and stimulate their enthusiasm for buying. It was a surprising result that the streamer's commitment during the live broadcast process does not affect the viewer's purchase intention. From another point of view, it also showed that the viewer was rational. The promise is regarded as the streamer's sales technique, and the streamer's promise is not recognized by the viewers, so it is not used as a reference for purchases. From the perspective of various promotions, discounts, and full reduction activities of current e-commerce, low prices are still one of the important factors for consumers to make online purchases, so reciprocity is called one of the main factors that effectively promote consumer purchases. This study did an additional analysis by removing the reciprocity variable from the model and checking whether the impact effect of the commitment exists. The results found that there was a weak positive correlation between the streamer's commitment and the viewer's purchase intentions, indicating that the irrelevant variance of reciprocity was suppressed, which slowed down the relationship between the commitment and the dependent variable. Once the impact of reciprocity is considered, higher commitments have little effect on purchase intention. A potential explanation for this discovery may be that, after

taking into account the reciprocity factor, viewers are looking forward to preferential prices, but they believe that this is just a consistent routine between merchants and streamers. It was only determined in advance for live streaming sales, let alone the streamer's commitment. This pinpoints the direction of the streamer's behavior during live streaming: the joint promotion of low prices and promises is a more conducive way to promote sales.

LIMITATIONS AND FUTURE RESEARCH

This study has several limitations, which need to be addressed. First, this research was a cross-sectional study based on the questionnaire survey, the independent and dependent variables in this study were all self-evaluated data from viewers. Due to a cross-sectional design, it was difficult to examine a dynamic interaction between the changes in the streamer's social capital and the resulting dynamic interaction effects in the viewer's purchase intentions. Therefore, future research can focus on the comparative relationship between longitudinal data.

Second, this study did not consider the relationship between the streamer's centrality and the parasocial relationship but regarded the scale of live streaming e-commerce brought about by the streamer's parasocial relationship as a manifestation of centrality. This expression is not very rigorous and becomes the limitation of this research. Future research can consider exploring the mutual influencing factors of streamer centrality and parasocial relationship and find the key path from centrality to establishing a trust relationship. However, the limitation of this research is that the streamer's professionalism was based on the self-assessment of viewers, which shows the consumer's understanding of the streamer's professionalism. The way of consumer evaluation lacks reasonable and comprehensive objective indicators to measure the streamer's professionalism, which needs to be objectively defined in further research.

Third, the streamer's parasocial relationship was determined by using theory as an independent variable in the model. However, parasocial relationship can also be regarded as a dependent variable or the result of the social capital model. Although parasocial relationship is an important indicator to promote viewers' purchase intention, the measurement of parasocial relationship may also be used to show the behavioral results achieved by the streamer's social capital. Therefore, future research should consider the dynamic nature of parasocial relationship and the social capital model. Of course, this study may be restricted due to sample selection and do not focus on fan groups with "star effects," but this still does not prevent this conclusion from becoming a factor that should be considered. Future research can obtain sample data from the fan group for analysis to truly reflect the "star effect" on the mitigation of the streamer's negative events.

In addition, the limitation of this research was it only examined the factors that increase the viewer's purchase intention. Future research should examine whether the other sales models that rely on social network influence also exhibit similar factors, to see whether there are similar results of personal social capital found in this research. That is, whether the social capital model applies to the sales practices that are similar in nature.

CONCLUSION

Although the development of e-commerce has brought people efficiency and convenience, huge and mixed information of online sales also makes people at a loss. A large amount of information about the products sold online also exacerbates the asymmetry of consumers' perception of product information. Live streaming commerce uses "people" as the link to eliminate a unilateral display of products sold in the past. The streamer's "lively" interactive display mechanism makes up for the information dissemination method of e-commerce unilaterally delivering product information. The connection between the social capital of the streamer's "individual" and the viewers' "crowd" creates a trustworthy image for consumers, effectively reducing the information asymmetry caused by consumer online purchases, thereby promoting consumers' purchase intentions.

Why do people trust the inaccessible and unfamiliar streamers through live streaming commerce to purchase online? The research findings show that when the streamer had a high professional ability in sales, low-price reciprocity norms during the live broadcast process and a parasocial relationship with the viewers, who watch the live broadcast show a strong willingness to buy. Surprisingly, the scale of the live broadcast by the streamer and the performance of its commitment to the viewer does not seem to promote consumers' purchase intentions. Live streaming commerce is a new form of e-commerce platform, and there is still a lot of room for the improvement of its consumer groups. How to fully show a unique, charm, and stable mechanism to attract people to use live streaming commerce as an online purchase option needs further academic exploration.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. Written informed consent for participation was not required for this study in accordance with the national legislation and the institutional requirements. Written informed consent was obtained from the individual(s) for the publication of any potentially identifiable images or data included in this article.

AUTHOR CONTRIBUTIONS

All authors listed have made a substantial, direct, and intellectual contribution to the work and approved it for publication.

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Roles of Multiple Entrepreneurial Environments and Individual Risk Propensity in Shaping Employee Entrepreneurship: Empirical Investigation From China

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While prior literature has widely acknowledged that the entrepreneurial environment significantly fertilizes entrepreneurship, the impact of workplace receives limited attention, and the vital role of organizations in linking social entrepreneurial environment and employee entrepreneurship has been largely ignored. Therefore, this study aims to unfold how multiple entrepreneurial environments (i.e., social, organizational, and interpersonal factors) shape employee entrepreneurship and then further reveal how such relationships vary with employees' risk propensity. Drawn on the theoretical lens of mindsponge process, which offers an explanation of why and how organizations and individuals adopt new values through the cost-benefit analysis, we proposed a research model to explain the influence mechanisms of the social entrepreneurial environment on the cost-benefit analysis of both organizations and individual employees. Specifically, given that organizations deeply embedded in the society need to balance the costs and benefits under the pressure of the social entrepreneurial environment, the social entrepreneurial environment affects the organizational entrepreneurial environment (i.e., organizational hostility toward employee entrepreneurship). Similarly, employees' cost-benefit analysis under the pressure of organizational hostility will influence their entrepreneurial intentions. Through analyzing the data collected from a two-wave survey with 220 employees, we showed that organizational hostility toward employee entrepreneurship plays a mediating role between social entrepreneurial environment and employees' entrepreneurial intentions. In addition, such mediation relationship is moderated by coworkers' unethical behaviors during their entrepreneurship and employees' risk propensity, which are expected to influence organizations' and employees' cost-benefit analysis, respectively.

Keywords: employee entrepreneurship, entrepreneurial environment, organizational hostility, unethical behavior, risk propensity

INTRODUCTION

Employee entrepreneurship, referring to the phenomenon that employees quit their jobs to start their own new ventures (Ganco, 2013; Ye et al., 2021b), is not uncommon all around the world (Franco, 2005). Due to the mass entrepreneurship and innovation policy in China, there is an increasing number of employees leaving their original organizations to create new ventures (Kaul et al., 2021; Wang L. et al., 2021). In the existing literature, the important roles of social entrepreneurial environments (e.g., institutional, regional, and industrial factors) in driving entrepreneurship have been well-documented (e.g., Klepper and Thompson, 2010; Lan and Luc, 2020; Wu et al., 2020; Latif and Ali, 2021; Ricciardi et al., 2021). However, the organizational entrepreneurial environment receives limited attention (Wang B. et al., 2021), and less is known about the vital role of organizations in linking social entrepreneurial environment with employee entrepreneurship (Rasool et al., 2021). According to previous studies, employee entrepreneurship is inevitably affected by the original organizations (Agarwal et al., 2004; Agarwal and Shah, 2014; Shah et al., 2019). Furthermore, studies show that the original organizations may play a decisive and dominant role in directly influencing employee entrepreneurship (Gambardella et al., 2015; Agarwal et al., 2016b), while social and interpersonal environments influence employee entrepreneurship in an indirect way. Thus, it is crucial to answer the question that how multiple entrepreneurial environments shape employee entrepreneurship. With the development of emerging research on employee entrepreneurship, scholars have highlighted the significant influences of organizational factors on employee entrepreneurship (Agarwal and Shah, 2014; Kaul et al., 2021). However, prior studies paid more attention to the influences of objective characteristics, for instant, organizational age and size (Agarwal et al., 2016a). It is still unclear whether and how subjective factors (i.e., organizations' subjective attitudes toward employee entrepreneurship) also shape employee entrepreneurship (Campbell et al., 2012; Walter et al., 2014).

In addition, although previous studies have either explicitly or implicitly shown that the influence of organizations' attitudes toward employee entrepreneurship on entrepreneurship is positive or neutral (e.g., Klepper and Sleeper, 2005; Zhuang et al., 2020), and how, in reality, its influence on employee entrepreneurship could be different compared with other forms of entrepreneurship. Research has shown that employee entrepreneurship is likely to bring indirect damage to the established organizations (i.e., entrepreneurs' original organizations) and inhibit their development and survival (Campbell et al., 2012). Therefore, organizations' attitudes toward employee entrepreneurship can be hostile, which is termed as organizational hostility—the degree to which a company does not appreciate employee entrepreneurship (Walter et al., 2014; Vaznyte et al., 2021). Hostility would cause the established organization to unite with its coalition partners to resist the new ventures created by its employees (Walter et al., 2014), resulting in an increase in employee entrepreneurship's cost and a decrease in employee entrepreneurship's benefit

(Klepper and Thompson, 2010). According to the mindsponge process, whose underlying themes of multi-filtering information process and inductive attitude offering an explanation of why and how individuals and organizations adopt new values through the cost-benefit analysis. Individuals adsorb external environmental values into their mindset after making the cost-benefit analysis and take the values personal (Vuong and Napier, 2015; Vuong, 2016). Therefore, the organizational entrepreneurial environment (i.e., organizational hostility) would shape employees' cost-benefit analysis and further influence employees' entrepreneurial intentions.

Similar to employees who are deeply embedded in their organizational environments, organizations are heavily stuck in their social environment, and thus, the social entrepreneurial environment is an important factor that takes shape in an organizational entrepreneurial environment. Social entrepreneurial environment embodies the whole society's attitude toward entrepreneurship, which refers to the laws, regulations, and government policies toward entrepreneurship, local people's knowledge and skills about creating and operating new ventures, and residents' respect and support for entrepreneurs and entrepreneurial activities in the entrepreneurs' location (Busenitz et al., 2000). According to the perspective of mindsponge process, organizations embedded in the social entrepreneurial environment absorb the values of external environment through the cost-benefit analysis and take the values as their own (Vuong and Napier, 2015; Vuong, 2016). Actually, organizational hostility is also a result of the cost-benefit analysis process (Agarwal et al., 2004; Finch et al., 2015), in which organizations weigh the costs and benefits that employee entrepreneurship may bring to them under the influence of the social entrepreneurial environment. On the one hand, a favorable social entrepreneurial environment would make new ventures easier to obtain their legitimacy (Zimmerman and Zeitz, 2002; Bitektine, 2011; Wang and Zhou, 2020), which indicates that the society is more tolerant of the damage that employee entrepreneurship brings to the established organizations (Kibler and Kautonen, 2016). Therefore, hostile attitudes and behaviors from the established organizations would be less likely to be accepted by society, and organizational hostility is bound to face greater costs and resistance. On the other hand, in a conducive social entrepreneurial environment, established organizations and new ventures are more likely to form an amicable relationship. Such relationship not only prompts the organizations to recognize the legitimacy of new ventures (Tost, 2011; Huy et al., 2014), but also contributes to the backflow of cutting-edge knowledge from new ventures to the organizations (Kim and Steensma, 2017), which also bring about potential benefits for established organizations. Therefore, a favorable social entrepreneurial environment can directly shape organizations' attitudes toward employee entrepreneurship and reduce organizational hostility (Roxas and Coetzer, 2012). Accordingly, from the perspective of mindsponge process, organizations play an indispensable role in linking the social entrepreneurial environment with employees' entrepreneurial intentions. We discussed such mechanism in detail and further detected other important factors (i.e., coworkers' unethical

behaviors during their entrepreneurship and employees' risk propensity) that may influence the cost-benefit analysis of either organizations or employees.

The above discussion leads to the following research questions (RQ):

RQ1. How do multiple entrepreneurial environments shape employee entrepreneurship?

RQ2. Why does organizational hostility toward employee entrepreneurship play a mediating role between social entrepreneurial environment and employee entrepreneurship?

The structure of this study is as follows. In the next section, the theoretical basis is introduced, and each hypothesis is elaborated. Then in the "Materials and Methods" section, the participants and measurement of this study are presented. Subsequently, statistical results and hypothesis testing are shown. Finally, the theoretical and practical contributions are discussed.

THEORY AND HYPOTHESES

Social Entrepreneurial Environment and Employees' Entrepreneurial Intentions

The social entrepreneurial environment refers to the sum of various factors that entrepreneurs must face and can use in the process of carrying out entrepreneurial activities. It mainly includes three dimensions, namely, regulatory one containing preferential policies and incentive measures that the government provides for entrepreneurial activities; cognitive one referring to people's in-depth cognition and professional knowledge of entrepreneurial activities; and normative one standing for the society's tolerance of entrepreneurial failure and respect for entrepreneurs (Busenitz et al., 2000). All those dimensions are conducive for employees to leave their jobs and start their own businesses (Urbano et al., 2020; Ye et al., 2021a). From the perspective of mindsponge process, a favorable social entrepreneurial environment makes employees perceive that the potential benefits of leaving the company outweigh their possible costs (Kibler and Kautonen, 2016). First, from the perspective of resource dependence, the regulatory dimension reflects the abundance and certainty of the market resource. An ideal regulatory environment provides diverse and sufficient resource acquisition channels for employees, thus laying the foundation for entrepreneurial activities (Shah et al., 2019; Lazar et al., 2020). Second, the cognitive dimension would shape employees' positive perceptions toward entrepreneurial activities and magnify the tangible benefits obtained from entrepreneurship (Lim et al., 2010). The mindsponge process implies that employees' cognition of entrepreneurship is shaped by cultural environment, thereby a favorable cultural environment leads to employees' positive cognition toward employee entrepreneurship (Vuong and Napier, 2015; Wang et al., 2019). Finally, a good normative dimension indicates a positive attitude toward entrepreneurial activities from the whole society, that is, the society would offer enough support and encouragement for entrepreneurs

(Busenitz et al., 2000), which further brings about intangible benefits, such as social honors, for the employees who quit to start new ventures. Moreover, other empirical studies have also shown that an entrepreneurial environment can enhance employees' entrepreneurial intentions (Gupta et al., 2014; Herrmann, 2019). Therefore, we proposed the following hypothesis:

Hypothesis 1: Social entrepreneurial environment is positively related to employees' entrepreneurial intentions.

Mediating Role of Organizational Hostility

From the perspective of an established organization, their attitudes toward employee entrepreneurship ultimately depend on their judgments on the legitimacy of new ventures (Finch et al., 2015). An important criterion of such legitimacy judgment comes from organizations' own cost-benefit analysis under the pressure of the social entrepreneurial environment (Suchman, 1995) as the legitimacy of new ventures actually refers to the degree to which new ventures fit the social entrepreneurial environment. The social entrepreneurial environment reflects whether new ventures will have difficulty in obtaining the legitimacy of their entrepreneurship and thus, plays a key role in the formation of established organizations' attitudes toward employee entrepreneurship (Roxas and Coetzer, 2012; Wang and Zhou, 2020). A favorable social entrepreneurial environment stands for the whole society's encouragement and support for new ventures (Suchman, 1995; Busenitz et al., 2000). Therefore, organizational hostility toward employee entrepreneurship might be considered unacceptable and make those established organizations suffer from great costs (e.g., resistance by the society). Rather, if the organizations adopt a positive attitude toward employee entrepreneurship, the sufficient resources offered by the social environment may eventually generate potential benefits for established organizations in other forms, such as resource spillover or backflow (Rabbiosi and Santangelo, 2013; Kim and Steensma, 2017). Thus, hostility is bound to increase organizations' costs and decrease potential benefits. Accordingly, a favorable social entrepreneurial environment can relieve organizational hostility toward employee entrepreneurship.

As for organizational hostility, it has been argued to inhibit employees' entrepreneurial intentions and behaviors. Generally, start-ups created by employees are more or less in competition with the established organizations. For example, new ventures created by employees are very likely to enter the same industry as the established organizations (Klepper and Thompson, 2010). Research has shown that the social network of established organizations is an important channel for new ventures created by employees to acquire useful resources. Under the competition situation mentioned above, organizational hostility would drive the established organizations not only to seal off their own social networks from the new ventures, so that the new ventures are unable to utilize those resources in the organization's social network, but also to unite with its coalition partners in their social network to resist and suppress the new ventures created by its employees (Walter et al., 2014). Thus, organizational

hostility would increase employees' costs and decrease benefits of engaging in entrepreneurial activities. The decision of employee entrepreneurship is a result of subjective judgment (Kaul et al., 2021), thus reducing employees' entrepreneurial intentions. In summary, we proposed the following hypothesis:

> *Hypothesis* 2: Organizational hostility plays a mediating role in the relationship between social entrepreneurial environment and employees' entrepreneurial intentions.

Moderating Role of Unethical Behavior and Risk Propensity

When coworkers commit unethical behaviors that violate social norms during the process of employee entrepreneurship, their entrepreneurial actions will bring direct damage to the established organization (McKendrick et al., 2009). Given that the cost-benefit analysis is an important criterion for judging legitimacy (Suchman, 1995), organizations are more likely to overlook the legitimacy of new ventures generated by the social entrepreneurial environment (Bitektine, 2011). That is because coworkers' unethical behaviors during their entrepreneurship have directly caused substantial damage to the established organizations, which violates the moral legitimacy judgment of those organizations (Bitektine and Haack, 2015; Kibler and Kautonen, 2016). In addition, such moral legitimacy judgment would further drive the established organizations to shift the legitimacy of new ventures generated by the social entrepreneurial environment (Huy et al., 2014). Thus, we proposed the following hypothesis:

> *Hypothesis* 3: Coworkers' unethical behaviors during their entrepreneurship positively moderate the negative relationship between social entrepreneurial environment and organizational hostility. The more serious unethical behaviors are, the weaker the negative influence of the social entrepreneurial environment on organizational hostility becomes.
> *Hypothesis* 4: Coworkers' unethical behaviors during their entrepreneurship negatively moderate the mediating role of organizational hostility. The more serious unethical behaviors are, the weaker the mediating effect of organizational hostility becomes.

Risk propensity plays an important role in the formation of employee entrepreneurship (Nieß and Biemann, 2014). Employees with high-risk propensity would selectively overestimate the probability of entrepreneurial success and positive outcomes. At the same time, employees with high-risk propensity would underestimate the risks and losses of entrepreneurial failure (Sitkin and Weingart, 1995). Therefore, employees with high-risk propensity would tend to make a positive evaluation of their own situation and capabilities. Specifically, higher risk propensity would reduce employees' sensitivity to the adverse conditions and mitigate their perception of entrepreneurial risk brought by the organizational hostility (Sitkin and Weingart, 1995). Besides, the inertia of decision-making might also drive employees to make more radical actions (Hoskisson et al., 2017), which makes the employees more

willing to attempt entrepreneurial activities. Thus, we proposed the following hypothesis:

> *Hypothesis* 5: Employees' risk propensity positively moderates the negative relationship between organizational hostility and employee entrepreneurship. The more risk employees are willing to take, the weaker the negative influence of organizational hostility on employees' entrepreneurial intentions becomes.
> *Hypothesis* 6: Employees' risk propensity negatively moderates the mediating strength of organizational hostility. When employees have higher levels of risk propensity, the mediating effect of organizational hostility is weak.
> *Hypothesis* 7: Coworkers' unethical behaviors and employees' risk propensity play a joint moderating role in the mediating role of organizational hostility.

In summary, the conceptual model proposed in this study is shown in **Figure 1**.

MATERIALS AND METHODS

Participants

This study adopted a questionnaire survey, which is a common and extensively used research approach to collect data for large-scale participants (Rasool et al., 2019; Samma et al., 2020). The survey targeted companies where employee entrepreneurship occurred. These companies are mainly located in southeast China, which is a region that is very representative of current employee entrepreneurship, and they are mainly in the internet, education, service, and manufacturing industries, where employees are most likely to leave to start new businesses. The snowball sampling method was used for survey distribution. Besides, to ensure an adequate recovery rate of the survey, we contacted 30 research agents in advance, all of whom were in companies that met the above requirement. Each agent was required to look for 10–15 former coworkers or other participants who worked in the companies who would be interested in completing the survey. Participants were employees who were familiar with their former coworkers who left the organizations to create new ventures. To reduce the common method bias, data were collected through a two-time-point survey with an interval of 3 weeks. The whole time period of the survey distribution process was approximately 5 weeks. All the employees participating in the survey were numbered to match the data between Time 1 and Time 2 questionnaires. In the first round, data on the social entrepreneurial environment, unethical behavior, and organizational hostility were collected. In the second round, we collected data on employees' risk propensity and employees' entrepreneurial intentions. In Time 1 survey, a total of 365 questionnaires were distributed, and 342 valid questionnaires were returned. Time 2 survey was targeted at the participants who provided valid questionnaires in the first round. A final total of 220 valid matched questionnaires were obtained.

Measures

A five-point Likert-type scoring method was used in all the scales, ranging from 1 = "completely disagree" to 5 = "completely agree."

TABLE 1 | Results of confirmatory factor analysis.

Model	χ 2	df	χ 2/df	RMSEA	RMR	CFI	GFI	IFI	TLI
Five-factor model	222.85	125	1.78	0.06	0.06	0.95	0.90	0.95	0.94
Four-factor model[a]	340.52	129	2.64	0.09	0.07	0.89	0.84	0.89	0.87
Four-factor model [b]	338.05	129	2.62	0.09	0.07	0.89	0.85	0.90	0.88
Four-factor model [c]	495.50	129	3.84	0.11	0.12	0.82	0.78	0.82	0.78
Four-factor model[d]	719.29	129	5.58	0.15	0.16	0.70	0.73	0.71	0.65

The sample size N = 220.
[a]*Combining social entrepreneurial environment with employees' entrepreneurial intentions.*
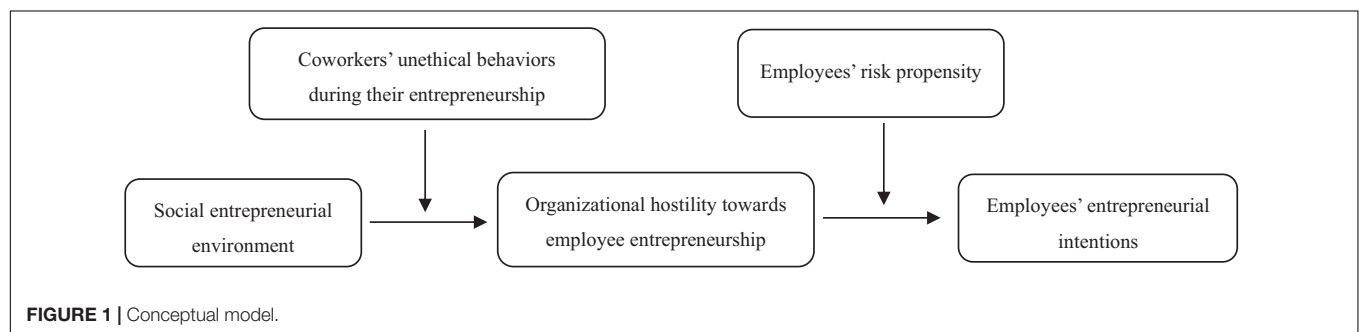[b]*Combining social entrepreneurial environment with organizational hostility.*
[c]*Combining unethical behavior with organizational hostility.*
[d]*Combining organizational hostility with employees' entrepreneurial intentions.*

TABLE 2 | Means, SDs, and correlations.

Variables	M	SD	1	2	3	4	5	6	7	8	9	10
1. Gender	1.50	0.50										
2. Age	30.71	5.76	−0.10									
3. Organizational tenure	4.27	3.79	−0.17**	0.62***								
4. Education level	2.98	0.69	−0.03	0.04	−0.03							
5. Numbers of coworkers leaving to start business	2.34	2.58	−0.06	0.15*	0.05	−0.07						
6. Social entrepreneurial environment	3.48	0.56	−0.12	−0.09	−0.00	−0.03	0.01	(0.89)				
7. Coworkers' unethical behaviors	2.05	0.81	−0.08	−0.10	0.05	−0.03	0.11	0.09	(0.88)			
8. Organizational hostility	2.76	1.00	−0.00	0.02	0.06	0.08	0.03	−0.17*	0.52***	(0.87)		
9. Employees' risk propensity	3.29	0.74	−0.16*	−0.09	−0.03	0.02	0.07	0.22**	0.15*	−0.05	(0.81)	
10. Employees' entrepreneurial intentions	2.86	0.98	−0.06	−0.05	0.05	−0.09	0.10	0.21**	0.13	−0.21**	0.45***	(0.93)

*N = 220; ***p < 0.001; **p < 0.01; and *p < 0.05.*

FIGURE 1 | Conceptual model.

Social Entrepreneurial Environment (Time 1)

The social entrepreneurial environment scale developed by Busenitz et al. (2000) was used. It had a total of 13 items, which were divided into regulatory environment, cognitive environment, and normative environment. Example item includes "Local and national governments have special support available for individuals who want to start a new business." The reliability of the scale was 0.89.

Unethical Behavior (Time 1)

The unethical behavior scale was adapted from the scale developed by Singhapakdi et al. (1996) that is based on the concept of moral strength proposed by Jones (1991) to fit our context of employee entrepreneurship, with a total of six items.
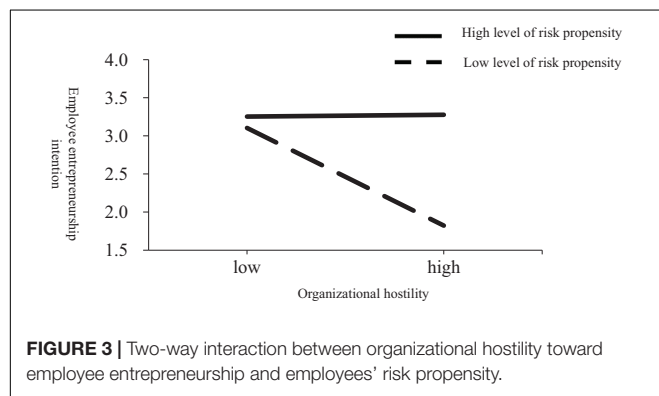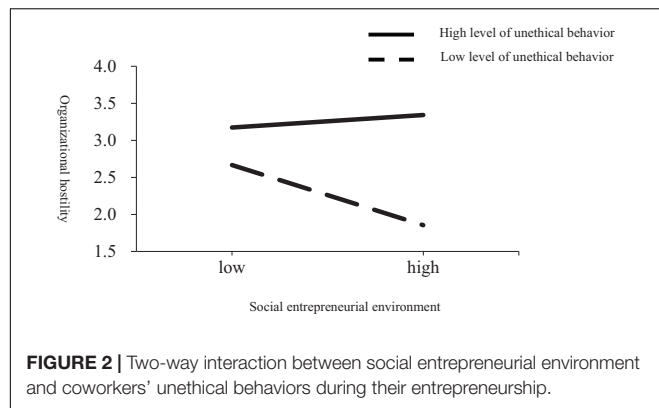
An example is "In general, most people would agree that the behavior of employee entrepreneurship is wrong." The reliability of the scale was 0.88.

Organizational Hostility (Time 1)

Organizational hostility scale developed by Walter et al. (2014) was used, with three items in total. An example is "The management of my organization does not appreciate employee entrepreneurship." The reliability of the scale was 0.87.

Employees' Risk Propensity (Time 2)

The risk propensity scale developed by Zhao et al. (2005) was used, with a total of six items. An example is "I am willing to take

FIGURE 2 | Two-way interaction between social entrepreneurial environment and coworkers' unethical behaviors during their entrepreneurship.

FIGURE 3 | Two-way interaction between organizational hostility toward employee entrepreneurship and employees' risk propensity.

a significant risk if the possible rewards are high enough." The reliability of the scale was 0.81.

Employees' Entrepreneurial Intentions (Time 2)

Employees' entrepreneurial intentions were adapted from the six-item scale developed by Liñán and Chen (2009) to fit our context of employee entrepreneurship. An example is "I have very seriously thought of leaving my job to start a firm." The reliability of the scale was 0.93.

Control Variables

In previous studies, demographic variables had a certain degree of influence on employee entrepreneurship (Agarwal et al., 2016a). Therefore, we took the employees' gender, age, organizational tenure, and education level. Besides, the numbers of coworkers leaving to start a business were also controlled as it may influence employees' entrepreneurial intentions.

RESULTS

Measurement Model

We used Amos 21.0 for confirmatory factor analysis. The balance method was used to package unethical behavior and entrepreneurial intentions, and the average value of each dimension of entrepreneurial environment was used as the measurement index for the corresponding dimension. The results showed that the five-factor model fits the data well: $\chi^2(125) = 222.85$, $\chi^2/df = 1.78$, root mean square error of

approximation (RMSEA) = 0.06, root mean square residual (RMR) = 0.06, comparative fit index (CFI) = 0.95, goodness of fit index (GFI) = 0.90, incremental fit index (IFI) = 0.95, and Tucker-Lewis index (TLI) = 0.94. Thus, the convergent validity was verified. In addition, the five-factor model had better fitting indicators than other models, thus verifying the discriminant validity. Results are presented in **Table 1**.

Descriptive Statistics

Table 2 presents the mean, SD, correlation, and reliability coefficients of the variables. As shown in **Table 2**, the social entrepreneurial environment was positively correlated with the employees' entrepreneurial intentions ($r = 0.21$, $p < 0.01$). The descriptive statistics of the data preliminarily showed that, from a socioeconomic point of view, a sound entrepreneurial environment can provide a micro-dynamic basis for socioeconomic development by promoting employee entrepreneurship. In addition, social entrepreneurial environment was negatively correlated with organizational hostility ($r = -0.17$, $p < 0.05$). The descriptive statistics of the data preliminarily showed that, from a socioeconomic perspective, the contribution of a sound entrepreneurial environment to the socioeconomic development exceeds the negative impact that employee entrepreneurship may have on the original organization. Meanwhile, organizational hostility was negatively correlated with the employees' entrepreneurial intentions ($r = -0.21$, $p < 0.01$). The preliminary data analysis showed that the socioeconomic benefits brought by employee entrepreneurship may not be as good as the costs brought by potential conflicts with the original organization. The descriptive statistics provided a preliminary verification of our theoretical hypotheses.

Hypothesis Test

Main Effect and Indirect Effect of Organizational Hostility

SPSS 21.0 was used for analysis. The results of regression were shown in **Table 3**. Model 6 showed that social entrepreneurial environment was positively related to employees' entrepreneurial intentions ($\beta = 0.19$, $p < 0.01$, M6), thus Hypothesis 1 was supported. The data analysis results supported that social entrepreneurial environment provides a driving force for the overall socioeconomic development. A three-step regression analysis was used, and the results of Model 2 and Model 7 suggest that there was a partially mediating effect of organizational hostility between social entrepreneurial environment and employees' entrepreneurial intentions. Besides, the result of the bootstrap analysis on the mediation effect was significant, and the indicators are as follows: effect = 0.06, SE = 0.04, and CI [0.007, 0.152]. Therefore, Hypothesis 2 was supported. The results of data analysis showed that organizations connect the macro socioeconomic environment with the micro individual socioeconomic decision-making.

Moderating Effect of Coworkers' Unethical Behaviors and Employees' Risk Propensity

The analysis results of moderating effect were shown in **Table 3**. The interaction between social entrepreneurial environment and

TABLE 3 | Results of regression.

	Organizational hostility				Employees' entrepreneurial intentions				
	M1	M2	M3	M4	M5	M6	M7	M8	M9
Control variables									
Gender	0.01	−0.01	0.03	0.03	−0.05	−0.03	−0.03	0.04	0.03
Age	−0.05	−0.07	0.06	0.06	−0.15	−0.12	−0.14	−0.06	−0.08
Organizational tenure	0.09	0.10	0.00	−0.01	0.12	0.11	0.13	0.10	0.09
Education level	0.09	0.08	0.09	0.10	−0.07	−0.07	−0.05	−0.05	−0.03
Numbers of coworkers leaving to start business	0.04	0.04	−0.03	−0.02	0.10	0.11	0.11	0.06	0.03
Independent variable									
Social entrepreneurial environment		−0.18*	−0.21***	−0.16**		0.19**	0.16*	0.05	−0.02
Mediator									
Organizational hostility							−0.19**	−0.29***	−0.32***
Moderators									
Coworkers' unethical behaviors			0.55***	0.50***				0.19**	0.18**
Employees' risk propensity								0.39***	0.41***
Interaction									
Social entrepreneurial environment × Coworkers' unethical behaviors				0.24***					
Organizational hostility × Employees' risk propensity									0.33***
Adjusted R^2	−0.01	0.02	0.31	0.36	0.01	0.04	0.07	0.26	0.36
ΔR^2	0.01	0.03	0.29	0.05	0.03	0.04	0.03	0.19	0.10

*N = 220; ***p < 0.001; **p < 0.01; and *p < 0.05.*

TABLE 4 | Results of moderating mediation effect test.

Model	Coworkers' unethical behaviors	Employees' risk propensity	Conditional indirect effect	Boot SE	Boot LLCI	Boot ULCI
Model 1	1.24		0.14*	0.06	0.044	0.265
	2.86		−0.03	0.04	−0.129	0.025
Model 2		2.55	0.17*	0.08	0.036	0.358
		4.03	−0.03	0.11	−0.111	0.005
Full Model	1.24	2.55	0.40*	0.05	0.204	0.627
	1.24	4.04	−0.07	0.10	−0.192	0.024
	2.86	2.55	−0.09	0.10	−0.309	0.082
	2.86	4.03	0.02	0.02	−0.012	0.093

*N = 220; *p < 0.05.*

coworkers' unethical behavior during their entrepreneurship was positively correlated with organizational hostility (β = 0.24, $p < 0.001$, M4). In addition, the interaction between organizational hostility and the employees' risk propensity was positively correlated with the employees' entrepreneurial intentions (β = 0.33, $p < 0.001$, M9). The moderating mode of unethical behavior was in **Figure 2**. When coworkers' unethical behavior was weak, the social entrepreneurial environment had a significantly negative influence on organizational hostility (β = −0.75, $p < 0.001$). Meanwhile, when coworkers' unethical behavior was strong, the social entrepreneurial environment had an insignificantly negative influence on organizational hostility (β = 0.17, $p > 0.05$). The regression analysis result and the moderating trend in **Figure 2** were consistent with the hypothesis. Thus, Hypothesis 3 was supported. In addition, the moderating mode of risk propensity was shown in **Figure 3**. When employees' risk propensity was weak, the organizational hostility had a significantly negative influence on

employees' entrepreneurial intentions (β = −0.53, $p < 0.001$). Meanwhile, when the employees' risk propensity was strong, the organizational hostility had an insignificantly negative influence on the employees' entrepreneurial intentions (β = 0.10, $p > 0.05$). The regression analysis result and the moderating trend in **Figure 3** showed that Hypothesis 5 was supported.

Moderating Mediation Effect

The SPSS-based PROCESS plug-in program was used for moderating the mediation effect test, and the results of analysis are shown in **Table 4**. When coworkers' unethical behavior was weak, the mediating effect of organizational hostility was significant (effect = 0.14, $p < 0.05$). Meanwhile, when coworkers' unethical behavior was strong, the mediating effect became insignificant (effect = −0.03, $p > 0.05$). Thus, Hypothesis 4 was supported. When employees' risk propensity was low, the indirect effect of organizational hostility was significant (effect = 0.17, $p < 0.05$). When the employees' risk propensity was high, the

indirect effect became insignificant (effect = −0.03, $p > 0.05$). Thus, Hypothesis 6 was supported.

The two moderating variables were incorporated into the PROCESS program concurrently, and the results are shown in the full model in **Table 4**. When both coworkers' unethical behavior and employees' risk propensity were low, the mediating effect of organizational hostility was positively significant (effect = 0.40, $p < 0.05$). Meanwhile, when coworkers' unethical behavior and employees' risk propensity were high, the mediating effect of organizational hostility became insignificant (effect = 0.02, $p > 0.05$). Therefore, Hypothesis 7 was supported.

CONCLUSION

Our research draws several conclusions. First, a social entrepreneurial environment can alleviate an organization's hostile attitudes toward employee entrepreneurship. From the perspective of mindsponge, an organization absorbs the values of a social entrepreneurial environment into mindset and then replaces waning values of hostility. This conclusion is consistent with previous studies that portray how organizations evaluate the cost-benefit of holding or ejecting a value to change their attitudes (Vuong and Napier, 2015; Vuong, 2016). From a socioeconomic perspective, a sound social entrepreneurial environment can promote socioeconomic development. But at the same time, it will also contribute to employee entrepreneurship and harm the organization. Therefore, for organizations, whether social entrepreneurial environment can inhibit organizational hostility lies in whether the sound entrepreneurial environment brings greater benefits than the socioeconomic loss cost caused by employee entrepreneurship. Second, organizational hostility inhibits employees' entrepreneurial intentions, which is similar to the results of Walter et al. (2014). Based on the perspective of mindsponge process, employees take their organizations' values personally and eject the original values of employee entrepreneurship. This conclusion echoes the theoretical rationale of mindsponge process, which proposes how individuals accept or reject some values of the external environment by making cost-benefit analysis, and finally change their mind (Vuong and Napier, 2015; Vuong, 2016). From the perspective of social economy, employee entrepreneurship can promote the social economy, but at the same time, they should also bear the loss cost caused by the potential conflict between employees and the original organization. Therefore, for employees, the key to whether to quit and start a business is whether the socioeconomic benefits brought by entrepreneurship exceed the costs brought by the potential conflict with the original organization. Third, organizational hostility plays a mediating role between the social entrepreneurial environment and the employees' entrepreneurial intentions, which echoes the multilevel model of legitimacy judgment (Tost, 2011; Bitektine and Haack, 2015). Also, the mindsponge perspective and socioeconomic perspective both imply that organizations are a mediator that links the macro entrepreneurial environment and the micro employee entrepreneurship. The conclusion

further promotes our understanding of the role of organizational attitude in the above two perspectives. Fourth, coworkers' unethical behavior plays a moderating role in the mediating relationship. Unethical behavior is an important moderating variable that influences organizations' legitimacy judgment toward employee entrepreneurship, which is consistent with the legitimacy judgment literature (Bitektine and Haack, 2015). Fifth, the employees' risk propensity plays a moderating role in the indirect effect of social entrepreneurial environment and employees' entrepreneurial intentions *via* organizational hostile. This conclusion emphasizes that employee entrepreneurship is truly a risky decision after the cost-benefit analysis, and employees' risk propensity is the key to shift the criterion of this cost-benefit analysis.

Theoretical and Practical Contributions

The theoretical contribution of this study is threefold. First, this study helps to clarify the process and mechanism that how multiple entrepreneurial environments and individual risk propensity shape employees' entrepreneurial intentions in the workplace. Based on the theoretical lens of mindsponge process analysis, we proposed that organizations' attitudes toward new ventures (i.e., organizational hostility) under the pressure of social entrepreneurial environment and employees' decision to quit and then to start their own businesses (i.e., employees' entrepreneurial intentions) under the pressure of organizational entrepreneurial environment are results of the cost-benefit analysis conducted by organizations and employees, respectively. Second, this research also extends the existing literature by highlighting the importance of organizational legitimacy judgment toward employee entrepreneurship. Although previous studies have mainly focused on how new ventures can obtain legitimacy in the competitive market (Bitektine, 2011; Bitektine and Haack, 2015), this research points out that the key source of legitimacy obtained by new ventures comes from the established organizations, and organizations' judgment on the legitimacy of start-ups further determines the organizations' attitude toward employee entrepreneurship. Third, we also detected the impacts of other important factors (i.e., coworkers' unethical behaviors during their entrepreneurship and employees' risk propensity) on the cost-benefit analysis of either organizations or employees, which offer a fine-grained picture of the complex relationship between social entrepreneurial environment and employees' entrepreneurial intentions.

There are three main practical contributions of this study. First, given that organization may suffer from employee entrepreneurship, thus, if the organization does not agree with employees to leave to start a business, it should show visible hostility by formulating corresponding policies and taking actions to create a healthy work environment (Zhou et al., 2021). Second, since employee entrepreneurship is driven by multiple entrepreneurial environmental factors (i.e., social, organizational, and interpersonal), the employee entrepreneurs are suggested to launch their new business in a positive entrepreneurial environment to avoid unnecessary costs and pursue a longer-term development (Zhou et al., 2020). Finally, considering that

the unethical behavior of focal employees in the process of employee entrepreneurship will aggravate the hostility of the original organization, employee entrepreneurs should try to avoid unethical behavior during the process of entrepreneurship to seek sustainable development and entrepreneurial performance (Rasool et al., 2020).

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Secretariat of Academic Committee, Zhejiang University of Technology. The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

KZ designed the study, collected and analyzed the data, and drafted the manuscript. DW designed the study and provided resources to administer the project. ZL strengthened and revised the manuscript. YX reviewed and revised the manuscript. XZ reviewed and edited the manuscript. All authors contributed to the article and approved the submitted version.

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Can Identity Buffer Against the Detrimental Effects of Threat? The Case of the Qatar Blockade

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In 2017, the blockade of Qatar Gulf states caused a plethora of effects on the country. This paper sought to examine the resulting threat effects of this blockade in terms of lowered self-esteem and well-being, and the potential buffering effects of an overarching identity. Using self-report questionnaire data from Qatari secondary school students ($N = 1,410$), multiple moderated mediation models investigated the predictive effects of youngsters' perceived threat, *via* self-esteem, on their well-being, and the mitigating roles herein of, respectively, national, Gulf region, and Arab identity. Perceived threat was indeed related to lower well-being *via* lower self-esteem, and this relationship was equally strong for those low and high in social identity. In terms of the three facets of identity, the overarching Gulf identity seems the most predictive, and it even (marginally significantly) buffers the negative relationship between threat and reduced self-esteem.

Keywords: perceived threat, national identity, self-esteem, well-being, Qatar blockade

INTRODUCTION

In 1981, six Arab countries (the Kingdom of Saudi Arabia, Qatar, the Kingdom of Bahrain, the United Arab Emirates, Kuwait, and Oman) signed an agreement to establish the Gulf Cooperation Council (GCC). This charter contributed significantly to the stability in the region., the GCC region has even been considered the most stable entity of the Middle East region (Bianco and Stansfield, 2018). The fundamental principles of constructing this entity were to promote economic, financial, and cultural cooperation, to enhance social ties between people, and to foster political stability and security within the region (Nakhleh, 1986).

From a social identity perspective, the charter also helped to facilitate an integrated entity among the Gulf states and its citizens. It enabled people in all Gulf states to develop a shared identity known as "Khaleeji' identity" (Al-Misned, 2016). Historically, this overarching Gulf identity had been formed long before the separate Gulf states, and their according national identities, emerged (Allam and Karolak, 2020). In relation to social ties, intermarriage across GCC countries is common. As a result, the existence of extended families across these six countries produced similarities in many aspects of life spanning culture, identity, music, and poetry. In addition, GCC citizens have travel privileges to facilitate free movement between member states without visa requirements

(Alshihaby, 2015). Therefore, these factors indicate that GCC citizens perceived themselves as relatively united and with a common identity sharing many key characteristics (Al-Khouri, 2010).

The 2017 Blockade of Qatar

Aside from the geopolitical importance of the landscape, the Gulf region is undergoing considerable political and social transformations caused by several key trends in recent times, including the Arab Spring, economic transitions, and shifting demographics. The state of Qatar—a small peninsula within the Arabian Gulf—is a traditional Muslim collectivist society with established gender segregation norms (e.g., separate boys and girls schools; Bahry and Marr, 2005); but with state commitments to harmoniously modernize the country with ambitious development strategies at national and international levels, such as the hosting of the FIFA World Cup 2022. High levels of social security, extensive public and private investments, openness to globalization and rapid industrialization have typified the nature of Qatar's development in recent decades (Dogan Akkas and Camden, 2020). Such developments have also led to the emergence of regional competitiveness, with Qatar and the United Arab Emirates (UAE) regularly competing with each other to promote their active contributions to international society (Ennis, 2018). As a result, it has been suggested that the success of Qatar in different fields such as sport can foster jealousy (Gulf Times, 2017).

Although the GCC entity has maintained stability and cohesion since its inception, the political relationships have encountered some tensions among the allied countries. For example, there was a sovereignty dispute between Bahrain, Qatar and the Hawar Islands in 1936, which was peacefully resolved in 2001 *via* the International Court of Justice (Wiegand, 2012). Similarly, political tension resulted in a border dispute between Qatar and Saudi Arabia in 1992 and 1994 (Okruhlik and Conge, 1999). Nonetheless, the GCC overcame these disputes and maintained the strong ties among the Gulf states.

However, on 5th June 2017, to much regional and international shock, the Gulf States of the Kingdom of Saudi Arabia, the Kingdom of Bahrain, the United Arab Emirates; and Egypt all severed diplomatic relations with Qatar. Given the cooperation of the Gulf region in the past, this blockade was regarded as unprecedented; and brought with it a cascade of effects across many levels of society. Sophisticated cyberattacks on Qatari state media implicated Qatari stakeholders across a range of politically sensitive allegations. Following this, a 13-point list of maximalist demands were given to Qatar (Ulrichsen, 2020)—itself underpinned by a narrative of Qatari involvement in terrorist activity and corruption (Milton-Edwards, 2020). For example, the demands included: closing of Qatari-run media such as Al Jazeera, ceasing military cooperation with Turkey, severing alleged ties with terrorist organizations and the hosting of their representatives within Qatar, and paying compensation to the blockading Gulf states.

Despite a willingness to find a resolution, Qatar did not wish to accept the accusations nor the demands of the blockade. Owing to considerable dependence on importations of key goods and services, in addition to the social and familial interconnectedness of Gulf states, immeasurable challenges emerged for the Qatari population. The Qatari National Human Rights Committee (QNHRC) in 2017 reported that the blockade had instilled a sense of fear due to the fragmentation of families (due to border closures), created risks of adverse psychological outcomes, and caused irreparable damage between once-intertwined Gulf cultures and societies. Undoubtedly, the feelings of threat accompanying the blockade may pose a serious challenge to the self-esteem and the well-being of Qatari people. Nonetheless, these psychological consequences of intergroup conflicts in the Gulf region remain poorly understood within the literature. The particular characteristics of this blockade present a unique opportunity to understand intergroup conflict within an understudied region.

The Detrimental Effects of Threat

Research on (perceived) intergroup conflict has typically focused on effects relating to stressors that may exacerbate conflict, physicality, territory, power; in addition to restrictions for civil liberties and human rights (Carriere et al., 2020). For instance, previous studies on the European continent have indicated that threat is related to greater levels of prejudice [see e.g., Van Assche et al. (2018) for samples from Netherlands and Germany] and to lower levels of well-being [see Schmid and Muldoon (2015) for a Northern Irish sample]. In the latter context, this detrimental effect of threat was only for those who had prior experience with the particular political conflict or with the co-occurring violence. Yet, there is a distinct lack of research outside these so-called WEIRD (Western, Educated, Industrialized, Rich, and Democratic) contexts, and on the potential role of perceived threat for well-being and self-esteem (a well-known proxy of well-being) in young adults where such individuals do not have prior experience of conflicts, as is the case in the Qatari blockade.

The distinctive factors within the Qatari blockade are difficult to situate within the current perceived intergroup threat literature. This is due to a number of factors, chiefly the absence of violence, and the uniquely impactful role of social media in communicating some of the psychological effects of the blockade in young adults—living in an increasingly globalized Qatar—who have no direct experience of political conflict or violence (Alkaabi and Soliman, 2017; El-Masri et al., 2020). Moreover, over 50,000 citizens from the Kingdom of Saudi Arabia, the Kingdom of Bahrain, and the United Arab Emirates lived in Qatar prior to the blockade, and significant overlapping familial, sporting, commercial and political ties existed across the Gulf (Zahlan, 2016).

The largely unforeseen and immediate severing of these ties has never been experienced by the so-called generation Z of Qatari citizens (born from 1996 onward). Given the overlapping ties held by young Qatari adults across Gulf groups, it is unclear how the functionality of the perceived threats from the blockade would potentially affect individual self-esteem and well-being, depending on the commonality Qataris feel with other Gulf state citizens. It should be noted that perceived threats of any kinds may not adversely impact well-being in all contexts. There is a

body of research that has demonstrated the important positive relationship between one's social identity and perceived threats.

Social Identity as a Potential Buffer

Whereas the threat by the blockade can have a negative impact on Qatari's self-esteem and well-being, they can find solace in their social identity. In particular, this paper adopts a theoretical background initially framed by social identity theory (Tajfel et al., 1979) which posits that individuals' sense of identity is based on their group membership(s), and can thus heavily influence other key psychological factors (including self-esteem, group pride, and even well-being). Social identity theory places the origins of social identity within the domains of both cognitive and motivational factors—these can influence group members to support or detach from their group. Indeed, one of the key contributions of social identity theory is the replicated finding of ingroup favoritism across different conditions (Brewer, 1979).

Of course, much depends on how broadly one defines one's ingroup to be. To the extent that one identifies as Qatari, this national identity might be related to stronger preference for Qatar over other Gulf countries (and their citizens). Nevertheless, such national identity and ingroup favoritism has been shown to elevate one's self-esteem (Rubin and Hewstone, 1998). To the extent that one identifies with the overarching category of Gulf states (i.e., "Khaleeji"), this superordinate common ingroup identity (e.g., Dovidio and Gaertner, 2000) might be related to a more broad-minded perspective on the intergroup tensions following the blockade. As such, this overarching identity might not only be positively related to self-esteem and well-being, it might even *buffer* against the detrimental effects of perceived threat. Exactly because this supranational identity incorporates a strong sense of connection with the other Gulf states, i.e., the very perpetrators imposing the blockade and potentially causing the feelings of threat, we hypothesize that this level of identification has the strongest potential to buffer against threat effects. Finally, to the extent that one identifies with the even larger category of Arabs globally, this social identity facet might relate positively to self-esteem and well-being, but its potential buffering effect on the impact of post-blockade threat perceptions might be limited, given the broadness of the identification that spans much wider than the conflict area *per se*.

To sum up, in the context of social identity theory, we put forward that some individuals may more readily identify with their perceived ingroup in an attempt to cope with the stressors originating from perceived outgroup threats (Haslam et al., 2005). The unique Qatari situation of contact between the sub-groups making up a nation (or set of nations) could lead to different levels of identification (national, supra-regional, and ethno-cultural/religious), which, can be a source of consolation in the face of the potentially detrimental impact of threat on self-esteem and well-being (Gaertner et al., 1996; Dovidio and Gaertner, 2000).

The Current Study

The current study was set up against the backdrop of the Qatari blockade. We specifically focused on Qatari youth, as previous research demonstrated that mental health problems in Qatari young adults are comparatively frequent (Al-Attiyah and Nasser, 2016; Schoenbach et al., 2018). Other data from undergraduate samples reported higher self-rated levels of mental health and well-being (Abdel-Khalek, 2013). However, a recent cross-cultural telephone survey of non-migrant Qataris and migrants found that the former had lower levels of depression that was comparable to Western epidemiology (between 4.2% and 6.6%; see Khaled, 2019; Khaled and Gray, 2019). Within Qatari primary healthcare, it is estimated that approximately one-quarter of attendees had at least one psychiatric diagnosis (Ghuloum et al., 2011; Bener et al., 2015). However, much of this data is using smaller samples from college-aged participants or older adults in timeframes that predated the Qatari blockade (Ciftci et al., 2013; Zolezzi et al., 2017).

To date, there exists no high-quality dataset regarding the well-being, self-esteem, identity or perception of threat among young citizens in Qatar, and no research regarding the effects of the blockade on these psychological variables. Nonetheless, the *National Mental Health Strategy for Qatar, Changing Minds, Changing Lives 2013–18* has identified a need for a population health approach using an integrated system of care, with mental health and well-being named as a priority area. This study aims to fill this gap by examining a model where threat and identity additively and interactively predict well-being *via* self-esteem. In other words, we propose a moderated mediation model with threat as predictor, well-being as outcome, self-esteem as mediator, and social identity as moderator. Indeed, we first predict that threat will be negatively related to well-being *via* lower levels of self-esteem (mediation hypothesis). Secondly, anchored in the Common Ingroup Identity hypothesis within Social Identity Theory, we hypothesize that national (Qatari), supra-regional (Khaleeji/Gulf), and ethno-cultural/religious (Arab) identities will be positively related to self-esteem and well-being, and the supra-regional identity in particular might exert a buffering effect on the negative threat-self-esteem association (moderation hypothesis).

MATERIALS AND METHODS

Sample Size and Participants

According to the annual statistics of education in the State of Qatar (2018), the total number of secondary schools is 62 (33 are secondary schools for boys), and the total number of Qatari students in the secondary schools is 13,946 (7,305 are females). Given that there are eight municipalities in Qatar, the authors listed the secondary schools located in each municipality and randomly selected the schools. The results were a total of twenty-six schools (13 of which were for boys)[1]. Following that, the targeted number of the participants of each school was 60 students (20 participants per grades 10, 11, and 12 each).

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[1]We performed additional analyses that also included gender at the school level in the model, but there were no differences in self-esteem and well-being between boys- and girls-schools ($b = 0.04$, $p = 0.43$ for self-esteem; $b = -0.05$, $p = 0.59$ for well-being), nor were there cross-level interaction effects between individual threat and school-level gender ($b = 0.00$, $p = 0.93$ for self-esteem; $b = 0.01$, $p = 0.77$ for well-being).

Data were collected *via* a self-report paper questionnaire between November 2019 and February 2020. Eligible participants had to be Qatari citizens from public secondary schools in Qatar. A representative sample of 1,500 participants was recruited using convenience sampling, and 50 incomplete responses and 40 non-Qatari respondents were excluded. The final sample included 1,410 participants, of which 40% were males (M_{age} = 16.98, SD = 0.86).

After receiving a signed consent form from their parents, respondents were presented with a clear description of the study and they provided written informed assent prior to completing the survey. Participation was voluntary and respondents were asked to complete the questionnaire at the school under the supervision of the school teachers and the recruited research assistants for the study.

Measures

Perceived Threat

The authors developed a 5-items scale to assess the extent to which Qatari citizens feel threat as a result of blockade. Examples of the items used were "I feel anxious when I think of the blockade crisis" and "I feel fearful when I think of the blockade crisis." The participants were asked to rate their responses on a 7-point Likert scale ranges from 1 = strongly disagree to 7 = strongly agree. A CFA showed the suitability of the scale, where RMSEA = 0.022; SRMR = 0.006; CFI = 0.99; NFI = 0.99; GFI = 0.99; and TLI = 0.98. The internal consistency showed a good reliability (Cronbach's α = 0.84).

Social Identity

To measure national (Qatari) identity, we selected four items from the Arabic version of the national identity scale developed by Al Rabaani (2017). Such a scale was developed and used for Omani secondary school students in the same education stage as their Qatari counterparts. Moreover, since Qatar and Oman have a shared Khaleeji culture, the authors decided to use the same scale with small adaptation where the word "Omani" was replaced with "Qatari." Besides, the scale indicated a very good internal consistency in the Omani sample (α = 0.94). Participants were asked to rate the items on a 7-point Likert scale from 1 = strongly disagree to 7 = strongly agree (for example, "I am proud of being Qatari"). A confirmatory factor analysis (CFA) showed the suitability of the scale, where RMSEA = 0.001; SRMR = 0.001; CFI = 0.99; NFI = 0.99; GFI = 0.99; and TLI = 0.99. The internal consistency of the scale was very strong (Cronbach's α = 0.88).

To measure supra-regional (Gulf) identity and ethno-cultural (Arab) identity, we used the same scale that was used to assess the national identity and replaced the word Qatar with Khaleeji and Arabi for the two scales. For example, "I am proud of being Khaleeji" and "I am proud of being Arabi." A confirmatory factor analysis for each scale indicated adequate model fit, where the model fit indices for the Gulf identity scale were RMSEA = 0.088; SRMR = 0.014; CFI = 0.99; NFI = 0.99; GFI = 0.99; and TLI = 0.99 and those for the Arab identity were RMSEA = 0.098; SRMR = 0.021; CFI = 0.98; NFI = 0.98; GFI = 0.99; and TLI = 0.96.

The Cronbach's Alpha for the Gulf and Arab identity scales was 0.87 and 0.83, respectively.

Self-Esteem

A 10-item scale of Rosenberg (1965) was used. Items included questions such as "At times I think I am no good at all (*reverse coded*)" and "I take a positive attitude toward myself." Each item was rated on a 7-point Likert scale ranging from 1 = strongly disagree to 7 = strongly agree. The authors used the Arabic version of Gradat (2006). A CFA was performed and showed an acceptable model fit of the scale, where RMSEA = 0.079; SRMR = 0.057; CFI = 0.90; NFI = 0.90; GFI = 0.95; and TLI = 0.86. The internal consistency was acceptable where Cronbach's Alpha coefficient was 0.71.

Well-Being

We opted for a broad and general assessment of different facets of psychological well-being (for a similar approach, see Costabile et al., 2021). Relying on the work of Seligman (2011), we defined well-being in terms of the five "PERMA" pillars: Positive emotion, Engagement, Relationships, Meaning, and Accomplishment. A 15-item PERMA-Profiler was used. This scale was developed by Butler and Kern (2016). The scale was translated by a bilingual mental health specialist and back translated by a certified translator to avoid ambiguity of the items. Participants were asked to report their answers on a 10-point scale from 1 = strongly disagree to 10 = strongly agree. The items included "How often do you feel joyful" and "To what extent you have been feeling loved." A CFA was carried out and showed an acceptable model fit of the scale, where RMSEA = 0.040; SRMR = 0.003; CFI = 0.97; NFI = 0.97; GFI = 0.98; and TLI = 0.97. The internal consistency of the scale was very strong (Cronbach's α = 0.90).

Statistical Analysis

To investigate our hypotheses, SPSS Version 26 software was used. Our data were theoretically nested (i.e., pupils were nested within schools). Therefore, we first investigated whether multilevel analyses were warranted. We estimated empty (intercept-only) models, which provide insight into the variances in our mediator and outcome at the individual and contextual levels. We also assessed the intraclass correlations (ICCs) to explore if there was substantial between-level variance in the scores of our mediator and outcome variable, which would warrant the use of multilevel modeling. Taking into account the higher-level structure did not significantly improve the goodness-of-fit statistics of each model (i.e., changes in $-2 \times$ log-likelihood were χ^2 (1) = 1.86, p = 0.17 for self-esteem; and χ^2 (1) = 0.46, p = 0.49 for well-being. Additionally, all ICC's were very small (0.0056 for self-esteem and 0.0028 for well-being), indicating that only 0.56% of the variance in self-esteem and only 0.28% of the variance in well-being are due to differences at the school level. As such, multilevel analyses are not warranted.

Pearson correlation coefficients were calculated to explore the relationships among the study variables. To test the conditional indirect effects of threat on well-being *via* self-esteem at different levels of social identity, we conducted bootstrap analyses (1,000

bootstrap samples) using Hayes' (2013) Process macro in which the association between the predictor (i.e., threat) and the mediator (i.e., self-esteem), as well as the associations between the predictor and the outcome variable (i.e., well-being) were moderated by social identity faces (i.e., Model 8; Hayes, 2013). In particular, we tested three such models, testing the separate buffering effects of national, supra-regional, and ethno-cultural identities, respectively (while controlling for the other two identity facets).

RESULTS

Descriptive Statistics

Table 1 presents the means, standard deviations, and correlations between all study variables. At the outset, there were high overall levels of all three facets of social identity, and of self-esteem and well-being in the sample. The identity facets were all strongly positively interrelated, and they were all positively related to self-esteem and well-being. The mean score for perceived threat—a 7-point Likert scale—was considerably lower. Furthermore, there was no significant relationship between perceived threat and the identity facets, although threat was significantly negatively associated with self-esteem and well-being.

Predicting Qatari Youth Well-Being

Table 2 portrays the results of the moderated mediation analyses. First, threat (negatively) and each identity facet (positively) independently predicted self-esteem. The interaction terms were not statistically significant, except for the small yet marginally significant interaction effect of threat and Gulf identity in the prediction of self-esteem. As predicted, simple slope analyses indicated that Gulf identity seemed to buffer the negative threat effects, in the sense that the threat effect was considerably lower for high Gulf identifiers than for low Gulf identifiers. Notably, the negative effect of threat, although small, was still significant among high Gulf identifiers, indicating that the buffering effect of this overarching social identity is rather limited. For Qatar and Arab identity, a similar buffering trend was found, but none of the slopes were significantly different between high and low identifiers.

Second, self-esteem further predicted well-being, and while perceived threat again negatively predicted well-being in each model, only Gulf identity was positively related to well-being. None of the interaction terms reached conventional levels of significance, and simple slope effects corroborated this by showing similarly negative effects of threat among low vs. high identifiers.

Table 3 further delineates the total, direct, and indirect effects of perceived threat on well-being, at different levels of social identification. The results in each of these models revealed significant total and direct effects of threat on well-being for those with low, medium, and high levels of social identification alike. Importantly, the significant indirect effects point to self-esteem as mediator of the threat-well-being relationship. This mediating effect was significant at all levels of (each facet of) identity.

TABLE 1 | Correlations among study variables.

Measure	M	SD	1	2	3	4	5	6
Perceived threat	2.91	1.52	–					
Qatari identity	6.87	0.53	0.02	–				
Gulf identity	6.40	0.95	−0.02	0.53***	–			
Arab identity	6.61	0.74	−0.04	0.60***	0.66***	–		
Self-esteem	4.95	0.80	−0.13***	0.27***	0.26***	0.29***	–	
Well-being	7.82	1.49	−0.13***	0.20***	0.25***	0.23***	0.49***	–

[a]$p < 0.10$; *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

Finally, as an additional robustness check, we created indices of comparative identity (see Huici et al., 1997). Particularly, we produced variables that compared each facet or "level" of identity with the other two and reran the analyses using these comparative identity scores as moderators. The results are portrayed in **Table 4** and, interestingly, seem to mirror the original results, as such providing more confidence in our conclusions. Specifically, identifying relatively more as Qatari compared to as Khaleeji or Arab did not moderate the association between threat and self-esteem, nor did identifying relatively more as Arab compared to as Khaleeji or Qatari. The only significant moderator was identifying relatively more as Khaleeji compared to as Qatari or Arab. Simple slope analyses indicated that this comparative Gulf identity buffered the negative threat effects, in the sense that the threat effect was considerably lower for those who most strongly identified with the Gulf area compared with their level of identification with Qatar or with the whole Arab world. Put differently, this comparative supranational, regional identity aspect of identifying relatively most with the Gulf area significantly weakened the psychological effects of the threat following the blockade, whereas the other two comparative identities (either at the lower, national or the higher, religious level) did not exert such moderating effects. In sum, the saliency of the Gulf identity mattered most.

DISCUSSION

The aim of the current study was to investigate the additive and interactive effects of threat and social identity in predicting self-esteem and well-being among Qatari youth. Indeed, it can be argued that the 2017 Qatar blockade may have increased feelings of threat, particularly among this group, and whereas such threat perceptions might negatively impact well-being *via* lowered self-esteem, we predicted that an overarching social identity might mitigate (i.e., buffer) this negative association. Our results somewhat provided support for this hypothesis. Indeed, the overarching supra-regional identity facet of Gulf (Khaleeji) identity not only positively predicted self-esteem and well-being, it also buffered the negative threat-self-esteem association. Specifically, among those identifying more strongly with the Gulf region, the threat perceptions accompanying the blockade did not relate to lower self-esteem to the same extent (as opposed to among low Gulf identifiers). Interestingly, both identification with the "lower" national (Qatar) identity facet and

TABLE 2 | Unstandardized estimates and 95% confidence intervals of moderated mediation analyses on self-esteem (upper panel) and well-being (lower panel) for each facet of social identity separately.

	Moderator:								
	Qatar identity			Gulf identity			Arab Identity		
	Estimate	95% CI		Estimate	95% CI		Estimate	95% CI	
Outcome: self-esteem	b	LL	UL	b	LL	UL	B	LL	UL
Perceived threat	−0.07***	−0.09	−0.04	−0.07***	−0.09	−0.04	−0.07***	−0.09	−0.04
Social identity	0.23***	0.14	0.32	0.07**	0.02	0.13	0.15***	0.07	0.22
Perceived threat × social identity	0.03	−0.03	0.08	0.02[a]	0.00	0.05	0.01	−0.02	0.04
Threat effect for low identifiers	*−0.08***	*−0.12*	*−0.04*	*−0.09***	*−0.12*	*−0.05*	*−0.07***	*−0.11*	*−0.04*
Threat effect for high identifiers	*−0.06***	*−0.09*	*−0.04*	*−0.05***	*−0.08*	*−0.02*	*−0.06***	*−0.09*	*−0.03*
Outcome: well-being									
Self-esteem	0.82***	0.74	0.90	0.82***	0.74	0.90	0.82***	0.74	0.91
Perceived threat	−0.07***	−0.11	−0.03	−0.07**	−0.11	−0.03	−0.07**	−0.11	−0.03
Social identity	0.06	−0.11	0.22	0.17***	0.08	0.27	0.04	−0.09	0.16
Perceived threat × social identity	0.03	−0.06	0.13	0.01	−0.04	0.05	0.00	−0.05	0.06
Threat effect for low identifiers	*−0.09**	*−0.16*	*−0.02*	*−0.07**	*−0.13*	*−0.02*	*−0.07**	*−0.13*	*−0.01*
Threat effect for high identifiers	*−0.06**	*−0.11*	*−0.02*	*−0.07**	*−0.11*	*−0.02*	*−0.07**	*−0.11*	*−0.02*

[a] $p < 0.10$; *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.
LL, lower limit; UL, upper limit.
The italics are added to indicate slope effects.

TABLE 3 | Unstandardized estimates and 95% confidence intervals of the total, direct, and indirect, effects of perceived threat on well-being *via* self-esteem, at different levels of each facet of social identity separately.

| | Total | | | Direct | | | Indirect | | |
| | Estimate | 95% CI | | Estimate | 95% CI | | Estimate | 95% CI | |
	b	LL	UL	b	LL	UL	b	LL	UL
Moderator: Qatar identity									
Low identity	−0.15***	−0.23	−0.08	−0.09**	−0.16	−0.02	−0.07**	−0.11	−0.02
Medium identity	−0.12***	−0.17	−0.08	−0.07***	−0.11	−0.03	−0.05**	−0.08	−0.03
High identity	−0.11***	−0.16	−0.07	−0.06**	−0.11	−0.02	−0.05**	−0.08	−0.03
Moderator: gulf identity									
Low identity	−0.14***	−0.21	−0.08	−0.07**	−0.13	−0.02	−0.07**	−0.10	−0.04
Medium identity	−0.12***	−0.17	−0.08	−0.07**	−0.11	−0.03	−0.05**	−0.08	−0.03
High identity	−0.11***	−0.16	−0.05	−0.07**	−0.11	−0.02	−0.04**	−0.07	−0.02
Moderator: Arab identity									
Low identity	−0.13***	−0.20	−0.07	−0.07**	−0.13	−0.01	−0.06**	−0.10	−0.02
Medium identity	−0.12***	−0.17	−0.08	−0.07**	−0.11	−0.03	−0.05**	−0.08	−0.03
High identity	−0.12***	−0.17	−0.06	−0.07**	−0.11	−0.02	−0.05**	−0.08	−0.02

[a] $p < 0.10$; *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.
LL, lower limit; UL, upper limit.

with the "higher," more encompassing ethno-cultural/religious (Arab) identity facet failed to exert such buffering effect.

Applying Intergroup Threat and Social Identity Theory to Intergroup Relations in the Gulf Region

It has been argued that social identity theory has not been as impactful as expected in political psychology due to a focus on the effects of social identity across group memberships in lab contexts (within Western societies), and a lack of attention on the development of such identities in real-world contexts (outside the labs of Western universities, see Huddy, 2001). It is important to note the challenges to social identity theory, as outlined by Huddy (2001), also reflect some of the original theorizing by Tajfel et al. (1971), who emphasized the importance of understanding the role of context when applying the theory to different groups and to not make the assumption of universality. Nonetheless, a recent cross-cultural meta-analysis including over 20,000 respondents across 18 studies/samples found ingroup bias to be a relatively universal phenomenon (Fischer and Derham, 2016), but with

TABLE 4 | Unstandardized estimates and 95% confidence intervals of moderated mediation analyses on self-esteem (upper panel) and well-being (lower panel) for each facet of comparative social identity separately.

	Moderator:								
	Comparative Qatar identity			Comparative Gulf identity			Comparative Arab identity		
	Estimate	95% CI		Estimate	95% CI		Estimate	95% CI	
Outcome: self-esteem	b	LL	UL	b	LL	UL	b	LL	UL
Perceived threat	−0.06***	−0.09	−0.04	−0.07***	−0.09	−0.04	−0.07***	−0.09	−0.04
Social identity	−0.17***	−0.23	−0.11	0.10***	0.05	0.16	0.04	−0.04	0.11
Perceived threat × social identity	−0.03	−0.07	01	0.03*	0.00	0.07	−0.02	−0.06	0.03
Threat effect for low identifiers	*−0.05**	*−0.08*	*−0.01*	*−0.09***	*−0.12*	*−0.06*	*−0.06***	*−0.09*	*−0.03*
Threat effect for high identifiers	*−0.08***	*−0.11*	*−0.05*	*−0.04**	*−0.08*	*−0.01*	*−0.08***	*−0.11*	*−0.04*
Outcome: well-being									
Self-esteem	0.87***	0.79	0.95	0.88***	0.80	0.96	0.82***	0.74	0.91
Perceived threat	−0.06**	−0.11	−0.02	−0.07**	−0.11	−0.02	−0.07**	−0.11	−0.02
Social identity	−0.21***	−0.31	−0.10	0.19***	0.10	0.28	−0.06	−0.18	0.06
Perceived threat × social identity	0.00	−0.06	0.06	0.00	−0.05	0.06	−0.01	−0.08	0.06
Threat effect for low identifiers	*−0.06**	*−0.12*	*−0.01*	*−0.07**	*−0.12*	*−0.01*	*−0.06**	*−0.12*	*−0.01*
Threat effect for high identifiers	*−0.06**	*−0.12*	*−0.01*	*−0.06**	*−0.12*	*−0.01*	*−0.07**	*−0.13*	*−0.01*

[a]$p < 0.10$; *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.
L, lower limit; UL, upper limit.
The italics are added to indicate slope effects.

systematic variance found for countries with differing levels of individualism or collectivism, and uncertainty avoidant contexts. Importantly, and reflecting limitations found in much of the literature, no data on Muslim-majority countries were included, thereby limiting the generalizability of the findings.

Relatedly, while there is extensive research on the effects of political violence (Palmieri et al., 2008; Muldoon, 2013), less is known about the complex relationship between the perception of threat in socio-political tensions, and the potential buffering effect of identity in its associations with mental health variables such as self-esteem. This is especially the case for younger populations. In fact, because the blockade of Qatar is experienced as an act of aggression, it can be seen like a perceived threat to social identity and national security. In those circumstances, people may perceive this threat as a source of anxiety and worry. But when the crisis is well managed, a collective consciousness can develop protective attitudes and resilient actions to overcome the threat by reinvesting and re-constructing their social identity and collective social esteem.

Threats to the content and value of group membership are distinguished in social identity theory (Breakwell, 1983; McKeown et al., 2016). When individuals' social identity is threatened, they attempt to raise their esteem. Worchel and Coutant (1997) maintain that threats to our identities may come from out-groups: when such out-groups attack our in-group, this threat can severely worsen our self-worth and well-being. Studies showed that perceived threat to our group identities leads to intergroup anxiety, and but very few attempted to examine the potential buffering role the identities we attempt to portray may play (Branscombe et al., 1999). An exception can be found in the work of Chen et al. (2015). In a South African and a Chinese sample, they found strong effects of (environmental and financial) threat on lower well-being and higher ill-being,

and although relatedness (a construct closely related to group identification) was positively related to well-being, it failed to buffer against the detrimental threat effects—put differently, they also found additive but no interactive effects.

What Do We Know About the Psychology of Qataris?

Compared to studies involving Western samples, there is a lack of high-quality large-scale datasets concerning populations from Gulf States such as Qatar. Within psychology, and social sciences more broadly, the dependence on samples typically from WEIRD populations has limited the cross-cultural generalizability of key conceptualizations of the self, motivation, and behavior (Henrich et al., 2010). Nonetheless, there has been an emergence of some empirical research on youth well-being from Gulf countries in international psychology literature (Abdel-Khalek, 2011, 2013; Al-Attiyah and Nasser, 2016; Bedair et al., 2020).

The potential role of the Qatari blockade and its influence on youth national, regional, and ethno-cultural identity, self-esteem, and well-being presents a dilemma for political psychology conceptualizations of intergroup conflict. The combined effects of these variables and their potential association with well-being in Qatari youth is poorly understood. This paper addressed this issue, and its results s present a number of interesting findings in the context of the unique challenges brought about by the Qatari blockade for Qatari youth. Firstly, it is clear that despite these challenges, young Qataris perceived relatively low levels of threat, and scored relatively high on all facets of identity, self-esteem, and well-being. In line with our predictions, those who perceived lower levels of threat and had higher levels of identification and self-esteem were more likely to report stronger levels of overall well-being. In contrast to prior literature suggesting that social identification increases due to perceived

threat (Haslam et al., 2005), this model provides no evidence that this was directly the case within the Qatari blockade.

Most importantly, and partly confirming our predictions based on a firm theoretical background, this study also found a (marginally significant) buffering effect of superordinate identification with the Gulf region as a whole, but not with national or Arab identification. This may be due to the relatively untested psychometric properties of the measure used, but it may also be attributed to the fact that young Qataris already had high levels of national identity prior to the blockade. Given the absence of valid and reliable representative data for the mental health of Qatari youth prior to the blockade, it is not possible to infer direct causal effects of the blockade at present. Nonetheless, we put forward that future studies could further explore the roles of different "levels" of identification. Although all facets of identity positively relate to positive outcomes such as self-esteem and well-being, only a "medium-level" identity can (to a limited extent) buffer against negative effects of intergroup threat perceptions.

Khaleeji Identity as a "Cure for All"?

On the one hand, a national identity could be too narrow to offer solace after an impactful event (such as the blockade) that heightens intergroup tensions in the area. As the blockade might have especially triggered those strongly identifying with their country, one could have even expected an opposite interaction effect here, with strong national identification amplifying the threat effects. On the other hand, the superordinate identification with all Arabs globally might be too broad to buffer threat effects either. Indeed, the blockade worsened intergroup relations in the Gulf area only. As a consequence, a strong ethno-cultural identity would not be powerful enough to limit the effects of threat on self-esteem and well-being. It seems that the overarching identity with the Gulf area (i.e., the perpetrator of the blockade) is just about right to buffer against the potential detrimental effects of the blockade. And even this facet of Khaleeji identity has its limits, as the threat effect remained significant among high Gulf identifiers.

In the beginning of the 21st century, the Arab Gulf countries entered a new era, an era during which it drew its power, not only through its oil production, but also through possessing cultural capacities (Alsharekh and Springborg, 2012). The Gulf countries have succeeded in shaping a Gulf identity, as they considered doing that was necessary to maintain national, regional, and international legitimacy (Allam and Karolak, 2020). This identity used to provide the citizens of those countries with a sense of safety, trust, and positive self-image. Historically, the Gulf identity emerged with the establishment of the Gulf Cooperation Council in 1981. The purpose of this council was presenting a unified vision of the Arab Gulf regarding external political affairs which reflect one Gulf identity.

The Gulf Cooperation Council members worked hard to manifest this idea to a living reality (Lawson, 2012), and they succeeded to a certain extent in doing so. These countries have strong social, familial relations, and homogenous patterns in sports and cultural expression'such as poetry and music that they share. This homogeneity is what makes Gulf countries standout from the rest of Arab countries. The Gulf countries participated in huge projects for rewriting their mutual history, traditions, sports and arts (Erskine-Loftus et al., 2016).

However, the recent Gulf crisis and the blockade of Qatar demonstrated the fragility of this political homogeneity amongst them. This crisis has also impacted aspects of identity for Gulf countries; especially for Qataris, since the blockade, the threats, and the media conflicts -especially on social media- resulted in an identity wound, where the Gulf identity was thought to have lost its value and importance as a source of safety and trust. There was much anecdotal reports and media coverage regarding the Qatari resilience in response to the blockade, and it remains unknown why the specific facet of Khaleeji identity provided a path to such resilience. It may be related to the web of identities fused between Qatari citizens and their fellow GCC countries, and the potentially complex depths of the Khaleeji identity (which itself predates the national GCC identities; Al-Misned, 2016; Allam and Karolak, 2020). As such, we claim that the Gulf region is characterized by distinct ingroup-outgroup dynamics, which in itself form an interesting avenue for future work. For instance, experimental co-ethnic voting evidence from Qatar indicates that Qataris have low political salience of ethnic divisions, and do not exhibit negative prejudice against perceived outgroup members (Shockley and Gengler, 2020). Perhaps such low outgroup negativity is the exact reason why a strong Gulf identity is maintained, even in the face of the blockade.

Taken together, these nuanced and interlinking identity features could impact the identification of cause-and-effect relationships between the blockade and different levels of identity, mental health, and well-being. The interconnected nature of Qatari identity within the GCC means that the shared descent of all stakeholders could be separable from the perceived threat of the blockade with respect to other factors (i.e., economic problems). It is also possible that Qatari youth were able to set apart their shared identity with the blockading GCC countries from the socio-political conflicts underpinning the blockade.

Implications for Education in Qatar

The Qatari National Human Rights Committee (QNHRC) in 2017 very clearly highlighted the adverse impact of the blockade on all aspects of society, including youth mental health. Coupled with a comparatively high prevalence of mental health problems (Schoenbach et al., 2018; Khaled, 2019), in addition to the enduring role of stigma in the region (Ciftci et al., 2013; Zolezzi et al., 2017), there are several educational lessons from which to strengthen societal understanding of the connections between Qatari youth identity, perceived threats in the present or future, self-esteem, and well-being. Given the salient effects of threat and uncertainty on youth mental health, awareness-raising campaigns and the psychoeducation of how humans react to (perceived) threat can assist in helping young Qataris understand their reaction to the blockade, and indeed any future changes. Further initiatives that can solidify and support youth Khaleeji identity in the face of (perceived) threats of the blockade are likely to positively impact outcomes for Qatari youth, but more formal

evaluations of such interventions are nonetheless advisable. Indeed, in order to offset or minimize any potentially adverse mental health consequences, educational psychologists in Qatar may be appropriately placed to facilitate new awareness and psychoeducational campaigns to help young Qataris understand the functionality of identity in all its facets and all its complexity, especially in the face of perceived threats and uncertainty.

Strengths and Limitations

Despite the fact that we used a very large sample from a non-WEIRD country, in a unique context to perform this integrative test of three well-known predictors of well-being, there are a number of methodological considerations in this study. It is important to note that the time of data collection for this study was in mid-2020. Owing to the considerable gap in time between the initial shock of the blockade and the 2020 pandemic, it is conceivable that this time lag effect may have impacted the quality of the data. Given the developmental changes of the young Qatari population from the time of the blockade up until this study's data collection, it is likely that respondents could have had different responses during the blockade. It is also possible that Qatari youth consolidated and enhanced their national sense of identity within this time period, but this was not possible to retrospectively demonstrate within the methodology of this study. Furthermore, given the nature of the research questions, it would have been useful to compare data before and after the blockade; but no such data presently exists for the population of interest. Moreover, the psychometric properties of the national identity measure and also the perceived threat require further validation in Gulf populations before concrete interpretations can occur. Especially our measure of threat stands rather far from classic threat scale that tap into a certain symbolic or realistic feeling of threat with outgroup members (mostly newcomers) "taking away" part of the ingroup culture or ingroup socio-economic status. Our measure contains more anxiety-related items referring to the blockade, as such tapping into threat coming from outgroups that are not present within the own country, but still pose a major concern (particularly in terms of economic threat). A final limitation to be considered is the role of socially desirable responses when interpreting the overall dataset.

CONCLUSION

In the context of intergroup relations within the Gulf area, we showed that perceived threat accompanying the 2017 Qatar blockade was related to Qatari youngsters' lower well-being *via* lower levels of self-esteem. Conversely, identification with the nation of Qatar, the Gulf area, and the Arab world as a whole were all strongly positively associated with self-esteem and well-being, and the specific facet of Gulf (i.e., Khaleeji) identity even buffered against some detrimental threat effects. Given the new forms of intergroup conflict that are evolving—such as cyberwarfare, or sanctions and restrictions due to pandemic and/or geopolitical factors—researchers should examine the real-time development of perceived threat among different age cohorts, in addition to embedding other variables that can capture the potential role of individual differences. Additionally, future research should endeavor to collect representative samples from across the Gulf region to ensure greater comparability across the collective literature. This will aid the advancement of a more globally representative political psychology where the GCC region can be appropriately situated.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by the IRB and was obtained from the Doha Institute for Graduate Studies. The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

AA reviewed the analyzed data and supported the writing of the manuscript. JV and DM performed data analysis and supported the drafting and editing of the manuscript. JV, AA, and MA analyzed the data and drafted the manuscript. DA-A and MA conducted the data collection. JV and YH reviewed the analysis and supported the writing of the manuscript. All authors read and approved the final manuscript.

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Research on the Operating Mechanism of E-Commerce Poverty Alleviation in Agricultural Cooperatives: An Actor Network Theory Perspective

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E-commerce poverty alleviation has become a new wisdom in China's rural poverty alleviation, but there are a few empirical researches on e-commerce poverty alleviation based on farmer cooperatives. Taking four typical poverty counties in Zhejiang Province as an example, based on the actor network theory (ANT), this paper defines the participants and their obligatory passage point (OPP) from the e-commerce poverty alleviation actor network (EPAAN), combs the roles and interest demands of various stakeholders, and constructs the EPAAN model based on farmer cooperatives according to the translation process. We found that the EPAAN is a heterogeneous network by constantly updating, which consists of human actors with cooperatives as the main body and non-human actors. Moreover, our study illustrates that the formation and operation mechanism of cooperative e-commerce poverty alleviation network alliance under the background of targeted poverty alleviation can be well analyzed with the help of actor network theory. This study contributes to provide a feasible Chinese plan for the cause of poverty eradication all over the world, and provides a great reference value for global poverty governance.

Keywords: E-commerce poverty alleviation, farmer cooperative, actor network theory, poverty eradication, targeted poverty alleviation, sustainable development goals, UN SDGs

INTRODUCTION

Poverty has become one of the most serious problems faced by the whole world. According to the Global Multidimensional Poverty Index 2020 report released by the United Nations, a total of 1.3 billion people in the world are in a "multidimensional poverty state" now, and there are great differences in the degree of poverty among countries and regions within countries (Oxford Poverty and Human Development Initiative, 2020). Moreover, the first item of the United Nations' 2030

Sustainable Development Goals points out that all forms of poverty will be eliminated on a global scale in 2030 (Peng and Li, 2017). Poverty eradication is the common task of humankind. China has always paid great attention to poverty alleviation and implemented a series of poverty alleviation national plans for medium and long term development. From relief-based poverty alleviation to development-driven poverty alleviation and then to targeted poverty alleviation, it has made historic achievements in poverty alleviation in China. According to the white paper titled "Poverty Alleviation: China's Experience and Contribution" issued by China's State Council Information Office in April 2021, it showed that 770 million people in rural areas all shook off poverty by the current poverty threshold after reform and opening up. By the international poverty standard of the World Bank, the China's poverty reduction population accounted for more than 70% of the global poverty reduction population in the same period. At the end of 2020, China achieved the goal of eliminating extreme poverty on time. The 98.99 million people in rural areas that were living below the current poverty threshold all shook off poverty, all the 128,000 impoverished villages and 832 designated poor counties got rid of poverty. China has eliminated poverty over entire regions and eradicated extreme poverty (The State Council Information Office of the People's Republic of China, 2021). Consequently, China which accounts for nearly one fifth of the world's population has comprehensively eradicated extreme poverty. It has realized 10 years ahead of schedule to achieve the poverty alleviation goal of the United Nations 2030 agenda for sustainable development.

Since the strategy of targeted poverty alleviation is implemented in China, the rural impoverished population has decreased significantly. It has made a remarkable achievement and made a great contribution to the cause of global poverty alleviation. As a new thing under the targeted poverty alleviation strategy, e-commerce poverty alleviation makes a deep integration with industrial poverty alleviation by taking e-commerce as the carrier. It has become an important channel among the poverty alleviation work in China. In 2015, the Poverty Alleviation Office of the State Council listed the "E-commerce Poverty Alleviation Project" as one of the ten targeted poverty alleviation projects (Wei, 2017; Wang and Peng, 2020). In November 2016, the file titled "Guidelines on Promoting Targeted Poverty Alleviation through E-commerce" was jointly issued by the Poverty Alleviation Office of the State Council and other 16 ministries and commissions of the CPC Central Committee. The guidelines pointed out that the resources from all parties should be coordinated to jointly support and promote e-commerce targeted poverty alleviation (The National Rural Revitalization Administration, 2016). In December 2018, the notice on further highlighting the poverty alleviation orientation and making every effort to implement the e-commerce poverty alleviation policies was issued by the Ministry of Commerce. From the notice, based on the resource endowment and industrial characteristics, it should develop diversified e-commerce supply chains such as subsidiary agricultural products, tourism, catering and folk customs according to local conditions, improve the interest

connection mechanism, and explore ways to achieve targeted assistance to poor households (Ministry of Commerce People's Republic Of China, 2018). In June 2020, the notice on doing a good comprehensive work for e-commerce in rural areas in 2020 was jointly issued by the Ministry of Finance and other 3 ministries and commissions of the CPC Central Committee. It clearly stated that using e-commerce can broaden the sales channels of agricultural and livestock products, overcome the impact of the epidemic and help increase income and get rid of poverty (Zhang, 2020). These policies highly promote the development of rural e-commerce and e-commerce poverty alleviation in poor areas based on different perspectives. Moreover, from the practice of e-commerce poverty alleviation in recent years, e-commerce poverty alleviation has indeed achieved remarkable effect in poor areas, especially based on cooperatives which are with farmers as the main body. Therefore, in this paper, we focus on e-commerce poverty alleviation based on cooperatives, and attempt to address such a research question as "how cooperatives lead e-commerce poverty alleviation to play an important role in poverty-stricken areas, ensure that e-commerce poverty alleviation benefits all participants, and form a dynamic operation mechanism."

The design and implementation of our research are under the guidance of actor network theory (Law, 1999). It is a kind of sociological method that interweaves various heterogeneous actors to build a network, and solves a specific problem through the network development (Law, 1999). The adoption of ANT is helpful to comprehensively sort out the relationship of interdependence, interaction and transformation between individuals and systems in the process of e-commerce poverty alleviation based on cooperatives. Based on the perspective of ANT, this paper draws on the experience of ANT theoretical framework, and provides a new research method for studying the development process of e-commerce poverty alleviation based on cooperatives. Through field research and case analysis, this paper attempts to translate and analyze the practice process of e-commerce poverty alleviation based on cooperatives in China, so as to find existing problems and countermeasures. In order to promote poverty alleviation in China and other developing countries for e-commerce poverty alleviation, it will put forward some useful theoretical value and practical significance.

The rest of this paper is structured as follows. In the second part, we review the relevant literature. In the third part, we describe the research method, sample strategy and data collection. In the fourth and fifth parts, we will respectively state our findings and a discussion. It will conclude in the sixth part.

LITERATURE REVIEW

In this section, it mainly includes 4 parts. We summarize the role and influence of e-commerce in poverty alleviation in the first part. The second part is to explore the influence of farmer cooperatives in the process of poverty alleviation. We summarize the ANT framework

and explore its research in related areas of poverty alleviation in the third part. The last part is to discuss the innovation of this study.

E-Commerce Toward Poverty Alleviation

Nowadays, with the continuous popularization of e-commerce, people have realized the importance of e-commerce, and e-commerce has become an important engine for the development of the national economy. In the whole poverty alleviation system, e-commerce poverty alleviation has gathered more and more consensus, and it is becoming a new channel for poverty alleviation and a new highlight in the development of e-commerce. From some foreign researches, foreign scholars are paying more and more attention to the role of information and communication technology and e-commerce in anti-poverty, and have reached the same consensus on their role in poverty alleviation. For example, by studying the relationship between information technology and anti-poverty, it is considered that information technology plays a positive role in anti-poverty (Becerril and Christian, 2020). Moreover, the application of information and communication technology in rural areas plays an important role in increasing farmers' income and promoting rural economic development (Raza et al., 2020; Bjorn et al., 2021). It can establish the foundation for the formation of rural e-commerce ecosystem and contribute to the self-development of rural e-commerce (Hsu et al., 2020). Simultaneously, the usage of e-commerce can help farmers in developing countries play a positive role in expanding the sales channels of agricultural products and reducing transaction costs and transaction risks (Dsouza, 2014; Liu et al., 2020; Chen et al., 2021). It is conducive to accelerating the process of agricultural industrialization and expanding income. From some domestic researches, domestic scholars mainly focus on the e-commerce poverty alleviation's conception, development models, paths and countermeasures. The conception of "e-commerce poverty alleviation" was first proposed by Wang and Wang (2015), who summarized the basic concept, forms, necessity, function incentives and implementation measures of e-commerce poverty alleviation (Wang and Wang, 2015; Yao, 2019). So far, there is no final definition of e-commerce poverty alleviation, but the thought is gradually clear. Scholars have fully discussed its connotation and formed a relatively consistent view on e-commerce poverty alleviation, which is that using e-commerce promotes families in poor areas to get rid of poverty and promote the development of local industries (Zhou, 2015; Wang, 2017; Wei, 2018; Lin and Wang, 2020; Zhang, 2021). With the development of e-commerce poverty alleviation in poor areas in China, some scholars investigated the current situation of characteristic industries and agricultural products markets in poor areas, and explored the main models and countermeasures of e-commerce poverty alleviation suitable for poor areas (Zhang and Wang, 2016; Deng and Liu, 2021; Gao et al., 2021). There are some typical representatives of e-commerce poverty alleviation models such as "Longnan Model," "Dangshan Model," "Chenxian Model," "Qingchuan Model," "Tongyu Model," "Shaji Model," and so on (Research Group for Longnan' Poverty Alleviation via E-commerce, 2018; Dong et al., 2019; Guo and Mi, 2019; Zan and

Wang, 2020; Chen, 2021). Some scholars analyzed the main ways of rural e-commerce poverty alleviation in combination with local practice, such as increasing income, saving expenditure and improving energy, and so on (Lin, 2016; Yan et al., 2018; Zhang, 2018). According to the existing main problems, they put forward some countermeasures and suggestions in infrastructure, talent training, policy support, resource docking and so on (Wei, 2017; Yi, 2018; Wang, 2020; Gong et al., 2021).

Farmer Cooperatives Toward Poverty Alleviation

Because of the low degree of farmers' organization (Ao et al., 2021), the weak ability of connecting the large market and resisting risks, it is difficult for poor farmers to continuously increase their income. So it has become one of the most prominent problems that poor farmers are returning to poverty after getting rid of poverty. Therefore, the most effective way is to improve the level of farmers' organization, which can better solve the problem of farmers' poverty. The farmer cooperatives are the main form of improving the degree of farmers' organization. They play an important role in promoting farmers' income, responding to market competition, and improving the level of agricultural organization and standardization. In China, government always pays high attention to the development of cooperatives. In October 2006, the "law of the People's Republic of China on Specialized Farmer Cooperatives" was promulgated, and it was revised in December 2017 and implemented in July 2018. During those years, it was issued a series of laws, regulations and supporting policies according to cooperatives in China. Looking at foreign studies, foreign scholars more agree that cooperatives play a role in poverty alleviation, and pay more attention to the research on the role of cooperatives, the impact on poverty alleviation and increasing farmers' income. For example, small-scale farmers are often unable to bear high transaction costs, but cooperatives can take advantage of economies of scale when providing services (Xu, 2018; Arunrat et al., 2021),they can facilitate small farmers to enter differentiated markets, reduce transaction costs (Peng and Fu, 2018), and help small farmers overcome information deficiencies related to production technology and market access (An et al., 2015). Getnet and Anullo (2012) analyzed data from Ethiopia and believed that agricultural cooperatives are important to support the development of people's livelihood and poverty alleviation, and play a role in saving costs, increasing income and saving in the production and life of farmers. Onyilo and Adong (2019) emphasized the important impact of cooperatives on farmers' poverty alleviation by exploring the marketing and credit policy reform of agricultural cooperatives in Uganda. Gava et al. (2021) studied the effects of Bosnia and Herzegovina farmer cooperatives in reducing rural poverty and preventing poverty. Looking at domestic studies, domestic scholars currently focus on the mechanism, model and countermeasures of cooperatives in targeted poverty alleviation. For example, some scholars agree with the functional value and mechanism of cooperatives very much in promoting industrial targeted poverty alleviation (Bai et al., 2017; Shao and Yu, 2017; Feng et al., 2020; Zhou et al.,

2020). Other scholars have explored the poverty alleviation model of cooperatives from different viewpoints, such as the "farmer cooperative+" industrialized targeted poverty alleviation model (Liao et al., 2016), the "government-market-community-cooperative" four-in-one poverty alleviation model (Li and Chen, 2017), and the collaborative poverty alleviation model of rural collective economic organizations and cooperatives (Ding, 2020), and so on. Moreover, some scholars have discussed the problems of cooperatives in assisting targeted poverty alleviation, and put forward countermeasures and suggestions to improve the effectiveness of cooperatives in poverty alleviation (Bai and Li, 2017; Guo and Zhao, 2018; Yuan et al., 2021).

Actor Network Theory Framework

Actor network theory (ANT) was founded by Latour, Callon, and Law in the middle of 1980s,who were famous scholars belonged to Sociology of Scientific Knowledge in French (Law, 1999). Callon was the first to propose three concepts, namely the actor network, actor, translation (Callon, 1984). Law followed the research method of Callon and put forward how to maintain the stability of actor network (Law, 1984). Based on the theoretical research of Callon and Law, Latour (1987) further enriched the theoretical connotation of actor network, and put forward that its broad definition meant that a scientific activity was completed by the joint participation of "actors" in different roles. In order to realize the benefits conferred by participating in the activity, various actors play different roles or functions, thus forming an inseparable network, and the ultimate interests of actors are realized through the joint linkage between themselves and other actors. At the same time, the core concepts of "actor," "actor network," "obligatory passage point," and "translation" are described in more detail, and their theories are applied to scientific practice (Latour, 1997).

Actor network theory is based on the principle of generalized symmetry, which gives all actors equal status (Callon, 1984). Here "actor" refers to any element that plays a role in the process of scientific practice and research. It includes both animate human actors and inanimate non-human actors. Human actors include individuals, groups, organizations, institutions, etc. Non-human actors include technology, equipment, software, platforms, communication hardware, infrastructure standards, etc. (Walsham, 1997). The "actors" can be divided into core actors and other actors. The actors who play a leading role in the construction of the actor network can be called core actors (Luo, 2013). The concept of "actor" breaks the distinction between "human" and "non-human," and eliminates the dual opposition between subject and object, nature and society (Latour, 1987), which has profound revolutionary significance. An "actor network" refers to a constant dynamic and non-transcendental network formed by closely connecting all actors as "network nodes" around a common goal by defining and endowing their interests, roles, functions and status (Latour, 1987). "Translation" means that core actors translate and explain the language, problems, identity and interests of other actors in their own words, bring them into the network, and combine the interests of various actors to form a solid network interest alliance (Latour, 1987). The translation process includes

problematization, interessement, enrolment, and mobilization (Callon, 1986). In order to enable all actors to reach a consensus, take unified action and ensure the smooth operation of the whole translation process, it is necessary to pass through the "obligatory passage point" (OPP). OPP is a scheme proposed by the initiator of the actor network, which solves the problems faced by other actors, achieves their own goals, and highly unifies the thoughts and behaviors of all actors according to their own purpose. OPP is a necessary point for all actors going through. The actors only pass through OPP, then they can be allowed to enter actor network. Moreover, their satisfaction with problem solving directly affects the stability of the network alliance (Latour, 1997; Liu et al., 2016). The framework of ANT is shown in **Figure 1** as follows.

Since the birth of ANT, it has been highly paid attention by academic circles at home and abroad. Now ANT has been widely used in many fields of social sciences. For example, some foreign scholars such as Voeten et al. (2015), Saba et al. (2018); Hagberg and Fuentes (2018), and some domestic scholars such as Liu (2011); Huang (2016), Wang et al. (2020) they respectively introduce ANT in different areas such as poverty alleviation, farmer cooperatives, and e-commerce. Taking ANT as the foundation of endogenous development, scholars explore the composition of various interest groups, the relationship among various stakeholders and the construction of dynamic network, and put forward corresponding improvement countermeasures.

The Innovation of E-Commerce Poverty Alleviation Actor Network Based on Cooperatives From the Perspective of Actor Network Theory

The application of e-commerce to poverty alleviation is an important government initiative in China. As this practical activity has not been carried out for a long time, there are many problems about e-commerce in the process of cooperatives poverty alleviation, such as multiple actors, cooperation mechanism and benefit distribution. Throughout the existing studies, scholars at home and abroad have adopted different research methods to analyze the theories of e-commerce poverty alleviation, cooperatives and ANT from different perspectives. It has reference significance and lays a research foundation for the development of e-commerce poverty alleviation based on cooperatives.

Actor network theory is an important theoretical tool for analyzing multi-agent relationships, complex and dynamic system networks. Using the theoretic framework of ANT to e-commerce poverty alleviation and cooperatives, it can construct the model of e-commerce poverty alleviation actor network (EPAAN) based on cooperatives. The EPAAN model can more comprehensively and systematically analyze the interaction among various actors in the implementation of e-commerce poverty alleviation in cooperatives, and effectively solve the problems in the process of their cooperation mechanism and the rational distribution of interests and responsibilities. It is conducive to the analysis and construction of the operating mechanism of e-commerce poverty alleviation in
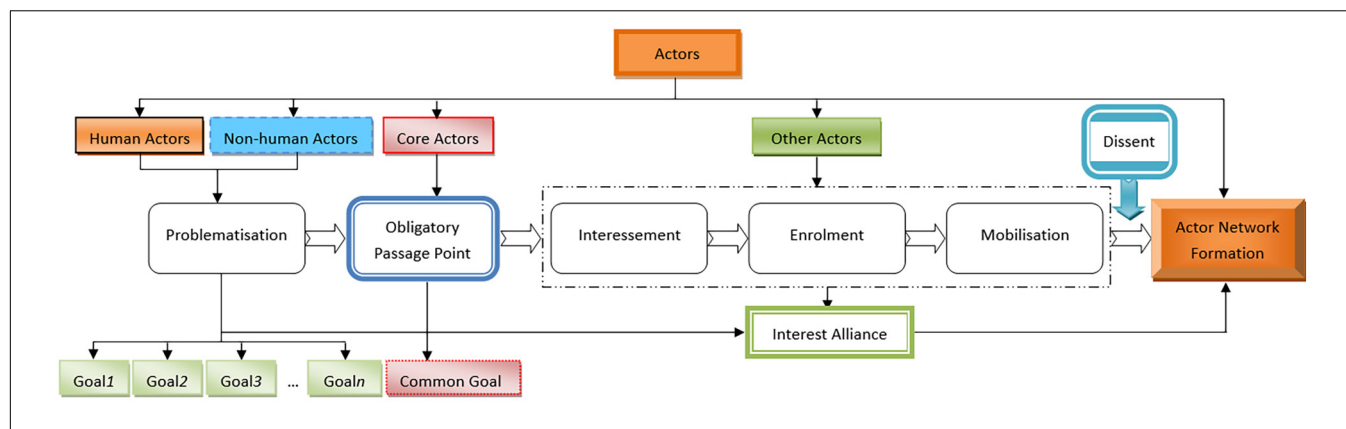
FIGURE 1 | The framework of actor network theory (ANT).

the implementation of cooperatives. Therefore, it is fully feasible to apply ANT to the research on e-commerce poverty alleviation based on cooperatives. Based on previous studies, it is hypothesized that cooperatives in the EPAAN may have a positive impact on farmers in poverty-stricken areas to get rid of poverty and become rich. This hypothesis will be tested and evaluated in the current study.

In summary, the research on the development of e-commerce poverty alleviation based on cooperatives from the perspective of ANT provides a new idea for relevant research. It is different from traditional research that tends to focus on business management, Internet technology, information and communication technology, etc. And it breaks the limitations of research perspectives. Simultaneously, it conducts research from the perspective of influential actors in the entire e-commerce poverty alleviation network, fully explores the relationship among various elements in the construction of the e-commerce poverty alleviation network, and interprets the construction process of EPAAN from a systematic and comprehensive perspective, and proposes the dynamic and sustainable development strategies. To some extent, this study fills the research gap on the role of cooperatives in e-commerce poverty alleviation and exploring the internal relationship of various actors in the EPAAN from the perspective of ANT.

RESEARCH DESIGN

Methodology

Since the scholar Wang and Wang (2015) put forward the concept of "e-commerce poverty alleviation" in China, e-commerce poverty alleviation has been widely concerned and discussed by scholars from all walks of life on society. Because the main battlefield of e-commerce for poverty alleviation is in rural areas in China, especially in poor rural areas, it is difficult to obtain data through broad surveying methods. Therefore, we adopt a qualitative, multi-case study research design (Collis and Hussey, 2003; Yin, 2003). For a specific phenomenon, e-commerce poverty alleviation as a new thing involves many bodies, we adopt the maximum variation sampling strategy as

a research strategy (Eisenhardt, 1989; Voss et al., 2002). It can deeply explain and analyze all its variations, and explore its law of development (Creswell, 1998; Merriam, 2009; Freitas et al., 2018). Now rural e-commerce has fully exploded. In particular, Zhejiang Province has played a leading role in the national e-commerce poverty alleviation practice. Through the e-commerce poverty alleviation based on cooperatives, it has brought tangible changes to more and more impoverished counties, impoverished villages, and impoverished households. Hence, we aim to build an EPAAN model based on cooperatives, and explore how multiple entities can form joint forces in the e-commerce poverty alleviation process to help targeted poverty alleviation. Its operation mechanism will be explored in our case. In our research, the case study mainly follows "theory-practice-theory." Firstly, we combine ANT to form perceptual knowledge on the basis of preliminary investigations, and construct a preliminary theoretical model through theoretical derivation. Secondly, a large amount of data is collected from several counties in Zhejiang that were once underdeveloped, and the preliminary theoretical model is continuously tested, revised and improved through data analysis, so that the theoretical model is continuously enriched and improved, until it finally reaches theoretical saturation. Moreover, the final theory can effectively explain the phenomenon of e-commerce poverty alleviation based on cooperatives. Finally, we discuss the practical significance of the final theoretical model.

Case Introduction

As a developed province in the eastern coast of China, Zhejiang is the first region to completely eliminate absolute poverty in China (The State Council Information Office of the People's Republic of China, 2015). However, due to different natural endowments, regional development is not balanced. Especially the economic development of counties and townships in southwestern Zhejiang is relatively backward, and there are some poor counties and poor people (The State Council Information Office of the People's Republic of China, 2015). Therefore, our study selects Wencheng county, Taishun county, Yongjia county, and Suichang county in the southwestern Zhejiang Province as the research sites. Their common feature is that they once belonged to the 26

underdeveloped counties in Zhejiang Province (Pan, 2015), and the mountainous area of each county is relatively large, which is the epitome of "seven mountains, two rivers and one field" in Zhejiang Province. Therefore, how to develop the "green water and green mountains" of the underdeveloped counties into "golden mountains and silver mountains," e-commerce has a great promising. On the one hand, the government of Zhejiang Provincial has increased investment in infrastructure construction, and on the other hand, it has helped these counties actively explore e-commerce and connect with local characteristic industries. For example, it has helped local agricultural products walk into thousands of households across the country through e-commerce, and has made some achievements in helping farmers increase their income. Due to effective measures, these counties have achieved obvious poverty alleviation effects. In August 2020, the general office of Zhejiang Provincial Party Committee announced the development performance evaluation results of 26 counties including Chun'an in 2019. Among them, Taishun county, Wencheng county, and Yongjia county ranked among the top three (Xu, 2020) in Zhejiang Province. However, e-commerce plays an important role in this poverty alleviation project. For a long time, the experience of poverty alleviation in Zhejiang has been at the forefront in China. This paper studies the e-commerce poverty alleviation problems of once underdeveloped counties in developed provinces. It can provide a useful reference and practical significance for governments at all levels in different regions of economic development to formulate e-commerce poverty alleviation policies. Meanwhile, it has played a good complement and perfect significance for the e-commerce poverty alleviation theory in the developing countries.

Data Collection

In our study, all data collection is obtained by site visits, face-to-face semi-structured interviews, and archival data from the internet from September 2019 to January 2021. According to the feasibility of e-commerce in cooperatives in counties and the actors involved in the process of poverty alleviation, the interviewees are determined as cooperative principals, farmers (including ordinary farmers and poor farmers), grass-roots cadres/government officials, agriculture-related e-commerce enterprises, logistics enterprises, experts from universities and research institutes, e-commerce elites, consumers, etc.

Through the website of Zhejiang Provincial Department of Agriculture and Rural Affairs, we initially contacted 42 provincial-level demonstration farmer cooperatives with practical representatives from four research sites, and then selected 20 cooperatives that met our research requirements. In the field investigation, we carried out focus-group interview and made observations. After interviewing 20 cooperative principals, we purposefully selected 40 farmer representatives (e.g., benefits economic distribution from e-commerce poverty alleviation) and 12 managers of agriculture-related e-commerce enterprises (e.g., a minimum of 5 years of experience in e-commerce sales of agricultural products with cooperatives), 12 managers of logistics enterprises (e.g., a minimum of 5 years of experience in providing logistics services for cooperatives), and 8 village secretaries (e.g., a minimum of 3 years of experience in poverty alleviation in

the village). In the first round of data collection, we focused on collecting data to comprehensively understand the operation of e-commerce poverty alleviation based on cooperatives in each research site. In the second stage of data collection, we collected data to focus on understanding the effectiveness of e-commerce poverty alleviation for all participants.

In order to ensure the validity and reliability of the construct, we interviewed 6 agricultural experts (e.g., a minimum of 12 years of experience in guiding grass-roots agricultural industry) and 6 backbone teachers of e-commerce (e.g., a minimum of 8 years of e-commerce poverty alleviation experience) from two agricultural colleges and universities. Moreover, we interviewed 28 consumers who had experience in purchasing agricultural products by online shopping. Hence, it increased the interview sample to 132 persons. It is shown in **Table 1**.

Through field investigation and in-depth interviews, we centered around the case location to understand their regional characteristics, geographical environment, characteristic industries, cooperative participation, farmer participation, regional culture, folk customs, rural e-commerce and e-commerce poverty alleviation development characteristics. Meanwhile, we understood the interactions of different actors such as government, cooperatives, farmers, agriculture-related e-commerce companies, and logistics companies. During the interview, we will do some fine-tuning for the interview outline according to the category of interviewees, but we still insisted that the interview goal is "the influence and role of e-commerce poverty alleviation in the operation of cooperatives" as the core content. The duration of each interview will be 60–120 min. According to the data collection method (Yin, 2013), we will convert all interview data into text materials, and perform coding and descriptive statistical analysis for the relevant data, and some interviewees will accept more than once interview.

Finally, during our data analysis stage, as suggested by Yin (2009), we should pay much attention to establishing all chains of evidence that can trace back from the initial research questions to the final case study conclusions in our case study. Once any evidence source is found incomplete or missing in the process of system analysis, we will be more active in collecting and updating more data to track until we find the origin of the

TABLE 1 | Interview sample structure.

Geographical position	Sample category	Sample size
	Farmer cooperative	20
Wencheng county	Cooperative principal	20
Taishun county	Farmer	40
Yongjia county	Village secretary	8
Suichang county	Manager of agricultural e-commerce enterprise	12
	Manager of logistics enterprise	12
Zhejiang province	Agricultural expert	6
	Backbone teacher of e-commerce	6
	Consumer	28

problem. It will be used to either substantiate or disconfirm our theoretical.

FINDINGS

An Integrated Evolution Model of E-Commerce Poverty Alleviation Actor Network

Through theoretical deduction and case analysis, our key findings are based on the development process of EPAAN based on cooperatives, the composition of many actors and the implementation process of e-commerce poverty alleviation network. During our field investigation, we found that Suichang county had earlier come into contact with e-commerce than other counties. Combined with the local characteristic agriculture in the mountainous area, Suichang county sold characteristic agricultural products such as bamboo charcoal, camellia oil and tea through the e-commerce platform, and formed an e-commerce poverty alleviation network to drive a large number of poor farmers to increase their income. Therefore, through the comparison of relevant sample data in four counties, it is found that the cooperatives from Suichang county have done better in developing the e-commerce poverty alleviation network based on cooperatives than those in other counties. During our site visits, take an interview question of "please describe whether e-commerce poverty alleviation can have a positive impact on cooperatives and its specific performance" as an example, the 20 interviewed cooperatives compared the traditional market-based poverty alleviation with the current use of e-commerce poverty alleviation, and unanimously agreed that e-commerce poverty alleviation can help greatly increase the sales of agricultural products and increase the income of cooperatives. For example, on the question of "please describe whether cooperatives participating in e-commerce poverty alleviation can have a positive impact on farmers and its specific performance," the interviewed farmers agreed with joining cooperatives and participating in e-commerce poverty alleviation. They all said that it can more effectively solve farmers' problems on selling agricultural products than individual retailing in the traditional marketing way. It can greatly increase their income and achieve targeted poverty alleviation.

As noted above, on the development process of EPAAN based on cooperatives, we summarize our findings as an integrated evolution model shown in **Figure 2**. Before the emergence of e-commerce poverty alleviation, cooperatives used traditional marketing poverty alleviation to sell agricultural products to help poor farmers. However, with the development of e-commerce, cooperatives found that they could obtain a broader sales market and stronger bargaining power with the help of e-commerce. Hence, they began to use rural e-commerce for online sales of agricultural products, cooperated with other partners to establish an EPAAN around the common goal, and formed a solid interest alliance network.

In our model, it should pay attention to exert the subject consciousness of cooperatives, stimulate and mobilize the endogenous motivation of farmers through cooperatives to form the bottom-up targeted poverty alleviation. Cooperatives will gradually upgrade into e-commerce cooperatives in this model, and promote the continuous and steady increase in the income of poor farmers. Therefore, how to give full play to the main role of cooperatives in the process of e-commerce poverty alleviation, and how to ensure that stakeholders realize efficient alliances in the process of e-commerce poverty alleviation are key issues that need to be resolved urgently in the integrated development of e-commerce poverty alleviation and cooperatives. However, the translation process is the core content of the actor network. With the help of the translation process, the core actors can be closely linked with other actors around their common goal to form a network of interest alliance, which can effectively solve the above problems encountered by the EPAAN based on cooperatives.

Actors Identification of E-Commerce Poverty Alleviation Actor Network

In order to fully understand the main body of the e-commerce poverty alleviation network system based on cooperatives, it is found that it contains many actors by sorting out the interview data and extracting relevant elements. According to the ANT, we can divide actors into human actors and non-human actors according to the first level classification. According to the second level classification, human actors can be divided into organization and individual, and non-human actors can be divided into material category and consciousness category. Therefore, the EPAAN includes human actors represented by organizations such as governments, cooperatives, enterprises, etc., as well as individual representatives such as leaders of relevant government departments, cooperatives principals, enterprises managers, experts and scholars, e-commerce elites, farmers, etc. Moreover, EPAAN also contains non-human actors represented by material categories such as land, funds and agricultural products, knowledge and technology, etc., as well as consciousness categories such as policies and regulations experience accumulation, etc. It is shown in **Table 2**.

From the interview data, the realization of "e-commerce poverty alleviation" is a very complicated project. It needs not only the support of the government, cooperatives, agriculture-related e-commerce enterprises and so on, but also the support of land, policies, agricultural products, etc. Just as the ANT advocates, the EPAAN can be regarded as a place where human actors and non-human actors work and interact together. It does not give priority and key status to the power of either party. Driven by the common interests, these human actors and non-human actors cooperate and translate in different ways of action, and promote the formation and development of "e-commerce poverty alleviation" with cooperatives as the carrier.

Implementation Process of E-Commerce Poverty Alleviation Actor Network

The implementation process of e-commerce poverty alleviation based on cooperatives is a process of continuous establishment and renewal of heterogeneous networks. Heterogeneous actors are accompanied by the change in the pattern of interests, and
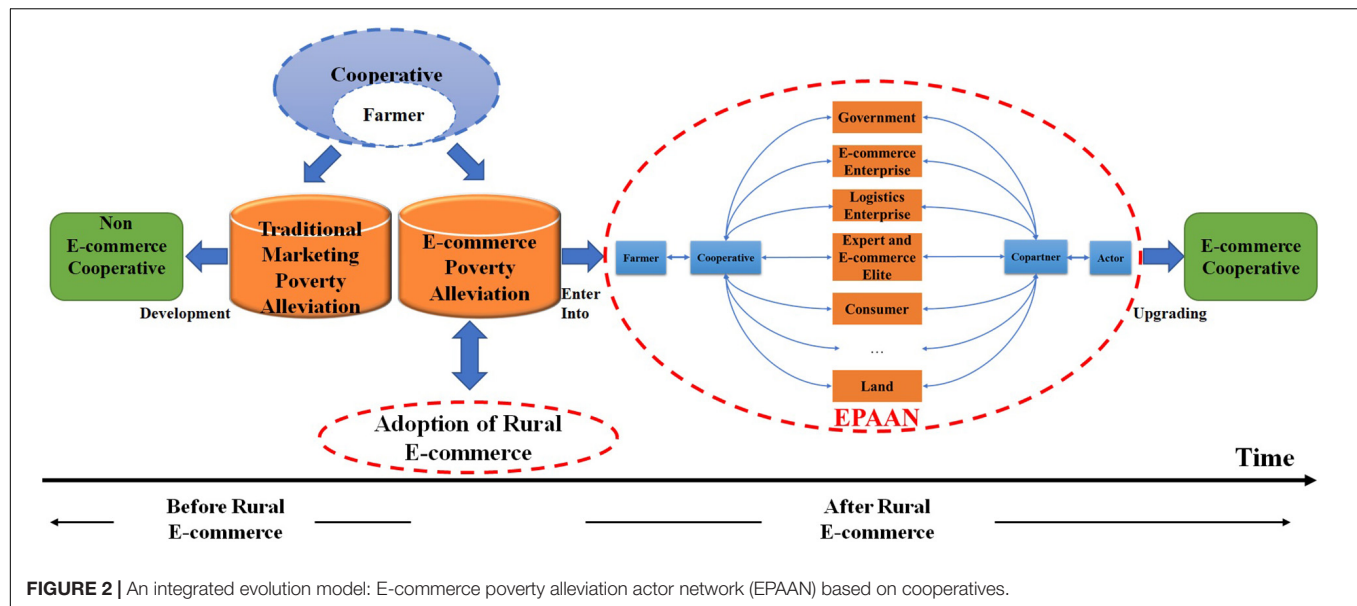
FIGURE 2 | An integrated evolution model: E-commerce poverty alleviation actor network (EPAAN) based on cooperatives.

TABLE 2 | The actors composition of e-commerce poverty alleviation actor network (EPAAN).

Actor	Classification	Representative
Human actor	Organization	Governments, cooperatives, agriculture-related e-commerce companies, third party e-commerce platform enterprise, logistics companies, etc.
	Individual	Government officials, cooperative members, farmers, e-commerce workers, logistics workers, managers, technicians, consumers, etc.
Non-human actor	Material category	Land, funds, equipment, platforms, software, agricultural products, etc.
	Consciousness category	Thoughts, knowledge, experience, technology, system, social environment, policies and regulations, values, knowledge and skills, etc.

different actors will enter and exit the network at different stages. According to the ANT, the translation process of EPAAN mainly includes five stages: problematization, interessement, enrolment, mobilization and dissent. Combined with the content of the interview, we analyzed the five stages of the translation of EPAAN. We identified the core actors and OPP, analyzed the obstacles and benefits involved by different actors, and conducted consultations through core actors to find out the countermeasures to overcome the obstacles of various actors. Finally, it formed a stable and dynamic interests alliance of EPAAN.

Problematization and Obligatory Passage Point

Problematization is the initial stage of interest alliance of EPAAN. The core actors point out the ways for different actors to achieve their goals, and clarify the obstacles and problems faced by different actors for achieving their goals. Through the core actors, it finds out the OPP that all actors recognize and have to travel. The OPP connects the core actors and various heterogeneous actors into an actor network. Core actors are followers of network construction, and various heterogeneous actors cooperate with each other to achieve common goals. At present, farmer cooperatives are the fastest growing and most widely covered rural cooperative organizations in China. Therefore, cooperatives should be introduced into China's e-commerce targeted poverty

alleviation project and become core actors. They can use their authority and leadership to accurately identify, evaluate and assist poor farmers from the perspective of accuracy. According to the government's poverty alleviation policies and resources, it can make use of the advantages of cooperatives to drive small farmers to connect to the big market, and empower the participants of rural e-commerce through e-commerce, so that the poor groups can enjoy the fruits of e-commerce development and effectively enhance their endogenous motivation. Moreover, through practical research, we find that all of farmers, village secretaries and agriculture-related e-commerce enterprises etc., recognize the core position of cooperatives in the implementation of e-commerce poverty alleviation.

In the process of e-commerce poverty alleviation, cooperatives propose the general goal of e-commerce poverty alleviation interest alliance based on their own interest demands, which is "believe that e-commerce poverty alleviation can promote industrial development in poverty-stricken areas, improve people's living standards, and help people realize a new situation of getting rid of poverty and becoming rich." Simultaneously, in order to achieve the respective goals of all actors, it is necessary to set up OPP to achieve the overall goal based on the interests of cooperatives. It is the "e-commerce poverty alleviation project." The OPP is a prerequisite for the consolidation of interest alliances among various heterogeneous actors. It specifies the

subject's objectives for each actor, and it is as shown in **Figure 3**. Obstacle elimination and goal realization of all actors can enter the next stage of network construction only after passing through OPP.

Interessement

Interessement is a means to attract and stabilize the interest alliance relationship between core actors and other actors. It aims to encourage various actors to play the new roles assigned to them by core actors in the process of e-commerce poverty alleviation interest alliance, and clarify their own new roles orientation. Moreover, the ultimate interest of each actor is obtained by the interaction between itself and other actors, so as to realize the interaction and win-win of heterogeneous actors in the network interest alliance. In the process of e-commerce poverty alleviation, non-human actors and human actors with cooperatives as the main body, will encounter some obstacles in the development process due to their different positions. And these obstacles will limit their development. Therefore, it is necessary to clarify the obstacles and interests of all actors in the actor network, so as to continue to maximize the function of heterogeneous actors in the interest alliance. At present, according to the analysis results of survey data and combined with existing literature research, there are some obstacles and interests involved by the main actors in the EPAAN. They are as follows.

(1) Farmer cooperative. The main obstacles of farmer cooperatives are the lack of sufficient understanding of e-commerce poverty alleviation policies and the failure to give full play to the policy effects. Cooperatives lack the mastery of e-commerce operation technology and the flexible use of rural e-commerce. They lack of funds for development of agricultural product e-commerce and land for agricultural product production. The benefits of farmer cooperatives are to attract more farmers, expand the team of cooperative members, provide technical guidance to farmers, obtain e-commerce operation technology, obtain additional funds and land support, and improve the income and reputation of the cooperative, etc.

(2) Government. The main obstacles of the government are limited e-commerce technical support, incomplete e-commerce poverty alleviation promotion system, inaccurate grasp of e-commerce needs of grass-roots poor farmers and cooperatives, and low targeting of e-commerce poverty alleviation targets. The main benefits obtained by the government are to promote agricultural production and increase income, accurately identify poor farmers, greatly reduce the number of poor people, formulate policies to promote the development of cooperative e-commerce poverty alleviation, continuously improve the cooperative e-commerce poverty alleviation system, and achieve targeted poverty alleviation.

(3) Agriculture-related e-commerce enterprise. Agriculture-related e-commerce enterprises lack control of the source quality of agricultural products, lack the tightness of the upstream supply chain of agricultural products, lack in-depth understanding of the attributes of agricultural products, and lack the supply of agricultural products. The benefits obtained by agriculture-related e-commerce enterprises include effectively

ensuring the stability and quality of the supply of agricultural products, improving the repurchase rate of agricultural products, increasing enterprise income, and doing a good job in quality control, etc.

(4) Logistics enterprise. The main obstacles for logistics enterprises in remote areas are imperfect infrastructure, few logistics distribution centers, weak logistics system, etc. For example, some fresh agricultural products are prone to corrode and damage. Hence, it needs to be distributed with cold chain vehicles, the logistics cost will be high. The main benefits obtained by logistics enterprises are to reduce logistics costs because of the increase in sales of e-commerce agricultural products, gradually improve logistics infrastructure, increase logistics distribution centers, etc. In addition, it will accelerate rural road construction and road upgrading, implement the express delivery project to the countryside, improve rural logistics distribution capacity, and optimize the rural logistics distribution mode.

(5) Expert and e-commerce elite. The main obstacles for experts and e-commerce elites are the lack of in-depth research at the rural grass-roots level, the lack of a comprehensive understanding of rural areas, agriculture and farmers, and the ineffectiveness of implementing e-commerce for poverty alleviation. The benefits obtained by experts and e-commerce elites are mainly to establish a high-level professional assistance team, improve the service capacity of "rural areas, agriculture and farmers," and improve the online sales of agricultural products.

(6) Farmer. The main obstacles for farmers are the backward planting technologies, small planting scales and low agricultural income. The benefits that farmers receive are to access to the latest agricultural technology and increase in personal income.

(7) Consumer. The main obstacles for consumers are the limited ways to purchase regional characteristic agricultural products, and the limited choice of diverse agricultural products. The main benefits for consumers are to broaden the way to buy agricultural products, and enjoy a variety of special agricultural products with high quality and low price.

(8) Land. The main obstacles for land are the low utilization rate of land, and the phenomenon of idleness and waste. The benefits of land are mainly to increase the intensive utilization of local land and promote the large-scale, intensive, and standardized use of land resources.

(9) Agricultural product. The obstacles of agricultural products are that agricultural products have some characteristics such as seasonality and regionality. They are many varieties but not excellent, and they are widely distributed and scattered. They lack of scale and brand, lack of quality control, lack of unified standards, etc. The benefits of agricultural products mainly include solving the problems of unsalable agricultural products in poor areas and difficult sales for farmers, and improving the online sales capacity of agricultural products. It can improve the quality, standards and brand added value of agricultural products, and realize the upward trend of e-commerce agricultural products.

(10) Equipment. There are some main obstacles for the equipment. For example, the equipment function is imperfect and limited. The equipment life has a certain period, and the maintenance cost is high. The benefits obtained by equipment

FIGURE 3 | Problematization and obligatory passage point (OPP) of EPAAN.
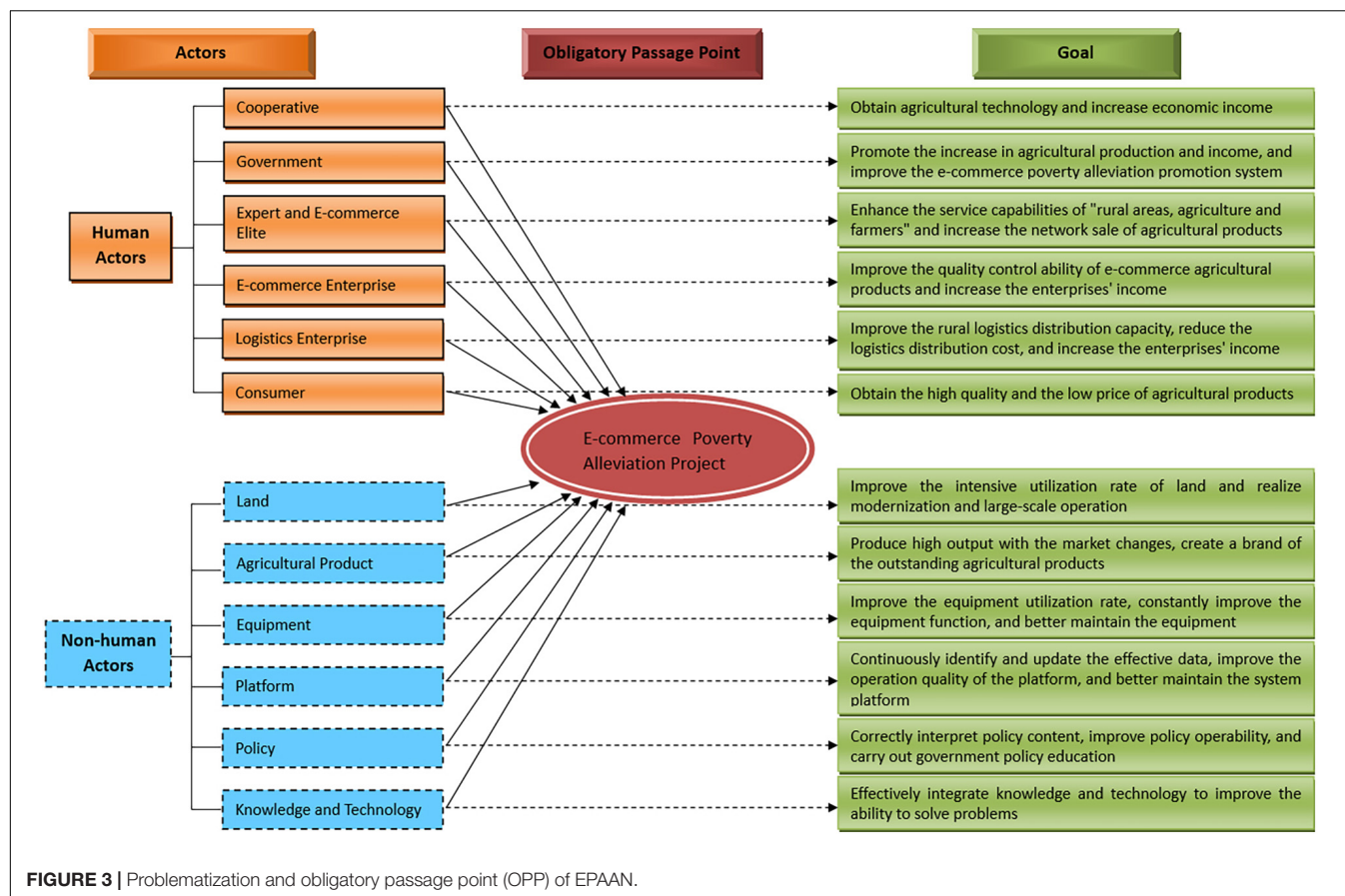
mainly include the development of functional diversity and perfection of the equipment, improving the utilization rate of the equipment, better maintaining the equipment and prolonging the service life of the equipment.

(11) Platform. The obstacles for the platform are that effective data cannot be identified due to the precipitation of massive data. The operation of the platform is complex. The cost of manual operation and maintenance is much higher and more cumbersome. The platform system has many loopholes, so it will be dangerous sometimes. The benefits obtained by the platform mainly include facilitating the effective identification and updating of data, doing a good job in the maintenance of the platform system, improving the operation quality of the platform, etc.

(12) Policy. There are some main obstacles of the policy. For example, it cannot accurately understand the connotation of the policy, and it cannot accurately grasp the timeliness of the policy. Moreover, the way of policy communication is limited. The benefits obtained by the policy are mainly conducive to the correct interpretation of the content of the policy. It can effectively grasp the policy in real time, smooth the channels of policy communication and feedback, and improve the openness and transparency of the policy.

(13) Knowledge and technology. The obstacles of knowledge and technology are the lack of e-commerce operation knowledge and practice. It is the difficulty in mastering and applying

advanced planting technology, and the difficulty in integrating multidisciplinary knowledge and technology. The benefits of knowledge and technology mainly include the growth of e-commerce professional knowledge, the practice and renewal of professional planting technology, the integration and renewal of multidisciplinary knowledge and technology, etc.

Through the presentation of obstacles and interests of various actors, it can redefine the new status and role of various actors in the EPAAN. All actors are recruited into the e-commerce poverty alleviation network alliance through interessement, and they play different roles in the network and play their own positive functions. It is as shown in **Figure 4**. If various actors have conflicts during the interessement phase, they must pass through OPP. They will continue to coordinate and cooperate to gradually form a stable interest alliance network around the OPP and their respective interest needs.

Enrolment and Mobilization

Enrolment is to find suitable actors for the EPAAN, accurately connect and remove the obstacles faced by various actors. It will attract actors to the network through a series of strategies and measures. It will ensure that all parties can take action, play their new roles and complete the corresponding tasks. The enrolment stage is closely related to the interessement stage. The interest correlation of various actors is the premise of enrolment. The recruited objects include not only human actors,

FIGURE 4 | The interessement of EPAAN.
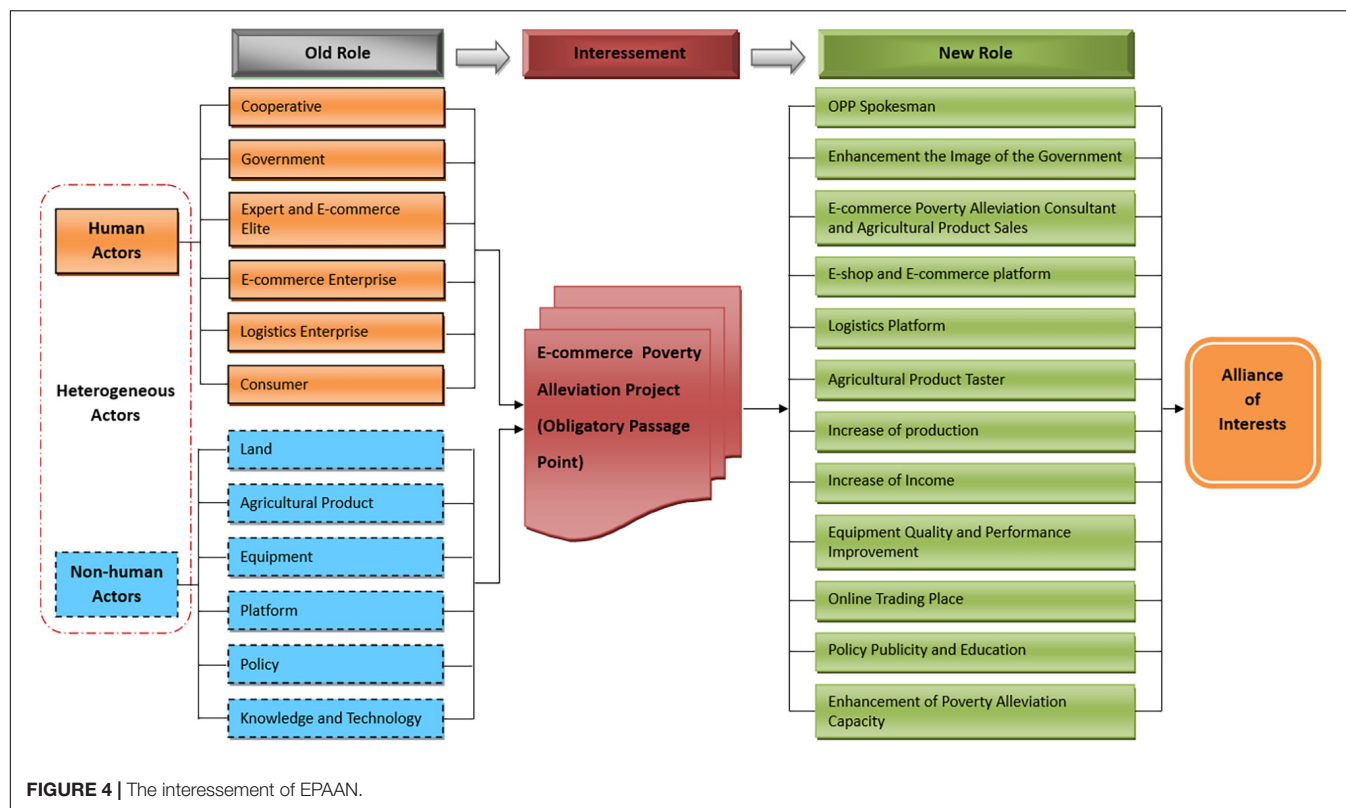
but also non-human actors. They follow the arrangements of core actors, complete the assigned tasks and obtain the specified benefits. In the process of e-commerce poverty alleviation, cooperatives composed of farmers recruit the government based on the needs of poverty alleviation and industrial development. The government attaches importance to the construction of e-commerce poverty alleviation projects based on cooperatives, and provides a series of e-commerce poverty alleviation policy support. Moreover, the government will recruit a batch of agricultural experts and e-commerce elites to form a service group of "rural areas, agriculture and farmers," which can go deep into the fields to help cooperatives and farmers solve various problems encountered in production and sales. Agriculture-related e-commerce enterprises and logistics enterprises are driven by economic interests to join the EPAAN and become members of the interest alliance. After human actors are recruited, non-human actors are also gradually recruited into the EPAAN such as land, agricultural products, knowledge and technology. After being recruited, the land becomes high-yield farmland, agricultural products become characteristic agricultural products. Knowledge and technology are recruited to improve the market competitiveness of cooperatives and farmers.

Mobilization means that the core actors fully mobilize the enthusiasm of all actors, execute their rights to all actors, and integrate them efficiently. In order to maximize benefits, they will work together, and finally form a stable and sustainable interest alliance. Callon believes that the actor network can be considered to establish completely only when the mobilization phase of the actor network interest alliance is done. In the EPAAN

based on cooperatives, cooperatives have the strongest ability to mobilize farmers because their interests are most directly related. Moreover, cooperatives have the most obvious leading effect on farmers. The government has a stronger ability to mobilize cooperatives, but its ability to mobilize individual farmers is relatively weak. Other relevant organizations cooperate with cooperatives under the guidance of various government policies, actively participate in the e-commerce poverty alleviation system, and jointly achieve targeted poverty alleviation and become rich.

Dissent

Dissent means that the heterogeneous actors in the actor network hold different opinions on the distribution of interests. Through equal consultation and mutual coordination, it can eliminate differences and obstacles, and finally achieve the goal of joint cooperation among the actors. In the e-commerce poverty alleviation system, due to the large number of heterogeneous actors that are involved with diverse identities and complex demands, it is necessary to continuously coordinate the interests of all parties in order to promote the continuous update and stable development of EPAAN. In order to maintain the balance of interests among all members of the network alliance, it is necessary to deal with the dissent of various heterogeneous actors in the process of e-commerce poverty alleviation, such as the dominant position of cooperatives, the targeted identification of poor farmers, the targeted assistance of cooperatives to poor farmers, and the industrial structure and industrial layout for cooperatives, accurate interpretation of e-commerce poverty alleviation policies, sales methods of

e-commerce agricultural products, brand effects of characteristic agricultural products, accurate implementation of e-commerce platforms and agriculture-related enterprises, etc.

As the five stages in the translation process, problematization, interessement, enrolment, mobilization and dissent demonstrate the basic path for the formation and development of EPAAN. Although they can randomly participate in the network construction process, their mutual communication and efficient collaboration are the key points for the successful construction of the network. Based on the ANT, this paper analyzes the translation process of EPAAN, and finds that the translation process is based on the core actors to clarify the OPP jointly determined by each actor to achieve their own goals, so as to realize their benefit correlation among all actors. When human actors and non-human actors are recruited to become members of the interest alliance, it is necessary to ensure the balance of the interests of all actors, make all actors satisfied and play their new roles, and constantly coordinate and handle the interest conflicts of all parties. So that all actors with different interest orientations can establish a solid relationship with each other, actively participate in network alliance and play their respective roles. Through the translation process, the actors will transform into different identities. For example, the cooperative formed by farmers spontaneously becomes the core actor of the network alliance and the spokesman of the interest alliance. The farmers become the promoters of the network alliance, and the government becomes the coordinator of the network alliance. Experts and e-commerce elites become the combers of the network alliance, agriculture-related e-commerce enterprises and logistics enterprises become participators in the network alliance, and consumers become the supporters of the network alliance. With the changes in the interests of members, there are new actors to continue to enter or the original actors exit from the network, which will lead to the continuous renewal of the structure of EPAAN. ANT requires researchers to pay attention to the changes of interest needs of network alliance members, timely sort out the interest demands of various actors involved in e-commerce poverty alleviation, and gradually form a stable and orderly EPAAN through continuous dynamic translation. It is as shown in **Figure 5**.

DISCUSSION

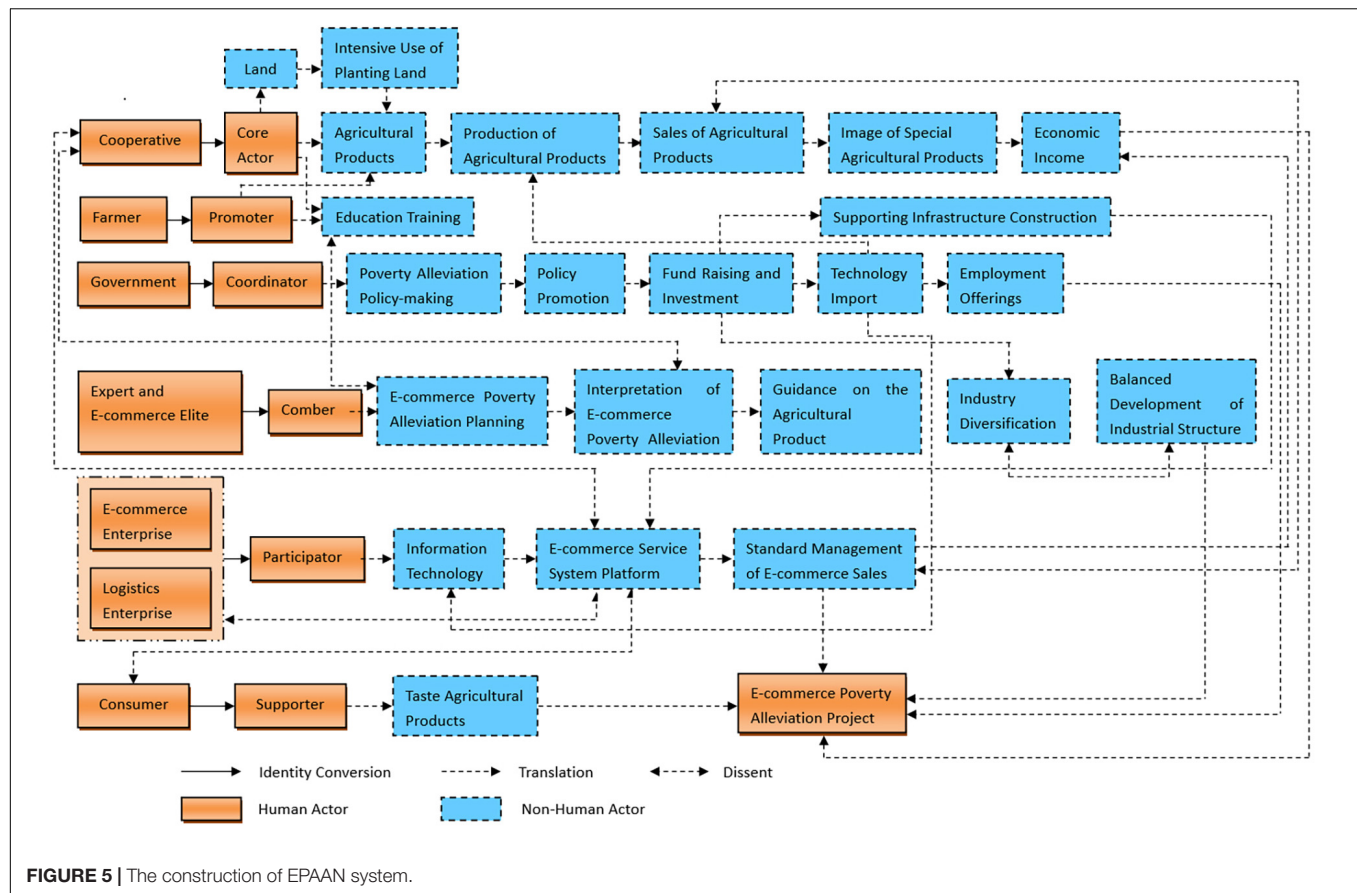### The Core Actor in the E-Commerce Poverty Alleviation Actor Network Is Farmer Cooperative

The ability poverty theory (Sen, 2000) enlightens us that the primary cause of farmers' poverty is that farmers have poor feasible ability, especially the individualization and decentralization of farmers lead to the low degree of farmers' organization. Therefore, the fundamental way to effectively solve the problem of farmers' poverty is to improve the organizational level of farmers, and then enhance the feasible ability of farmers. The organization of farmers can resolve the

contradiction between "small production" and "big market," strengthen farmers' bargaining power in the market, and reduce transaction costs, thereby increasing farmers' economic income (Sivramkrishna and Jyotishi, 2008). Therefore, with the great advantages of cooperatives in improving the degree of farmers' organization, it is determined that farmer cooperatives are the core actors in the EPAAN.

Our findings further suggest that the main task of cooperatives is to attract other actors to enter the EPAAN and work hard for the common goal, when cooperatives play the role of core actors. Hence, cooperatives should do the following jobs. Firstly, it is necessary to accurately identify poor farmers, guide them and mobilize their subject consciousness. Through stimulating their endogenous motivation, it can provide targeted assistance to them, and make them realize the importance of relying on organizational strength. Secondly, with the support of government policy, it can increase various training courses for farmers and members to study on e-commerce knowledge and production technology. Under the guidance of agricultural experts and e-commerce elites, it can continuously improve their skills. Thirdly, it should make an overall plan for e-commerce sales of characteristic agricultural products, and formulate relevant regulations to ensure the online sales of agricultural products. Through integrating the resources of various actors, it can help agricultural products enter the city for sale. Fourthly, it should increase capital investment and coordinate with various actors, especially agriculture-related e-commerce enterprises and logistics enterprises. Then, it should formulate enforceable systems and measures combined with the interest demands of various actors, so as to ensure the successful implementation of the sales process of e-commerce agricultural products, and finally it can form a stable e-commerce poverty alleviation actor network alliance.

The Obligatory Passage Point in the E-Commerce Poverty Alleviation Actor Network Is Implementation of the E-Commerce Poverty Alleviation Project

Obligatory Passage Point (OPP) is an action plan that can be recognized and accepted by all actors in the network. Our results reveal that the implementation of e-commerce poverty alleviation project as an OPP is indeed conducive to highly unifies the thoughts and actions of all actors in the EPAAN. It can be unanimously recognized by all actors in the EPAAN, and effectively solve the problems faced by all actors, so as to achieve their respective goals. There are the main actors in the network, such as cooperatives, farmers, governments, agriculture-related e-commerce enterprises, logistics enterprises, agricultural experts, and e-commerce elites, etc. Focusing on the common goal of getting rid of poverty and promoting the development of local industries, they rely on e-commerce to improve their own initiative to participate in the EPAAN, and change the traditional sales mode of agricultural products in poor areas. They make use of internet infrastructure and cooperation platforms to integrate resources from all parties, expand sales channels of agricultural products, and reduce transaction costs

FIGURE 5 | The construction of EPAAN system.

and risks. Through e-commerce poverty alleviation, it can turn high-quality resources into wealth in poor areas, and improve the economic level of poor farmers. It can effectively improve the opportunities for poor farmers in cooperatives to participate in market competition. Moreover, it will help cooperatives promote the overall development of local industries and rural areas.

The Emphases in the E-Commerce Poverty Alleviation Actor Network Are Multi-Party Cooperation and Joint Development of Rural E-Commerce

In November 2016, China incorporated e-commerce poverty alleviation into the overall deployment and work system for poverty alleviation. Moreover, various regions continued to explore the implementation of rural e-commerce applied to e-commerce poverty alleviation. In addition, agricultural products supported from e-commerce poverty alleviation had always achieved good sales results in recent years. In 2020, the total online retail sales of 832 national poverty-stricken counties was RMB 301.45 billion in China, which was an increase of 26.0% over the same period last year. Among them, agricultural product e-commerce continued to grow rapidly. Furthermore, the agricultural product online retail sales of national poverty-stricken counties was RMB 40.66 billion in

2020, which was an increase of 43.5% over the same period last year (The State Council of the People's Republic of China, 2021). Meanwhile, the total number of online merchants in national poverty-stricken counties had reached 3.065 million by the end of 2020, which was an increase of 366,000 stores or 13.7% over 2019 (The State Council of the People's Republic of China, 2021).Our finding not only prove that more and more farmers like to make online sales of agricultural products, but also demonstrate that rural e-commerce has become an effective strategy for e-commerce poverty alleviation to achieve targeted poverty alleviation. It plays an important role in promoting the development of industries in impoverished areas and driving the poor people out of poverty to become rich.

At present, e-commerce poverty alleviation has generated remarkable economic benefits and significant social impact. People from all walks of life are paying more and more attention to the role of rural e-commerce in anti-poverty, and they have reached a consensus on its role in poverty reduction. Therefore, how to develop rural e-commerce so that all the actors in the EPAAN can benefit and form a good cooperative relationship. It is necessary to deeply explore the factors that affect the in-depth cooperation of various actors and eliminate the obstacles as much as possible. Our research further confirms that the development of rural e-commerce is very helpful for poverty alleviation in poor areas. Through the development of rural e-commerce, all actors are allowed to

establish a long-term collaborative mechanism. It needs to fully meet the requirements of participants by integrating resources of all parties and giving full play to the functions of all parties. For example, with the help of government departments, it can vigorously develop transportation facilities and communication infrastructure in remote rural areas, and open up the circulation channels of agricultural products between rural and urban areas. Furthermore, the government departments can provide various experts and e-commerce trainers for poor rural areas, and actively attract and cultivate rural e-commerce talents by different policies. For instance, with the help of cooperatives, agricultural-related e-commerce enterprises and logistics enterprises, it can promote the industrialization, scale and brand of agriculture. When actors reach a consensus, develop together and establish the sustainable EPAAN, they can really drive poor farmers to get rich and provide better opportunities and benefits from rural e-commerce to the utmost.

The Difficult Point in the E-Commerce Poverty Alleviation Actor Network Is the Deep Integration of E-Commerce and Poverty Alleviation to Achieve Continuous Poverty Alleviation Without Returning to Poverty

The ultimate goal of e-commerce poverty alleviation based on cooperatives is to accurately identify and assist poor farmers under the help of cooperatives. Moreover, cooperatives as a carrier can improve poor farmers' awareness on e-commerce, improve their vocational skills, and cultivate their ability to get rid of poverty. Our results offer that the deep integration of e-commerce and poverty alleviation projects can greatly promote the effectiveness of e-commerce poverty alleviation. Through the new format of e-commerce, it will deeply carry out the e-commerce poverty alleviation project. It will continue to maintain the endogenous growth of e-commerce, which has the hematopoietic function for poverty alleviation. It needs that all actors are able to identify their roles at different stages, cooperate with each other, and play a role at the right moment. Our results also paint three stages on the integration of e-commerce and poverty alleviation. In the first stage, e-commerce will be introduced to establish an upward sale channel of agricultural products to help the poor. It will attract more and more poor households through cooperatives, integrate local characteristic resources, and develop agricultural and sideline products industries which have market prospects. It can make poor farmers to initially enjoy the dividends brought by e-commerce. In the second stage, it will integrate resources from all walks of life to help the rapid development of agricultural product e-commerce. Government departments have issued various supporting policies to create a good development environment for cooperatives, agriculture-related e-commerce enterprises, logistics enterprises, etc. Agriculture-related e-commerce enterprises, logistics enterprises, experts and e-commerce elites will increase their support and cooperation to provide strong guarantees for cooperatives and farmers to develop characteristic agricultural products brands in the field of e-commerce. Simultaneously, consumers, agricultural products and equipment are all essential actors, and they will also play a role at key points. In the third stage, it will continuously improve the e-commerce poverty alleviation ecosystem and better serve poor farmers and industries. Through the implementation of the e-commerce poverty alleviation project, cooperatives should mobilize all actors to actively participate in the battle against poverty, and perfect the rural e-commerce service system that cooperates with all parties. In order to make the quality of e-commerce agricultural products meet the market requirements, it is necessary to implement the standardized, large-scale and brand management for e-commerce agricultural products to form industrial agglomeration and scale effect. It will achieve the solid poverty alleviation without returning to poverty, so as to help solve the problem of rural poverty.

CONCLUSION

Poverty eradication is one of the difficult problems that need to be solved urgently in today's society. Although the actual situation of countries around the world is different, they all actively adopt various methods to try to solve this problem. With the development of information and communication technology, especially the emergence of e-commerce, people have high hopes for the application of e-commerce to solve poverty. Scholars are actively studying it. At present, there are still few literatures on e-commerce poverty alleviation based on theory. Based on ANT, this paper proposes that when studying cooperatives in poor areas to drive farmers out of poverty, with the help of e-commerce, we should explore its formation mechanism and operation process from the aspects of actors, actor networks, obligatory passage point (OPP) and translation. Taking the poor counties in Zhejiang Province as an example, this paper puts forward the EPAAN model based on cooperatives.

From our research model, it can be found that the translation process of EPAAN based on cooperatives includes problematization, interessement, enrolment, mobilization and dissent. Our research results emphasize the role of the translation process of e-commerce poverty alleviation in the formation of a solid interest alliance network. Meanwhile, the research results not only emphasize the role of cooperatives in the entire e-commerce poverty alleviation ecosystem and ensuring the increase of farmers' income and sustainable growth in industrial development, but also emphasize that all actors involved in the network have an equal status. The process of eliminating absolute poverty through e-commerce in poor counties in Zhejiang Province shows that the implementation of e-commerce poverty alleviation project based on cooperatives is a huge and complex system project. Once the interest alliance network of e-commerce poverty alleviation actors based on cooperatives is established, it can organize and develop itself to help more farmers in poor areas get rid of poverty and contribute to poverty alleviation.

Therefore, the use of e-commerce is not only of great significance to the economic development of agriculture-related industries in developing countries, but also plays an important role in poverty alleviation work in poor areas.

Finally, our research not only plays a positive demonstration effect on how cooperatives in poor areas in developing countries use e-commerce to solve poverty problems, but also contributes to the overall research of e-commerce poverty alleviation and ANT. In the context of e-commerce poverty alleviation, it is expected that in the future, with the rapid development of cooperatives, agriculture-related e-commerce enterprises, logistics enterprises, finance, and infrastructure, as well as the issue of related policies, more and more agricultural products will enter the city through e-commerce. As a result, it will be common for more and more farmers to reduce poverty. Of course, our research has certain limitations. We take Zhejiang Province of China as a case study. Therefore, we hope that it can further enrich and perfect our theory in future research. Moreover, the biggest challenge of poverty alleviation is how to consolidate the achievements of poverty alleviation, to ensure that the poor people do not return to poverty and really get rid of poverty, as well as how to focus on high-quality development and build common prosperity. These will be research hotspots in the future.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author/s.

AUTHOR CONTRIBUTIONS

All authors contributed to the development of the manuscript including the data collection, data analysis, and the writing phase.

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Verbal or Written? The Impact of Apology on the Repair of Trust: Based on Competence- vs. Integrity-Based Trust Violation

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This study examined the effect of verbal and written apologies on trust repair based on competence and integrity after a trust violation. Through three experiments, the empirical results showed that the written apology was more effective than verbal ones a restoring trust for integrity-based trust violations. However, the verbal apology was more effective against competency-based trust violations than a written one. Moreover, the results also showed that perceived trustworthiness played a mediating role between trust violation and trust repair, while positive emotions played a moderating role. Finally, this study provided a general discussion, implications, and suggestions for future research.

Keywords: verbal apology, written apology, trust repair, competence-based trust violation, integrity-based trust violation

INTRODUCTION

The positive effect of trust on individuals, teams, and organizations has been widely confirmed by empirical research (Colquitt et al., 2007). Trust can reduce consumers' sense of insecurity, improve their satisfaction and loyalty, and maintain a good and sustainable relationship (Palvia, 2009). However, trust is fragile and can be easily damaged or destroyed (Kramer, 1999; Kim et al., 2013). Compared with the positive information that enhances trust, the negative information that destroys trust is more likely to attract the sender's attention. In the process of trustworthiness judgment and evaluation, negative information occupies a higher decision-making weight than positive information. Because of this typical asymmetry, the development, destruction, and decline of trust have become the norm (Slovic, 1993).

How can trust be repaired and rebuilt after it has been broken? The researchers studied apology, denial, silence, explanation, commitment, justification, voluntary collateral, compensation, punishment, and other verbal responses repair strategies (Bottom et al., 2002; Nakayachi and Watabe, 2005; Schweitzer et al., 2006; Tomlinson and Mryer, 2009). Among these strategies, the research on apology mainly focused on the content and function of apology. Apologies can positively influence the trustor's assessment of the trustor's motivation, reduce the trustor's fear of future harm, and eventually improve the trustor's level of trust (Blackman and Stubbs, 2001). Although apologies can be divided into verbal and written apologies, existing research has not solved which form of apology is more sincere and compelling.

The type of trust violation is also a hot topic for academic research. The most critical is to analyze how trust is broken because different ways of breaking trust may require different remedial

measures (Schoorman et al., 2007). Kim et al. (2004) classified the types of trust violations into competence-based violations and integrity-based violations. Kim et al. (2006) concluded that if an external attribution apology is made for integrity-based violations, the trust would be better repaired; on the contrary, an internal attribution apology would be better repaired for competency-based violations. However, Kim et al. (2006) did not consider the form of apologies in their research. In the practice, enterprises or individuals often use verbal or written forms of apology in the process of apology, but their effectiveness has not been thoroughly studied. Therefore, as a result, there has been no research on whether verbal or written apologies are more effective.

Continuity of relationships stems from the trust, and Mayer et al. (1995) put forward the accepted credibility in terms of competence, kindness, and integrity. When faced with violation behavior (such as betrayal, violation, deception), an individual's perception of the offender might be damaged, and credibility might be reduced (Kim et al., 2004).

The researchers found that trust was not a rational cognitive process, and emotional factors affect trust evaluation. Scholars generally believe that trust consists of emotional, cognitive, and behavioral components, and trust is divided into cognitive trust and emotional trust (Weber and Carter, 2003; Lewis and Weigert, 2012). Therefore, emotional expression is inevitable and crucial in the process of trust repair. In recent years, with the rise of positive emotion research, many scholars have found that positive emotion has a significant effect on promoting interpersonal trust, thus establishing a link between emotion and trust, positive emotion and trust repair, and other research fields (Lount, 2010). Therefore, when transgression involves integrity and competence, how do positive emotions play a role?

This research has three main contributions. Firstly, this study expands the literature on apology types, including verbal and written ones, and examines the validity of trust violations responses. Secondly, researchers have studied the relationship between perceived trustworthiness and apology and believe that apology improves the perceived credibility of offenders, thus increasing trusting behavior (Ma et al., 2019). Therefore, we examine the relationship of perception credibility between violation and trust repair. Thirdly, in view of the influence of the promotion of existing positive emotions on interpersonal trust, this study attempts to expand the scope of research, namely, the moderating effect of positive emotions on trust violation and trust repair and explore the influence of positive emotions on consumers' trust repair in the situation of competence and integrity trust violation.

THEORETICAL BACKGROUND AND HYPOTHESES DEVELOPMENT

Trust Formation, Violation, and Repair
Trust Violation and Repair
This study defines trust as the psychological state of being willing to accept a weak position based on positive expectations of the intentions and actions of others (Rousseau et al., 1998). Following (Mcknight et al., 1998), Kim et al. (2006) identified two factors of trust: trusting intentions and trusting beliefs. A violation of trust occurred when the trusting party perceived that the trusted party's behavior did not conform to its expectations. Trust violation refers to the phenomenon of trust damage caused by the behavior of the violator not meeting the positive expectations of the victim. This study recognizes that trust structure is very complex, and trust repair needs to focus on trust beliefs and trust intentions. Therefore, we believe that trust repair is activities that try to make trust intention and trust belief more positive after a trust violation is felt.

Apology
After a violation of trust, a formal apology may be a prerequisite for restoring a trusting relationship. By apologizing, the offender acknowledges the harm done to the victim, expresses remorse and reconciliation, and hopes to continue to maintain a good relationship (Goffman, 1972; Tedeschi and Norman, 1985; Lewicki and Bunker, 1996). It is an important step to reduce mistrust after violations, as it conveys to the injured a recognition of injustice and a desire to restore fairness (Greenberg, 1990). In addition, apologies can represent an influential social account and help victims get more information about violations and the exact nature of the offender. For example, Greenberg (1990) describes the apology as "an attempt to convince the audience that any attribution made on the basis of an actor taking responsibility for an undesirable event is inaccurate." Research shows that apologies are essential for reducing aggression in injured people and that more severe aggression requires more extensive apologies (Ohbuchi et al., 1989; Sitkin and Bies, 1993).

Tomlinson et al. (2004) divided apology into three categories: one was the "no-apology" response, and there was no explicit apology to the victim; The second kind thought that internal factors caused the mistake. The apology of internal attribution admitted that the mistake was caused by one's own weakness (such as ability). The third category attributed the conflict to external factors. Apologies for external attribution assumed that external factors contributed to the mistake (for example, circumstances). An apology with internal attributions may be more effective in motivating reconciliation because the offender takes responsibility instead of passing it off. Conversely, those who shift the blame to external factors, although they seem to have no responsibility, their reputation may be affected (Schlenker et al., 2001).

The violation of trust often causes negative emotions in consumers, such as sadness and anger. Apology expresses care, sincerity, politeness, and empathy to consumers to reduce their negative emotions and alleviate their feelings of injustice. Therefore, apology is considered to be an effective measure to restore trust (Smith et al., 1999; Tomlinson and Mryer, 2009). However, some researchers argue that apologies, because they admit guilt, may not ameliorate the negative consequences of trust violation (Riordan et al., 1983). Therefore, on the one hand, an apology expresses repentance and indicates the intention not to repeat such violations in the future, thus restoring trust; on the other hand, an apology acknowledges guilt and indicates that the

violator should be blamed, which may reduce trust (Kim et al., 2006). This contradiction has prompted researchers to expand the field of study to types of apologies. Although they admit guilt and hope to avoid a violation, which one reduces trust, and which one restores it?

Tomlinson et al. (2004) proved that apologies were more effective than no apologies in trust repair, and apologies with an internal attribution are more effective than apologies that blame the behavior of broken promises on external reasons. However, other studies have shown that this conclusion has limitations. For example, in the context of different types of trust violations, Kim et al. (2006) demonstrated that external attribution apologies repair trust better than internal attribution apologies for integrity-based trust violations. However, if there is a violation of competency-based trust, an internal rather than external attribution apology should be used. This is because when trust violations involve integrity, people tend to focus on the negative information about integrity. Furthermore, they tend to value positive information when trust violation involves competence (Snyder and Stukas, 1999).

According to the different forms of apology, it can be divided into written apology and verbal apology. The written apology is more formal and solemn and can reflect sincerity, usually with the apology letter as the carrier, easy to retain, is a relatively stable, long-term, and solidified comfort to the victim. On the other hand, the verbal apology is through the verbal language to apologize. However, sincerity is not as good as a written apology, but "face to face" apology, through language, tone, eyes can highlight the apology's ability, enabling people to feel the spiritual comfort and convenient, flexible operation directly (Zhang, 1996).

Violation Type

Which is more effective, a verbal apology or a written apology? Whether a violation of trust involves competence or integrity issues may be a factor that plays a key role. Ferrin et al. (2007) and Kim et al. (2006) analyzed the effect of apology and other verbal responses on trust repair through a series of studies. They found that the type of trust violation affected the effectiveness of the apology. They represent the two most important qualities in determining credibility (Cook and Wall, 1980; Barber, 1983; Butler and Cantrell, 1984; Schindler and Thomas, 1993; Mayer et al., 1995). Two kinds of expectations were thought to involve some basic implications of trust: the performance expectation of technically competent roles, and the other is the expectation of the continuity and fulfillment of natural and moral social orders (Barber, 1983). This concept was supported by empirical evidence (Butler and Cantrell, 1984).

Moreover, prior research has shown that these dimensions offer essential bases on which individuals evaluate a variety of targets, such as potential collaborators (Kee and Knox, 1970). Butler and Cantrell (1984) defined competency-based trust as the principal's belief that the trustee has the technical and interpersonal skills required for the job. Mayer et al. (1995) defined integrity-based trust as a set of principles that the principal considers acceptable for the trustee to abide by.

According to the attribution bias theory of Reeder and Brewer (1979), from the perspective of competence, individuals attach more importance to positive information because it is intuitively assumed that high-competence individuals are capable of exhibiting performance at many levels based on motivation and task demands. Conversely, those with low competence can only perform at levels commensurate with or below their ability level. From the perspective of integrity, individuals value negative information more because people intuitively believe that honest people will not behave dishonestly under any circumstances while dishonest people may behave dishonestly or honestly, depending on their motivation and opportunities (Kim et al., 2006).

In summary, active verbal apology, combined with language, eyes, and body movements, for a competency-based trust breach can soothe people emotionally, reflect their abilities, meet people's expectations, and repair trust (Ma, 2006). Comparatively speaking, the written apology only through words, reflecting the lack of repair effect, is not as good as a verbal apology. For a violation of trust based on integrity, being sincere provides a strong signal that honest behavior is coming. Written apologies are more formal, solemn, and can be kept long. They are a long-term commitment with an engagement and can repair trust better than verbal ones.

H_{1a}: Apology type positively moderates the relationship between trust violation and trust repair.

H_{1b}: When trust violation involves competence, trust may be better repaired by responding with a verbal apology rather than a written one.

H_{1c}: When trust violation involves integrity, trust will be better repaired by responding with a written apology rather than a verbal one.

Perceived Credibility

Politicians, orators, and public speakers have attempted to identify the determinant characteristics of effective speakers (Giffin, 1967). Likewise, previous research attempts to determine the components of source credibility.

If the source of information is credible, it is valid. Aristotle defined credibility as the quality of a source of information that is the most credible of all evidence. Credibility plays a decisive role in determining the validity of an endorsement (Amos et al., 2008). If a source is credible, it helps to have a more positive attitude toward advertising (Muda et al., 2014). Moreover, credible sources will also affect consumers' purchase intentions (Lafferty et al., 2002). Verma and Kapoor (2004) found that many participants admitted to buying a product only because they admired the particular celebrity who endorsed the product. Hovland Carl et al. (1953) pointed out that two factors lead to celebrities' perceived trustworthiness: experts and trustworthiness. Credibility refers to the degree of trust and acceptance of the speaker and the information conveyed by the audience (Hovland Carl et al., 1953). Gaziano and Mcgrath (1986) found that source credibility included security, qualification, and vitality dimensions. Ohanian (1990) proposed constructing a multidimensional credibility measure,

which included three dimensions: attractiveness, expertise, and credibility. Newell and Goldsmith (2001) conducted five studies to purify two scales, one on the credibility aspect of credibility and the other on the professional aspect.

Previous studies suggested that the act of an apology could reduce the negative impression of violators (Darby and Schlenker, 1982, 1989) and indicate trustworthy intentions and tendencies in the future (Schniter and Sheremeta, 2014). Apologizing could improve the offender's trust and increase the trust behavior (Ma et al., 2019). When trust violation occurs, the perceived credibility of the victim will be reduced, and trust will be destroyed.

When trust violation involved competence, people would think that the offender was not competent, and those with low competence could only act following or below their competence level (Reeder and Brewer, 1979). However, the improvement of competence was not achieved overnight and cannot be promoted in a short period. These factors would affect the judgment of credibility, which affected trust and repair. When trust violation involves integrity, people with low integrity might exhibit dishonest or honest behavior, depending on their motivations and opportunities (Kim et al., 2006).

H_{2a}: Perceived credibility mediates the relationship between trust violations and trust repair.

H_{2b}: Perceived credibility has a more significant impact on repairing trust under competence-based violations than integrity-based ones.

Positive Emotion

Positive emotion is a kind of joyful feeling, which is the joyful experience of individuals when their needs are met, goals are achieved, or things are going well (Russell and Barrett, 1999). According to the positive emotion expansion and construction theory, positive emotion was a temporary pleasure, an individual's unique and immediate response to meaningful things. Positive emotions enhanced the cognitive domain (Fredrickson, 2003). Positive emotions were related to the behavioral approach and were also the accompanying emotional reactions in the process of the behavioral approach (Davidson et al., 1990). Frijda (1986) documented those positive emotions should include happiness, interest, desire, and wonder. In addition, Lazarus (1991) believed that happiness, pride, hope and love were positive emotions. Ekman (1992) supposed that positive emotions included joy and surprise, while Fredrickson (1998) indicated that positive emotions include joy, interest, contentment, and love. Therefore, happiness and cheerfulness were essential indicators of positive emotions.

Wyer (1979) believed that emotional states had informational and direct functions in information processing. According to the affect-as-information perspective, individuals tended to consider their feelings about the target rather than made judgments by measuring other factors. Moreover, their reactions to the target were based on the emotional states they have experienced before making judgments in the process of making a judgment (Sarwar et al., 2013). Lount (2010) found that when other groups

had target cues (credibility) that promoted interpersonal trust, a positive mood enhanced interpersonal trust, indicating that target cues influenced the cognitive processing of emotional, interpersonal trust.

Positive emotions increased the predictability of the offender's behavior and indicated that the environment is safe and reliable, increasing trust. Studies have shown that even the accompanying emotions unrelated to the trust situation can impact trust, and positive emotions such as happiness can enhance trust (Dunn and Schweitzer, 2005). For example, when trust violation involves integrity, positive emotions can make the victim feel that honesty is coming, which can better eliminate the negative effects of trust violation. On the other hand, when the violation involves competence, the offender is considered incompetent, and competence is less affected by situational factors. Therefore, the repair effect of positive emotion is worse than that of integrity violation.

H_{3a}: Positive emotions moderate the relationship between trust violations and trust repair.

H_{3b}: Positive emotions have a greater impact on repairing trust under integrity-based trust violations than competence-based trust violations.

Our proposed framework is shown in **Figure 1**.

# EXPERIMENT DESIGN, PROCEDURE, AND STATISTICS ANALYSIS

Study 1

To investigate the moderating effect of apology and the effect of Verbal versus written apology, in study 1, we extended the laboratory experiment developed by Kim et al. (2004). In Kim's study, participants watched a video of an interview for a senior-level tax accountant, and at the end of the video there was a violation by the candidate. Finally, participants completed a questionnaire. We asked participants to read the materials about the employment interview, in which the candidates responded with verbal and written apologies for violating the trust based on competence or integrity in their previous job. After reading the material, participants were asked to report their trust in the applicant. This study implemented a 2 (type of violation: competence vs. integrity) × 2 (verbal vs. written apology) between-subjects design.

Method

Participants. Four hundred ninety-nine students from a management course at a college in eastern China took part in the study as part of a classroom exercise. The average age of the participants was 20 and 78% were male.

Task. The role of the participant was set as a hiring manager, responsible for recruiting and managing a senior tax accountant. If the candidate was hired, he/she would receive a one-year contract, subject to renewal based on an annual performance review. First, managers read a piece of written material and then evaluate the candidate.

FIGURE 1 | Proposed research model.
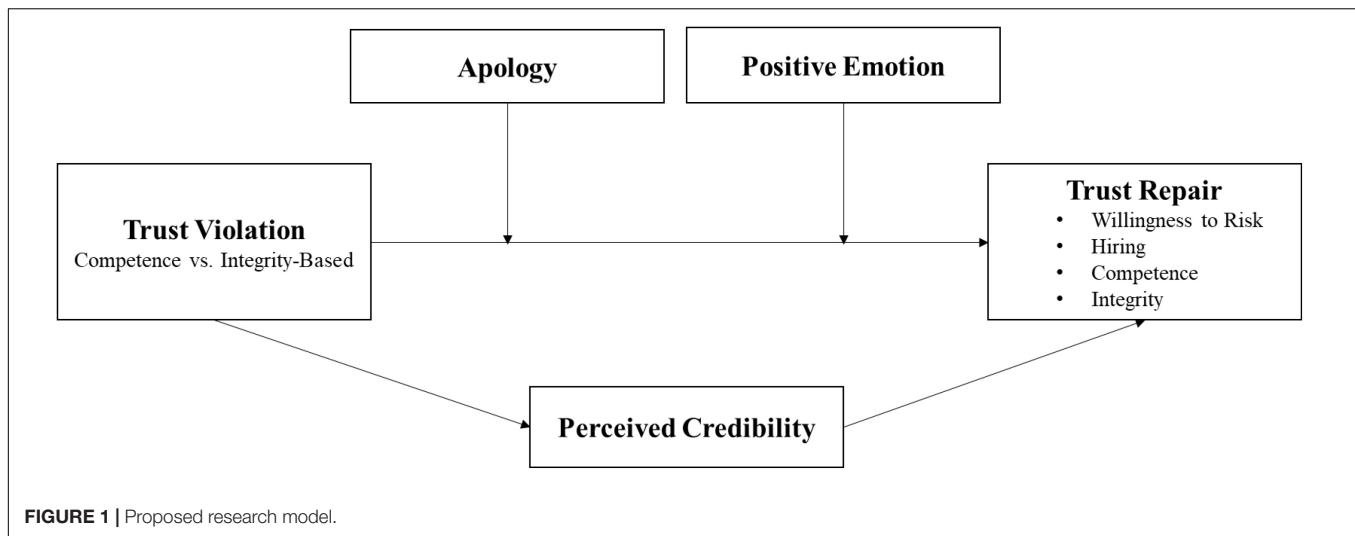
Manipulations. According to our 2 × 2 between subject's design, the written materials include the basic situation of the candidate's interview. The end of the material shows the candidate's accounting-related violations in his/her previous work. The framework and response to such violations of trust represent research operations.

Violation type. We classify a violation of trust as an integrity-based or a competency-based one. We set up a situation where the recruiter told the candidate that he/she had contacted the candidate's former employer and learned that the candidate had behaved inappropriately at his/her previous job. For example, deliberately understating a client's taxable income in the integrity condition. In the condition of competence, the applicant was accused of filing an incorrect tax return due to an insufficient understanding of tax laws. In two cases, the information was anecdotal; The recruiter had no hard evidence to prove the truth of the allegations.

Apology. Immediately after mentioning the violation, the candidate attempted to restore trust by taking responsibility for the relevant behavior through a verbal or written apology. With a verbal apology, the candidate admits his/her bad behavior and takes full responsibility for it. He/she also promises that he/she will never do it again. Finally, he/she promises not to have any concerns about his/her integrity/competence if the company hires him/her. The applicant admitted the violation and apologized in a written letter in a written apology.

Manipulation checks. We designed three questions to assess whether participants were aware that they had been assigned to different experimental conditions. The first two questions assess whether they recognize the nature of the violation differently. All participants answered three operational inspection questions. Specifically, respondents were first asked, "In the material, the applicant was accused of incorrectly preparing a tax return. What was the accusation?" Options were "inadequate knowledge of tax codes," "intentionally underreported a client's capital gain," and "neither of the above." They were then asked, "what was the problem with this accusation?" Options included "primarily

the applicant's technical ability (i.e., understanding of tax codes)," "primarily the applicant's integrity (i.e., willingness to bend the rules)," and "neither of the above." The third question assessed whether the respondent recognized the reaction to the violation, admitted the mistake, and apologized.

Dependent Variables Measures. Following Mcknight et al. (1998), we differentiate trust into trusting intentions and trusting beliefs. We believe that responses to trust violations may influence trust beliefs and trust intentions. Two independent multi-item scales were used to assess trust beliefs in this study. Perceived integrity and perceived competence were measured using a three-part scale adapted by Mayer and Davis (1999) to assess participants' perceptions of the applicant's integrity and competence. Two additional scales were used to assess trust intention. The first was willingness to risk, measured by three items adapted by Mayer and Davis (1999) to capture the degree to which participants were willing to take risks in selecting candidates. Two of them were reverse scores. The second is whether to hire. We would capture participants' intention to trust by their willingness to hire candidates.

Perceived integrity. We used three items to assess candidates' integrity. The scale was also based on the integrity scale used by Mayer and Davis (1999). First, respondents were asked to rate the following items: (1) I really like the candidate's values, (2) the applicant's behavior meets norms, and (3) the applicant is honest, using a 5-point Likert scale (1 = "strongly disagree"; 5 = "strongly agree").

Perceived competence. Similar to the Integrity Scale, we also used three items based on the Competency Scale of Mayer and Davis (1999) to assess the applicant's competence. The items are as follows: (1) the applicant is capable of completing his/her work; (2) The applicant has sufficient knowledge required for the job; (3) I have great confidence in the applicant's skills. In addition, respondents rated the questions on a 5-point Likert scale (1 = "strongly disagree" to 5 = "strongly agree").

Willingness to risk. We used three items to measure participants' willingness to risk, the degree to which they were willing to put themselves at risk in choosing a candidate. The items were as follows: (1) I will not let the applicant influence me on issues that are important to me (reverse-scored); (2) I will pay close attention to the applicant (reverse-scored); (3) I will give the applicant a task or problem that is important to me, even if I can't monitor his/her actions. Respondents used the 5-point Likert Scale (1 = "strongly disagree"; 5 = "strongly agree more"). The scale was adapted from the trust scale used by Mayer and Davis (1999).

Hiring Intention. We asked participants to rate their willingness to hire a candidate on a 5-point Likert scale of "definitely not" and "definitely." This indicator expresses trust intentions by whether or not to hire a candidate (Schwarz, 1990).

Results and Discussion

Manipulation checks revealed that the manipulations were successful. A total of 499 pieces of data were collected, in which 489 people answered the first question correctly, χ^2 (2, $N = 499$) = 243.683, p-value < 0.001, and 490 people answered the second question correctly, χ^2(2, $N = 499$) = 226.225, p-value < 0.001, The number of people who answered the third question correctly was 487, χ^2(2, $N = 499$) = 921.768, p-value < 0.001. Confirmatory factor analyses of the trusting beliefs and trusting intentions variables (perceived competence, perceived integrity, willingness to risk, and hiring intention) indicated a good fit and supported convergent validity for a four-factor model, χ^2(24, $N = 499$) = 63.05, GFI = 0.99, NFI = 0.99, RMSEA = 0.058, The factor coefficients of each item corresponding to the three variables of perceived integrity, perceived competence and Willingness to risk are all above 0.5, indicating that the corresponding item of each

variable has certain representativeness. In addition, Average Variance Extracted (AVE) of perceived integrity, perceived ability, and willingness to risk were greater than 0.5, and Composite Reliability (CR) was greater than 0.7, indicating that the convergence validity of perceived integrity, perceived competence, and willingness to risk was ideal (p-value < 0.001).

Descriptive statistics, reliability, and correlation of study variables are shown in **Table 1**. **Table 2** shows the mean and standard deviations of the variables for verbal and written apologies for violation of competence and integrity.

Interaction items of violation type and apology type had significant positive effects on perceived integrity ($\beta = 2.74$, p-value < 0.001), perceived competence ($\beta = 2.70$, p-value < 0.001), and willingness to risk ($\beta = 2.28$, p-value < 0.001), supporting Hypothesis 1a.

Verbal and written apologies are responses to violations of trust. Different types of violation were classified according to the types of apologies, and the scores of perceived integrity, perceived competence, willingness to risk and hiring were analyzed by Analysis of Variance (ANOVA), and the differences of perceived integrity, perceived competence, willingness to risk and hiring under different types of violation, and apology were compared using ANOVA (see **Figures 2–5**). As a response to an integrity violation, written apology was significantly more effective than verbal apology in terms of its effects on perceived integrity (11.52 vs. 10.18; mean difference = 1.34, S.E. = 0.90), p-value < 0.001 (95% CI = [15.06, 18.60]), perceived competence (13.83 vs. 12.40; mean difference = 1.43, S.E. = 1.24), p-value < 0.001 (95% CI = [17.20,22.10]), and willingness to risk (11.19 vs. 10.10; mean difference = 1.09, S.E. = 1.19), p-value < 0.001 (95% CI = [13.36, 18.06]), and hiring intention (3.54 vs. 2.73; mean difference = 0.81, S.E. = 0.51), p-value < 0.001 (95% CI = [5.96, 7.98]). Verbal apologies are more effective as a response to competence violations than written ones because verbal apologies have a greater impact on perceived integrity (11.43 vs. 10.03; mean difference = 1.4, p-value < 0.001), perceived competence (14.04 vs. 12.78; mean difference = 1.26, p-value < 0.001), and willingness to risk (11.17 vs. 9.98; mean difference = 1.19, p-value < 0.001), and hiring intention (3.62 vs. 2.78; mean difference = 0.84, p-value < 0.001). When trust violation involves competence, trust is better repaired by responding with a verbal apology rather than a written one. When trust violation involves integrity, trust is better repaired by responding with a written apology rather than a verbal one. These analyses supported our Hypothesis 1b and 1c.
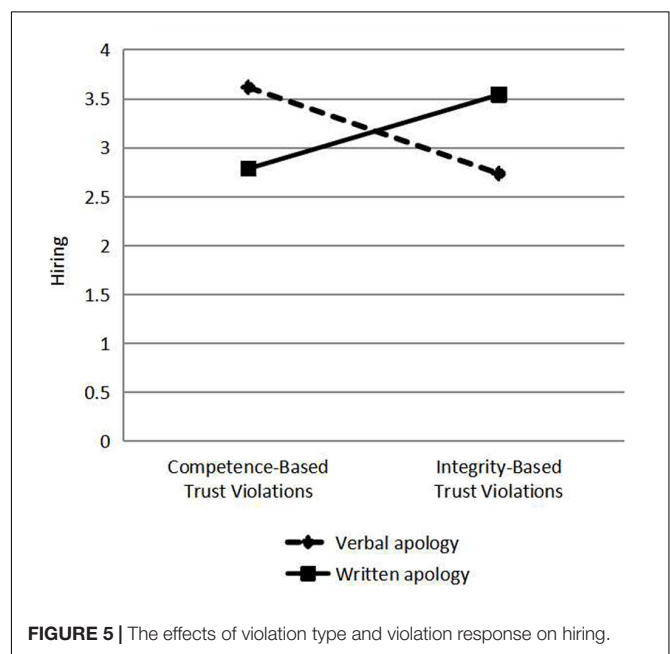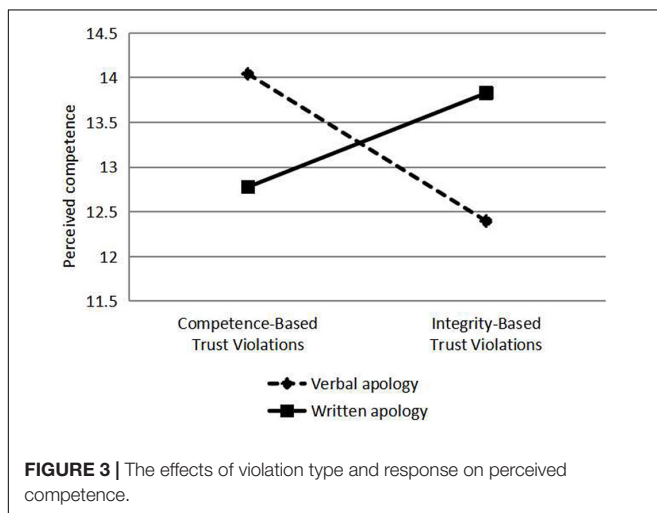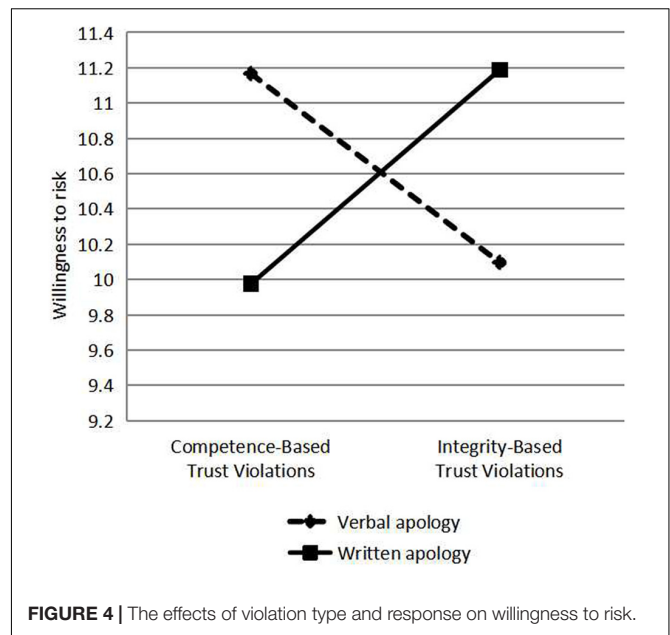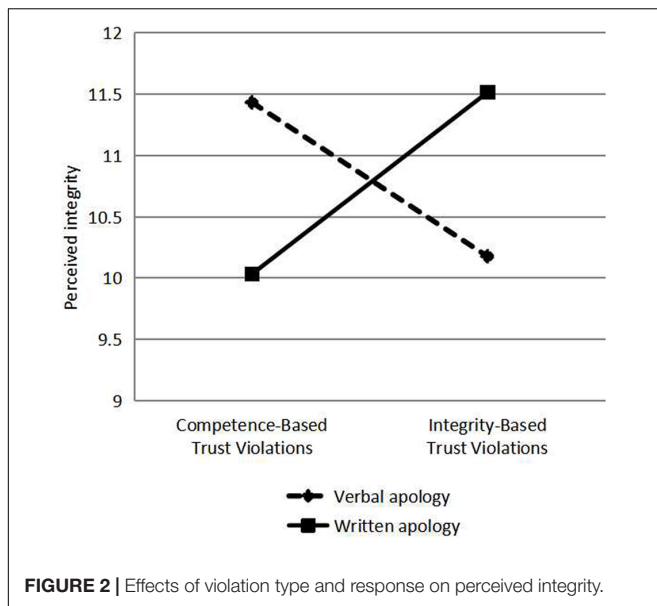
TABLE 1 | Study 1 means, standard deviations, reliabilities, and intercorrelations.

Variable	M	SD	α	1	2	3
1. Perceived integrity	10.79	2.09	0.832	0.796		
2. Perceived competence	13.25	2.81	0.906	0.374**	0.885	
3. Willingness to risk	10.60	2.68	0.883	0.137*	0.113*	0.846

**p < 0.01, *p < 0.05.

TABLE 2 | Study 1 means, standard deviations of verbal apology and written apology.

			Trusting beliefs				Trusting intentions			
			Perceived integrity		Perceived competence		Willingness to risk		Hiring	
Violation type	Apology type	N	M	SD	M	SD	M	SD	M	SD
Integrity	Verbal	124	10.18	1.87	12.40	2.91	10.10	2.46	2.73	1.09
Integrity	Written	122	11.52	2.00	13.83	2.99	11.19	2.77	3.54	1.09
Competence	Verbal	120	11.43	2.03	14.04	2.57	11.17	2.67	3.62	1.18
Competence	Written	121	10.03	2.05	12.78	2.44	9.98	2.59	2.78	1.13

FIGURE 2 | Effects of violation type and response on perceived integrity.

FIGURE 3 | The effects of violation type and response on perceived competence.

FIGURE 4 | The effects of violation type and response on willingness to risk.

FIGURE 5 | The effects of violation type and violation response on hiring.

In experiment 1, participants who could not correctly understand the meaning of the experiment because they failed the attention check. Moreover, they are only a minimal number of respondents, and excluding them does not influence the experiment results. However, this study cannot perform a difference test between them due to limited omitted samples. Therefore, future research should split into two groups and conduct a comparative study between passed and failed the attention check if we have enough samples.

Study 2

We conducted a scale survey to investigate the mediating effect of perceived credibility and repair.

Method

Participants. Three hundred thirty-five students in a marketing course at a university in eastern China took part in the study as a class assignment. The average age of the participants was 19.17 years (SD = 2.71), and 59% of them were male.

Task. The participants were divided into two groups based on violation of integrity or competence and then asked to play the role of a manager in recruiting and managing a senior tax accountant. Participants first read a written document, then took a test of perceived trustworthiness, and then evaluated the candidates.

Manipulations. The scale of perceived credibility was developed by Ohanian and had been extensively verified in studies (Ohanian, 1990, 1991). The scale included "Dependability, Honesty, Sincerity, and Trustworthy," and

respondents used the five-point Likert Scale to assess perceived credibility. Participants as managers of the recruitment process referenced study 1.

Results and Discussion

The mediating role of perceived credibility. This study performed meditation test by adopting Process (Hayes, 2017). The mediating effect of perceived credibility between trust violation and perceived integrity was significant (Effect = –2.86; 95% CI = [–3.51, –2.29]), and the mediating Effect between trust violation and perceived competence was significant (Effect = –2.58; 95% CI = [–3.21, –2.01]), and there was a significant mediating Effect between trust violation and willingness to risk (Effect = –2.18; 95% CI = [–2.77, –1.65]), and there was a significant mediating Effect between trust violation and hiring intention (Effect = –0.78; 95% CI = [–0.99, –0.59]). Therefore, Hypothesis 2a is confirmed.

The role of perceived credibility in different violation types. Different types of violation were classified according to the types of apology, and the scores of perceived integrity, perceived competence, willingness to risk and hiring were analyzed by ANOVA. Perceived credibility is more effective under competence violation than integrity violation, perceived integrity (11.10 vs. 6.97; mean difference = 4.13, p-value < 0.001), perceived competence (11.19 vs. 7.05; mean difference = 4.14, p-value < 0.001), and willingness to risk (11.51 vs. 7.80; mean difference = 3.71, p-value < 0.001), and hiring intention (3.78 vs. 2.56; mean difference = 1.22, p-value < 0.001). Hypothesis 2b is confirmed.

Study 3

To explore the mediating role of positive emotions in trust violation and trust repair, we induced positive emotions through a direct writing task.

Method

Two hundred eighty-six students participated in a management course at a college in eastern China took part in the study as a classroom exercise. The average age of the participants was 19.14 years (SD = 1.82), and 65% were male.

Task Participants were divided into two groups based on integrity or competence violations and then asked to participate in an emotion-inducing task followed by completing an emotion-checking test. All respondents were asked to take on the role of a manager in recruiting and managing a senior tax accountant. Next, participants read a written statement and then evaluated the candidates.

Manipulations During the emotional induction, participants completed writing tasks designed to manipulate emotions. The emotive-eliciting program was developed by Strack et al. (1985), which was accomplished by direct writing. That method has been extensively validated in research (Kehner et al., 1993; Lerner and Keltner, 2001; Dunn and Schweitzer, 2005). The task asked participants to describe two or three things that made them feel really happy, at a level that would make someone else feel happy, to elicit positive emotions. Participants as managers of the recruitment process referenced study 1.

Results and Discussion

Emotional manipulation check. We also recruited forty-one students from the innovation and Entrepreneurship course to participate in the emotional manipulation check. In the manipulation check, firstly, participants were asked to describe things they felt happy about, in the sense that others would also feel happy about them, and then rated the extent of their current emotional experience on a 5-point Likert scale ranging from 1 "very unhappy" to 5 "very happy." The results showed that positive emotions were successfully induced (M = 4.10, SD = 0.14).

The moderating role of positive emotions. To test the moderation effect, this study conducted ANOVA. The empirical results showed that interaction items of violation type and positive emotion had significant positive effects on perceived integrity (β = 0.63, p-value < 0.001), perceived competence (β = 1.51, p-value < 0.001), and willingness to risk (β = 0.70, p-value < 0.001), and hiring intention (β = 0.77, p-value < 0.001), supporting Hypothesis 3a. These results suggest that positive emotions play a partially moderating role in the relationship between trust violation and trust repair. Hypothesis 3a is confirmed.

The role of positive emotion in different types of disobedience. Positive emotions are more effective under integrity violations than competence violations, perceived integrity (11.97 vs. 7.78; mean difference = 4.19, p-value < 0.001), perceived competence (11.61 vs. 8.09; mean difference = 3.52, p-value < 0.001), and willingness to risk (11.95 vs. 9.08; mean difference = 2.87, p-value < 0.001), and hiring intention (3.98 vs. 2.92; mean difference = 1.06, p-value < 0.001).

GENERAL DISCUSSION, IMPLICATIONS, AND LIMITATIONS AND FEATURE RESEARCH

General Discussion

Whether to trust someone or not is very challenging (Perrone et al., 2003). When trust is broken, it is difficult to trust. But violations of trust, whether intentional or unintentional, are common. Researchers must therefore study how trust is established and how individuals react when they perceive that trust has been violated. In general, the study of this reaction is still in its infancy (Kim et al., 2004, 2006).

This study aimed to investigate the effects of a verbal apology and a written apology on trust repair after trust violations based on competence and integrity and to investigate the mediating role of perceived credibility and the moderating role of positive emotions in both types of trust violations. Firstly, consistent with our predictions, we found that verbal and written apologies effectively restored trust. However, verbal apologies were more effective than written apologies under competency-based trust violations, and under integrity-based trust violations, a written apology is more effective than a verbal one. Secondly, our study has revealed that perceived credibility mediates between trust violation and trust repair and is more

effective under competence-based violations than integrity-based violations. Thirdly, we also examined the moderating role of positive emotions between trust violations and trust restoration, and the effect was higher under integrity-based violations than competence-based violations.

Theoretical Contributions

Our research investigates how trust is repaired after a breach, and while previous investigations in this area have concluded that many repair strategies (apology, explanation, compensation) contribute to effective trust repair, this paper extends these insights in three ways. (1) This study divides apology into verbal apology and written apology, respectively, revealing its effectiveness in trust restoration, and which apology form is more effective depends on the type of trust violation; (2) The role of perceived credibility is investigated; (3) Positive emotion variables is also introduced, and its effectiveness is analyzed.

Firstly, existing studies have confirmed the positive effect of apology on repairing trust. Kim et al. (2006) divided apology into internal attribution and external attribution, believing that whether apology is effective depends on the type of trust violation. This study expands on these ideas by exploring the relationship between apology and types of aggression. An apology can be divided into verbal apology and written apology. Based on the types of trust breach, it is concluded that verbal apology has a better effect than written apology under competence-based trust breach, and in the case of integrity-based trust breach, a written apology is more effective than a verbal apology.

Secondly, this study explores the relationship between perceived credibility in violation and trust repair, further expanding people's understanding of perceived credibility in the field of trust, and conducts classified research on different types of violation, enriching the mechanism of perceived credibility.

Thirdly, current research confirms the positive effect of positive emotions on trust (Lount, 2010) and a moderating role between trust repair strategies and trust repair. However, no studies have used positive emotions as a moderator between trust violation and trust repair. This study found that positive emotion can play a moderating role between trust violation and trust restoration and found that positive emotion has different effects between different types of trust violations, and the influence of integrity violations is higher than that of competence violations. These studies extend the application of positive emotions in trust repair and further explain the relationship between trust violation and repair from an emotional perspective.

Managerial Implications

The studies also highlight some issues that may need management attention. First of all, the results are helpful for enterprises or individuals to choose more effective forms of apology to repair trust after a trust breach. When the breach of trust involves competence, a verbal apology that can demonstrate competence is more appropriate. When a violation of trust is a matter of integrity, a more formal and sincere written apology is more likely to solve the problem. Secondly, the effect of perceived credibility of merchants or individuals on trust repair cannot be ignored. Merchants should make efforts to improve perceived

credibility so as to lay a foundation for trust repair. Thirdly, positive emotions can promote the repair of consumers' trust. The enlightenment of this conclusion for businesses is that when repairing the trust relationship between the two sides, businesses should actively identify consumers' emotions and even actively create a good emotional atmosphere to give full play to the role of positive emotions in promoting trust.

Limitations and Future Research

This study has some limitations and provides a direction for further research. In this study, situational experiments were used to evaluate consumers' perception of the types of trust violation and the effect of trust repair. Although situational experiments have obvious advantages in marketing research, how to create a better scenario for surfeiters remains a problem. Field experiments, reading materials, and questionnaires have certain limitations and cannot completely restore the environment. Second, the survey subjects are all college students who generally lack recruitment experience and do not fully understand the work of the accountants involved in the study, so expanding the demographic range of survey participants may yield rich insights. Third, we should note that the results of this study cannot prove whether the apology is enough to restore trust to the level before the violation completely, and trust measures before and after the violation need to be obtained. Subsequent studies will overcome this problem and try to solve the difficult problem of whether trust can be "completely repaired." Fourth, response time for trust repair is also critical (Wirtz and Mattila, 2004). This study did not explore the use of "immediate" in the trust repair process to reduce the interference of response time on trust repair, and future research needs to explore the impact of response time and interaction with other factors on trust repair. Fifth, the hypotheses of this paper are limited to the violation and repair of personal trust, and its applicability to enterprises, media and countries needs further discussion and research. Sixth, although there is an intrinsic relationship between the three studies, there are still some substitutability, and the intrinsic relationship between apology and positive emotions and perceived credibility should be further sorted out in future research. Seventh, For the assessment of mood, no baseline was collected, which can be used in future studies to better show changes through comparison. Eighth, in study 1, we found that verbal apology has a greater impact on perceived integrity, which seems to contradict Hypothesis 1c, although the hypothesis holds in general, and we will test it with more research in future research. The last, Kim et al. applied SEM to analyze important factors for trust in human-robot interaction. Structural equations can solve more complex models with deeper and more reliable results. In future research, we can try to use Structural Equations Modeling to study t.he relationship between more variables about trust restoration (Kim et al., 2020).

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. Written informed consent from the patients/participants was not required to participate in this study in accordance with the national legislation and the institutional requirements.

AUTHOR CONTRIBUTIONS

SG and JY: conceptualization, methodology, validation, data curation, and writing—review and editing. SG: formal analysis, writing—original draft preparation, and supervision. JY: visualization and project administration. Both authors have read and agreed to the published version of the manuscript.

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Evidence-Based Analysis of Social Impact Bonds for Homelessness: A Scoping Review

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Social impact bonds (SIBs) have emerged as an innovative financial instrument designed to support the social service sector in delivering innovative social programs. In particular, SIBs can be used to finance prevention of homelessness among those regarded as vulnerable. There is little evidence that outcomes from SIB-funded programs are significantly different compared to more traditional programs. This is the first scoping review of academic and gray literature that explores the main features and outcomes from all SIBs for homelessness based on evidence, addressing an important gap in the literature. The scoping review provides a transparent and comprehensive approach for mapping areas of this research. A total of 73 studies and articles were found eligible for inclusion. These concerned 32 SIBs for homelessness implemented in the United Kingdom, the United States, Australia, and Belgium. The review found that academic papers on SIBs for homelessness lack evidence-based analysis, while gray literature lacks transparency, especially in evaluation method and outcome. We found that fourteen projects met their target outcomes. The common features of these SIBs were a navigator intervention model, effective partnership working, and use of Special Purpose Vehicles. Our findings show that it is necessary for the managers of SIBs to improve outcome metrics and evaluation methods, support target groups fairly, and attract more private investors to finance SIBs for better addressing homelessness.

Keywords: scoping review, social impact bonds, innovative financing mechanisms, evidence-based analysis, homelessness

INTRODUCTION

Homelessness has become a global problem. According to Global Homelessness Statistics, 1.6 billion people worldwide live in poor housing conditions, with about 15 million being forced to relocate every year. In the context of ongoing economic uncertainties across the world, post-COVID 19, this number is expected to grow in the absence of effective policy intervention (Aldridge and Enevoldsen, 2021).

Globally, there is no consistent definition of homelessness. Researches argue that definitions of homelessness do and should vary to offer different perspectives on homelessness based on criteria such as country, lifestyle, location, permanence of occupation, welfare entitlement, and housing quality (Tipple and Speak, 2005). The common characteristic of the definitions is that homelessness is the condition of lacking stable, safe, and adequate housing

(Tipple and Speak, 2005; Toro, 2010; Wallace et al., 2018; Clifford et al., 2019, 2022; Sadzaglishvili and Kalandadze, 2019). Amore (2013) argues homelessness should be replaced by the concept of severe housing deprivation, which includes two main criteria: (1) that a person is living in severely inadequate housing due to (2) a lack of access to housing that meets a minimum adequacy standard. Amore's definition is used in this paper, as it is a more comprehensive definition of homelessness.

Homelessness is a complex public health and social problem that is both a driver and a consequence of ill-health, social exclusion and economic marginalization (Vallesi et al., 2019). Physical ill-health is a concerning issue amongst homeless populations. They have a myriad of health problems, including high rates of chronic diseases, intentional and unintentional injury, and mental health and substance use problems (Yoshioka-Maxwell and Rice, 2019). The average life expectancy of people who experience homelessness is 30 years less than non-homeless populations. Homeless populations have high rates of mental illness (Fraser et al., 2019). Homeless people experience greater levels of discrimination and stigma, the negative effects of which make it difficult for people to escape homelessness (Mejia-Lancheros et al., 2021). In addition to human suffering, public expenditures associated with homelessness are substantial. Few rigorous studies quantify the additional social losses in productivity and well-being (Fowler et al., 2019). Countries around the world struggle to manage the human and financial burdens of homelessness. Trends in homelessness remain stubbornly high despite policy initiatives to end homelessness (Abdel-Samad et al., 2021).

In 2011, a new homeless support service navigator model was developed using Social Impact Bonds (SIBs). This endeavor involved the Department for Communities and Local Government, the Greater London Authority (GLA), homeless organizations, and others besides (Mason et al., 2017). SIBs are an innovative financing mechanism that transfers fiscal risk from governments or commissioners to new investors who provide up-front funding to expand evidence-based social programs and improve outcomes for vulnerable populations (Berndt and Wirth, 2018). According to the Impact Bond Global Database and the University of Oxford Government Outcomes Lab, several national governments, including those of the United Kingdom (UK), United States (US), Australia, and Belgium, have developed SIBs for funding the prevention of homelessness.

The SIB model offers opportunities, challenges, and obstacles under active discussion by many scholars and practitioners (Trotta et al., 2015; Rania et al., 2020; Warner, 2020) but far less headway has been made in analyzing the evidence supporting the use of SIBs for financing the prevention of homelessness. Fraser et al. (2018a) did an international review of the use of SIBs suggests that there is a paucity of concrete evidence about outcomes, where much of the reportage on SIBs is commentary and speculation. Painter and Culhane (2021) review Social Impact Bonds. They note that it is difficult to determine whether the SIBs can help accelerate public sector reform to end homelessness. However, Painter and Culhane (2021) just summarize the opinions of other researchers' lack of evidence-based analysis.

Wang et al. (2018) reconstruct the evaluation model based on the SIB solving homeless problems in the United Kingdom by weight function. The limitation is that reconstructed evaluation model is not validated by the real cases. Vallesi et al. (2019) evaluate the Journey to Social Inclusion program in a randomized controlled trial (RCT) that aims to test the effectiveness of the program relative to standard service provision. The study is conducted in Australia and findings may not generalize to other nations (Vallesi et al., 2019). George et al. (2020) focus on the views of link workers in a SIB funded project which works with rough sleepers in the East of England. The study concludes that if SIBs are effective solutions to deeply ingrained social problems, there needs to be more careful evaluation of their true benefits in comparison to publicly funded projects. Wirth explore the functioning and implementation of a social impact bond-funded welfare service for young homeless people in the United Kingdom (Wirth, 2021). The empirical case studies for this article are only a group of youth homelessness projects called the Fair Chance Fund Social Impact Bonds. Aldridge and Enevoldsen (2021) set out the policy context on homelessness and street homelessness in England and to provide an overview of how improvements to the available data and evidence have contributed to, and influenced, policy-making. While the evaluation suggests that the SIB worked effectively, the program only took place in London (Aldridge and Enevoldsen, 2021).

In a growing critical literature on SIBs, a largely doubt whether the SIBs can help accelerate public sector reform end social problems. Existing studies about SIBs for homelessness are lack of evidence-based analysis, or narrowly focus on a single case study that the findings may not generalize to other programs in other countries. Thus, this scoping review focuses on evidence-based analysis and explores the key features and outcomes of all SIBs for homelessness. Specifically, it will address the following research objectives: (1) Analyze academic and gray literature relating to SIBs launched for homelessness. (2) Develop a unique database summarizing target groups, interventions, investment, financial terms, evaluation, and outcomes of all SIBs for homelessness. (3) Explore the key features and outcomes of SIBs issued for homelessness.

METHODOLOGY

A scoping review was employed as the lack of high-quality research in new research field meant a systematic review was not feasible (Levac et al., 2010). Key defining features that comprised a working definition of scoping studies included the exploratory mapping of literature in a field, iterative process, inclusion of gray literature, and no quality assessment of included studies (O'Brien et al., 2016). Unlike traditional systematic reviews, scoping reviews are not intended to assess the quality of existing literature, but to provide context for a comprehensive systematic review of a research area, or to identify areas of literature where existing research is sparse (Brien et al., 2010).

We conducted a scoping review in order to synthesize the evidence of the key characteristics and outcomes of the implemented SIBs for homelessness. We used a scoping review methodology to map the SIBs for homelessness as the field is nascent, publication themes are widely scattered, and conventional searches of academic databases are less likely to be fruitful.

This scoping review is based on the checklist of Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews (PRISIMA-ScR) (Tricco et al., 2018; Hulse et al., 2021), and on guidance for conducting systematic scoping reviews (Peters et al., 2015). The methodological framework for this scoping study contains information sources, eligibility criteria, search strategy, and critical appraisal.

Information Sources

Arksey and O'Malley (2005) emphasize the importance of comprehensiveness in identifying relevant studies. As the study of SIBs is a nascent field and lacks academic analysis, we gather information from both academic and gray literature and complement it with knowledge from key informants. The following electronic databases were searched for this scoping review: Web of Science, Elsevier, Google Scholar, and Google.

Eligibility Criteria

Eligibility criteria for the scoping review search are listed in **Table 1**. We searched for articles published from 2010 to 2022 that related to the features and outcomes of SIBs for homelessness. The start date of 2010 was chosen because that was the year the first SIBs were launched by the United Kingdom.

To be eligible for inclusion, all academic and gray literature needed to be published in English and focused on SIBs for homelessness. The eligible types of gray literature were databases, working papers, fact sheets, reports, and webpages of related stakeholders. This review covered all SIBs for homelessness that were published through the databases of Social Finance and the University of Oxford Government Outcomes Lab. Based on those two databases, a unique database was created summarizing the target groups, interventions, investment, financial terms, evaluation, and outcomes of all SIBs for homelessness. As some information in the source databases was incomplete or not updated, it was necessary to supplement the data using other gray literature like evaluation reports or outcome reports.

TABLE 1 | Eligibility criteria.

Criterion	Inclusion	Exclusion
Time period	2010–2022	Studies outside these dates
Language	English	Studies not available in English
Academic and gray literature	Focused on SIBs for homelessness	Not related to SIBs for homelessness

Search Strategy

The SIBs are referred to as Payment by Results (PbR) instruments in the United Kingdom, the Pay for Success (PFS) model in the United States, and Social Benefit Bonds (SBB) in Australia (Trotta et al., 2015; Edmiston and Nicholls, 2018). Keywords for the literature search were 'social impact bond*,' 'payment by result*,' 'pay by result*,' 'pay for success*,' 'social benefit bond*,' 'pay for performance *,' 'impact investing*,' 'impact bond*,' 'homelessness impact bond*,' and 'homelessness*'. Both published and gray literature were identified in the search, titles, abstracts, and full text of articles were reviewed for relevancy and eligibility under the inclusion and exclusion criteria.

Critical Appraisal

Gray literature sources are not subject to peer reviewing and do not have the same rigorous as published sources. Gray literature in this scoping review was critically appraised via the authority, accuracy, coverage, objectivity, the date, and significance (AACODS) checklist (Tyndall, 2010). AACODS checklist is designed to evaluate authority, accuracy, coverage, objectivity, the date and significance of the gray literature sources.

RESULTS

Figure 1 outlines the screening process applied to identified studies. A total of 576 articles were identified from Web of Science, Elsevier, and Google Scholar, and 85 articles were obtained from Google. In the end, 73 articles were included in the scoping review.

Summary of Academic and Gray Literature

A total of 73 articles were included in the scoping review, of which 14 were academic articles and 59 gray literature. We found that the body of published work exploring evidence from SIBs launched for homelessness remains inadequate.

Regarding the 14 included academic articles, most were published in 2018 and 2019 (7/14), reflecting the emerging nature of this field (Cox, 2011; Cooper et al., 2013; Cooper et al., 2016; Carrillo, 2017; Andreu, 2018; Edmiston and Nicholls, 2018; Finn et al., 2018; Ramsay and Tan, 2018; Wang et al., 2018; Scognamiglio et al., 2019; Vallesi et al., 2019; George et al., 2020; Painter and Culhane, 2021; Wirth, 2021). The articles were authored in the United States (4/14), the United Kingdom (3/14), Australia (2/14), Italy (1/14), Ireland (1/14), Switzerland (1/14), and China (1/14). There was one cross-country study involving the United Kingdom and Canada (1/14), and one compared analysis with other financial tools (1/14). Most employed quantitative analysis (10/14), mainly focusing on single case studies and interviews. Just two articles involved qualitative analyses, and one utilized mixed methods, including both quantitative and qualitative analysis (Vallesi et al., 2019).

FIGURE 1 | PRISMA flow diagram of screening process and outcome (Moher et al., 2009).
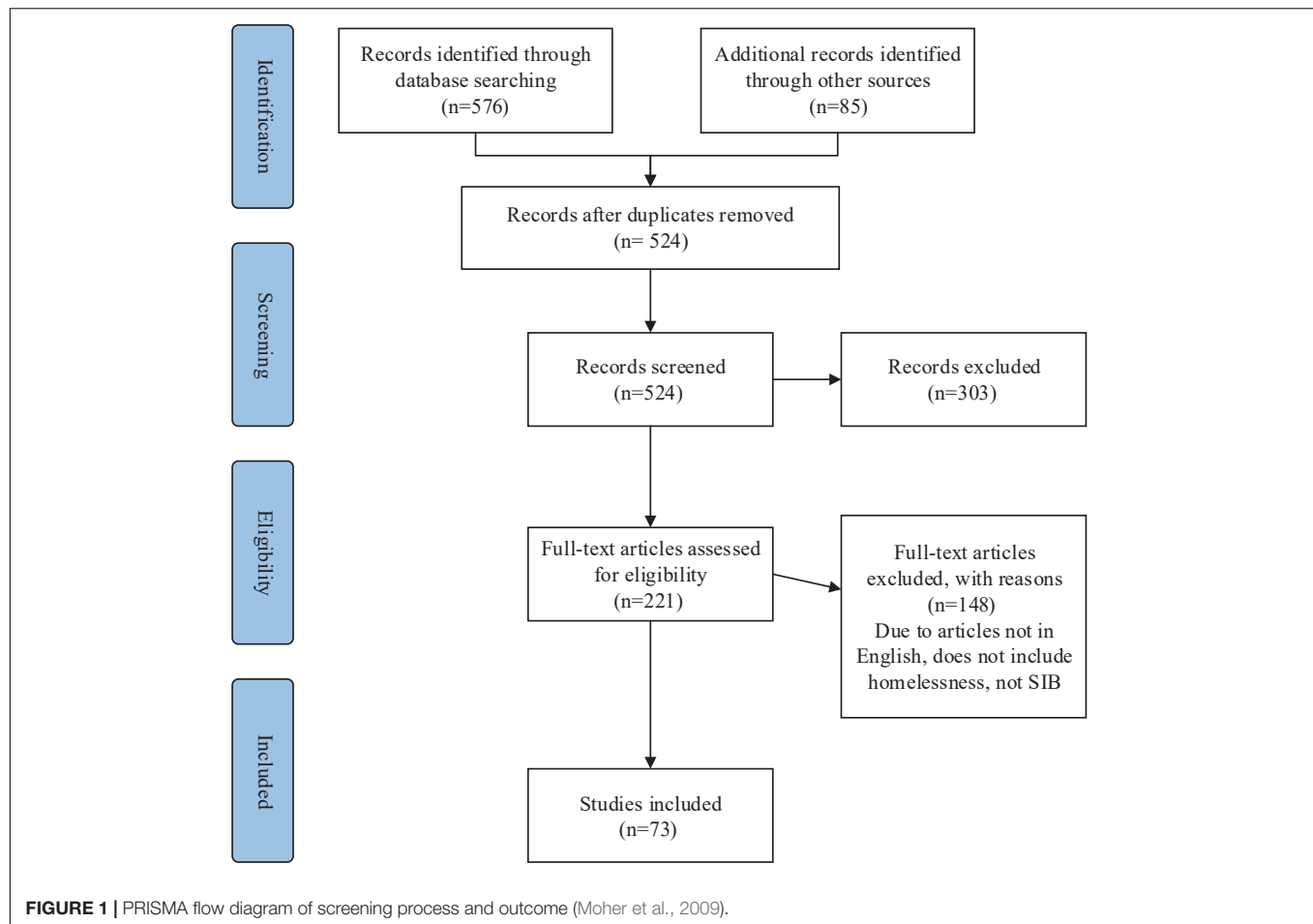
Regarding gray literature, all of them were critically appraised via ACCODs checklist to mitigate the risk of bias. Most were identified from online databases, namely, Social Finance and the University of Oxford's Government Outcome Lab (32/59). Other included literature consisted of reports published by investors, commissioners, evaluators, service providers, government departments, social research firms, universities, and other non-profit organizations (18/59), or was obtained from the websites of investors, service providers, and commissioners (7/59), a fact sheet (1/59), and an unpublished thesis (1/59).

Target Groups of Social Impact Bonds for Homelessness

As of April 2022, 32 SIBs had been issued for homelessness in four countries. Most (22) were issued in the United Kingdom. The remainders comprised five in the United States, four in Australia, and one in Belgium. The first SIB for supporting homelessness was issued in 2011 in the United Kingdom. The majority of included SIBs were issued from 2015 to 2020 (29/32; 91%). Collectively, all 32 had a total of over 23K service users, of which about 20K were in the United Kingdom, nearly 1,865 in the United States, 1,080 in Australia, and 133 in

Belgium. Importantly, the Social Finance database and that of the University of Oxford's Government Outcome Lab are not up to date. For example, the Los Angeles SIB is not included in either but instead is disclosed in one unpublished thesis (Johnson, 2019). Consequently, we needed to refer to gray literature to complement and update the database information.

The target groups of all SIBs supporting homelessness are summarized in **Table 2**. The various SIBs targeted people of different ages. For example, 11 SIBs (34%) targeted young people aged between 18 and 24 who were not in employment, education, or training (NEET) or were at risk of homelessness, while only two SIBs supported seniors, and just one targeted homeless individual aged 15–18 years. This finding shows that vulnerable children or seniors are not the main target groups of SIBs, particularly compared to young people aged 18–24. However, young people do not predominate among the homeless. For instance, it has been reported that in the United States, over 18% of homeless people are children, approximately 8% are between the ages of 18 and 24, and approximately 74% are over the age of 24 (Henry et al., 2021). Therefore, more SIBs should be implemented to solve the problems of vulnerable children and seniors.

In conclusion, most SIBs to date have targeted individuals who have slept outside for long periods of time or experienced

TABLE 2 | Target population and interventions of all SIBs for homelessness to date.

Country	Stage of development	Target population	Intervention
United Kingdom	(1) Completed project: ACTion Glos (Assertive Community Treatment in Gloucestershire), ACTion Lincs (Lincolnshire), Ambition (Leicestershire), Aspire (Gloucestershire), Depaul (Greenwich), Fusion (West Yorkshire), Home Group (Newcastle), Local Solutions (Liverpool), St Basil's (Birmingham), London Homelessness Social Impact Bond (St Mungo's), London's SIB (Thames Reach), Greater Manchester's SIB. (2) Ongoing project: Mayday Inspire (Northamptonshire), London's SIB, Newcastle and Gateshead's SIB, Single Homelessness Prevention Project (SHPS) Brent, Brighton's SIB, Bristol's SIB, Kirklees Integrated Support Services, Opening Doors (Bexley), Promoting Independence (Sheffield), Single Homeless Prevention Service (London).	(1) Young people not in employment, education, or training. (2) People having slept outside for long periods of time. (3) Rough sleepers with complex needs. (4) Adults at risk of being homeless. (5) Single adults and childless couples living in temporary accommodation.	(1) Housing First approach. (2) Delivery model based on a team approach. (3) Specialist link workers provide personalized support. (4) Supports a focus on sustaining accommodation, and on employment, training.
United States	(1) Completed project: Massachusetts' SIB, Denver's SIB. (2) Ongoing project: Los Angeles County's SIB, Santa's SIB.	(1) Individuals experiencing chronic homelessness. (2) Anticipated high-cost users of emergency services. (3) Individuals with histories of homelessness and involvement with the criminal justice system. (4) Single and residing in an emergency shelter.	(1) Home and Healthy for Good program. (2) Permanent supportive housing and assertive community treatment. (3) Rapid rehousing. (4) Homes Not Jail program.
Australia	Ongoing project: Aspire Social Impact Bond Adelaide, Journey to Social Inclusion (Victoria), The Youth CONNECT Social Benefit Bond (Queensland), Foyer Central SIB (Sydney)	(1) Individuals at risk of homelessness, released from a partnering prison, or discharged from a partnering hospital. (2) People experiencing sustained and chronic homelessness. (3) Young people exiting the child protection system. (4) Young people leaving out-of-home care and at risk of or experiencing homelessness.	(1) Housing First approach. (2) Trauma-informed intervention that integrates intensive case management and service coordination. (3) A relationship-based approach and provision of long-term support. (4) Connect with education, training, and employment.
Belgium	Ongoing project: Back on Track (Belgium)	(1) Young adults without income or accommodation, or released from prison.	(1) Housing First for Youth program.

multiple episodes of homelessness. As some homeless individuals have complex needs, including substance misuse issues, mental health issues, recent offending history, physical health issues, and learning difficulties, appropriate targeting and screening of participants is an important consideration.

Interventions of Social Impact Bonds for Homelessness

Extant SIBs for homelessness in the United Kingdom, the United States, Australia, and Belgium all take the Housing First approach, which is increasingly being recognized internationally as the most effective model in helping homeless people into settled accommodation, has been proven to be a more cost-effective way of addressing homelessness than traditional model (Ly and Latimer, 2015). The Housing First approach does not require that participants meet preconditions for entry such as entering treatment, achieving sobriety, or committing to ongoing service participation requirements (Mary et al., 2018). The Housing First approach aims to quickly and successfully connect individuals experiencing homelessness with a settled accommodation. In addition, the United Kingdom, the United States, Australia, and Belgium arrange for specialist link workers to provide personalized interventions. An individual each participant can turn to specialist link workers for help with wider life issues such as budgeting, health, offending, drug and alcohol addiction, or relationships. The role of a link worker is to flexibly support clients to meet all of their needs in any setting, whether that be the street, hospital, prison, or home. Notably, interventions in the included SIBs were mainly delivered by not-for-profit organizations with specialized experience. Only the providers of Gloucestershire's SIB and Liverpool's SIB were private for-profit companies. It shows that not-for-profit organizations are the main service providers of SIBs for homelessness.

The projects in the United Kingdom were delivered by a team of specialists that included a drug and alcohol recovery worker and a mental health practitioner. These projects benefit from significant contributions by local housing, education, and other support organizations, enabling expertise to be joined and tailored to each vulnerable individual to obtain the best outcomes. Academic articles have also demonstrated that collaboration of several involved actors within a project is very important (Smeets, 2017; La Torre et al., 2019; Jamieson et al., 2020). Projects in the United States realized that lack of stable housing is associated with significant health concerns and used the Home and Healthy for Good (HHG) model, in which supportive housing is paired with medical and mental health services, substance abuse treatment, and vocational training, all coordinated by a case manager (Golden et al., 2015; Brown et al., 2019; Johnson, 2019). Those in Australia seek to build independence and resilience through tiered services including employment pathways, life skill development, and connection to broader services (Vallesi et al., 2019; Riddell, 2020). As of February 25, 2020, BNP Paribas listed on its website that endeavors in Belgium focus first of all on housing, then helping young people to recover, build networks, and find jobs or training.

Current literature indicates that a focus on housing is effective in addressing homelessness (Gulcur et al., 2003; Schiff and Rook, 2012; Pleace, 2018). Another article observed housing to be followed by significant reductions in client use of public services (Finn et al., 2018). In addition, the "navigator" model was rather than only pursing a "housing first" strategy. This intervention emphasized the idea that intense personalized interventions and sustained support provided by a navigator link worker should be given priority (Wirth, 2020). Navigators link workers can provide intensive, practical, and psycho-social support on the basis of individually-tailored action plans informed by completion of outcomes. Thus, it is not a traditional intervention but rather provides persistent practical and emotional support across the landscape of existing provision (Mason et al., 2017). In conclusion, although the housing first model is effective model in helping homeless people into settled accommodation, housing first model could be paired with navigator intervention model, which is effective in supporting homelessness with high levels of complex needs.

Investment Into Social Impact Bonds for Homelessness

Table 3 summarizes the investments made into SIBs financing homelessness in the United Kingdom, the United States, Australia, and Belgium. The lowest investment was US$0.13 M into Manchester's SIB in the United Kingdom, and the highest was US$10 M into Los Angeles County's SIB in the United States (Lantz and Iovan, 2018). The average initial investment was US$2.29 M. Five funds were listed as financing 19 SIBs: the Fair Chance Fund (7/19), Rough Sleeping Program (5/19), Life Chances Fund (4/19), GLA Rough Sleeping Program (2/19), and Commissioning Better Outcomes Fund and Social Outcomes Fund (1/19).

As listed in Table 3, the most common investor type was charity/non-profit organizations (16/32), followed by high-worth social merchant banks (12/32), impact investment companies (11/32), private investors (10/32), philanthropic foundations (8/32), private foundations (2/32), commercial banks (2/32), and insurance companies (2/32). Investors can be divided into two categories, senior and subordinate investors, with senior investors being able to get higher interest rates than subordinate investors. For example, the Santa Clara County project is expected to return 5% interest to senior investors and 2% interest to subordinate investors if outcome metrics are met (Johnson, 2019). Some SIB service providers are also investors, such as the P3 Charity (People Potential Possibilities), which participated in Ambition (Leicestershire), Aspire (Gloucestershire), and the London Homelessness Social Impact Bond (St Mungo's and Thames Reach). Some invested into more than one SIB. For instance, the organization Big Issue Invest invested into Ambition, Depaul (Greenwich), Local Solutions, St Basil's, the London Homelessness Social Impact Bond (St Mungo's and Thames Reach), the Entrenched Rough Sleepers Social Impact Bond- Pan-London, the Entrenched Rough Sleeping Social Impact Bond- Newcastle and Gateshead, the Entrenched Rough Sleepers Social Impact Bond- Street Impact Brighton, Opening Doors (Bexley), and Promoting Independence (Sheffield).

We could not find data on the investors of ACTion Glos, ACTion Lincs, Journey to Social Inclusion, or the Youth Connect Social Benefit Bond (Queensland). In addition, information on

TABLE 3 | Investment in SIBs for homelessness.

Country	Capital raised	Fund	Investor types
United Kingdom	(1) Total amount: over US$23M. (2) Lowest amount: US$0.13M for Manchester's SIB. (3) Highest amount: US$4.432M for Kirklees Integrated Support Services.	Fair Chance Fund, Rough Sleeping Program, Life Chances Fund, GLA Rough Sleeping Program, and Commissioning Better Outcomes Fund and Social Outcomes Fund.	(1) Charity/non-profit organizations (16/32). (2) Social merchant banks (12/32).
United States	(1) Total amount: over US$23M. (2) Lowest amount: US$3.5M for Massachusetts' SIB. (3) Highest amount: US$10M for Los Angeles County's SIB.	Undisclosed	(3) Impact investment companies (11/32). (4) Private investors (10/32). (5) Philanthropic foundations (8/32).
Australia	(1) Total amount: over US$18M. (2) Lowest amount: US$ 3.83M for Queensland's SIB. (3) Highest amount: US$9M for Aspire's SIB.	Undisclosed	(6) Private foundations (2/32). (7) Commercial banks (2/32). (8) Insurance companies (2/32).
Belgium	Total amount: $1.90M	Undisclosed	

the investors of some projects published by Social Finance is incomplete and needs supplementation by data from the Government Outcomes Lab. Those projects were Ambition, Aspire, Depaul, Home Group, and the London Homelessness Social Impact Bond (St Mungo's). Moreover, some information in the two source databases is inconsistent. For example, Salt Lake County's investment as disclosed in the Government Outcome Lab is US$5.5M, while that disclosed in Social Finance is US$4.4M. Bristol's investors were also inconsistently reported in the two databases. Therefore, key informants should be contacted to identify an investment's corresponding investors.

Financial Terms of Social Impact Bonds for Homelessness

Table 4 provides an overview of the outcome metrics of all SIBs for homelessness. All used at least one target outcome. Metrics tied to payment included outcomes based on accommodation, wellbeing, education/training, employment, independence, or days in jail (Brown et al., 2019). Outcome payers were mainly local or central governments (31/32). However, the outcome payer of Journey to Social Inclusion (Victoria) was non-governmental (1/32). SIBs are important for allowing local governments to embark on innovative homelessness projects while minimizing financial risk and limiting resource commitment by the federal government. Notably, one report and thesis indicated that some tracked outcomes are not tied to success payments (Brown et al., 2019; Johnson, 2019). For instance, in the Massachusetts SIB, health care service usage, number of nights spent in shelter, and number of days incarcerated were tracked but not tied to any success payment. Taking this implementation as a model will allow future SIBs to adjust outcome metrics as appropriate.

Also summarized in **Table 4** are the maximum outcome payments, interest rates, and SIB structures. Projects in the

United Kingdom, United States, and Australia all published return or interest rates for meeting targets. However, only Aspire and Foyer published information concerning the return to investors when outcomes are below or above the target level. If outcomes are above targets, investors can get higher returns. Besides that, an implementation agreement may be terminated early if performance is well below the target (Riddell, 2020). Therefore, it shows that outcomes meeting or exceeding the target level are important for return on investment and continuous implementation of projects.

In terms of structure, most of the included SIBs were intermediated (23/32; 72%), meaning the service provider contracted with intermediaries, particularly a Special Purpose Vehicle (SPV) like the Street Impact Project of the London Homelessness Social Impact Bond (St Mungo's). Intermediaries can be classified as either main or secondary. For instance, in the Denver project, the main intermediary is CSH while the secondary intermediaries are Social Impact Solutions, Inc. and Enterprise Community Partners. Directed structures were also relatively common, in which the service provider contracted with the outcome payer, and some SIB structures were undisclosed (9/32; 28%). It has been suggested in an academic article that the absence of a SPV in a SIB has a negative impact on performance management when compared to SIBs having intermediate structures (Edmiston and Nicholls, 2018). This conclusion is supported by the Thames Reach SIB, which is without a SPV, and St Mungo's Broadway, which has an intermediated structure. The majority of intermediaries were non-profit organizations (10/23). Other intermediaries included private organization (13/23), banks (5/13), private market investors (4/13), law firms (1/13), consultancy companies (1/13), and market research companies (1/13). However, intermediates were not disclosed by Gloucestershire, Lincolnshire, London, Newcastle and Gateshead, Bristol, Bexley, Sheffield, Los Angeles, or Sydney.

TABLE 4 | Financial terms of all SIBs for homelessness.

Country	Outcome metrics	Maximum return	Interest rate	Structure
United Kingdom	(1) Sustained accommodation. (2) Sustained reconnection. (3) Improved health and wellbeing. (4) Improved education/training. (5) Achieved independence. (6) Reduced rough sleeping.	Gloucestershire: $1.4M, Lincolnshire: $1.8M, Leicestershire: $4.1M, ACtion Glos: $2.1M, Greenwich: $2.2M, Liverpool: $1.7M, Birmingham: $3.4M, London's SIB (St Mungo's and Thames Reach): $1.6M, Newcastle and Gateshead: $2.1M, Bristol: $6.8M, Bexley: $2.3M, Brent: $1.6M, and Newcastle: $3.2M. Other projects undisclosed.	(1) ACtion Glos: 20% discount to the maximum outcome payment rate-card. (2) London's SIB (St Mungo's and Thames Reach): annual rate 6%. (3) Other projects undisclosed.	(1) Intermediated structure: Leicestershire, Gloucestershire, Greenwich, West Yorkshire, Newcastle, Liverpool, Birmingham, East and South East London, West and North West London, Manchester, and Single Homeless Prevention Service. (2) Other projects have directed or undisclosed structure.
United States	(1) Stable tenancy. (2) Decreased jail bed days. (3) Reduced rate of re-incarceration. (4) Enrollment into substance abuse service. (5) Accepted mental health services.	Massachusetts: $6M, Santa Clara: $12, Denver: $11.4M, Los Angeles: $11.5, Salt Lake County: $5.5M.	(1) Massachusetts: maximum return of 5.3%. (2) Santa: senior investor 5%, subordinate investor 2%. (3) Denver: 3.5%. (4) Los Angeles and Salt Lake County: senior investor 5%, subordinate investor 2%.	(1) Intermediated structure: Santa Clara County, Denver, Los Angeles County, Salt Lake County, and Massachusetts.
Australia	(1) Hospital bed days. (2) Convictions. (3) Crisis accommodation periods. (4) Stable housing, employment, or education. (5) Improved health and wellbeing. (6) Personal development.	Aspire: $12M, Foyer Central SIB: maximum return 10%. Victoria and Queensland: undisclosed maximum return.	(1) Aspire: below target 4.5%, target 8.5%, above target 12%, fixed coupon rate is 2% per annum. (2) Foyer Central SIB: below target 1.0%, target 5.9%, above target 9.6%, and fixed coupon of 2% per annum for first 3 years. (3) Victoria and Queensland undisclosed.	(1) Intermediated structure: Adelaide, Victoria, and Queensland. (2) Directed structure or undisclosed: Foyer Central SIB
Belgium	(1) Obtain a renting agreement. (2) Have legal income or start training. (3) Reduction in recidivism compared to a reference rate.	Undisclosed	Undisclosed	Undisclosed

Evaluation and Outcomes of Social Impact Bonds for Homelessness

According to one published article, the main evaluation methods used for SIBs are validated administrative data, historical comparisons, quasi-experimental methods, and randomized controlled trials (Gustafsson-Wright et al., 2015). As given in **Table 5**, the SIBs for homelessness reviewed in this study employed heterogeneous evaluation methodologies: qualitative interviews, validated administrative data, randomized controlled trials, mixed-methods approaches combining qualitative and quantitative data, before and after comparisons, and quasi-experimental approaches using propensity score matching (Cooper et al., 2013; Mason et al., 2017; Finn et al., 2018; Vallesi et al., 2019; Rosenbach and Carter, 2020; Gillespie et al., 2021).

Eighteen projects did not disclose their evaluation methodologies. Additionally, such initiatives feature an independent evaluator tasked with assessing and reporting on performance outcomes. Among the reviewed studies, these evaluators were of many types: non-profit organization (4/32), university-based evaluators (4/32), research centers launched by universities or governments (3/32), and private or independent corporations (2/32). However, 20 SIBs did not disclose their evaluators (Mason et al., 2017; Finn et al., 2018; Johnson, 2019). Only Fair Chance Fund, London (St Mungo's and Thames Reach), Denver, Kirklees Integrated Support Services, and Aspire Social Impact Bond Adelaide disclosed their evaluation reports.

Outcomes of the SIBs for homelessness were mainly released in the Social Finance database and through the University of

TABLE 5 | Evaluation methods and outcomes of all SIBs for homelessness.

Country	Evaluation method	Evaluator	Outcomes
United Kingdom	(1) Fair Chance Fund Projects (Ambition, Aspire, Depul, Fusion, Home Group, Local Solutions, St Basil's): mixed methods approach combining the collection and analysis of qualitative and quantitative data. (2) London's SIB (St Mungo's and Thames Reach): qualitative evaluation and impact evaluation. (3) Manchester: the PTS approach and FCF outcomes. (4) Single Homelessness Prevention Project: interviews, surveys, and collection of management information. (5) Kirklees, Bexley, Sheffield and SHPS: semi-structured interviews. (6) Other projects undisclosed.	(1) ACTion Glos: Sheffield Hallam and Southampton universities. (2) London's SIB (St Mungo's and Thames Reach): International Coaching Federation (ICF). (3) Kirklees: Bridges Outcome Partnerships. (4) Bexley Sheffield and SHPS: the Government Outcomes Lab (GO Lab).	(1) ACTion Glos and Action Lincs, respectively, recruited 124 and 135 people in 2017. Sustained accommodation, mental health, and drug/alcohol support exceeded targets. (2) Fair Chance Fund Projects: accommodation, employment, volunteering, and education outcomes surpassed targets. (3) St Mungo's and Thames Reach: stable accommodation and 13/26-week employment outcomes above target levels, reduction in rough sleeping, volunteering/employment qualifications, and reconnections with home countries lower than targeted. (4) Mayday Inspire: in the first year, over 50 rough sleepers into secure accommodation – over 30% more than initial targets. (5) Greater Manchester's SIB: sleeping rough declined by 57% since 2017. Almost 356 people supported into accommodation. 133 people accessed mental health. 97 people accessed drug/alcohol services. 45 people started employment/volunteering. 40 people improved education/training. (6) Bristol's SIB: at project started in 2017, 64% of 125 SIB clients were sleeping rough. Now in 2021, only 4% are on the streets.
United States	(1) Massachusetts: before and after comparison, and validated data. (2) Santa Clara County and Denver: validated data and a randomized controlled trial (RCT). (3) Los Angeles County. (4) Salt Lake County: treatment and control groups.	(1) Massachusetts: Root Cause. (2) Santa Clara County: University of California-San Francisco. (3) Denver: Urban Institute. (4) Los Angeles County: RAND Corporation. (5) Salt Lake County: University of Utah Criminal Justice Center.	(1) Massachusetts: reduction of chronic individual homelessness has significantly exceeded targets and successfully placed over 656 high-need individuals into stable, supportive housing, with 92% remaining housed after 1 year. (2) Santa housed 111 chronically unsheltered people. Annual emergency services use dropped from $62,473 to $19,767. (3) Denver: as of July 2018, two and a half years into the SIB, 85% 285 participants had remained in housing without ever exiting the program. During their first year in housing, 44 percent of participants did not return to jail. (4) Los Angeles County and Salt Lake County: undisclosed.
Australia	(1) Aspire: compares targeted and actual intervention groups. (2) Journey to Social Inclusion: mixed methods, RCT. (3) Other projects undisclosed.	Undisclosed	(1) Aspire generated total SA Government savings of $5.69 million over 3 years (to June 30, 2020), which is 210% of the initial plan. (2) Other projects are undisclosed.
Belgium	Undisclosed	A research team from KU Leuven.	Undisclosed

Oxford's Government Outcomes Lab. We supplemented these sources with stakeholder websites, reports, media releases, and papers. For example, commissioners of the Ministry of Housing, Communities and Local Government published an evaluation report on the Fair Chance Fund, which financed projects of Ambition, Aspire, Depul, Fusion, Home Group, Local Solutions, and St Basil's. Likewise, the service provider Colorado Coalition for the Homeless released information about the Denver

program on their website. However, just 12 projects published performance information, and some did not publish the data in full. For example, Mayday Inspire only released performance for the first year. All told, this analysis of evaluation measures and outcomes reveals that SIB projects lack transparency.

Among the 32 reviewed SIBs, 14 (44%) completed the projects. These comprised 12 projects in the United Kingdom (ACTion Glos, ACTion Lincs, Ambition, Aspire, Depul, Fusion, Home

Group, Local Solutions, St Basil's, the London Homelessness Social Impact Bond, and the Entrenched Rough Sleeping Social Impact Bond-Greater Manchester) and two projects in the United States (Massachusetts and Denver). According to the University of Oxford's Government Outcomes Lab, only ten of these SIBs were complete, which is not accurate. Considering both completed and incomplete projects, most reported strong outcomes on accommodation, which provides evidence of the effectiveness of the Housing First model (Andrikopoulos, 2020). Employment proved to be a more popular pathway for all participants than entry into education or training. Moreover, volunteering was not a popular option in the Fair Chance Fund projects. However, volunteering was a success in terms of outcome, with positive outcomes such as improved self-esteem and reduced social isolation being reported. Overall, there is considerable evidence that SIBs improve the physical and mental health of target groups, but these aspects were not typically tracked and included in outcome metrics. The Aspire project did track the use of public services and reported a significant reduction relative to baseline in accessing justice services, emergency accommodation, and hospital bed days (Sainty, 2020). Likewise, the Santa Clara County projects housed 111 chronically unsheltered people and observed utilization of emergency services to drop by nearly $43,000 a year.

Those SIBs that met target outcomes shared several features in common: a navigator intervention model, partnership working, and use of a Special Purpose Vehicle (SPV). Evidence from project evaluations suggests that the navigator intervention model provides intense personalized services and sustained support, which is effective in supporting entrenched rough sleepers with high levels of complex needs (Mason et al., 2017). Partnership working is likewise important to meeting complex needs. For example, relationship building and partnership working with landlords and local authorities proved critical for widening access to housing options. Prior work has also reported that collaboration of several involved actors within a project is very important (Smeets, 2017; La Torre et al., 2019; Jamieson et al., 2020). Intermediary organizations that help match providers with investors, structure the financial deal, and monitor programs use a Special Purpose Vehicle. Absence of such a vehicle has been demonstrated to negatively impact performance management (Edmiston and Nicholls, 2018). Finally, the reviewed projects lack standardized reporting for describing their features and outcomes. In addition, some project-related publications were not written in English, which generated missing information. It is important for SIBs to utilize standardized reporting, thereby enabling ready comparison of their features and outcomes.

DISCUSSION

In a growing critical literature on SIBs, a largely doubt whether the SIBs can help accelerate public sector reform end social problems. Currently, there is little published work that explores the evidence obtained from all SIBs for homelessness. We explored that evidence utilizing both academic and gray literature and developed a unique database summarizing target groups, interventions, investment, financial terms, evaluation, and outcomes of all the SIBs for homelessness in the United Kingdom, the United States, Australia, and Belgium. This paper identified several common features of SIB studies. First, academic researches focus on the targeted outcomes, which are measurable pre-defined social outcomes and trigger payment for the SIBs, but tend to ignore soft outcomes achieved in the SIBs programs, which are difficult to measure and depend on subjective measurement, such as an individual's self-assessment. Second, some outcomes that are tracked are not tied to success payments. Third, SIBs tend to support young people instead of the relatively more vulnerable child and senior populations. Fourth, non-profit organizations invest much more than private investors. Fifth, not all SIB-related data were disclosed. Both SIBs projects and earlier studies lack transparency.

Fraser et al. (2018b) found little evidence of SIB-funded programs having significantly different outcomes from more traditional programs (Fraser et al., 2018b). One reason for this observation is that academic studies tend to ignore soft outcomes, which are not tied to success payment but have been identified as important for supporting target population. SIBs are able to improve some soft outcomes that traditional programs cannot. For example, mental health is at the forefront of everything Fair Chance Fund projects do. In addition to the official 'targeted outcomes', their target population achieved a number of soft outcomes such as increased resilience, better communication skills, and improved confidence and self-esteem. While these soft outcomes were neither measured nor included in the outcome metrics, their realization should have been recognized in some way through the Payment by Result (PbR) framework. In fact, achievement of such soft outcomes has been identified as key for the achievement of education and sustained accommodation and employment outcomes, according to evaluation of the Fair Chance Fund final report 2019. Therefore, we should improve outcome metrics and evaluation methods to encompass soft outcomes, such as through conducting a qualitative study using semi-structured interviews. However, even when outcomes are tracked, they may not necessarily be tied to success payments. For instance, the Santa Clara County project tracked utilization of health care, social service, and criminal-justice systems, but did not tie these measures to payments even though health conditions and crime reduction are also important for addressing homelessness. In the future, the current array of inadequate and imperfect outcome metrics needs to be improved. Moreover, the problem of imperfect metrics could be addressed by utilizing the payment mechanism divided between a fixed and a variable payment per project (Andersen et al., 2020).

Our review revealed that SIBs tend to support young people aged 18–24, instead of the more vulnerable child or senior populations. This is not consistent with age demographics among the homeless. For example, a prior study in the United States reported that over 18% of homeless people are children, approximately 8% are between the ages of 18 and 24, and approximately 74% are over the age of 24 (Henry et al., 2021). One reason for preferentially supporting young

people is that doing so can yield better performance in the short term. There is a risk of "cream-skimming" if providers offer services only to those who are most likely to benefit from intervention (Cox, 2011). In addition, non-profit organizations that act as service providers aim to address inequities and help vulnerable groups fairly. As such, primarily supporting young people goes against the purpose of these organizations. Overall, SIBs are morally permissible in principle but are at great risk of becoming unethical or unfair in practice (Morley, 2021). Going forward, more SIBs are needed to support vulnerable children and seniors rather than tending to support young people.

It is noteworthy that among the 32 SIBs reviewed here, non-profit organizations comprised more of the investors (16/32) than did private investors (10/32). This finding is consistent with a prior academic article that reported early entrants to this new investment market as likely to be social investors for whom economic return may be less critical than social benefits (Finn et al., 2018). It is also in contradiction with some papers that regard private investors as the main investors of SIBs (Maier et al., 2018). Indeed, each SIB for homelessness featured non-profit organizations as providers, who can finance SIBs and then become investors. This may be one reason that the number of non-profit organizations as investors is higher. Another reason is that it is difficult for SIBs to attract private investors because the investment is high-risk (Giacomantonio, 2017). To promote balance among stakeholders in the SIB model, future SIBs should appeal more to private investors for project financing, such as through substantial incentives or guarantees being provided by the government or third party.

In the future, managers of SIBs should pay attention to some aspects in which SIBs still need to improve in practice. First, SIBs should improve outcome metrics and evaluation methods to capture soft outcomes, and the breadth of tracked outcomes should be tied to payments. Second, SIBs for homelessness need to support vulnerable children and seniors fairly, proportionate to the composition of the homeless population, rather than tending to support young people. Third, SIBs should increase their appeal to private investors to ensure a balance of stakeholders, such as through substantial incentives or guarantees being provided by the government or third party. Fourth, managers should publish the progress and outcome of SIBs in time so that the stakeholders and citizens can learn more about SIBs and increase the confidence of SIBs. As for the government, they need to improve the information disclosure system of SIBs, such as issuing a related decree.

The study has some limitations. First, this paper is a scoping review, which are lack of assessing the quality of existing literature, and is not as rigorous as systematic reviews, but more distinctive in methodology and is less likely to be strongly influenced by opinion than a traditional literature review. Second, some project-related publications were not written in English, which generated missing information. Due to the absence of published data, SIB outcomes were largely obtained from gray literature sources which do not have the same rigorous as published sources. Gray literature sources were critically appraised via ACCODs checklist to mitigate the risk of bias. Third, some SIBs had limited transparency in relation to some features and outcomes, which could affect the validity of the results. Therefore, some features not analyzed in this study could also have contributed to the outcomes of SIBs.

CONCLUSION

This scoping review addresses an important gap in the literature that we explored the evidence provided by all extant SIBs for homelessness and analyzed their key features and outcomes based on academic and gray literature. We found that academic papers lack evidence-based analysis while gray literature lacks transparency, especially regarding evaluation methods and outcomes. All SIBs for homelessness shared several common features: a Housing First model, personalized intervention, specialized service providers, and varied investors. Fourteen of the reviewed SIBs met target outcomes. The common features of these were: a navigator intervention model, effective partnership working, and use of a Special Purpose Vehicle. These features are important for the following reasons: First, a navigator intervention model provides personalized services and sustained support for target groups. Second, having a team of specialists cooperate enables holistic support for the target population. Third, the use of Special Purpose Vehicle as the prime contractor allows supervision of service providers and isolation of financial risk.

AUTHOR CONTRIBUTIONS

HW collected the data and wrote the manuscript. XX was responsible for modifying the manuscript. Both authors contributed to the article and approved the submitted version.

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The relationship between future self-continuity and intention to use Internet wealth management: The mediating role of tolerance of uncertainty and trait anxiety

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This study aimed to analyze the mediating effect of tolerance of uncertainty (TU) and trait anxiety (TA) on future self-continuity (FSC) and intention to use Internet wealth management (IUIWM) systems. A questionnaire survey was distributed online and a total of 388 participants completed questionnaire, The questionnaire included the following scales: Chinese version of the FSC, Intention to Use the Internet Wealth Management, TU, and TA. Pearson correlation was used to investigate the correlation coefficient between variables while the sequential regression method was used to analyze relationship between variables. To analyze the collected data, the SPSS 26.0 was used. A two-step procedure was applied to analyze the mediation effect. Confirmatory factor analysis (CFA) was conducted to test the measurement model. Afterward, the Maximum Likelihood method was used for path analysis, and the Bias-corrected Bootstrap method was used to investigate determine the estimated value and confidence interval of the mediating effect. To analyze the mediation effect, the Mplus 7.0 was used. The results showed that FSC positively predicted individuals' Internet wealth management systems. Furthermore, TU and TA played complete serial multiple mediating roles between FSC and IUIWM. The role of TA and TU have negative impact on intention to use. This study provides a theoretical basis in personality psychology that Internet financial product suppliers can use to improve the attractiveness of their products. Product managers can subdivide users according to these personality traits to provide customized products.

KEYWORDS

Internet wealth management, future self-continuity, tolerance of uncertainty, trait anxiety, Internet finance

Introduction

Since 2013, when Yu' E Bao ushered in an era of Internet wealth management in China, the country's Internet Wealth Management market has developed rapidly (Zhao and Zhang, 2021). Internet wealth management is a system that the Internet as its medium for financial management. When the participation of financial intermediaries such as banks and securities brokers is considerably reduced, the supply and demand of funds can trade directly through information intermediary platforms to enable property gain for investors (Ren and Sun, 2017; Sun et al., 2020). Internet financial services, as an emerging financial investment and management technique, have attracted many individual users by offering savings products and money market funds with more robust returns. Average returns are higher than bank savings rates over the same period, and trading is more straightforward. These features make them an attractive alternative to bank savings (Wang and Tang, 2020). Benefitting from its advantages such as convenience, low threshold, and fragmented management, the number of Internet financial users has changed significantly. According to the data on the website of Tianhong Asset Management, which manages the Yu 'E bao fund, Yu;'E bao now has 260 million users and held funds totaling about 620 billion RMB by the end of 2015 (Ren and Sun, 2017). Resultantly, the pace of change was so rapid that Internet wealth management profoundly changed the structure of finance with a subversive impact (Dong and Guo, 2015).

Although Internet finance has a short development time, it has exerted a great influence on China's financial market though its characteristics and has gradually become a new form of business that cannot be ignored in the entire domestic financial ecosystem. It has also led to a remarkable change in the way and pattern of personal finance management.

Behavioral finance demonstrates that in addition to observed objective variables, psychological factors are important subjective variables affecting investors' behavior choices (Kasemsap, 2015). Research on Internet financial management has focused more on qualitative analysis, such as the development model, *status quo* research and external influencing factor (Zhao and Zhang, 2021). As far as Internet financial products are concerned, there are few existing studies on what psychological factors will affect investors' purchase of products and how. Moreover, for individuals who lack personal wealth management skills and are not driven to consider the future, the prevalence of consumerism, promotions, online sales, and so forth makes it easy to fall into a consumerism circle (Bartels and Urminsky, 2015); thus, investigating internal factors that affect individual financial management are urgently needed.

According to different service forms, Internet finance can be divided into three categories: Internet extension of traditional financial services (such as e-banking and online banking), financial Internet intermediary services (such as third-party payment and P2P online loan platforms), and Internet financial services (such as the Internet Fund and insurance sales platforms) (Ping and Chuanwei, 2012). In this study, we defined Internet wealth management as the purchase and use of Internet funds.

Future self-continuity and Internet wealth management

Future self-continuity (FSC) reflects an individual's present self and future self, influencing their future behavior (Ersner-Hershfield et al., 2009). It is an essential indicator of their access to long-term future development (Bartels and Urminsky, 2011) FSC is how an individual perceives a strong connection between the present self and the future self. The more robust the link, the stronger the individual's FSC (Ersner-Hershfield et al., 2009; Liu et al., 2018) will be. Hershfield (2011) argued that FSC consists of three components: similarities to the future self, the vividness of the future self, and positive affect (positivity) toward the future self.

FSC has many effects on individual psychology and behavior. For example, individuals with high FSC more frequently choose to delay options in intertemporal decision-making tasks to obtain higher monetary benefits (Ersner-Hershfield et al., 2009). Furthermore, FSC significantly predicts anxiety and depression levels in individuals, with high FSC individuals showing lower levels of anxiety and depression (Sokol and Serper, 2019). In addition, individuals with high FSC are more rational in their consumption and show less impulsive consumption behavior (Bartels and Urminsky, 2015). FSC is also related to saving behavior. Individuals who perceive their future to be more similar to the present (high FSC) will exhibit less consumption behavior and increase investment in their savings. They perceive the future as a continuation of their present self and need to prepare for it (Ersner-Hershfield et al., 2009; Hershfield et al., 2011). Conversely, individuals who believe that their present self- differs from their future self- experience have a sense of separation between their present and future selves (Gelder et al., 2013). These individuals see no reason to prepare for their future selves and instead focus more on hedonistic consumption in the present moment (Pronin et al., 2008). If the present self is more considerate toward the long-term future self, the individual will set aside more resources to meet the future self's needs. However, while previous studies of FSC and economic factors have focused on individuals' saving behavior, little attention has been paid to individuals' investment and financial behavior (Liu et al., 2018). With the development of the Internet economy, Internet wealth management has become popular (Zhao and Zhang, 2021). Therefore, we want

to explore whether FSC will affect individuals' Internet wealth management to some extent.

Internet wealth management reduces the participation of financial intermediaries because funds are traded directly through an information intermediary platform to achieve property gain for investors (Sun et al., 2020). Internet wealth management is popular among people with low-income and micro and small enterprises, which provide inclusive financial services to different classes of society, because of its low risk, low threshold, and high liquidity characteristics (Dong and Guo, 2015). The related savings products and money market funds have more robust average returns and lower overall risk than bank savings rates. Thus, they have become the leading choice of wealth preservation and appreciation for young and middle-aged people (Wang and Tang, 2020). Wang et al. (2020) argued that when individuals have a strong FSC, the difference between the anticipated state of the "future self" and the "present self" is not significant. Therefore, individuals with high FSC perception will prefer low-risk options and will not engage in high-risk investments to reduce the financial risk to their future selves. Therefore, we hypothesized that individuals with higher FSC are more likely to participate in Internet wealth management.

Future self-continuity, tolerance of uncertainty and Internet wealth management

Tolerance of uncertainty (TU) refers to individual differences in emotional, cognitive, or behavioral reactions to uncertain situations (Buhr and Dugas, 2002; Zvolensky et al., 2010). Individuals faced with uncertain events worry because they cannot predict the consequences. Individuals who can manage uncertainty and respond positively are well adapted (Carleton, 2016). In contrast, individuals who cannot tolerate uncertainty and try to avoid it feel anxious and uneasy. TU reflects these inter-individual differences (Huang et al., 2014). TU is thought to be significantly related to generalized anxiety disorder (Counsell et al., 2017), social anxiety (Shannon et al., 2021), and memory bias (Francis et al., 2016). Adelman et al. (2016) showed that students with higher FSC were more thoughtful about future consequences. High FSC was significantly and positively associated with self-control (Qing et al., 2021). These individuals are better able to control anxiety when dealing with uncertainty (Tangney et al., 2004). Luhmann et al. (2011) found that individuals with low TU preferred the immediate option in an intertemporal choice task because waiting in an uncertain delayed option state was torturous.

Although most Internet wealth management benefits are more robust and the overall risk is low, small risks still exist (Dong and Guo, 2015). Since individuals with low TU have a low tolerance threshold for uncertain events, even when the probability of an uncertain event is small, they perceive it as threatening, intolerable, and anxiety-generating (Buhr and Dugas, 2002). This tendency may decrease their intention to use Internet wealth management (IUIWM) products. Individuals with high TU have a higher tolerance threshold for uncertain events, can accept the existence of certain risks, have a lower level of anxiety, and therefore may be more inclined to use Internet wealth management products. We take into account the mindsponge model, an emerging theory of transformative cultural values popular across multiple disciplines, which states that the individual mind acts like a sponge, absorbing new cultural intellectual values and eliminating outdated ideas in a multi-dimensional environment (Vuong and Napier, 2015). Through the mindsponge principle, we can understand the acceptance process of individuals for Internet financial management: First, individuals learn the basic information of Internet financial management, then evaluate it based on the existing knowledge and experience, and finally judge whether Internet financial management can help them better adapt to the uncertain future. Specifically, individuals with high FSC can overcome their fear of uncertainty, better build up their inclusion and trust in emerging things, and ultimately lead to a higher willingness to use Internet financial management. Therefore, we suggest that high TU individuals would have a greater tendency to use Internet wealth management products. FSC will affect the intention to use these products by influencing individuals' TU.

Future self-continuity, trait anxiety and internet wealth management

Trait anxiety (TA) is a relatively stable personality trait that refers to an individual's propensity to be anxious when assessing external stimuli or dangerous situations differently (Sang et al., 2019). Individuals with high TA are more likely to exhibit anxiety and agitation when faced with uncertain situations (Endler and Kocovski, 2001). Lauriola and Levin (2001) noted that individuals with high TA tend to overestimate risks when considering their future. Even when the probability of adverse events is low, individuals with high TA show severe anxiety levels and have a significant attentional bias toward negative information (Loewenstein et al., 2001; Yu, 2020). Individuals with high TA are more conservative in making decisions and facing rewards, preferring to maintain the *status quo* rather than engage in tenuous wealth management investments (Pittig and Scherbaum, 2020). Even though the overall risk of Internet wealth management is low, for people with high TA, the very low probability of an adverse event is magnified. This risk makes them feel anxious. Thus, we assume that higher TA levels decrease individuals' IUIWM products. Similarly, individuals with high FSC exhibit lower anxiety levels because heightened FSC awareness may help them to view life events from a

broader perspective and realistically consider potential future self-experiences, thereby reducing an individual's level of TA (Sokol and Serper, 2017, 2019).

Since the above research suggests that FSC can eliminate the negative effects of TA, TA will reduce the willingness to use Internet financial management. At the same time, FSC can effectively improve the rational consumption behavior of individuals, decision-making beneficial to the future self, and positive life expectations for the future (Bartels and Urminsky, 2011; Bartels and Urminsky, 2015; Rutchick et al., 2018). Therefore, can FSC eliminate the negative impact of TA on financial investment and direct it to a more positive direction? Thus, this study puts forward the hypothesis that although TA acts as a negative predictor, FSC can still predict Internet financial management through the intermediary path of TA.

Future self-continuity, tolerance of uncertainty, trait anxiety and internet wealth management

According to risk-sensitivity theory, the primary goal of individuals in the face of risks is to avoid those options that will fail their goals, rather than necessarily pursue the maximization of benefits (Caraco et al., 1980; Mishra et al., 2017). Risk decision is a decision that is closely related to one's current state and future goal. Since future goals are always associated with future self, risky decisions will depend on the extent to which there is a gap between my current state and my future goals. When it comes to financial decision risk, it refers to the change range of expected results caused by a financial decision. Why do some individuals avoid risk and others prefer it?

For example, option A's benefits range from $1100 to $1300. The income range of option B is from $400 to $2,000, and the expected income of the two is the same ($1200 for both), but the risk of the latter is higher due to the larger range of change. If an individual's goal is to eventually have $10,000, he is more likely to choose the low-risk option A if he already has $9,000. If the individual currently has only $8,000, he is more likely to choose the high-risk option B. If there is a much gap between the future self's goal and the present state, then the individual will prefer risk; Conversely, individuals will avoid risk if there is a small gap between their expected future self's goals and their present status. This is why we hypothesize that high FSC predicts more Internet financial management.

In decision-making, uncertainty is a key factor (Jaeger et al., 2013). We also take into account the vigilance-avoidance hypothesis (Mogg et al., 1997), Individuals who cannot tolerate uncertainty have certain cognitive biases, and will automatically regard vague or uncertain information as threatening and respond to it with certain negative repetitive thinking (Fergus et al., 2013). The attention to the threatening stimulus leads to the avoidance response, which hinders the objective evaluation of the stimulus and exacerbates the anxiety of the individual

(Mogg et al., 2004). On the other hand, TU is often thought to be significantly associated with generalized anxiety disorder and negatively predicts its degree (Wright et al., 2016; Counsell et al., 2017; Heiden et al., 2019; Wilson et al., 2020). Song and Li (2019) found that TU was significantly correlated with TA and could predict individuals' TA, with higher individual TU associated with lower TA. Low TU predicted higher TA levels (Mogg et al., 1997; Fergus et al., 2013). Ultimately, individual anxiety levels further enhance individual risk-averse behaviors (Mueller et al., 2010; Giorgetta et al., 2012; Charpentier et al., 2017).

Based on the above discussion, we believe that individuals' FSC will affect individual's financial risk preference. While TU and TA are affected by FSC, they also affect individuals' financial risk preference. Specifically, (1) self-continuity means the stability of self in the time dimension, which ensures that the states and needs of the future self and the present self will not be greatly different. Therefore, combined with the risk sensitivity theory, individuals with high FSC prefer low-risk Internet financing. (2) Individuals with high FSC showed higher TU, while high TU predicted lower TA level, and eventually showed higher risk avoidance behavior and higher willingness to use Internet finance, a financial behavior with lower risk.

The current study

In summary, since higher FSC is significantly and positively correlated with self-control, and individuals with higher self-control tend to have higher TU, FSC can influence individuals' TU. Furthermore, as an essential factor affecting TA, it can predict individuals' anxiety levels. In addition, anxiety levels influence individuals' consumption and wealth management behaviors. Therefore, we proposed H1: individuals' FSC positively predicts the IUIWM products; H2: Higher FSC is associated with higher TU and higher IUIWM products, with the TU having a mediation effect; H3: higher FSC is associated with lower TA and a greater tendency to use Internet wealth management products, with TA having a mediation effect; and H4: higher FSC is associated with higher TU for the future, lower TA, and a higher IUIWM products, with TU and TA having a serial multiple mediation effect.

This research has significant managerial and theoretical contributions. First, the relationship between FSC and IUIWM products has not been investigated. In addition, whether TU and TA act as mediating variables between FSC and intention has not been confirmed. Second, while FSC has been extensively studied in saving behaviors (Ersner-Hershfield et al., 2009), the role of FSC in shaping consumer behaviors has rarely been explored. Third, while external influence factors of individuals' saving behaviors have received extensive attention from researchers, limited studies have investigated the role of personality characteristics and individual differences in saving behaviors.

Materials and methods

Sample and design

The methodological cross-sectional approach was adopted in this study. The participants were recruited through a convenient sampling technique. An online survey was conducted from September 2021 to November 2021 to collect date. Since most Internet finance users are aged 18–30 (Wang and Tang, 2020) and considering sampling convenience (She et al., 2021a), research sample screening criteria included (1) age 18–30 years old. (2) Knowledge of or have used Internet financial management. The prior sample size estimation was employed during the research planning state to avoid type I and type II errors (Beck, 2013; She et al., 2021b). The minimum sample size of 356 was required in this study based on 56 observed variables, a probability level less than 0.05, a power level of 0.8, and an effect size of 0.1 (Cohen, 2013). A total of 450 participants who met the criteria participated in the online self-report questionnaire through wjx.cn (a Chinese online survey platform). After removing 62 participants who failed to answer the screening questions correctly, 388 participants were included in the study. All participants were informed about participation and provided informed consent to participate. Table 1 presents participant demographic information.

Future self-continuity

We used the English version of the FSC scale compiled by Sokol and Serper (2019), which has 10 items. Each item is scored on a 5-point Likert scale, ranging from 1 to 5, with higher scores representing higher levels of FSC (e.g., "How similar are you now to what you will be like 10 years from now?"; "Do you like what you will be like 10 years from now?"). After the original FSC scale was translated into the Chinese version, we carried out a reverse translation to ensure that each item's intention

TABLE 1 Participant demographics.

Demographics	Frequency	Percentage
Sex		
Men	120	30.92
Women	268	69.07
Age		
18–24	170	43.81
25–30	218	56.29
Education		
Primary school	3	0.77
High school	12	3.09
Undergraduate	354	91.24
Postgraduate	19	4.90

was accurately conveyed in the scale. Native English speakers were also invited to review the authenticity of the translated version. In addition, we invited 3 professors and 3 doctors of psychology to evaluate the content validity of the scale using a 4-point Likert scale, ranging from 1 to 4, with 1 being irrelevant and 4 being very relevant. The questionnaire had good content validity (I-CVI = 0.833–1, S-CVI = 0.9).

Based on FSC item analysis and exploratory factor analysis of 502 Chinese adults, the Chinese version of the FSC scale was revised, with 10 items reserved and summarized into three factors. CFA based on 380 Chinese adults showed that the three factors fit well (χ^2 = 44.011, df = 32; CFI = 0.991, IFI = 0.988, RMSEA = 0.027). The Chinese version of the FSC scale showed satisfactory Cronbach's alpha (α = 0.823), retest reliability (r = 0.727), and convergent validity (CR = 0.90, AVE = 0.52). Scores of all items of FSC are averaged to give the total FSC score. Thus, scores on the total FSCQ range between 1 and 60, with higher scores indicating increased levels of FSC.

Tolerance of uncertainty

Tolerance of uncertainty was assessed using the TU Scale (Huang et al., 2014). This scale includes three factors measured via 11 items, each rated on a 5-point Likert scale, ranging from "completely inconsistent" to "completely consistent," with higher scores indicating lower TU levels (e.g., "I have to get rid of the uncertain state"; "I can't relax if I don't know what's going to happen tomorrow"). In addition, we reverse-scored to facilitate analysis and research, with higher scores indicating higher TU levels. The scale authors reported a Cronbach's α of 0.896, internal consistency α of 0.82, retest reliability of 0.78, and good structural validity (χ^2 = 67.15, df = 41; NFI = 0.96, NNFI = 0.98, CFI = 0.98, RMSEA = 0.043).

Trait anxiety

The State- TA Inventory was used to measure TA (Shek, 1988) via 20 items of the TA subscale (e.g., "I feel calm"; "I feel secure"), including 10 reverse-scored items, each of which was rated on a 4-point scale, ranging from "little" to "almost always." Higher scores indicate higher levels of TA. Cronbach's α was 0.894. Previous studies have demonstrated that the questionnaire has good construct validity (Shek, 1993; Balsamo et al., 2013; Lin et al., 2020; Zhang et al., 2021).

Intention to use internet wealth management

Intention to use Internet wealth management (IUIWM) was measured using the Internet Wealth Management Products

TABLE 2 Descriptive statistics and correlations between variables (*n* = 388).

	M (*SD*)	1	2	3	4
1 FSC	36.42 (7.35)	1			
2 TU	20.65 (8.03)	0.25**	1		
3 TA	44.90 (9.13)	− 0.48**	− 0.55**	1	
4 IUIWM	50.63 (8.50)	0.18**	0.28	− 0.26**	1

**p < 0.01.

Scale (Sun et al., 2020). This instrument assesses four factors using 14 items (e.g., "Internet wealth management products are credible"; "I am willing to understand and pay attention to the information related to Internet financial products"), each of which was scored on a 5-point Likert scale ranging from "completely disagree" to "completely agree." Higher total scores indicate a higher IUIWM products. Cronbach's α is 0.908, with good structural validity (χ^2/df = 2.34; *GFI* = 0.94, *AGFI* = 0.91, *CFI* = 0.94, *NFI* = 0.89, *IFI* = 0.94, *RMSEA* = 0.067) (Sun et al., 2020).

Data processing and analysis

Data were analyzed using IBM SPSS Statistics version 26 (IBM Corp, 2019). Statistical significance was set at $p < 0.05$. Means and standard deviations were used to describe the study variables. Associations between variables were analyzed using Pearson's correlation coefficients. Stepwise regression was used to explore whether and how FSC, TU, and TA influenced the IUIWM. Then, a two-step procedure was applied to analyze the mediation effect (Anderson and Gerbing, 1988). Firstly, the measurement model, which involved four manifest variables, was tested to assess the goodness of fit represented by its explicit indicators. Secondly, if the index of measurement model met the requirements, the maximum likelihood estimation examined the structural equation modeling. We used Mplus Version 7 (Muthén and Muthén, 2017) to construct structural equation models with 5,000 bootstrap samples to identify the mediation effect further and estimate path coefficients (Baraff et al., 2016). Indirect effects were considered significant when the 95% bootstrap path coefficient confidence intervals did not cross zero. The path coefficients were accepted as significant at the 0.05 level.

Results

Descriptive statistics and correlations between variables

Table 2 shows the means, standard deviations, and correlations among variables. The correlation between TU and intent to use Internet wealth management (IUIWM) was not significant. However, all other variable pairs showed significant correlations.

Regression analyses

First, IUIWM was taken as the dependent variable, and FSC, TU, and TA were taken as independent variables to conduct a stepwise regression analysis. FSC significantly predicted IUIWM (β = 0.184, $p < 0.001$). TU (β = −0.166, $p < 0.01$) and TA (β = −0.317, $p < 0.001$) had a significant negative impact on IUIWM. The results showed that FSC [$F_{(1, 386)}$ = 13.479, $p < 0.001$, $\triangle R^2$ = 0.031] significantly positively predicted IUIWM. The results supported H1. The addition of TU did not significantly improve the variance of the regression model [$F_{(1, 385)}$ = 6.792, $p > 0.05$, $\triangle R^2$ = 0.002], but adding TA resulted in a significant change in variance [$F_{(1, 384)}$ = 12.883, $p < 0.001$, $\triangle R^2$ = 0.055]. This shows that TU and TA added to Model 3 had an impact on the predictive effect of FSC (Table 3).

Measurement model

Confirmatory factor analysis (CFA) was conducted to test the measurement model comprising the four manifest variables, the measurement model fit the observed data well: χ^2 = 7.344, df = 2, χ^2/df = 3.67; *CFI* = 0.968, *TLI* = 0.904, *RMSEA* = 0.105, *SRMR* = 0.04.

TABLE 3 Stepwise regression analyses with intention to use Internet wealth management as the dependent variable.

	First step			Second step			Third step		
	b	*SE*	β	*b*	*SE*	β	*b*	*SE*	β
FSC	0.212	0.058	0.184***	0.218	0.06	0.188***	0.084	0.064	0.073
TU				− 0.02	0.055	− 0.019	− 0.175	0.062	− 0.166**
TA							− 0.296	0.06	− 0.317***
$\triangle R^2$		0.031***			0.002			0.055***	

**p < 0 .01, ***p < 0.001.

Structural analyses

We used a structural equation model to test the mediating effect of TU and TA on FSC and IUIWM; the model fit index was in the acceptable range: $\chi^2 = 0$, $df = 0$, $\chi^2/df = 0$; $CFI = 1.000$, $TLI = 1.000$, $RMSEA = 0.000$, $SRMR = 0.000$. The actual model is a saturated model, that is, all parameters to be estimated are exactly equal to the elements in the covariance matrix, and the degree of freedom is 0. Therefore, the fitting index is no longer estimated, and only the path coefficient is concerned (Kline, 2015). The results showed that FSC significantly positively predicted TU ($\beta = 0.22$, $p < 0.01$) and significantly negatively predicted TA ($\beta = -0.36$, $p < 0.01$. TU significantly negatively predicted TA ($\beta = -0.46$, $p < 0.01$) and IUIWM ($\beta = -0.37$, $p < 0.01$). The direct effect of FSC on IUIWM was not significant ($\beta = 0.06$, $p > 0.05$; **Figure 1**).

We used 5,000 bootstrapped samples to obtain the estimated bias-corrected confidence intervals of the three indirect effects. The indirect relationship between FSC and IUIWM through TU was significant. However, TU negatively predicted IUIWM, which is contrary to H2. The indirect relationship between FSC and IUIWM through TA was also significant. This significant mediating effect supports H3. Finally, the results showed that FSC was significantly related to IUIWM through serial multiple mediation of TU and TA, which supports H4 (**Table 4**).

In conclusion, the direct effect of FSC on IUIWM was not significant, indicating that TU and TA played a completely mediating role. Second, the positive effect of TA (59.65%) was greater than the negative effect of TU (21.39%). Finally, TU and TA played a sequential mediating role between FSC and IUIWM (18.95%).

Discussion

The purpose of this study was to investigate the role of uncertainty tolerance (TU) and TA on FSC and IUIWM. Consistent with the hypothesis, FSC affects IUIWM through TU and TA. The mediating effect includes three paths: The independent mediating effect of TU, independent mediating effect of TA, serial mediating effect of TU and TA. The serial mediation results show that high FSC leads to high levels of TU, and led to low TA levels, and leads to higher IUIWM.

TABLE 4   Bootstrapped indirect effects and 95% confidence intervals (CI) for the mediation model.

Model pathways	Estimated effect	SE	95% CI	
			Lower	Upper
FSC → TU → IUIWM	− 0.048	0.0225	− 0.103	− 0.013
FSC → TA → IUIWM	0.134	0.0325	0.074	0.202
FSC → TU → TA → IUIWM	0.043	0.0143	0.020	0.077

Internet wealth management is affected by various factors. The current results showed that FSC significantly and positively predicted IUIWM. When other mediating variables were not included, the influence of FSC on IUIWM was significant. This is consistent with previous research findings that FSC directly affects financial behavior (Wang et al., 2020). Individuals with high FSC are more rational consumers who show less impulsive consumption behavior. In addition, they prepare for their future by increasing their investment in savings (Bartels and Urminsky, 2015). Compared with traditional savings, Internet finance is a better choice for maintaining and increasing wealth, owing to its low risk, low threshold, and high liquidity (Dong and Guo, 2015). The findings from the current suggest that, the savings demand of individuals with high FSC is transformed into the demand for Internet finance, which ultimately improves their IUIWM. This also implies that individuals with high FSC are potential customers of Internet wealth management products. When product managers promote products, they should emphasize the attributes that products can provide reliable returns in the future to attract users.

On the other hand, the regression analysis showed that when TU and TA were added, the direct predictive effect of FSC on IUIWM became insignificant. TU mediated the impact of FSC on IUIWM, as individuals with high FSC had higher TU and lower IUIWM. This result is contrary to our hypothesis for TU, which proposed that TU would positively predict IUIWM. However, the regression analysis showed that TU had no significant ability to predict IUIWM under the condition of FSC control. The results of the mediating effect indicated that, after adjusting for FSC, TU negatively predicted IUIWM. Previous studies have found that individuals with high uncertainty tolerance will show more risk preferences and delayed option (Weber and Johnson, 2009; Luhmann et al., 2011). We found that individuals with high TU showed lower IUIWM. This may be because of the particularity of Internet wealth management, which is known to investors because of its small overall risk and relatively stable revenue (Dong and Guo, 2015). Individuals with high TU pay less attention to uncertain information in situations or events and are more active in attention, memory, and explanations of uncertain information (Francis et al., 2016). When faced with uncertain information, individuals with high TU tend to underestimate the probability of negative outcomes (Bredemeier and Berenbaum, 2008). When assessing investment and wealth management risks, individuals with high TU pay more attention to positive results, such as high returns, and ignore the possibility of high risks, which leads them to choose the traditional investment method with high returns and high risks. Therefore, a higher level of TU is an important factor leading to a lower level of IUIWM in individuals with higher FSC. This study is different from previous research results that emphasized the low-risk attributes of Internet wealth management products (Dong and Guo, 2015), suggesting that the return attributes of Internet wealth management products are also a key factor.
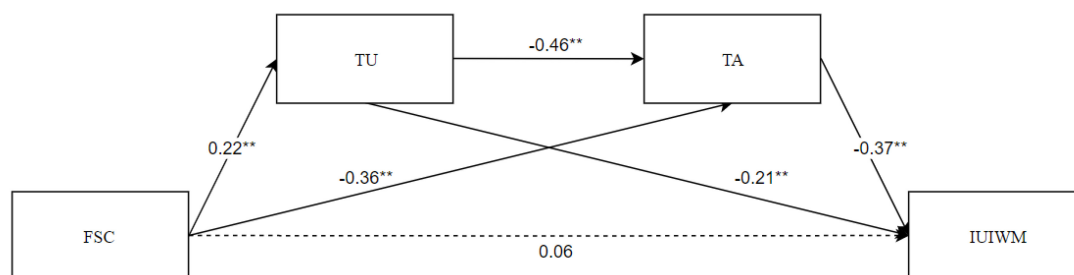
FIGURE 1
Serial multiple mediator model. **$p < 0.01$.

Further mediating effect tests also found that TA played a mediating role between FSC and IUIWM. Individuals with higher FSC had lower TA levels and higher IUIWM. Previous studies found that TA was low in individuals with high FSC (Sokol and Serper, 2017, 2019), which is consistent with the results of this study. We also found that IUIWM was higher in individuals with lower TA, which is consistent with the traditional view that high TA influences individuals to avoid risks and make conservative choices. Anxiety increases decision makers' sensitivity to negative information processing, which leads to an attentional bias toward negative information, which further weakens their competitive motivation (Gambetti and Giusberti, 2012; Gu et al., 2015). When making investment and wealth management decisions, individuals with high TA consider adverse results such as losses more than they consider the probability of negative results and ultimately choose to reduce or stop investment behavior. TA not only directly predicts IUIWM but also mediates the effect of FSC on IUIWM. In this study, the mediating effect of TA between FSC and IUIWM was 59.65%, which is greater than that of TU by 21.39%. This suggests that more attention should be paid to the influence of TA on IUIWM.

We found that TU significantly predicted TA in a negative direction, which is consistent with previous studies (Fergus et al., 2013; Song and Li, 2019). Anxiety levels in individuals with low TU accumulate before eliminating uncertainty factors, which leads to higher levels of anxiety (Wright et al., 2016; Song and Li, 2019). This study found that TU and TA not only play separate mediating roles between FSC and IUIWM, but FSC also influences IUIWM through serial multiple mediation of TU and TA. With the addition of TU and TA, the direct effect of FSC on IUIWM was not significant. TU and TA played a complete mediating role, which shows that the influence of FSC on IUIWM is predominately through TU and TA. From the perspective of indirect effects, although TU and TA had a serial multiple mediating effect, they exhibited a suppressing effect. FSC reduced IUIWM by increasing TU (mediating effect size 21.39%). Conversely, TA was lower in individuals with high FSC, which resulted in a higher IUIWM (intermediary effect size 59.65%). The positive effect of TA was

greater than that of TU. FSC decreased TA (serial multiple mediation effect size 18.95%) by increasing TU, resulting in an increase in IUIWM. According to the risk sensitivity theory, decision makers' risk decisions are not necessarily to seek the results of utility maximization, but to avoid those results that cannot meet their own needs (Caraco et al., 1980; Mishra et al., 2017). In the scenario of financial risk decision-making, individuals with low FSC induced anxiety due to their low TU of investment uncertainty, thus improving their sensitivity to potential risks of Internet financial management, and producing attention bias and priority processing, and more inclined to negative interpretation of the results of processing. Therefore, in order to avoid loss or negative emotional experience and meet the need of their own safety, anxiety promotes individuals' risk aversion, thus reducing their willingness to use Internet financial management.

Theoretical implications

In terms of theoretical significance, this paper firstly enriches the research on financial risk decision-making, especially the influence on Internet online finance. Existing studies have mainly discussed the external influencing factors of Internet finance (Zhao and Zhang, 2021). This paper explores the internal influencing factors from an individual perspective. Secondly, this study constructed a series of mediation models, which can provide reference for related research. Future research can explore other internal influencing factors of Internet finance. Third, current study also demonstrates the applicability of FSC theory in China. At the same time, the revised Chinese version of the FSC Questionnaire can also be applied to other studies with Chinese subjects.

Practical implications

In terms of actual impact, we provide practical operation plans for Internet financial products: Internet financial product

managers need to improve product competitiveness and expand market scale through customer segmentation and improving customers' experiences. Breakthroughs can be made in the following three aspects: First, FSC plays a particularly important role in promoting the intention to use, while the role of TA cannot be ignored. Product managers can subdivide users according to these two personality traits to provide customized products. Second, TU has a negative impact on intention to use. Individuals with high TU may prefer traditional financial products with high returns. Therefore, product managers can emphasize the profitability of Internet financial products rather than the low risk. Third, Vuong et al. (2022) found that the credibility of information influenced individuals' evaluation of using online healthcare information. Since the credibility of information and uncertainty are opposite, individuals with low TU are more willing to choose products with more real information, therefore they are more likely to choose financial products with higher credibility, which also revealed that Internet wealth management products providers should pay more attention to the authenticity of their publicity to attract more investors. Last but not least, there will always be risks of policy failures and systemic risks once the implementation becomes widely accepted and widely adopted, but it does not mean that the research does not make sense (Vuong, 2018). Investment is risky and financial management should be cautious.

Study limitations

This study has some limitations. First, only young people between the ages of 18 and 30 years participated in the study. Therefore, the study's conclusions cannot be generalized to other age groups. This leaves scope for future research to study IUIWM in other age groups. Second, conclusions drawn from cross-sectional studies may apply only to a certain point in time; longitudinal follow-up studies are needed to confirm the results. Third, this study found that TU and TA played a complete mediating role in FSC and IUIWM. However, other factors may influence the relationship between FSC and IUIWM. Future research may identify other influencing factors.

Conclusion

Although there is ample research on Internet wealth management, very few studies have focused on the role of personality psychology in people's intent to use Internet wealth management. Our results supported the hypothesized mediation models regarding the relationship between FSC and IUIWM. First, FSC negatively influenced the IUIWM through the mediation of tolerance to uncertainty. Second, FSC, through the mediating role of TA, positively influenced the IUIWM.

Third, TU and TA played complete serial multiple mediating roles between FSC and intention to use Internet wealth management. The positive effect of TA was greater than the negative effect of TU.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving human participants were reviewed and approved by the Ethics Committee of the School of Psychology, Fujian Normal University. The patients/participants provided their written informed consent to participate in this study.

Author contributions

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

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Positive reputation for altruism toward future generations regardless of the cost for current others

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Recently, altruism toward future generations (future altruism) has become a hot research topic. Although future altruism has been observed in several previous experiments, it is not yet clear when and why people are more likely to engage in future altruism. Drawing upon the empirical literature of reputation and cooperation, we predicted that future altruism brings reputational disadvantages. Accordingly, we investigated whether future altruism was evaluated positively or negatively by others in the current generation in two vignette studies (total N = 1,237). Contrary to our initial prediction, we found that future altruism was positively evaluated even when it decreased the payoff of the members of the current generation. The difference in the evaluation of future altruism, as opposed to unsustainable current-generation focused behavior, was most pronounced when people do not know how a future altruist allocates rewards among individuals in the current generation. However, the positive evaluation of future altruism did not stem from the expectation that future altruists would also be altruistic toward the current generation. These results indicated that reputational benefits (i.e., positive reputation from others in the current generation) promote future altruism.

KEYWORDS

altruism, future generations, intergenerational dilemma, sustainability, reputation, evaluation

1. Introduction

Recently, intergenerational problems, such as climate change and biodiversity loss, have attracted greater attention. It has become urgent to address these problems in the course of developing a sustainable society (United Nations, 2015). Intergenerational problems often entail the intergenerational dilemma, namely, conflict of interest between current and future generations (Wade-Benzoni and Tost, 2009); if we pursue the efficiency and benefit of our current generation, future generations will bear the cost, lose benefits, and/or face survival challenges. A growing body of research on altruism toward future generations (future altruism) has shown that people can behave altruistically toward the future, at least, in certain situations (Hauser et al., 2014; Saijo, 2019; Lohse and Waichman, 2020), and identified several psychological factors underlying future altruism (Wade-Benzoni, 2008; Wade-Benzoni, 2019 for review; Wade-Benzoni et al., 2008; Wade-Benzoni and Tost, 2009; Tost et al., 2015;

Bang et al., 2017). However, the degree to which people display future altruism depends on the situation, and it is unknown in what situation people can behave altruistically toward future generations. In this study, we investigated whether reputational disadvantage can be a boundary condition.

Altruistic behavior toward future generations is particularly challenging as compared to that toward the current generation. When individuals interact with others in the same generation, the interaction can continue, and they can correspondingly expect that their altruistic behavior can be reciprocated (Trivers, 1971). Contrastingly, however, people cannot have such an expectation when their altruistic behavior is directed toward future generations; obviously, others in future generations cannot time-travel to reciprocate the altruism that others in the past displayed (Wade-Benzoni and Tost, 2009). Given that people cannot expect to receive a return favor, it may be reasonable that rational individuals pursue their personal interests and benefits for their own generation.

Given that future altruism is theoretically challenging, it is of vital importance to empirically examine whether and to what extent people actually exhibit altruistic behavior toward future generations. To address this, researchers have developed new experimental economic games. The two most common games are the intergenerational goods game (IGG; Hauser et al., 2014) and the intergenerational sustainable dilemma game (ISDG; Kamijo et al., 2017). In these two games, groups of participants represent different generations, and they sequentially make decisions. It is important that, in these games, a group affects the size of public goods (i.e., benefits) of subsequent groups (i.e., generation) but not vice versa. If individuals prefer to pursue their interests, this maximizes their benefit but is detrimental to future groups. Contrastingly, if they make a sustainable decision, they do not maximize the benefit for their generation but preserve the size of public goods for future groups. In sum, these two games share two key features of the intergenerational dilemma: the unidirectionality of resource flow and the conflict of interest between the current and future generations.

Previous studies have shown that individuals display more altruistic behavior toward future generations in the IGG than in the ISDG. In the IGG, approximately 70% of the participants consistently left sufficient resources to subsequent generations (Hauser et al., 2014; Lohse and Waichman, 2020; Klaser et al., 2021). In the ISDG, by contrast, the proportion of groups that chose the sustainable option was only approximately 30% in general (Kamijo et al., 2017; Shahrier et al., 2017). We argue that game structure may play a pivotal role in the observed difference in future altruism between the two games.

In the IGG, each participant independently decides how much resource they would like to take from the common resource pool. If the remainder of the common resource pool falls below a threshold, the next group receives nothing. In this game, therefore, future altruism costs each participant but one's decision to benefit the future generation does not negatively influence the payoffs of others in the same generation. In the ISDG, players in the same group collectively choose between sustainable and unsustainable options (intergenerational decision). The sustainable option brings less benefits to the current generation than the unsustainable option, but the unsustainable option reduces the size of the public goods for the next group. In this game, thus, one's decision to preserve the public goods for the next group (i.e., future altruism) lowers the benefit for their group. Future altruism in the IGG only costs oneself, but that in the ISDG costs their group as a whole. We argue that the difference in the game structure helps us understand why people

display more future altruism in the IGG than in the ISDG (see also Böhm et al., 2020).

Why do people exhibit less future altruism when it costs their group than when it only costs themselves? We postulate that it can be because people assign different reputations to future altruism costing a group and that costing only oneself. Reputation creates incentives to behave altruistically toward strangers (Wu et al., 2016). Altruistic people are evaluated positively by third parties, and they can receive various benefits, including receiving altruistic behavior from others (indirect reciprocity; Nowak and Sigmund, 1998, 2005; Wedekind and Milinski, 2000; Milinski et al., 2001), building long-term relationships (Barclay, 2010), and improving their status (Hardy and Van Vugt, 2006; Van Vugt and Hardy, 2010). Conversely, people who behave exploitatively and selfishly toward others are evaluated negatively and are de facto excluded from the cooperative relationship (Feinberg et al., 2014; see also Halevy et al., 2012). When future altruism costs others in the same generation, those who display future altruism may earn a negative reputation and this may explain why individuals in the ISDG are much more reluctant to behave altruistically toward future generations compared to those in the IGG.

However, the role of reputation in the ISDG is not that simple; two diametrically opposite predictions can be made as to how people evaluate future altruism that costs the current generation as a whole. On the one hand, as we predicted in the previous paragraph, people may assign a bad reputation to future altruists who reduce the benefits for the current generation (Feinberg et al., 2014) in exchange for benefits for future groups. This brings a double disadvantage to future altruists; they not only fail to maximize their own payoff but also fail to build cooperative relationships with members of the current generation owing to their bad reputation. In this case, reputation may become an obstacle to future altruism. Conversely, people may positively evaluate future altruism despite that it reduces benefits for the current generation, if they can focus on the benefits that future altruists leave for future generations. As mentioned above, people tend to positively evaluate those who behave altruistically toward others in general (Hardy and Van Vugt, 2006; Barclay, 2010), and this may hold even when recipients of altruistic behavior are those in future generations. In this case, reputation may promote future altruism. Thus, while it seems reasonable to expect that the decreased future altruism in the ISDG is driven by reputational concern, this prediction deserves careful consideration, and it is of vital importance to first elucidate how individuals perceive future altruism that costs the current generation.

In the current research, therefore, we investigated whether future altruists in the ISDG, in which future altruism reduces the benefits of the current generation, would earn a negative or a positive reputation. In addition, we manipulated the amount of costs that future altruism makes members of the current generation incur. It is assumed that the fewer costs they have to incur, the more positive reputation future altruists earn. To address this, in the present research, we let future altruists decide the division of the money among members of the current generation; in one condition, the future altruist selfishly allocated money and imposed most of the costs associated with future altruism on the other member. In another condition, they equally allocated money and split the costs equally. In the last condition, they altruistically allocated money and bore most of the costs. This manipulation helped us elucidate whether the evaluation of future altruism depended on its cost for members of the current generation.

In Study 1, we exploratorily examined the evaluation of future altruists and unsustainable persons in the ISDG, manipulating the

division of money among members of the current generation. In Study 2, we confirmed whether the results of Study 1 could be replicated with preregistration, preregistering the experimental method, statistical method, and hypotheses. In addition, we examined whether the estimation of the money allocation among the current generation had a mediating effect on the evaluation when actual money allocation was unknown. These studies revealed when future altruists can earn good reputations and suggest how reputation systems in the current generation work for future altruism.

2. Study 1

2.1. Method

2.1.1. Participants

The survey form was prepared in Japanese and participants were recruited through an online research company (Cross Marketing Inc., Japan). We requested this company to equally assign participants' gender and age in each of the four between-participants conditions. The number of participants who successfully answered the comprehensive check questions and completed the ISDG evaluation task was predetermined at 1,000 (500 men and 500 women; 125 men and 125 women in each condition; M_{age} = 45.15, SD = 14.77). Because this was the first study on evaluating future altruism, the effect size was unpredictable. Therefore, we tentatively set the sample size at 250 in each condition.

We obtained ethics approval from the ethics committee of Kochi University of Technology, which met the requirements of the Declaration of Helsinki. We obtained informed consent from all participants; the description of this survey was displayed on the first page, and participants started the survey only after they agreed to participate.

2.1.2. Procedure

After giving consent, participants answered demographic questions (sex, age, and residential area). Participants then read the instructions of the ISDG and answered comprehension check questions about the ISDG to ensure that they correctly understood the structure of the game (see Supplementary material for more details). Participants who correctly answered at least two out of three comprehension check questions proceeded to the next part. They were presented with the correct answers and explanations of the comprehension check questions and they started the ISDG evaluation task (see ISDG Evaluation task section). Finally, they answered some questions about personality (see Section 5 of the Supplementary material). Participants who failed to correctly answer at least two of the comprehension check questions were excluded from the study at this point and dismissed.

2.1.3. ISDG evaluation task

This vignette task was developed to measure the evaluation of intergenerational behaviors in the ISDG, in which we manipulated the intergenerational altruism and the amount of costs that the current generation has to incur (i.e., intragenerational decision-making). Each group in the ISDG, which represented one generation, consisted of two people with different roles: the decision-maker (DM) and the evaluator. The DM made two decisions in the ISDG. In the first decision (the intergenerational decision), the DM chose between

unsustainable option A and sustainable option B. The payoffs of the intergenerational decision are represented in Table 1. For instance, if the DM chooses option B, the first generation gets 1800 yen, which is 600 yen less than it would earn if the DM chose option A. While the sustainable option leads to less earning for the first generation than the unsustainable one, it is more beneficial for the subsequent generations. If the DM in the first generation chooses unsustainable option A, the sustainable and unsustainable options in the second generation yield 1200 yen and 1800 yen for the second generation, respectively. By contrast, if the DM in the first generation chooses sustainable option B, the sustainable and unsustainable options in the second generation yield 1800 yen and 2400 yen for the second generation, respectively. After the DM made a choice between options A and B, they then proceeded to make the second decision (the intragenerational allocation); the DM divided the payoff from the first decision between themselves and the evaluator. If, for instance, the DM in the first generation chooses option A, the first generation earns 2400 yen, and the DM then divides it between themselves and the evaluator[1]. We would like to note that the DM was introduced as a leader and the evaluator as a member in the scenario.

In the ISDG evaluation task, participants evaluated the DM as the evaluator. We manipulated the intergenerational decision of the DM (sustainable vs. unsustainable) and the intragenerational allocation of the DM (no-decision vs. altruistic vs. equal vs. selfish), as within-participant factors (see Table 2). Thus, there were eight evaluations to make for participants. In the no-decision condition, participants evaluated the DM who had not yet made an intragenerational decision. Importantly, after participants evaluate the DM in the no-decision condition, they might pay less attention to intragenerational allocations in the subsequent trials. Thus, for half of the participants, we did not present the no-decision conditions (i.e., without no-decision condition). Thus, those in the without no-decision condition made six evaluations, while those in the with no-decision condition made eight (see Figure 1). As we designed the no-decision condition as a baseline, participants in the with no-decision condition were first presented with the no-decision × sustainable and the no-decision × unsustainable conditions in a randomized order and then completed the remaining conditions again in a randomized order. Those in the without no-decision condition completed the six evaluations in a randomized order (see Figure 1). In other words, the presence of the no-decision condition was manipulated as a between-participants factor (with no-decision condition vs. without no-decision condition; Table 3).

In addition, we manipulated the evaluation target as a between-participants factor to explore whether their evaluation differs depending on the domain of the evaluation: the DM or the DM's decision (Table 3). For participants who were randomly assigned to the decision-evaluate condition, we asked them to indicate how much they thought the decision made by the DM was right, respectable, inappropriate (reversed), harmful (reversed), and how much they supported this decision. Those in the DM-evaluation condition indicated how much they thought the DM was trustworthy, cooperative, generous, likable, kind, reliable, and how much they supported the DM.

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[1] We did not inform participants about whether the DM knew if they would be evaluated.

2.2. Results

We excluded participants who did not seem to pay attention to the study. Namely, we excluded participants who continued to give similar responses to the items measuring personality variables, which we asked for explanatory investigations (see **Supplementary material** for details about the questionnaires)[2]. This left us 944 participants for analyses. We used the SAS OnDemand for Academics

and the HAD 16.0 (Shimizu, 2016) for analyses. All items measuring evaluation were averaged and used as a main dependent variable (decision-evaluate condition: α = 0.85; DM-evaluate condition: α = 0.97). All statistical tests conducted following were two-tailed.

The average evaluation of each condition is shown in **Table 4**. First, we conducted a 2 (evaluation target: the DM vs. the DM's decision) × 2 (intergenerational decision: sustainable vs. unsustainable) ANCOVA[3] on the evaluation in the no-decision condition (i.e., when there is no information about intragroup

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2 We used a questionnaire for social value orientation (Eek and Gärling, 2006), which measures resource allocation preference. In this questionnaire, a person with a somewhat consistent preference will choose various options throughout the whole questionnaire because an option corresponding to a particular preference is different for each question. Therefore, we excluded those who chose the same options for all questions in this questionnaire, regarding this as paying insufficient attention to the survey. Note that the main results were similar when we analyzed all participants (there was no difference

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in results except that the effect of age was no longer significant in the ANCOVA of no-decision condition).

3 As many studies assume a normal distribution about the evaluation measured by questionnaires, we also assumed normal distributions. However, actual distributions of some indexes have higher kurtoses than the normal distribution. We reported the result of the ANCOVA test because the main

TABLE 1 The payoff in the intergenerational decision in the ISDG.

The 1st group	The 2nd group	The 3rd group	The 4th group	The 5th group	The 6th group	
			A 600	A 0	A −600,	B −1,200
				B −600	A 0,	B −600
		A 1,200	B 0	A 600	A 0,	B −600
	A 1,800			B 0	A 600,	B 0
		B 600	A 1,200	A 600	A 0,	B −600
				B 0	A 600,	B 0
			B 600	A 1,200	A 600,	B 0
				B 600	A 1,200,	B 600
A 2,400			A 1,200	A 600	A 0,	B −600
				B 0	A 600,	B 0
		A 1,800	B 600	A 1,200	A 600,	B 0
	B 1,200			B 600	A 1,200,	B 600
		B 1,200	A 1,800	A 1,200	A 600,	B 0
				B 600	A 1,200,	B 600
			B 1,200	A 1,800	A 1,200,	B 600
				B 1,200	A 1,800,	B 1,200
			A 1,200	A 600	A 0,	B −600
				B 0	A 600,	B 0
		A 1,800	B 600	A 1,200	A 600,	B 0
	A 2,400			B 600	A 1,200,	B 600
		B 1,200	A 1,800	A 1,200	A 600,	B 0
				B 600	A 1,200,	B 600
			B 1,200	A 1,800	A 1,200,	B 600
				B 1,200	A 1,800,	B 1,200
B 1,800			A 1,800	A 1,200	A 600,	B 0
				B 600	A 1,200,	B 600
		A 2,400	B 1,200	A 1,800	A 1,200,	B 600
	B 1,800			B 1,200	A 1,800,	B 1,200
		B 1,800	A 2,400	A 1,800	A 1,200,	B 600
				B 1,200	A 1,800,	B 1,200
			B 1,800	A 2,400	A 1,800,	B 1,200
				B 1,800	A 2,400,	B 1,800

Unit: yen.

TABLE 2 | The list of the evaluator's gain in each DM with the intergenerational decision and the intragenerational allocation.

| The intergenerational decision	The intragenerational allocation	Money that each player gets as a result of ISDG
Unsustainable	No-decision	Not mentioned (DM had not made intragenerational allocation yet)
	Selfish	DM: ¥1,500, Participant: ¥900
	Equal	DM: ¥1,200, Participant: ¥1,200
	Altruistic (only study 1)	DM: ¥900, Participant: ¥1,500
Sustainable	No-decision	Not mentioned (DM had not made intragenerational allocation yet)
	Selfish	DM: ¥1,200, Participant: ¥600
	Equal	DM: ¥900, Participant: ¥900
	Altruistic (only study 1)	DM: ¥600, Participant: ¥1,200
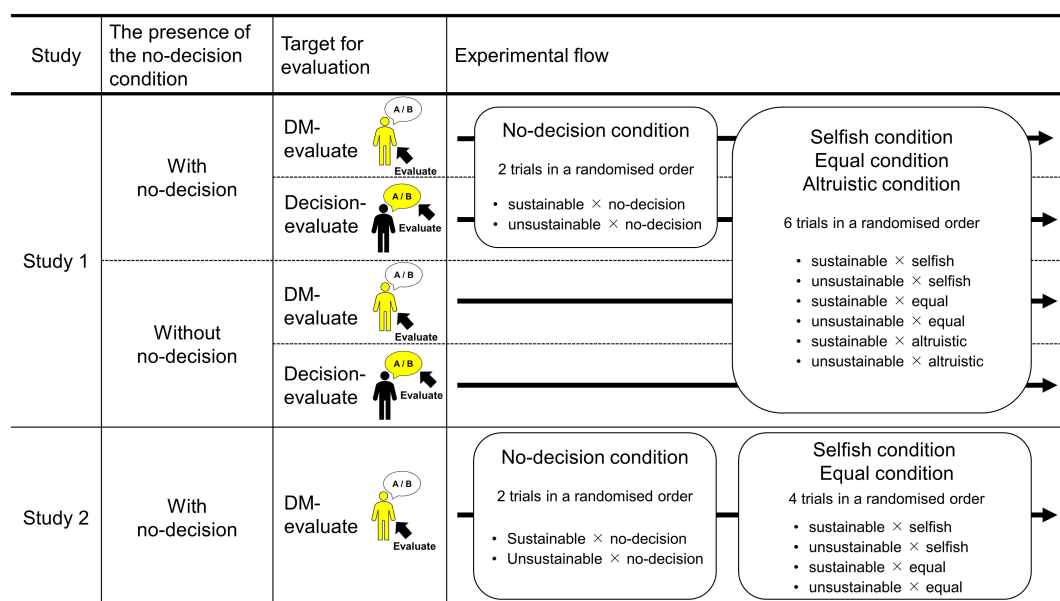
FIGURE 1

The process of the ISDG evaluation task. The abbreviation "DM" means the decision maker.

allocation) with age and sex as covariates. The reason for separately analyzing this condition was that only half of the total participants, who were assigned to the with no-decision condition, experienced the no-decision condition. Both of the main effect were found to be significant [evaluation target: $F(1, 466) = 37.268$, $p < 0.001$, $\eta_G{}^2 = 0.033$; intergenerational decision: $F(1, 468) = 23.917$, $p < 0.001$, $\eta_G{}^2 = 0.028$]. The evaluation was more positive when DM chose the sustainable option than when DM chose the unsustainable option (sustainable: $EMM^4 = 5.405$, $SE = 0.073$; unsustainable: $EMM = 4.888$, $SE = 0.067$). In addition, the evaluation in the decision-evaluate condition was more positive than in the DM-evaluate condition (decision-evaluate: $EMM = 5.425$, $SE = 0.065$; DM-evaluate: $EMM = 4.868$, $SE = 0.064$). The interaction effect was also found to be significant [$F(1, 468) = 9.727$, $p = 0.002$, $\eta_G{}^2 = 0.012$]; the simple main effect analysis of the intergenerational decision revealed that the DM who chose the sustainable option was evaluated

more positively than the DM who chose the unsustainable option in the DM-evaluate condition [sustainable: $EMM = 5.291$, $SE = 0.108$; unsustainable: $EMM = 4.445$, $SE = 0.096$; $F(1, 237) = 34.516$, Holm-corrected $p < 0.001$, **Figure 2A**]. However, there was no difference between the sustainable and unsustainable decisions in the decision-evaluate condition *per se* [sustainable: $EMM = 5.519$, $SE = 0.099$; unsustainable: $EMM = 5.332$, $SE = 0.092$; $F(1, 231) = 1.461$, Holm-corrected $p = 0.228$; **Figure 2B**]. Age was significant, suggesting that older people gave more positive evaluations [$F(1, 466) = 3.874$, $p = 0.050$, $\eta_G{}^2 = 0.004$]. There was no significant effect of sex [$F(1, 466) = 0.661$, $\eta_G{}^2 = 0.001$, $p = 0.417$].

Next, we conducted a 2 (evaluation target: the DM vs. the DM's decision) × 2 (intergenerational decision: sustainable vs. unsustainable) × 3 (intragenerational allocation: selfish vs. equal vs. altruistic) ANCOVA with age, sex, and the presence of the no-decision condition (with no-decision vs. without no-decision) as covariates[5] (**Figure 3**). All the main effects were significant

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results were almost the same as the analyses assuming other distributions (see **Supplementary material**).

4   Estimated mean when covariates equal mean values are shown.

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5   We conducted an analysis where we included the presence of the no-decision condition as an independent variable and examined the interaction

TABLE 3   The summary of the between-participants conditions.

Factor	Each condition name	Explanation
The presence of the no-decision condition	With no-decision	Participants experienced the no-decision condition about the intragenerational allocation. They made 8 evaluations.
	Without no-decision	Participants skipped the no-decision condition about the intragenerational allocation. They made 6 evaluations.
Evaluation target	Decision-evaluate	Participants were asked, "what do you make of the leader's choice of option A (B)?"
	DM-evaluate	Participants were asked, "what do you think about this leader's personality?"

[evaluation target: $F(1, 939) = 16.943$, $p < 0.001$, $\eta_G^2 = 0.007$; intergenerational decision: $F(1, 942) = 4.583$, $p = 0.033$, $\eta_G^2 = 0.001$; and intragenerational allocation: $F(2, 1884) = 217.118$, $p < 0.001$,

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effect between this and other independent variables. However, there was no interaction effect (see **Supplementary Table S1**). Therefore, we used a simpler model where this factor was a covariate.

$\eta_G^2 = 0.075$]. Again, the evaluation was more positive when DM chose the sustainable option than when DM chose the unsustainable option (sustainable: $EMM = 5.181$, $SE = 0.035$; unsustainable: $EMM = 5.099$, $SE = 0.036$). The evaluation in the decision-evaluate condition were more positive than in DM-evaluate condition (decision-evaluate: $EMM = 5.263$, $SE = 0.042$; DM-evaluate: $EMM = 5.018$, $SE = 0.042$). In addition, the selfish allocation among the current generation was evaluated as being significantly more negative than other allocations according to Holm-method multiple comparisons (selfish: $EMM = 4.546$, $SE = 0.042$; equal: $EMM = 5.440$, $SE = 0.040$; altruistic: $EMM = 5.434$, $SE = 0.042$). The evaluation target × intragenerational allocation interaction was significant [$F(2, 1884) = 14.610$, $p < 0.001$, $\eta_G^2 = 0.005$]. Yet, the other interaction terms were not significant ($F_s < 1.796$, $p_s > 0.181$, $\eta_G^2{}_s < 0.001$). We probed the significant interaction and found that the evaluation in the DM-evaluate condition was more negative than in the decision-evaluate condition when the intragenerational allocation was selfish [decision-evaluate: $EMM = 4.815$, $SE = 0.059$; DM-evaluate: $EMM = 4.276$, $SE = 0.059$; $F(1, 939) = 41.478$, Holm-corrected $p < 0.01$] and equal [decision-evaluate: $EMM = 5.531$, $SE = 0.057$; DM-evaluate: $EMM = 5.349$, $SE = 0.057$; $F(1, 939) = 5.107$, Holm-corrected $p = 0.048$]. However, this difference was not significant when the intragenerational allocation was altruistic [decision-evaluate: $EMM = 5.442$, $SE = 0.059$; DM-evaluate:

TABLE 4   The descriptive statistics of evaluation in each condition (Study 1).

Intergenerational decision		Unsustainable				Sustainable			
Intragenerational allocation		No-decision	Selfish	Equal	Altruistic	No-decision	Selfish	Equal	Altruistic
With no-decision	DM-evaluate (N = 238)	4.44 (1.48)	4.30 (1.52)	5.23 (1.56)	5.32 (1.51)	5.29 (1.65)	4.25 (1.59)	5.39 (1.64)	5.46 (1.62)
	Decision-evaluate (N = 232)	5.33 (1.41)	4.91 (1.30)	5.57 (1.41)	5.46 (1.39)	5.52 (1.50)	4.90 (1.50)	5.58 (1.46)	5.48 (1.27)
Without no-decision	DM-evaluate (N = 238)	—	4.17 (1.56)	5.33 (1.66)	5.34 (1.60)	—	4.38 (1.66)	5.44 (1.71)	5.58 (1.66)
	Decision-evaluate (N = 236)	—	4.72 (1.34)	5.45 (1.27)	5.38 (1.19)	—	4.73 (1.35)	5.53 (1.33)	5.45 (1.20)

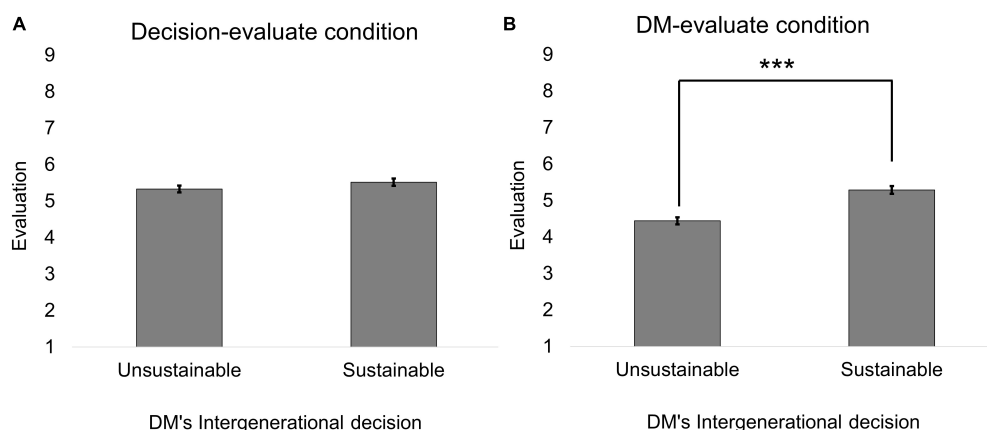Values in parentheses are standard deviations.

FIGURE 2

The baseline evaluation in the no-decision condition (Study 1). **(A)** Is the evaluation in the decision-evaluate condition. **(B)** Is the evaluation in the DM-evaluate condition. Error bars represented the standard errors. Different from the main text, sample means were shown. The asterisks indicate Holm-corrected statistical significance based on the simple main effect analysis of the sub-sample. ***$p < 0.001$.
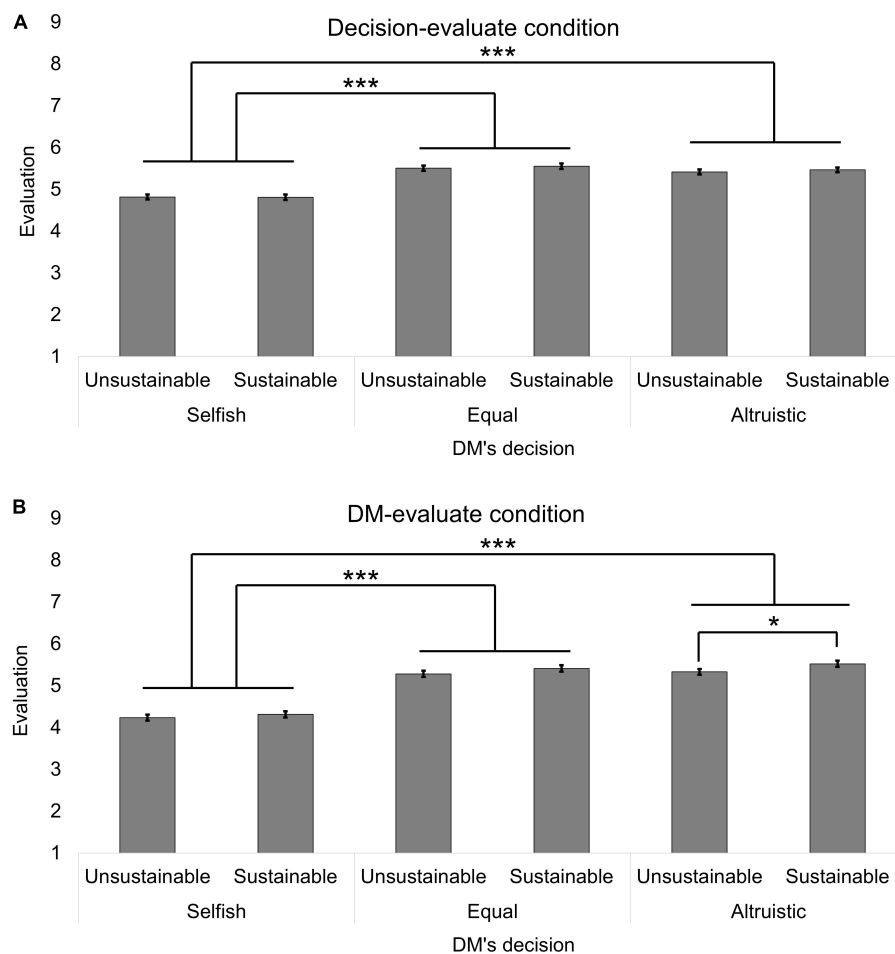
FIGURE 3
The evaluation in the three intragenerational allocation conditions other than the no-decision condition (Study 1). **(A)** Is the evaluation in the decision-evaluate condition. **(B)** Is the evaluation in the DM-evaluate condition. Error bars represented the standard errors. Different from the main text, sample means were shown. The asterisks indicate Holm-corrected statistical significance based on the simple main effect analysis of the sub-sample. *$p < 0.05$, ***$p < 0.001$.
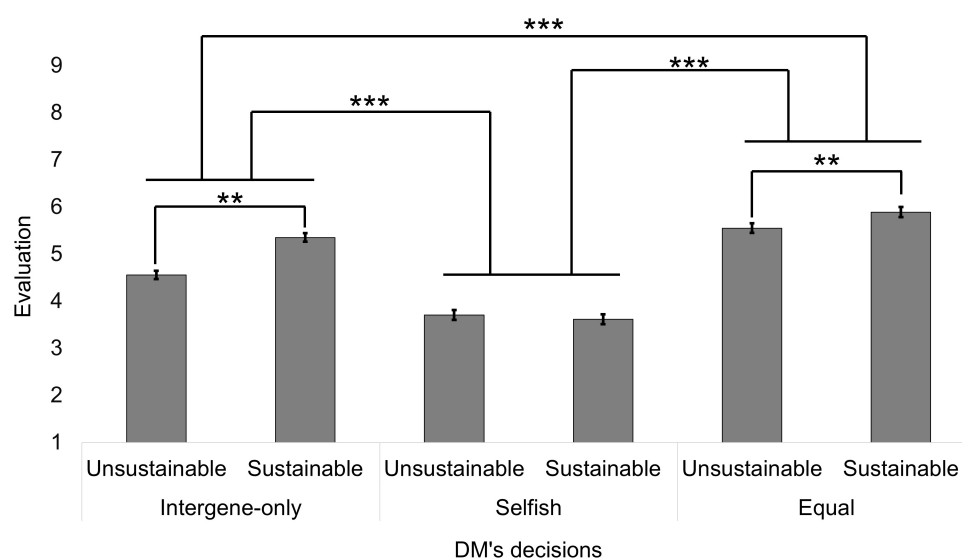
FIGURE 4
The evaluations in Study 2. The error bars represented the standard errors. Different from the main text, sample means were shown. The asterisks indicate statistical significance based on the ANCOVA and the simple main effect analysis of the sub-sample (Holm-corrected). **$p < 0.01$, ***$p < 0.001$.
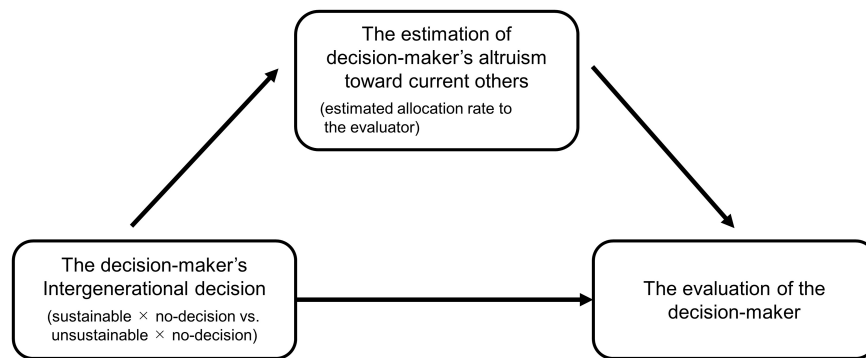
FIGURE 5
The mediation model investigated in Study 2.

$EMM = 5.427$, $SE = 0.059$; $F(1, 939) = 0.031$, Holm-corrected $p = 0.860$]. No covariates had significant effects in this analysis [age: $F(1, 939) = 2.291$, $\eta_G^2 = 0.001$, $p = 0.130$; sex: $F(1, 939) = 0.598$, $\eta_G^2 = 0.000$, $p = 0.439$; the presence of the no-decision condition: $F(1, 939) = 0.225$, $\eta_G^2 = 0.000$, $p = 0.635$].

In summary, future altruism was more positively evaluated compared to unsustainable behaviors, even if future altruism decreased the current generation's benefit. In addition, selfish intragenerational allocation was evaluated more negatively than equal and altruistic allocation. However, the interaction between intergenerational decision and intragenerational allocation was not significant. Interestingly, the effect size of the intergenerational decision was larger in the ANCOVA of no-decision condition than in the ANCOVA of the other three intragenerational allocation conditions. This suggests that the display of intragenerational allocation decreased the evaluation difference between the evaluations of sustainable and unsustainable behaviors. Comparing the effect size of the main effects between intergenerational decision and intragenerational allocation, intragenerational allocation affected the evaluation more strongly than the intergenerational decision when the intragenerational allocation was revealed. Regarding the evaluation target, the evaluation in the DM-evaluate condition was more negative than in the decision-evaluate condition. Especially, the evaluation of the DM became more negative than that of the decision when the DM made self-serving decisions (unsustainable decisions in the intergenerational decision and selfish allocations in the intragenerational allocation). As a result, the difference in the evaluation between the sustainable and unsustainable decisions was larger in the DM-evaluate condition.

Why was future altruism positively evaluated, even if it may be costly to current others, including the evaluators themselves? We focused on the result that the main effect of intergenerational decision was larger in the no-decision condition, where the DM's altruism toward current others was not revealed. This led us to further predict that people may evaluate future altruists based on their altruistic tendencies for the current generation, but when their altruistic tendencies are unknown, they generally positively evaluate future altruists, assuming that future altruists would not behave selfishly toward the current generation. When people do not know about how others would treat them and their generation, people may use future altruism as a proxy to infer their altruistic tendencies. If so, a positive evaluation of future altruism should be mediated by high estimations of altruism toward current others. To test the hypothesis, we conducted Study 2. To this end, in Study 2, we focused on the evaluation in the DM-evaluate condition, which had a larger difference between the sustainable and unsustainable decisions, and investigated whether the estimations of altruism toward current others explained this difference.

3. Study 2

3.1. Method

3.1.1. Participants

The survey form was prepared in Japanese and participants were recruited through the same research company as study 1. We requested this company to ensure that people who had participated in Study 1 did not participate again.

In Study 2, we sought to recruit at least 250 participants, which is the number of participants that we had in each between-subject condition in Study 1. Therefore, the target sample size was initially set at 275 so that 250 participants would remain after the exclusion. This sample size was calculated based on the exclusion rate in Study 1 (5.6%). However, based on advice from the research company, the sample size was later set to 300, a convenient number for generating an equal allocation of gender and age. Therefore, we collected 300 participants (150 men and 150 women; $M_{age} = 45.08$, $SD = 15.06$).

We conducted preregistration for Study 2 using the Open Science Framework (see Acknowledgments[6]). We conducted this study according to the preregistration, but the sample size was changed, as mentioned above. There are no other changes in the preregistration.

The ethics committee of Kochi University of Technology approved this study's procedure, which met the requirements of the Declaration of Helsinki. We obtained informed consent from all participants; the description of this survey was displayed on the first page, and participants started the survey only after they agreed to participate.

3.1.2. Procedure

The procedure of Study 2 was similar to that of Study 1. However, there were four main changes to the ISDG evaluation task to measure expectation about how altruistic future altruists are to

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6 https://osf.io/cwfxj

those in the current generation. First, we measured the estimation of the DM's allocation among the current generation in the no-decision condition. In particular, we asked participants how much money they thought the DM allocated to them. Participants answered this question in increments of 100 yen. Second, we removed the manipulation of the presence of the no-decision condition, and all participants experienced the no-decision condition to estimate DM's allocation. In Study 1, we found that this did not affect the evaluation of future altruism. Third, we also removed the manipulation of the evaluation target, and all participants evaluated the DM's impression in this study. This was because it seemed to be convenient to investigate the mediation effect to focus on the condition that has the larger difference in the evaluation between sustainable and unsustainable decisions. Finally, we removed the altruistic condition from the DM's intragenerational allocation because the evaluation was similar to that in the equal intragenerational allocation in Study 1.

In addition, we added two demographic questions to the end of the survey as control variables: parenthood and grandparenthood. This was because we suspected that having children or grandchildren may increase the concern for the future generation and also affect the evaluation of future altruism.

3.2. Results

We excluded participants who did not seem to pay attention to the study. Namely, we excluded participants who continued to give similar responses to the items measuring personality variables, which we asked for exploratory investigations (see **Supplementary material** for details about the questionnaires)[7]. This left us 293 participants for analyses.

We summarize descriptive statistics of the average evaluation score for each condition in **Figure 4**. First, we conducted a 2 (intergenerational decision: sustainable vs. unsustainable) × 3 (intragenerational allocation: no-decision vs. selfish vs. equal) ANCOVA[8]. The covariates were age, gender, parenthood, and grandparenthood. As a result, both of the main effects were significant [intergenerational decision: $F_{(1, 292)} = 27.084$, $p < 0.001$, $\eta_G^2 = 0.010$; intragenerational allocation: $F_{(2, 584)} = 183.446$, $p < 0.001$, $\eta_G^2 = 0.198$]. As in Study 1, the evaluation of the sustainable DM was more positive than of the unsustainable DM (sustainable: $EMM = 4.953$, $SE = 0.068$; unsustainable: $EMM = 4.603$, $SE = 0.073$). In addition, there were significant differences between all intragenerational allocation according to multiple comparisons (Holm method); the evaluation in the equal allocation condition was the highest; the second highest was the no-decision condition; and

it was the lowest in the selfish allocation condition (no-decision: $EMM = 4.954$, $SE = 0.070$; selfish: $EMM = 3.660$, $SE = 0.098$; equal: $EMM = 5.720$, $SE = 0.096$). The interaction effect was also significant [$F_{(2, 584)} = 29.994$, $p < 0.001$, $\eta_G^2 = 0.011$]. The simple main effect analysis of intergenerational decision revealed that the DM who chose the sustainable option was evaluated more positively than who chose the unsustainable option in the no-decision condition [sustainable: $EMM = 5.352$, $SE = 0.092$; unsustainable: $EMM = 4.556$, $SE = 0.088$; $F_{(1, 292)} = 48.436$, Holm-corrected $p < 0.01$] and equal allocation condition [sustainable: $EMM = 5.890$, $SE = 0.106$; unsustainable: $EMM = 5.550$, $SE = 0.101$; $F_{(1, 292)} = 16.032$, Holm-corrected $p < 0.01$]. In the selfish condition, the effect of the intergenerational decision was insignificant [sustainable: $EMM = 3.616$, $SE = 0.105$; unsustainable: $EMM = 3.704$, $SE = 0.103$; $F_{(1, 292)} = 1.249$, Holm-corrected $p = 0.265$]. The effect of covariates were all insignificant [age: $F_{(1, 288)} = 0.008$, $\eta_G^2 = 0.000$, $p = 0.929$; sex: $F_{(1, 288)} = 0.010$, $\eta_G^2 = 0.000$, $p = 0.919$; parenthood: $F_{(1, 288)} = 0.003$, $\eta_G^2 = 0.000$, $p = 0.958$; grandparenthood: $F_{(1, 288)} = 0.461$, $\eta_G^2 = 0.001$, $p = 0.498$].

Next, we investigated the mediation effect of the estimation of how altruistic a DM is toward those in the current generation (see **Figure 5**). We conducted a two-condition within-participants statistical mediation analysis (Montoya and Hayes, 2017). We did not add any covariates because covariates were to be considered only when they were predicted to affect differently in each condition in this analysis (Montoya, 2019), and we did not expect this difference. We used a SAS macro, MEMORE (Montoya, 2019), to estimate the total, direct, and indirect effects in the model. This macro estimates the confidence interval for these effects using the bootstrap method. We calculated the 95% confidence intervals with 10,000 bootstrap samples in our analysis. If they did not include 0, we considered the effect significant.

The result revealed that both the direct and indirect effects were significant; their confidence intervals did not contain zero (**Figure 6**). However, the indirect effect was much smaller than the direct effect. As such, the effect of the estimation of the DM's altruism toward current others was insufficient to explain why future altruism is positively evaluated, although the DM who chose the sustainable option was predicted to be more altruistic toward current others than the DM who chose the unsustainable option (estimated allocation rate to evaluator: sustainable: 48.1%; unsustainable: 45.5%; Wilcoxon signed-rank test: $S = 3227$, $p < 0.001$).

4. Discussion

Our studies suggest that people positively evaluate future altruism, even if future altruism reduces the payoff for their own generation as well as themselves. We also found that the evaluation difference between the sustainable and unsustainable DM was the largest when the DM's altruism toward current others was not revealed. By contrast, the effect of the intergenerational decision on the evaluation greatly diminished when the DM's intragenerational allocation was revealed. In this case, intragenerational allocation, namely altruism toward current others, had a stronger influence on the evaluation; the DM who allocated resources selfishly among the current generation was more negatively evaluated than the DM who allocated resources equally or altruistically.

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7 We again used a questionnaire for social value orientation (slider measure; Murphy et al., 2011). Although the questionnaire differed from Study 1, it is the same in that an option corresponding to a particular preference is different for each question. We excluded those who chose the same options for all questions in this questionnaire. Note that all the results were similar when we analyzed all participants.

8 As many studies assume a normal distribution about the evaluation measured by questionnaires, we also assumed a normal distribution on the occasion of the preregistration. However, when the actual distribution was checked ex-post, kurtoses of some measures were higher than the normal distribution. Although the reliability of the ANCOVA test was decreased, we reported the result of the ANCOVA test as we preregistered. This is because other major continuous probability distributions also did not apply to the actual distributions. The main results were the same as the analyses assuming other distributions (see **Supplementary material**).
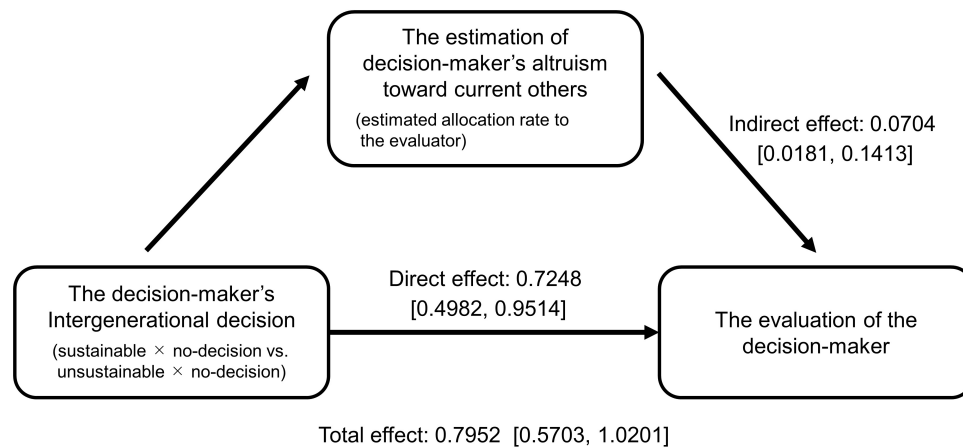
FIGURE 6
The result of the mediation analysis in Study 2. The values in the brackets are the confidence intervals.

Regardless, Study 2 suggests that the positive evaluation of future altruism does not stem from the prediction that future altruists will also de facto be altruistic toward current others. The prediction of altruism toward current others had only a small indirect effect on the DM's evaluation. This means that the good evaluation of future altruists comes from future altruism itself. From this perspective, people may distinguish the altruism displayed toward current others from that displayed toward future others for evaluation. However, our studies could not identify exactly why people positively evaluated future altruism. Further research is needed on this point.

We would like to note that the ecological validity of this study is limited. In the ISDG game, we defined other players who will play the game in later rounds as "future generations." This game represents important features of future altruism such as the unidirectionality of resource flow and the conflict of interest between the current and future generations. Yet, while everyday future altruism is often directed toward those who are not yet born (i.e., future generation), recipients of future altruism in our studies are other participants. In other words, our design did not fully reflect one feature of future altruism, that is, altruism being toward those not yet born. Therefore, future studies should examine the evaluation of future altruism in more ecologically suitable contexts, for instance, by focusing on pro-environmental behaviors (e.g., supporting the introduction of carbon tax).

There were some other limitations to these studies. First, our studies focused on second-party evaluations of future altruism, but the evaluation from the third party, who does not incur the cost of future altruism, has not yet been examined. Because we assumed that evaluators incurring costs of future altruists' behavior would lead to negative evaluation, we did not focus on the evaluation from the third party in our studies. Our results suggest that people positively evaluate future altruism even when they have to incur its cost. Therefore, it is expected that the third party with no interest will also positively evaluate future altruism, but it needs to be confirmed. Second, the participants may have been already altruistically biased according to the measure of personality, social value orientation (see **Supplementary Tables S7, S8** and **Supplementary Figure S1**). It needs to be checked whether our results can be replicated

with a potentially less biased sample. Third, we conducted two studies in vignettes because we needed to manipulate the target decisions. Therefore, our results should be validated in situations where participants are fully incentivized. Finally, our result that future altruism was evaluated positively raises a question about the hypothesis that the costs of the current others discourage future altruism. We predicted that people behave altruistically toward future generations in IGG (Hauser et al., 2014; Lohse and Waichman, 2020; Klaser et al., 2021) more than in ISDG (Kamijo et al., 2017; Shahrier et al., 2017) because future altruism is not supported by current others when the given behavior is costly for current others. However, our result suggested that current others support future altruism even if they have to incur costs. In this case, why are the degrees of altruistic behavior toward future generations different between these games? Is future altruism disadvantageous to the actual interests of the future altruist, even if a good reputation is obtained? Or are there other factors? Further research is needed on these questions.

In summary, we investigated whether future altruism leads positive or negative reputation to reveal whether there is a reputational disadvantage for future altruism. Our studies showed that future altruist is positively evaluated by current others. This suggests the possibility that future altruism is promoted by rewards from current others, as well as that altruism toward current third parties (indirect reciprocity). It is a plausible assumption that positive and negative evaluations induce rewards and punishments, respectively. Although it is necessary to examine whether future altruism can be maintained by punishments or rewards from current others, it is an important suggestion that reputational incentives may promote future altruism. If so, self-serving individuals may behave altruistically when the reputational incentives are emphasized. There may be both preference-based and reputation-based mechanisms behind future altruism (Inoue et al., 2021). The reputation-based mechanisms may promote future altruism especially among those who do not have a prosocial preference toward future generations. Highlighting reputational benefits of future altruism, i.e., disclosing the amount of contribution, may be an effective way to encourage sustainable behaviors.

Data availability statement

The datasets presented in this study can be found in online repositories. The names of the repository/repositories and accession number(s) can be found below: https://osf.io/qkfhm.

Ethics statement

The studies involving human participants were reviewed and approved by the Ethics Committee of Kochi University of Technology. Written informed consent for participation was not required for this study in accordance with the national legislation and the institutional requirements.

Author contributions

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Supplementary material

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpsyg.2022.895619/full#supplementary-material

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