

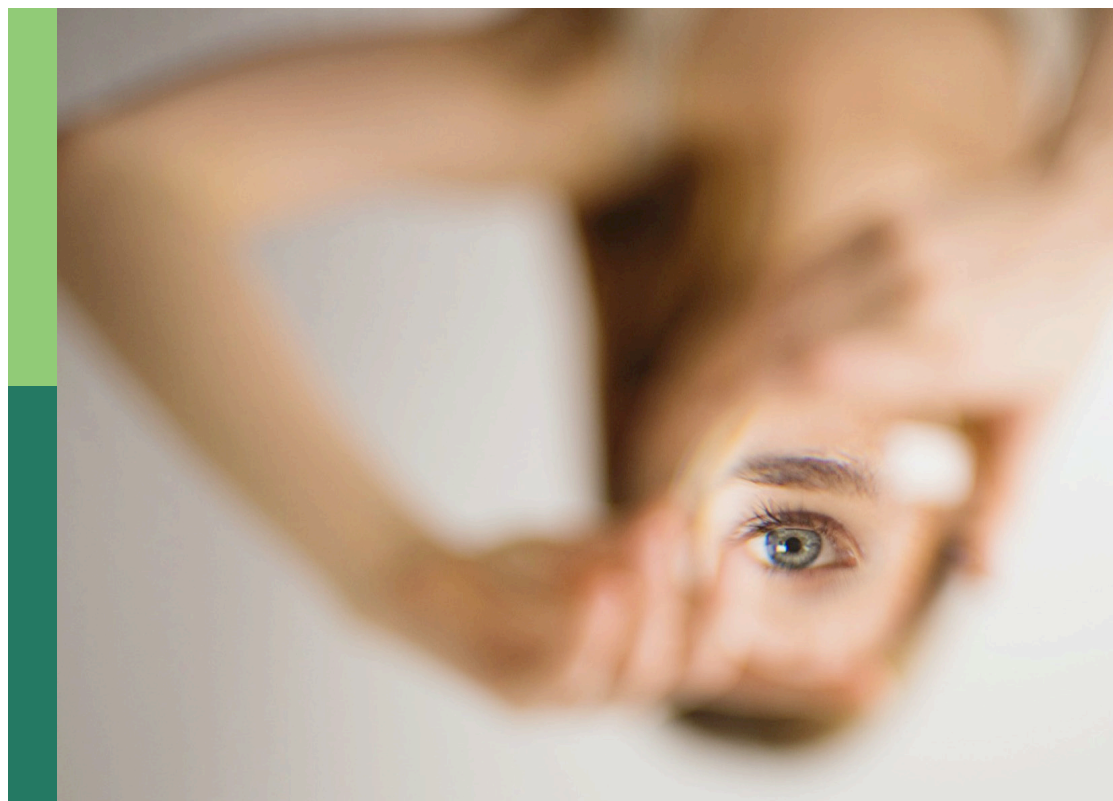
# Prosocial and antisocial behavior and personality

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# Prosocial and antisocial behavior and personality

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# Editorial: Prosocial and antisocial behavior and personality

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## KEYWORDS

mental health and psychological wellbeing, prosocial behavior, dark personality traits, motivational factors, technological mediation

## Editorial on the Research Topic

### Prosocial and antisocial behavior and personality

This specialized research section aims to advance the scholarly discourse on personality and social psychology by disseminating rigorous, multidisciplinary investigations. The area is committed to a wide range of subject matter, encompassing everything from foundational psychometric paradigms to complex social interaction dynamics. Studies submitted should adhere to high methodological and statistical rigor standards, and a predilection exists for research employing a multi-methodological approach and diverse participant samples.

Consequently, this review aspires to synthesize insights derived from 13 articles. Each probes various dimensions of human behavior, such as psychological wellbeing, altruistic inclinations, malevolent personality constructs, motivational antecedents, and the technological modulators of behavior.

## Mental health and psychological wellbeing: a social context

This section explores adult friendships and romantic relationships' significant influence on mental health and stress levels (Chen et al.; Li and Chu; Wijaya et al.; Zhang Q. et al.; Zhang Z. et al.). Additionally, the importance of mindfulness and its effectiveness in managing symptoms of depression and anxiety are discussed.

## Understanding prosocial behavior: mechanisms and outcomes

Research indicates the importance of prosocial motivations in workplace innovation, particularly in facilitating basic and applied research behaviors (Li, Mao, et al.; Li, Zhou, et al.; Lu et al.). In addition, how exposure to prosocial media content can influence subsequent prosocial behaviors among adolescents is analyzed, emphasizing the moderating role of empathy and moral elevation.

## The social consequences of dark personality traits

The darker aspects of personality, including traits like Machiavellianism, psychopathy, and sadism, have significant social consequences (He et al.; Pineda et al.; Zheng et al.). Mainly, such characteristics are predictive of being victims in bullying scenarios, especially among adolescents.

## The role of motivation in shaping behavior and orientation

This segment highlights the influence of motivational aspects on academic achievements and how mindfulness upbringing and prosocial motivation impact social entrepreneurship orientation (Mauduy et al.; Shan and Tian).

## The technological mediation of social behavior

The rise of new media platforms increasingly impacts prosocial behavior (Li, Mao, et al.; Li, Zhou, et al.). This section examines how different outcomes for prosocial behavior in short videos can influence subsequent prosocial actions, mainly through mechanisms like moral elevation.

## Conclusion

This academic review offers a comprehensive overview of the psychological and social factors that impact human behavior across various contexts, from personal relationships to the workplace.

## Author contributions

WW: Conceptualization, Writing—original draft, review, and editing.

## Conflict of interest

The author declares 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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# Reading prosocial content in books and adolescents' prosocial behavior: A moderated mediation model with evidence from China

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Drawing upon the General Learning Model, the present study developed a moderated mediation model to provide an in-depth understanding of whether and how adolescents' reading prosocial content in books predicts their prosocial behavior. The target population in this study is Chinese adolescents, and we adopted a paper-based survey to collect data ( $N = 602$ ). The age range of the sample was from 12 to 19 ( $M = 15.198$ ,  $SD = 1.596$ ). Among all participants, 49.3% were female, and 50.7% were male. PROCESS SPSS Macro was used to analyze the proposed moderated mediation model. The results showed that prosocial content reading was positively associated with adolescents' prosocial behavior. The positive association included a direct relationship and an indirect relationship through the mediation of moral identity. Furthermore, this study revealed the moderation effect of age on the relationships among prosocial content reading, moral identity, and prosocial behavior. Specifically, as age increases, the effects of prosocial content reading on moral identity and prosocial behavior attenuate, and the mediation effect of moral identity also decreases. The study adds to the body of knowledge on the prosocial media effect by extending it to book reading.

## KEYWORDS

prosocial behavior, adolescents, reading, prosocial media, moral identity

## Introduction

Prosocial behavior represents a broad category of acts that are defined by some significant segments of society and/or one's social groups as generally beneficial to other people, which include but are not limited to helping others, donating, volunteering, and cooperation (Penner et al., 2005). Prosocial behavior is important to humans because it not only benefits the recipients, but also benefits the actors themselves. For

instance, performing prosocial behavior has proved to be effective in improving social relationships and increasing happiness (Aknin et al., 2012; Dunn et al., 2014; Son and Padilla-Walker, 2020). Therefore, research endeavor has been devoted to discovering factors stimulating prosocial behavior in order to better nurture and advance such behavior (e.g., Eisenberg, 2003; Carlo et al., 2010; Imuta et al., 2016).

Scholars from various fields explore the predictors of prosocial behavior from different angles. Psychologists, behavioral economists, and biologists often focus on factors internal to individuals, such as altruistic motivations and prosocial emotions, whereas sociologists typically emphasize social forces external to individuals, including norms, and social networks (Simpson and Willer, 2015). Communication scholars, on the other hand, investigate the impact of the media environment on individuals' development of prosocial behavior. In the past several decades, they have examined the effects of prosocial content exposure on prosocial behavior focusing on different media, such as television (de Leeuw et al., 2015; Padilla-Walker et al., 2015), movies (de Leeuw and van der Laan, 2018), video games (Gentile et al., 2009; Greitemeyer and Osswald, 2010; World Health Organization, n.d.; Saleem et al., 2012; Prot et al., 2013; Greitemeyer and Mügge, 2014), and music (Greitemeyer, 2009; Ruth, 2016).

Books, on the other hand, are different from the above media types, which can be an interesting case for studying the effect of prosocial content. First, books, constituted by written language, are cultural objects carrying deeply rooted social values (Chen et al., 2020) and generally contain more prosocial content due to the stricter gatekeeping in almost all countries (Xiao and Yu, 2010). Therefore, individuals are more likely to be exposed to prosocial content in reading. Second, compared to watching television and movies, reading books is a more private activity requiring dedication over a longer time, and although people might spend the same amount of time reading a book versus watching a television program, the emotional effect of the former lasts much longer than the latter (Mar et al., 2011). More importantly, according to a Chinese national survey on reading in 2021, the reading rates among adolescents are higher than all other age groups: the reading rate is 99.1% for those 9–13 years old, and 90.1% for those 14–17 years old (National Press and Publication Administration, 2022). Such high reading rates highlight the significance of exploring the effects of reading prosocial content among adolescents.

There has been limited published literature on the prosocial effect of book reading. Mar et al. (2006, 2009) and Mar and Oatley (2008) conducted a series of important studies. With participants recruited from Canada, they explored the link between reading fiction and empathy, as well as the impact of fiction reading on social competency and prosociality. Conducting experiments in the United States, Johnson (2012) and Johnson et al. (2013) empirically demonstrated the influence of reading fiction on empathy, emotional perception

and prosocial behavior. They found that being transported into narrative stories could increase empathy and in turn, encourage prosocial behavior (Johnson, 2012). Besides, enhancing imagery in books increases the positive psychological effects of reading stories (Johnson et al., 2013). In addition, a study published in SCIENCE (Kidd and Castano, 2013) conducted five experiments among American participants and the results showed that reading literary fiction temporarily enhances individuals' theory of mind, the capacity to identify and understand others' subjective states.

However, there exist some pitfalls which need to be further addressed. First, most studies examine the general activity of fiction reading and lack specificity in terms of reading materials; one specific area to be further explored is prosocial content. Second, besides the frequently examined construct of empathy, some other potential mediators linking reading and prosociality such as moral identity remain underexplored. Moreover, previous studies on the prosocial media content's effects fail to pinpoint the condition upon which exposure to media content exerts impact on the outcome variables. Finally, most extant studies have been conducted in the context of Western countries, with fairly little attention to Asian countries. Cultural context is especially important for the association between reading and prosocial behavior. There are two reasons. On the one hand, publishing regulation differs from country to country (Li et al., 2019). On the other hand, prosocial behavior highly depends on cultural context because what is prosocial is not understood uniformly across different cultural contexts (Feygina and Henry, 2015). Besides, cultural factors such as interdependence, religion, and social norms are factors influencing prosocial behavior (Feygina and Henry, 2015; Kislyakov et al., 2020). Both country and cultural characteristics need scholarly attention.

To fill the research gaps, we intend to explore whether and how prosocial content reading enhances prosocial behavior among adolescents. We adopt the General Learning Model as our theoretical framework, aiming to extend it to a reading context. We choose adolescents as the interested group in the current study and the reasons for focusing on this certain group are twofold. First, adolescence is the key stage for the advancement of their prosociality (Li et al., 2022), which has proved to be positively associated with their academic performance (Gerbino et al., 2018), friendship quality (Closson, 2009; Jin et al., 2022), wellbeing (Son and Padilla-Walker, 2020), and achievement at later life stages (Toumbourou, 2016). Therefore, to better improve their prosocial behavior, more research endeavors are needed to deepen our understanding of prosociality development among adolescents. Second, adolescents are in a crucial developmental period of worldview exploration marked by instability and uncertainty. They are thus easily susceptible to external environments and more likely to be influenced by media use (Gross, 2004). In addition, to gain a nuanced understanding of the differences among adolescents

at different developmental stages, we also investigate the role of age in moderating the impact of prosocial content reading on subsequent prosocial behavior *via* moral identity.

## Literature review

### General learning model

Derived from the General Aggression Model (GAM), which is an integrative social-cognitive model explaining the influence of playing violent video games on people's antisocial behavior, the General Learning Model (GLM) was developed to explain the formation of people's more general behavior including nonviolent and prosocial behavior (Bushman and Anderson, 2002; Buckley and Anderson, 2006). According to the GLM, a person's behavior can be influenced by two kinds of input variables: situational variables and personal variables (Buckley and Anderson, 2006). The former refers to "the features of the environment around the individual" (Buckley and Anderson, 2006, p. 369) such as media and environmental settings, whereas the latter is "what a person brings to the current situation" (Buckley and Anderson, 2006, p. 369) like previous experience and emotions (Buckley and Anderson, 2006). Those input variables affect subsequent reactions or behavior by influencing people's internal state, including cognition, affect, and arousal (Buckley and Anderson, 2006).

The GLM has been adopted to explain the effects of prosocial video games, in terms of accessibility of prosocial thoughts (Greitemeyer and Osswald, 2011), promotion of prosocial behavior (Gentile et al., 2009), and reduction of aggressive cognitions and behavior (Greitemeyer and Osswald, 2009; Greitemeyer et al., 2012). Its validity has lent itself to the study of other media types such as music (Greitemeyer, 2009) and television (Padilla-Walker et al., 2015). Hence, it will be valuable to extend the GLM to the context of book consumption to test its vitality and validity, which remains underexplored compared to other types of media.

Specific to our study, the situational input variable is adolescents' exposure to prosocial content in books, measured by their frequency of prosocial content reading, and the personal input variable is adolescents' age. The internal state influenced by the input variables is moral identity, which is a cognitive construct. The outcome variable is adolescents' prosocial behavior, the potential behavioral response resulting from the change in moral identity.

### Prosocial content reading and prosocial behavior

Based on the GLM, media as a situational input variable could influence people's behavior, although the nature of

the relationship depends on the media content people are exposed to (Greitemeyer and Osswald (2010)). In such exposure, individuals will make their own behavioral decisions according to their observation of models' actions. The positive relationship between exposure to prosocial content and prosocial behavior has been confirmed by studies on prosocial content in television (Mares and Woodard, 2005; de Leeuw et al., 2015), music (Greitemeyer, 2009; Ruth, 2016), and video games (Greitemeyer and Osswald, 2009, 2010; Saleem et al., 2012; Greitemeyer and Mügge, 2014).

Specific to the prosocial effect of book reading, the literature is limited with mixed results. For instance, Johnson (2012) demonstrated the positive influence of fiction reading on individuals' empathy, emotional perception, and prosocial behavior. A meta-analysis revealed that compared to nonfiction reading and no reading, fiction reading leads to small yet statistically significant improvement in social-cognitive performance (Dodell-Feder and Tamir, 2018). Yet, research by Małecki et al. (2018), which contains three studies investigating the effects of fiction reading on pro-animal attitudes and behavior, found a positive impact in one study while a negative impact in the other two. One main reason for such discrepancy, as we see it, is the absence of a focus on prosocial content reading in the research design.

As discussed earlier, the GLM maintains that people could "learn" prosocial behavior *via* observing media characters' prosocial behavior. Although there has been no empirical support that exposure to prosocial book content facilitates prosocial behavior, the positive relationship confirmed in the study of other media provides theoretical foundation for our study. Therefore, we propose the first hypothesis as follows:

**H1:** Prosocial content reading positively predicts prosocial behavior.

### Moral identity

Moral identity, referred to as "the degree to which a person identifies himself or herself as a moral person" (Zhu et al., 2011, p. 151), is crucial in people's moral functioning due to its influence on people's interpretations and responses in situations involving moral judgments and decisions (Shao et al., 2008; Hardy and Carlo, 2011). Currently, the social-cognitive perspective dominates the literature in defining moral identity (Gotowiec and van Mastrigt, 2019), and it views moral identity as "a self-conception organized around a set of moral traits" (Aquino and Reed, 2002, p. 1427). Also, Aquino and Reed (2002) recognize the dual dimensionality of moral identity as composed of internalization and symbolization. Internalization is the private aspect of moral identity, which reflects "the degree to which the moral traits are central to the self-concept"



(Aquino and Reed, 2002, p. 1427), while symbolization refers to the public aspect of moral identity, which reflects “the degree to which the traits are reflected in the respondent’s actions in the world” (Aquino and Reed, 2002, p. 1427). The internalization dimension is more reliable in predicting moral outcomes than the symbolization dimension (Boegershausen et al., 2015), so this study adopts the internalization dimension of moral identity in its operationalization.

From the social-cognitive perspective, like other social identities that make up a person’s social self-schema, an individual’s moral identity can be activated (Aquino et al., 2009) or suppressed by contextual, situational, or even individual-differences variables (Aquino and Reed, 2002; Forehand et al., 2002), though the mechanisms of its formation are still relatively ambiguous (Hardy and Carlo, 2011). Researchers have examined the factors influencing individuals’ moral identity. For instance, Aquino et al. (2009) found that situational factors such as reading Ten Commandment, financial incentives, and writing with moral laden terms can activate the current accessibility of moral identity and in turn affect the sequential moral behavior intentions. Zhu et al. (2011) argued that the symbolic modeling of leaders could influence their followers’ moral judgment. Furthermore, the review by Hardy and Carlo (2011) showed that several factors, including developmental contexts (e.g., religious involvement and parenting style), individual characteristics (e.g., academic achievement), and opportunities to behave morally (e.g., community service), contribute to the development of moral identity. However, little is known about the influence of media use on moral identity.

On the other hand, moral identity as an internal state may mediate the relationship between input and outcome variables, according to the GLM (Buckley and Anderson, 2006). To the best of our knowledge, no research has directly addressed the relationship between reading prosocial content and moral identity; however, studies on prosocial media use could provide valuable theoretical guidance to explore a potential relationship. For example, the accessibility of prosocial thoughts is found to function as a pathway linking playing video games and prosocial behavior (Greitemeyer and Osswald, 2010), and such mediation effect is also found in listening to songs with prosocial lyrics (Greitemeyer, 2009). Considering that moral identity is similar to prosocial thought accessibility as both can be seen as how easy the schema can be primed or accessed (Greitemeyer and Osswald, 2010), we propose that moral identity could also be learned and activated when individuals are exposed to prosocial content in books. In other words, prosocial content reading positively influences moral identity.

Meanwhile, moral identity has been described as a self-regulatory mechanism that motivates moral actions and has also consistently been found to be a significant antecedent to prosocial behavior (Reynolds and Ceranic, 2007; Hertz and Krettenauer, 2016; Ding et al., 2018; Gotowiec and van Mastrigt, 2019). A meta-analysis conducted

by Hertz and Krettenauer (2016) revealed that moral identity is significantly related to moral behavior, including prosocial behavior. Based on the social-cognitive perspective, the accessibility of one’s moral identity determines the possibility of action (Shao et al., 2008), and a stronger moral identity denotes a more central role for morality in a person’s identity. Therefore, a person’s moral self-schema has a higher probability of being activated, and he or she is more likely to engage in moral behavior (Aquino and Reed, 2002; Aquino et al., 2009; Hardy and Carlo, 2011). Furthermore, people would make efforts to sustain the consistency between their moral self-conception and their behavior: as people possess a stronger moral identity, they will try to behave morally to maintain such consistency (Aquino and Reed, 2002; Aquino et al., 2009; Hardy and Carlo, 2011). As such, it is safe to say that moral identity positively predicts prosocial behavior. In sum, in light of the above discussions, we develop the second hypothesis.

**H2:** Prosocial content reading positively predicts moral identity, which in turn positively predicts prosocial behavior.

## Age

Different components of moral development, such as moral judgment, moral reasoning, theory of mind, and antisocial behavior, are all correlated with age (McDonald and Stuart-Hamilton, 1996; Happé et al., 1998; Forney et al., 2005; Heiphetz and Liane, 2014). Krettenauer and Victor (2017) discuss moral identity as a developmental construct that grows with age, and Kingsford et al. (2018) highlight the significance of developmental issues in moral identity emergence. Yet, the association between moral identity and age is not always a linear relationship. For instance, it was found that external moral identity motivation decreased with age, whereas internal moral identity motivation increased with it, and the effects of age were stronger in adolescence and emerging adulthood than in young adulthood and middle age (Krettenauer and Victor, 2017). In one word, there are no definitive answers to the relationship between age and moral identity.

Similarly, research into the association between age and prosocial behavior is not conclusive. Eisenberg et al. (2005) point out that despite theoretical assumptions that are consistent with an increase in prosocial tendencies in adolescence and early adulthood, empirical results are mixed. Different aspects of prosocial functioning, such as perspective-taking, prosocial moral reasoning, and simple prosocial proclivities (e.g., helping and sympathy), are associated with age in different and not necessarily linear ways. Jirsaraie et al. (2019) also indicate an inconsistency in the relationship between age and prosocial behavior, and age is found to be strongly related to cooperation and helping attitudes but fails to predict charity.

Based on the notion of the GLM, personal factors could interact with situational factors such as reading prosocial content (Buckley and Anderson, 2006). Therefore, age, a personal factor, could influence the association between reading prosocial content, moral identity, and prosocial behavior. Similarly, Valkenburg and Peter (2013) suggested that media effects are not uniform across individuals but are made complicated by potential moderators. One of them is developmental susceptibility, an individual's responsiveness to media as a result of his or her cognitive, emotional, and social development (Valkenburg and Peter, 2013, 2017; Valkenburg, 2020). This argument highlights the salience of incorporating age into media effects studies (Cingel et al., 2020; Valkenburg, 2020). Although current literature does not offer a definitive answer to whether age could moderate such a relationship and what the interaction effect would be, theories on media effects are essential to understanding when or under which conditions prosocial content reading impacts prosocial behavior. For this study, we believe that age (a personal variable) interacts with prosocial content reading (a situational variable) to exert an interaction effect on moral identity and prosocial behavior. Previous research has suggested that younger people are more susceptible to prosocial influences (Foulkes et al., 2018). Therefore, we propose the following hypotheses:

**H3a:** Age moderates the relationship between prosocial content reading and moral identity. The relationship attenuates as age increases.

**H3b:** Age moderates the relationship between prosocial content reading and prosocial behavior. The relationship attenuates as age increases.

**H3c:** Age moderates the mediation effect of moral identity on the association between prosocial content reading and prosocial behavior. The indirect relationship attenuates as age increases.

Based on the above hypotheses, we proposed our conceptual model as depicted in **Figure 1**.

## Materials and methods

### Participants and procedures

The target population of this study is adolescents. According to the definition of the World Health Organization, adolescence refers to the group aged from 10 to 19 years (World Health Organization, n.d.). We employed survey method to collect data to test the proposed model. The study was approved by

the Institutional Review Board at the authors' institution (No. H2021177I). The research procedures are described below.

We adapted established scales measuring the key constructs of our study, and then consulted three experienced middle school teachers with regards to the scales' wording to make sure that they were fully comprehensible to adolescent students. Then we performed a pretest with a convenience sample of 103 adolescents to test the reliability and validity of all the instruments. Necessary modifications were made based on the pretest results, including dropping several items and improving the wording of the remaining ones.

We conducted the formal survey among middle and high school students in a mid-sized city located in East China over 3 weeks in January 2021. We randomly selected one middle school and one high school from the city and invited several teachers to distribute the paper-based questionnaire during breaks. Participants were randomly selected from each grade at each school to ensure the distribution of our participants covered all six grades. The number of participants from each grade was approximately one hundred.

A total of 647 students participated in the study. We removed from the sample participants who filled in the survey with almost identical responses, whose questionnaires were almost blank, and whose responses were contradictory (especially with respect to reversed items). After this procedure, a final sample of 602 was kept for data analysis.

### Measures

To test the proposed model and the hypothesized relationships in our study, the instruments must have both reliability and validity. We first conducted confirmatory factor analysis (CFA) and dropped three items whose loading value was smaller than 0.6 (Comrey and Lee, 2013). The results from another CFA regarding the remaining items showed that all the items' standardized factor loadings were greater than 0.6 and the model fit indices of the measured model were acceptable ( $\chi^2/df = 2.931$ ;  $CFI = 0.943$ ;  $TLI = 0.934$ ;  $RMSEA = 0.057$ , 90%  $CI = [0.050, 0.063]$ ;  $SRMR = 0.037$ ). As displayed in **Table 1**, the Cronbach's alpha of all constructs ranges from 0.814 to 0.887, surpassing the acceptable level of 0.70 (Nunnally, 1978). The composite reliability (CR) of these measures ranges from 0.815 to 0.903, meeting the acceptable level of 0.60 (Fornell and Larcker, 1981). These indicators indicate that our measurement items have a high degree of internal reliability. The average variance extracted (AVE) of prosocial behavior is 0.438 (those of the other two constructs are 0.597 and 0.622), which is below the recommended level of 0.50. Nevertheless, according to Fornell and Larcker (1981), AVE is a relatively conservative estimate to assess the validity of the measurement, and "on the basis of  $\rho_{\eta}$  (composite reliability) alone, the research may conclude that convergent validity of



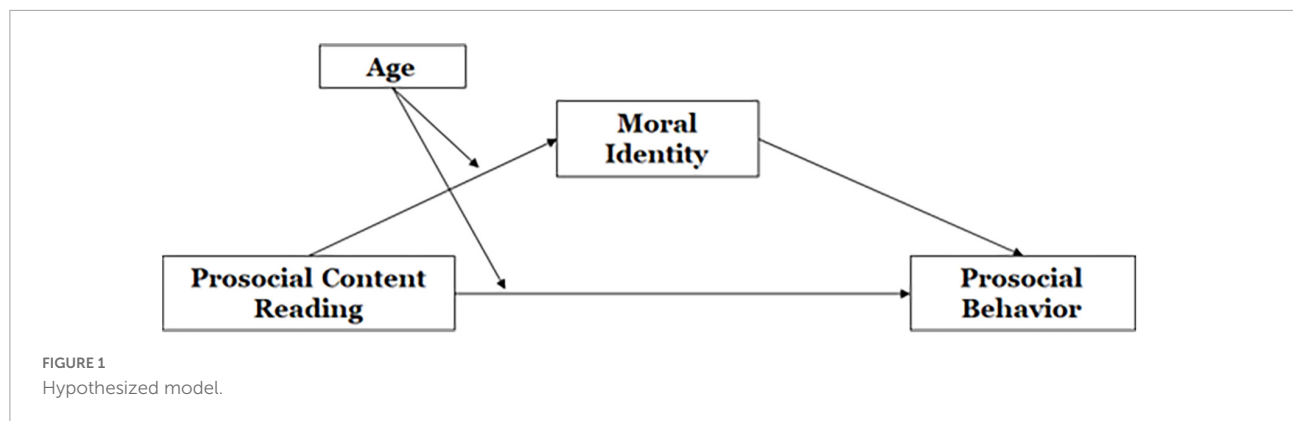


TABLE 1 Descriptive analysis, correlational coefficients, reliability, and validity test.

	<i>M</i>	<i>SD</i>	Cronbach's $\alpha$	CR	AVE	1	2	3
(1) Prosocial content reading	2.710	1.011	0.814	0.815	0.597	0.772		
(2) Prosocial behavior	3.598	0.758	0.887	0.903	0.438	0.296***	0.662	
(3) Moral identity	4.141	0.844	0.827	0.830	0.622	0.143***	0.471***	0.789

\*\*\* $p < 0.001$ . Diagonal SQRT of AVE.

the construct is adequate, even though more than 50% of the variance is due to error" (p. 46). Their recommendation is also followed by later researchers in their studies (e.g., Lam, 2012; Pervan et al., 2018). Therefore, we conclude that the convergent validity of the instruments in our study is acceptable considering the CR of each construct is well above the recommended level. Meanwhile, as shown in Table 1, all the square roots of the AVE values were higher than the correlation between the variable and other variables, indicating good discriminant validity (Fornell and Larcker, 1981). These variables were operationalized as follows.

### Prosocial content reading

The scales for prosocial content reading in our study were adapted from the prosocial media use scale of Ostrov et al. (2006) and Prot et al. (2013). The definition of prosocial behavior was provided for participants first. We also provided the illustration of prosocial book content, which refers to any book content encouraging prosocial behavior, such as description of people doing good deeds, stories of moral exemplars, and content encouraging harmonious interpersonal relationships. Participants were first instructed to list three of their favorite books, and for each book participants were then asked to rate how frequently they encountered prosocial content on a 5-point scale (1 = never and 5 = extremely frequently). The score for prosocial content reading was calculated as the average of the three items.

### Prosocial behavior

Based on the study of Carlo and Randall (2002), Yang et al. (2016) developed the Chinese version of the prosocial behavior

scale incorporating features of Chinese adolescents which has been validated and extensively used in measuring adolescents' prosocial behavior in China. Thus, we adopted it for the current study. Participants were asked to self-report the frequency of engaging in such behavior as described in the items on a 5-point scale (1 = Never and 5 = Always). Sample items included "I voluntarily give seats to those in need, such as the elderly, the weak, the sick, the disabled, and the pregnant," "When a classmate is sick, I take him/her to see the school nurse," and "I take the initiative to say 'Hi' to new classmates and make friends with them."

### Moral identity

The measurement of moral identity was adapted from Aquino and Reed (2002) and Wan and Yang (2008). A list of words (*trustworthy, honest, filial, responsible, sincere, polite, kind, loyal, upright, and helpful*) describing personal traits was provided to participants who were asked to visualize in their mind the kind of person who matched these characteristics. Participants were then asked to imagine how that person would think, feel, and act. After participants had a clear image of what this person would be like, they were instructed to rate the degree to which they agree or disagree with related statements on a 5-point Likert scale (1 = Strongly Disagree and 5 = Strongly Agree). The statements included "It would make me feel good to be a person who has these characteristics," "Being someone who has these characteristics is an important part of who I am," and "I strongly desire to have these characteristics."

## Data analysis and results

### Descriptive statistics

Data analyses were conducted on the valid sample of 602, and missing values were interpolated by the mean value. The age range of the sample was from 12 to 19 ( $M = 15.198$ ,  $SD = 1.596$ ). Among all participants, 49.3% were female, and 50.7% were male. Gender is included as a control variable because it is repeatedly found to be associated with both moral orientation (Jaffee and Hyde, 2000) and prosocial behavior (Pursell et al., 2008). The descriptive statistics of the variables in our study and correlational coefficients between each pair of them are also listed in Table 1.

### Mediation effect analysis

We performed the mediator analysis using Model 4 in PROCESS SPSS Macro (Hayes and Andrew, 2012) to examine the mediation effect from prosocial content reading to prosocial behavior *via* moral identity. Age and gender were entered into the model as covariates. As Table 2 indicates, at 0.05 statistical significance level prosocial content reading positively correlates with moral identity ( $B = 0.111$ ,  $p < 0.001$ ) and prosocial behavior ( $B = 0.170$ ,  $p < 0.001$ ). Moral identity positively correlates with prosocial behavior ( $B = 0.386$ ,  $p < 0.001$ ).

Considering that using the  $p$ -value of the regression model to judge mediation effects is not solid enough (Hayes and Rockwood, 2017), the bias-corrected bootstrapping method was also used to examine the mediation effects of moral identity. A 95% bias-corrected confidence interval based on 5,000 bootstrap samples indicated that the indirect effect through moral identity does not straddle zero ( $B = 0.043$ , 95%

CI = [0.016, 0.073]), and at the same time the direct effect of prosocial content reading on prosocial behavior does not straddle zero ( $B = 0.170$ , 95% CI = [0.119, 0.221]). Therefore, moral identity partially mediates the relationship between prosocial content reading and prosocial behavior.

### Moderated mediation effect analysis

Model 8 of PROCESS SPSS Macro (Hayes and Andrew, 2012) was later used to examine the conditional mediation model. As shown in Table 3, after the interaction term of prosocial content reading and age was added, prosocial content reading was again found to be positively related with moral identity ( $B = 0.775$ ,  $p = 0.017$ ) and prosocial behavior ( $B = 0.784$ ,  $p = 0.002$ ). Moral identity is also positively related with prosocial behavior ( $B = 0.379$ ,  $p < 0.001$ ). The interaction term of prosocial content reading and age is negatively related with moral identity ( $B = -0.044$ ,  $p = 0.040$ ) and prosocial behavior ( $B = -0.041$ ,  $p = 0.015$ ).

To better illustrate the interaction effect of age and prosocial content reading on moral identity and prosocial behavior, we plotted the interaction effects in Figures 2A,B. As displayed in both figures, the slopes are the largest among early adolescents, while lowest in late adolescents. In other words, the positive effects of prosocial content reading on moral identity and prosocial behavior decrease as age increases.

Again, the bias-corrected bootstrapping method was employed to examine the moderated mediation effects of moral identity. As Table 4 shows, the direct effect of prosocial content reading on prosocial behavior exists at all age levels (the bootstrapping confidence intervals do not contain zero). Taking into consideration the significant effect of the interaction term in ordinary least squares regression (OLS) Model 4, we determined

TABLE 2 Regression analysis results.

Dependent variable	Moral identity				Prosocial behavior			
	Coefficient	SE	95% CI		Coefficient	SE	95% CI	
			LL	UL			LL	UL
Independent variable								
Prosocial content reading	0.111**	0.033	0.045	0.176	0.170***	0.026	0.119	0.221
Moral identity					0.386***	0.032	0.324	0.448
Age	0.007	0.021	−0.035	0.049	−0.053**	0.016	−0.085	−0.021
Gender (male = 1)	−0.251***	0.068	−0.384	−0.118	−0.096	0.053	−0.200	0.008
Constant	3.863***	0.342	3.191	4.536	2.391***	0.292	1.818	2.963
Model fit								
R		0.207				0.539		
R <sup>2</sup>		0.043				0.291		
F		8.931***				61.187***		

\*\*\* $p < 0.001$ , \*\* $p < 0.01$ .

TABLE 3 Regression analysis results.

Dependent variable	Moral identity				Prosocial behavior			
	Coefficient	SE	95% CI		Coefficient	SE	95% CI	
			LL	UL			LL	UL
Independent variable								
Prosocial content reading	0.775*	0.325	0.137	1.412	0.784**	0.252	0.289	1.279
Moral identity					0.379***	0.032	0.317	0.442
Age	0.132*	0.065	0.006	0.259	0.063	0.050	−0.035	0.161
Interaction term <sup>a</sup>	−0.044*	0.021	−0.086	−0.002	−0.041*	0.017	−0.073	−0.008
Gender (male = 1)	−0.246***	0.068	−0.379	−0.113	−0.093	0.053	−0.196	0.011
Constant	1.959*	0.987	0.022	3.897	0.657	0.765	−0.846	2.159
Model fit								
R		0.223				0.546		
R <sup>2</sup>		0.050				0.298		
F		7.792***				50.562***		

<sup>a</sup>Interaction term = prosocial content reading × age; \*\*\* $p < 0.001$ , \*\* $p < 0.01$ , \* $p < 0.05$ .

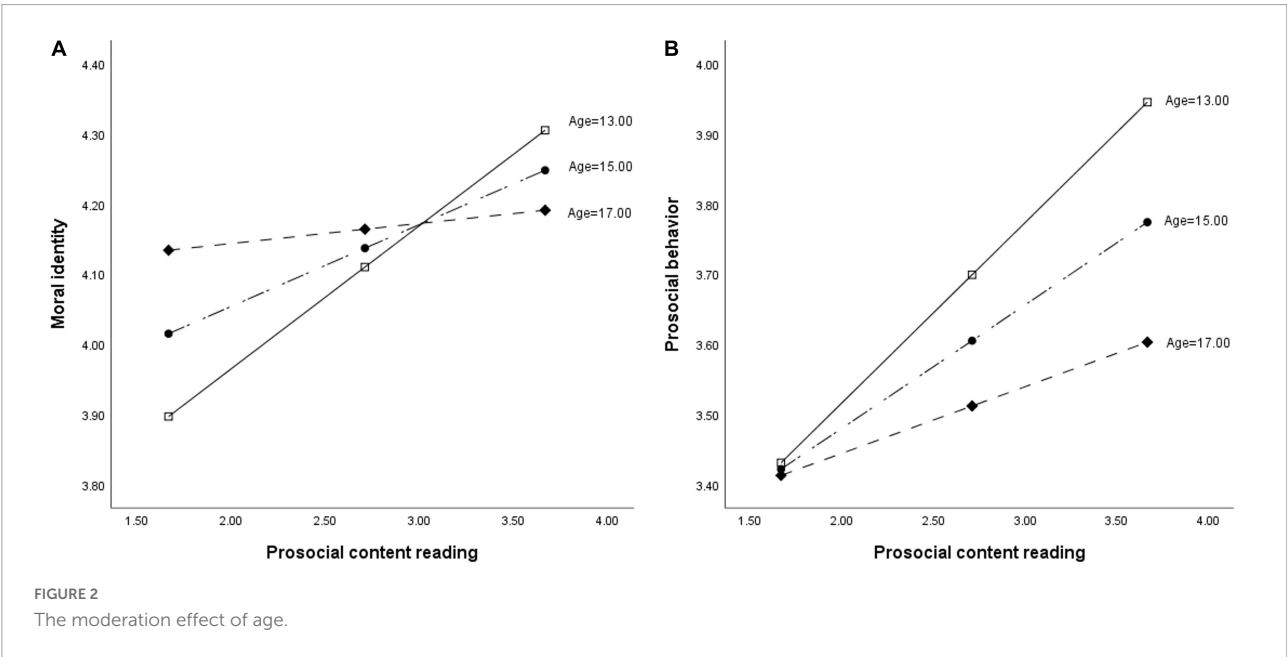


TABLE 4 The conditional direct and indirect effect.

Age	Direct effect				Indirect effect			
	Effect	SE	LLCI	ULCI	Effect	BootSE	BootLLCI	BootULCI
13.000	0.257	0.044	0.171	0.344	0.077	0.026	0.031	0.133
15.000	0.176	0.026	0.125	0.227	0.044	0.015	0.018	0.075
17.000	0.095	0.040	0.016	0.174	0.011	0.018	−0.025	0.047

Indirect effects are based on 5,000 bootstrap samples. LLCI, lower limit confidence interval; ULCI, upper limit confidence interval.

age moderates the direct effect of prosocial content reading on prosocial behavior. Specifically, although the effect sizes of the direct effects are significant at all age levels, they become weaker as age increases.

Meanwhile, the index of moderated mediation of age is  $-0.017$  ( $BootSE = 0.009$ ,  $95\% CI = [-0.034, -0.001]$ ), indicating a significant moderating effect of age on the indirect relationship between prosocial content reading and prosocial behavior through moral identity. Taking a closer look at [Table 4](#), we found that the indirect effect *via* moral identity exists among early and middle adolescents (the bootstrapping confidence intervals do not contain zero), and the effect size is stronger for early adolescents. In addition, there is no indirect effect in the group of late adolescents (the bootstrapping confidence interval contains zero). In short, as age increases, the indirect effect of adolescents' prosocial content reading on prosocial behavior through moral identity attenuates and even disappears.

## Discussion

Drawing upon the GLM, this study examined the relationship between prosocial content reading and adolescents' prosocial behavior. All hypotheses were confirmed, with the results supporting the effectiveness of the GLM in the new context of prosocial content reading. The theoretical implications of our research are fourfold.

First, this study goes beyond fiction and non-fiction reading to examine the positive effect of prosocial content reading on prosocial behavior among adolescents. [Young \(2019\)](#) suggested that reading can cultivate virtue in three ways: enhancing empathy, self-reflection, and social learning. While the general reasoning for the positive effects of reading fictions is that experiencing simulated social world benefits the development of social skills ([Mar et al., 2009](#)), this study looks into the effects of reading from the social learning perspective. This finding is consistent with the claim of the GLM in that exposure to the media content makes people "learn" how to behave. In other words, when reading content encouraging prosocial behavior, such as stories depicting protagonists who help others, adolescents will "learn" that such behavior is desirable and behave the same through vicarious learning.

Second, this study introduces moral identity as an alternative mediator to other constructs like empathy, helping us better understand the underlying mechanism of how book reading affects prosocial behavior. Previous studies on the effects of prosocial media content or fiction reading usually adopts empathy as the mediator ([Johnson, 2012](#); [Prot et al., 2013](#)). However, in spite of being one of the most important antecedents to prosocial behavior, it is not as consistent and internalized as moral identity. Our finding of the partial mediation effect of moral identity suggests that with exposure to prosocial content in books, adolescents will not only take

prosocial actions by just mimicking the depicted prosocial behavior, but also through the change of their moral identity, which means they will internalize the concept that they should behave morally.

More importantly, this study discovers that the direct and indirect effects of prosocial content reading on prosocial behavior are moderated by adolescents' age. Though previous studies on prosocial behavior have suggested age as an important factor ([Cingel et al., 2020](#)), little is known about its moderating effect on the relationship between prosocial media use and prosocial behavior. This study reveals that as the age of adolescents increases, the impacts of prosocial content reading on both moral identity and prosocial behavior decrease, and the size of the mediating effect of moral identity decreases as well. These findings shed light on the boundaries of the effects of prosocial media content. This is in line with the notion of the Differential Susceptibility to Media Effects Model, which suggests that more attention should be paid to the heterogeneity of media effects ([Valkenburg and Peter, 2013](#)). Particularly, this study shows that the prosocial media effects can be different across different stages of adolescence. Based on this finding, future media effect studies should put more emphasis on the heterogeneity of groups in a more nuanced way.

Finally, the present study enriches our understanding of the prosocial media effect by extending it to book reading. Drawing on the GLM, our study identifies the impact of reading prosocial content in books on adolescents' prosocial behavior and uncovers the underlying mechanism as well. It represents one important attempt to explore the prosocial effect of book reading from a media use perspective, and our findings add to the body of knowledge on the prosocial effect of media use. Previous studies have suggested prosocial behavior varies across different media types, while the association between book reading and prosocial behavior is stronger than other media types ([Li et al., 2019](#)). In future research, it would be interesting to explore why there are such differences. This study also extended the GLM to the context of book reading. Previous research has tested the GLM on video games ([Gentile et al., 2009](#); [Greitemeyer and Osswald, 2011](#)), music ([Greitemeyer, 2009](#)) and television ([Padilla-Walker et al., 2015](#)). To the best of our knowledge, this is the first study to examine the relationship between reading books and prosocial behavior based on the GLM.

Apart from theoretical contributions, the current study has important practical implications. For instance, our results shed light on the positive role of prosocial content reading in promoting adolescents' prosocial behavior; therefore, it is valuable for those who develop or administer adolescent reading practice or programs, such as school teachers, librarians, and parents, to encourage adolescents to engage in more prosocial content reading. Besides, as the mediating role of moral identity is only significant among younger adolescents, the abovementioned parties should nurture adolescents' habit of

prosocial reading as early as possible in their developmental stage in order to effectively improve their moral identity and ensuing prosocial behavior. Since the findings supported the potential of utilizing books to encourage prosocial behavior, this study also provides valuable lessons for publishers' business practices. Publishers can publish books containing more prosocial content and recommend them to teachers and parents. According to the moderation effect, publishers can label the books as including more prosocial content for younger adolescents so as to reap more educational and commercial benefits.

This study is not without limitations. First, the data of this study is cross-sectional; thus, we should exercise caution in the causal inference of the results. Future studies can use longitudinal or experimental design to investigate possible causal relationships among prosocial content reading, moral identity, and prosocial behavior in adolescents. Second, the survey was conducted in a mid-sized city in East China, which limits the generalizability of our research findings. The same investigation could be conducted in more cities in China as well as in other countries to improve the external validity of the results. Furthermore, we must acknowledge this study is flawed with social desirability problem in research design because of the self-reported measures. In the future, field experiment with actual prosocial behavior, such as donation, can be conducted to reduce the influence of social desirability.

## 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 Institutional Review Board of Shanghai Jiao Tong University. Written informed consent to participate in this study was provided by the participants' legal guardian/next of kin.

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## Author contributions

WL: conceptualization, methodology, reviewing, and editing. LZ: conceptualization, reviewing, and editing. PA: methodology, data collection, data analysis, and writing. GK: data analysis. All authors contributed to the article and approved the submitted version.

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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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# Configuration of prosocial motivations to enhance employees' innovation behaviors: From the perspective of coupling of basic and applied research

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Prosocial motivation refers to the employees' willingness to invest for the sake of helping others. It improves basic and applied research behaviors of employees and the interaction between them. Employees' innovation behavior depends on prosocial motivation because the motivation to protect the interests of others may promote knowledge sharing and knowledge coupling. However, there is a research gap in solving the optimal solution of prosocial motivations that facilitates different types of innovation behaviors based on the combination of prosocial motivations. We perform a qualitative comparative study on the effect of the motivation configurations on innovation behaviors. We find that highly basic and highly applied research behaviors share in common collectivism-based, principlism-based, contextual, and situational motivations which work in all configurations. But the core conditions between the two are different, which are principlism-based and situational motivations, respectively. In addition, both highly basic-to-applied and highly applied-to-basic transformation behaviors share the same core condition and the same secondary conditions with highly basic and highly applied research behaviors, respectively. Moreover, the behaviors of non-highly basic research and non-highly basic-to-applied transformation share the severe absence of egoism-based motivation as the core condition in common. Non-highly behaviors of applied research and applied-to-basic transformation have a common point of the severe absence of the pressure-based type as the key. Finally, we also analyze active and passive prosocial



degrees of all types of high/non-high innovation behaviors. Our study deepens the academics' thinking on multi-dimensional prosocial motivation and the classification management of coupling innovation behavior and provides implications for practice.

#### KEYWORDS

prosocial motivation, research behavior, transformation behavior, qualitative comparative analysis, configuration

## Introduction

With the development of science and technology, basic and applied research departments produce dual characteristics of independence and openness gradually. It puts forward high requirements on the behavior management of basic and applied research departments. In particular, the coupling process of the two also puts forward high challenges to innovation behavior management. However, the correlation between the two remains low. The innovation behaviors can no longer meet the requirements of a highly differentiated and integrated knowledge production mode (Liu et al., 2022). Therefore, the coupling of basic and applied research has become an important force to cope with changes (López-Martínez et al., 1994; Nagane and Sumikura, 2020). Employees who take part in the innovation activities are the main force of original innovation. How to use the complex psychological characteristics, especially like prosocial motivations of employees in innovation departments to manage the coupling behaviors, is an important topic.

Prosocial motivation refers to employees' willingness to invest for the sake of helping others (Batson, 1987). It is considered one of the key factors affecting employees' or organizational creativity and employees' innovation ability (Gebauer et al., 2008; Hoever et al., 2012; Li and Bai, 2015; Pian et al., 2019). With the increasing complexity and uncertainty of innovation, the research presents two challenges. First, prosocial characteristics of single motivation have limitations in explaining employees' innovation behavior (Li and Bai, 2015; Shie et al., 2022). Employees may not only hope that they can be free from life pressure and working environment to show their innovation ability but also hope that their innovation behaviors can be improved by their abilities, characteristics, and external situation (Sun Y. et al., 2020). Prosocial characteristics with different motivations can reflect employees' structural characteristics. Second, there is an insufficient discussion on the impact of prosocial motivation on the composition of innovation behaviors (Bertels, 2018). Therefore, it is necessary to further explore the applicability and effect of prosocial motivation on the innovation behavior within the department

and the innovation behaviors between the departments. So, the prosocial way to maximize employees' innovation potential is to improve basic and applied research behaviors and their coupling merits attention. Configuration of prosocial motivations provides a new perspective. The optimal solution of prosocial motivations that facilitates innovation potential based on the combination of different personalities and states should be explored.

## Literature review and theoretical basis

### Literature review

Employees with prosocial motivation are altruistic (Batson, 1987). They tend to think about what is useful to colleagues, superiors, and organizations and are willing to help others actively (De Dreu and Nauta, 2009; Grant and Berry, 2011). It will help them generate new ideas beneficial to others and achieve the innovation behaviors (Grant, 2007; Grant and Mayer, 2009; Grant and Berg, 2011; Hughes et al., 2018). It can also enhance the influence of intrinsic motivation on creativity (Kunda, 1990; Caruso et al., 2006; Anderson et al., 2014; Thuan and Thanh, 2020). Specifically, it is reported that prosocial motivation can help employees eliminate limitations from their aspect and focus on others and organizational levels (Hoever et al., 2012). It can help employees generate useful ideas with a high degree of novelty and promote their communications with leaders, which can bring benefits to others or organizations and finally improve innovation performance (Bear and Hwang, 2015; Kim and Choi, 2018; Che et al., 2019). Then, it is pointed out further that when prosocial motivation increases, employees are more concerned with collective interests and more willing to share and to participate in team innovation. Prosocial characteristics stimulate employees' sharing knowledge with others or organizations, which greatly enhances personal job autonomy and organizations' innovation ability (Pian et al., 2019; Tian et al., 2021; Lin et al., 2022). Collective prosocial motivation reduces knowledge hiding in teams and is conducive

to promoting innovation behaviors (Babic et al., 2018). But when employees perceive greater external pressure, it is not conducive for them to sharing knowledge (Škerlavaj et al., 2018).

However, the real prosocial psychology of employees cannot be reflected by single prosocial motivation, otherwise, it will affect the validity of its explanation (Li and Bai, 2015; Shie et al., 2022). So, academics began to pay attention to the influence of multi-dimensional prosocial motivations on employees' innovation behavior. Li and Bai (2015) considered the difference between employees' prosocial motivation and intrinsic motivation and found that prosocial motivation could amplify the positive impact of employees' internal motivation on their creativity. But when the policies endow the employees with a stable environment and make them feel abundant, employees are less likely to be driven by prosocial motivation, but by internal motivation (Jeong and Alhanaee, 2020). Zee et al. (2020) paid attention to explicit and implicit characteristics of prosocial motivations and found that employees with explicit prosocial motivations show more creativity. Gohler (2021) distinguished the prosocial motivations of principlism and collectivism and found that both have positive effects on knowledge sharing significantly. In addition, considering the influence of knowledge diversity on innovation behavior, Sun Y. et al. (2020) reported that prosocial interaction helps innovators overcome the problem of knowledge diversity. Besides, Bertels (2018) explored the difference between the influence of prosocial motivation on novelty and the influence of prosocial motivation on the usefulness of creativity. He reported that members who received an assignment description that included opportunity framing produced more novel solutions, whereas those who received the same assignment but with prosocial framing created less useful solutions. The difference between the effect of active knowledge exchange on innovation behavior and that of passive knowledge exchange on it was also focused on by Mittal et al. (2020). They brought the prosocial, proactive exchanges to the forefront of knowledge exchanges, which predominantly focused on reactive knowledge exchanges.

Therefore, it is necessary to decompose the type of innovation behaviors and to explore the influence of prosocial motivations on them from the perspective of multi-dimensional prosocial characteristics. On one hand, the influence of prosocial motivations is a complex process and innovation behavior is more susceptible to the prosocial characteristics of multiple motivations (Gohler, 2021). How to solve the optimal solution of prosocial motivations that facilitate different types of innovation behaviors needs to be further explored. On the other hand, previous analyses of the internal composition and characteristics of innovation behavior are insufficient (Bertels, 2018). According to the output process of innovation, innovation behaviors can be specifically divided into basic research behavior, applied research behavior, basic-to-applied transformation behavior, and applied-to-basic transformation behavior. How to overcome the difference between the prosocial

motivations of employees who take part in innovation activities within the departments and those of the employees between the innovation departments also needs to be explored further. As such, this study explores the effect of multi-motivated prosocial combinations on multiple types of innovation behaviors.

## Theoretical basis

### Index system of prosocial motivation

Prosocial motivation is related to employees' personality traits and psychological states, and how they interact with each other. The prosocial characteristics of multi-motivation can better show the real states of employees' psychological cognition. Personality traits and states are important summaries of the performance of prosocial motivation (Grant, 2008). To reflect the multi-dimensional prosocial characteristics of employees, Vallerand (1997) divided them into global, contextual, and situational types. Gebauer et al. (2008) classified them into pleasure-based and pressure-based motivations at the interior and exterior of driving forces. They were further divided into egoism-based, altruism-based, collectivism-based, and principlism-based motivations from the perspective of the purpose of motivation (Batson et al., 2011). These three ways to divide it can get eight types of prosocial motivations, which can reflect almost all aspects of prosocial motivations for personality traits and psychological states.

According to the motivated information processing theory, social motivation affects the content and the direction of information processing, and the desires of individuals can shape the way they react to information (De Dreu, 2006; Nijstad and De Dreu, 2012). Generally speaking, intrinsic motivation gets the closest way to the individual's desire, which is the lowest degree of information processing for the individual. When employees' prosocial motivation is closer to intrinsic motivation, they are more likely to connect the experiences of others with their own and empathize with others, show concern for others, and identify with the experiences of others (Aron et al., 1991; Sun J. et al., 2020). In other words, the closer the employees' desire is to the extrinsic motivation, the higher the employees' degree of information processing, and the lower the employees' efficiency in making prosocial decisions. Based on it, we divide prosocial motivation into actively and passively prosocial motivations, considering the difference between initiative and passivity of prosocial motivations.

Active prosocial motivations are based on value orientation internalized, including pleasure-based, altruism-based, collectivism-based, and principlism-based types. Among them, pleasure-based motivation is the desire to benefit others, which is motivated by a sense of happiness and the healthy development of body and mind. It is mainly expressed as an emotional state (Habashi et al., 2016). The collectivism-based prosocial motivation is the motivation to maximize collective

interests from the perspective of the entirety. It is mainly motivated by one's contact with the members in need of help so that employees can focus on how to protect the state of the collective interests (Luria et al., 2015). Both can be expressed as the psychological state of the individual. The altruism-based type is the desire to benefit other people or groups (Eisenberg et al., 2016). The principlism-based motivation refers to a stable personality trait with an outlook on prosocial life and values, which attaches great importance to the interests of others and groups. Both can be expressed as relatively persistent characteristics, which can be shown as a personal trait of altruism.

Passive prosocial motivations mainly focus on motivation constrained by target orientation and time focus, including pressure-based, egoism-based, contextual, and situational motivations. Among them, pressure-based motivation is the form of motivation to fulfill obligations (Škerlavaj et al., 2018). Contextual motivation focuses on employees' motivation toward a specific domain or class of behavior and is moderately variable across time and situations (Rodrigues et al., 2017). Situational motivation focuses on employees' motivation toward a particular behavior at a particular moment in time, which is more specific but unstable (Rodrigues et al., 2017). These three kinds of prosocial motivations can be regarded as extrinsic motivations, which are mostly expressed as a psychological state. It can help employees focus on protecting the interests of others due to external drive. Egoism-based motivation is the motivation to help others from one's interests. It can be shown as a personality trait (Eisenberg et al., 2016). Specific indicators of prosocial motivations are constructed as shown in Table 1.

## Characteristics and index system of innovation behavior

Innovation behavior refers to the process in which basic and applied research communities can acquire or create knowledge by internal cooperation or cross-cooperation and constantly generate new knowledge. In the process of internal cooperation, homogeneous innovation behavior comes into being. It refers to the behavior of members in a basic research department to make a breakthrough in the basic theory within the department or with members in other basic research departments. It also refers to the behavior of members in the applied research department to make a breakthrough in the technological application within the department or with members in other applied research departments. So, homogeneous innovation behavior includes basic and applied research behaviors. Specifically, basic research behavior refers to the behavior of a few basic researchers who have complementary theoretical knowledge and are willing to assume mutual responsibilities for common research purposes, which is driven by research projects with the main function of academic innovation (Xia and Yang, 2020). Applied research behavior is a type of research behavior with a clear direction and industrial technology breakthrough that

can be achieved in a relatively short period. In the cross-cooperation, heterogeneous innovation behavior takes place. It refers to the behavior of integrating basic and applied knowledge to improve the structure of innovation and to use the advantages of differentiation in research and development of others by matching basic and applied research subjects. It contains basic-to-applied and applied-to-basic transformation behaviors. The former gets at the behavior that makes technological breakthroughs based on existing findings and theories. The latter gets at revealing the essence of objective things and the law of movement from applied research achievements.

The common members who are involved in the activity of basic research and basic-to-applied transformation include tutor graduate students and teachers-teacher research teams, whose members have a high level of knowledge with a knowledge structure that is relevant and complementary (Smith, 1971). Moreover, the age structure of the members is reasonable, which leads to the characteristics of the coexistence of experts' experience and young people's passion. There are a large number of postgraduate members who are the leading force in teams. They are in a period of highly active thinking, without obvious experience constraints. Therefore, they are more innovative, centripetal, and energetic. To some extent, it is similar to the characteristics of the members participating in applied research and applied-to-basic transformation activities. However, the differences between basic research behavior, applied research

TABLE 1 Index system of prosocial motivation.

First-level index	Secondary index	Interpretation of index
Prosocial motivation for initiative	Pleasure-based motivation	Motivated by the sense of happiness and the healthy development of body and mind
	Altruism-based motivation	The motivation to help others as the ultimate goal
	Collectivism-based motivation	Motivation to maximize group interests
	Principlism-based motivation	Have a stable personality tendency of prosocial outlook on life and values
Prosocial motivation for passivity	Pressure-based motivation	Motivation to fulfill obligations
	Egoism-based motivation	Motivation to help others for your own gain
	Contextual motivation	Motivation toward a specific domain or class of behavior
	Situational motivation	Motivation toward a particular behavior in a particular moment in time

behavior, and transformation behaviors are mainly reflected in three aspects, namely the goal of innovation behavior, behavioral stability, and behavioral sustainability.

The differences in the target among innovation behaviors are mainly manifested in the following four sub-items. (1) Compared with members participating in applied and applied-to-basic research, basic and basic-to-applied research members do not consider the market prospects of achievements and their market awareness is indifferent (Nejati and Shafaei, 2018). The basic and basic-to-applied research activities they engage in are relatively independent. They can choose research topics relatively freely, formulate research plans based on their interest and capabilities, and achieve knowledge innovation through basic theoretical research. (2) Members who take part in basic and basic-to-applied research focus on the pursuit of spiritual needs. Members with high quality and common goals have a strong sense of honor and accomplishment. Their spiritual needs, such as obtaining social respect and maximizing self-realization, exceed material needs to a certain extent (Zhao et al., 2014). But members who participate in applied and applied-to-basic research do not. (3) Members who take part in basic and basic-to-applied research emphasize academic equality. Every member focuses on mutual respect and trust and creating a democratic team atmosphere to give full play to organization cohesion and to improve the overall innovation strength. However, members in applied and applied-to-basic research can accurately refine and decompose research goals and tasks and give everyone corresponding powers and responsibilities based on the effective division of labor to achieve research goals. (4) Basic and basic-to-applied research members can coordinate behavior and conduct equal academic transactions. This wins transaction partners with its own “transaction” value and obtains other supplementary capabilities (Zhao et al., 2014; Bordogna, 2020). The essence of this process is that the behavior of members is coordinated, rather than subordinate and mutually exclusive. Applied and applied-to-basic research behaviors rely on members to provide value to other members in collaboration to realize the actual value of their behavior.

In addition, members in applied and applied-to-basic research have relatively concentrated goals, and the organizational structure is hierarchical. Conversely, the organizational structure in basic and basic-to-applied research departments is like a relatively stable network structure in which members and tasks are interconnected and dependent (Tierney and Farmer, 2002; Zou, 2019). Moreover, knowledge sharing requires weakening the hierarchy cognition of participants, enabling members to communicate on a more equal basis and forming a “peer-to-peer” knowledge network, which helps members interact with each other.

Finally, basic and basic-to-applied research behaviors that can produce significant research achievements form a research entity naturally based on long-term cooperation (Liang and Zhu, 2002; Popova et al., 2017). These types of

research behaviors have the characteristics of relatively loose requirements for research task. Once basic and basic-to-applied research teams are established, they should be persistent and close and be able to do in-depth and continuous work around relevant research directions. Basic-to-applied and applied-to-basic transformation teams are usually temporary for a certain research task. Once the transformation achievements are obtained or their application enters a mature stage, the teams are dissolved. It is not conducive to knowing each other's expertise, forming a working tacit understanding, and accumulating research knowledge and experience (Portes, 2010). The specific construction of innovation behavior is shown in Table 2.

## Theoretical model

Based on the difference in the characteristics of different innovation behaviors, it is assumed that the effect of prosocial motivations on different types of innovation behaviors is also different. Due to the low cost of homogeneous knowledge innovation, members of basic and applied research departments tend to carry out innovation activities in a simple homogeneous environment. So, the active prosocial motivations generated from different degrees of internalized value orientation will play an important role. The tendency of altruistic behaviors promotes the sharing of scientific or technological knowledge within the departments, which is conducive to the realization of homogeneous innovation behaviors. Generally

TABLE 2 Index system of innovation behavior.

First-level index	Secondary index	Interpretation of index
Homogenous innovation behavior	Basic research behavior	Behaviors of basic researchers who are willing to assume mutual responsibilities for common purposes, which is driven by basic research projects and can realize academic innovation
	Applied research behavior	Behaviors with clear direction and industrial breakthrough that can be achieved in a relatively short period of time
Heterogeneous innovation behavior	Basic-to-applied transformation behavior	Research behavior that makes technological breakthroughs based on existing findings and theories
	Applied-to-basic transformation behavior	Theoretical research behavior revealing the essence of objective things and law of movement in applied research



speaking, the demand for basic research achievements often changes with the demand for the key technologies, and it is always out-of-market demand. The characteristic may submit a high claim regarding the role of specific prosocial motivation. Compared with the single prosocial motivation, prosocial motivations with multi-dimensional initiative can more effectively explain the occurrence of homogeneous innovation behaviors.

Furthermore, due to the cross-sectoral difficulty, the execution of heterogeneous innovation activities not only needs effective communication between departments but also bears the cost effect of heterogeneous knowledge fusion. Therefore, high technical requirements are put forward for prosocial motivations for initiative and passivity. Compared with homogeneous innovation behaviors, the realization of heterogeneous innovation behaviors requires not only the presentation of an active prosocial state and the explicit prosocial initiative but also the constraint effect of passive prosocial motivation to conditionally realize the knowledge transformation behaviors.

Hence, it can improve the initiative of basic and applied research behaviors and the way they interact with each other and promote the effective integration and configuration of prosocial motivations. To this end, this study explores the applicability and configurations of various prosocial motivations in the makeup of innovation behaviors by constructing the theoretical model shown in [Figure 1](#).

## Study design

### Data collection

Some private firms take the initiative to conduct basic research, but as public goods, basic science and the knowledge produced from it satisfy both the conditions of non-exclusivity and non-rivalry, which result in a high-risk investment for private firms. Thus, firms cannot focus on conducting basic research simply based on strong financial power ([Hiromi and Koichi, 2020](#)). Universities and public research institutes become the main body of basic research and important external providers of basic research outcomes for private firms ([Chesbrough, 2003, 2006](#)). They can conduct research independent of market mechanisms, which mostly depends on public funding. So, for employees participating in activities of basic research and basic-to-applied transformation, questionnaires were distributed to employees in universities and research institutes who were taking part in the basic research. Researchers, conducting applied science in universities, are not always able to obtain financial support for their lack of understanding on market demands. Therefore, firms and research institutes become the main body of applied

research and provide important knowledge of applied research outcomes for universities. For employees participating in applied research and applied-to-basic transformation, questionnaires were distributed to employees in enterprises and research institutes who were taking part in the applied research.

Data were gathered from randomly selected employees by adopting qualitative semistructural interviews and questionnaires in two phases. The first stage of the interview with managers laid the foundation for the design of questionnaires, whereas the second stage of the interview with employees is to confirm whether the feedback of the questionnaire can be replicated in the small-scale questionnaire survey. The first stage is a small-scale pre-survey. A total of 471 questionnaires were distributed, and 210 university samples and 261 enterprise samples were obtained. After excluding invalid samples, 195 university samples and 230 enterprise samples were retained for analysis. The questionnaire was divided into five parts. The first part is to mainly understand the basic information of the respondents, and the other four parts focus on the information about employees' prosocial motivations, basic or applied research behavior, basic-to-applied transformation behavior, and applied-to-basic transformation behavior (discussed in the section below).

The responses were measured using a five-point Likert-type scale, with the corresponding score for responses to each question survey ranging as "strongly agree" (five points), "agree" (four points), "uncertain" (three points), "disagree" (two points), and "strongly disagree" (one point). As an ethical consideration, the respondents volunteered to participate in the study and provided written consent before answering the questionnaire. They were told that they could discontinue their participation at any time without any consequences. To ensure anonymity, personal information was kept in a master file that was separate from the dataset used for the study analysis.

We chose respondents from various levels of gender, working years, professional degree, positional title, and industry. Regarding the respondents' gender composition, men accounted for 53.86%. The respondents were grouped by professional degree, namely college diploma and below (3.76%), bachelor's degree (29.02%), master's degree (36.33%), and doctorate (30.9%). Although the sample had a small proportion of members with a college diploma involved in innovation activities, it was consistent with the current innovation practice. Meanwhile, participants in the other groups were evenly distributed. Employees with a high degree had more knowledge on the promotion of innovation activities, which improved the accuracy of data collection. The respondents were grouped by working years, namely 3 years and below (18.37%), more than 3 years and below 10 years (34.03%), more than 10 years and below 20 years (35.28%), and more than 20 years (12.32%). Similarly, the proportions of

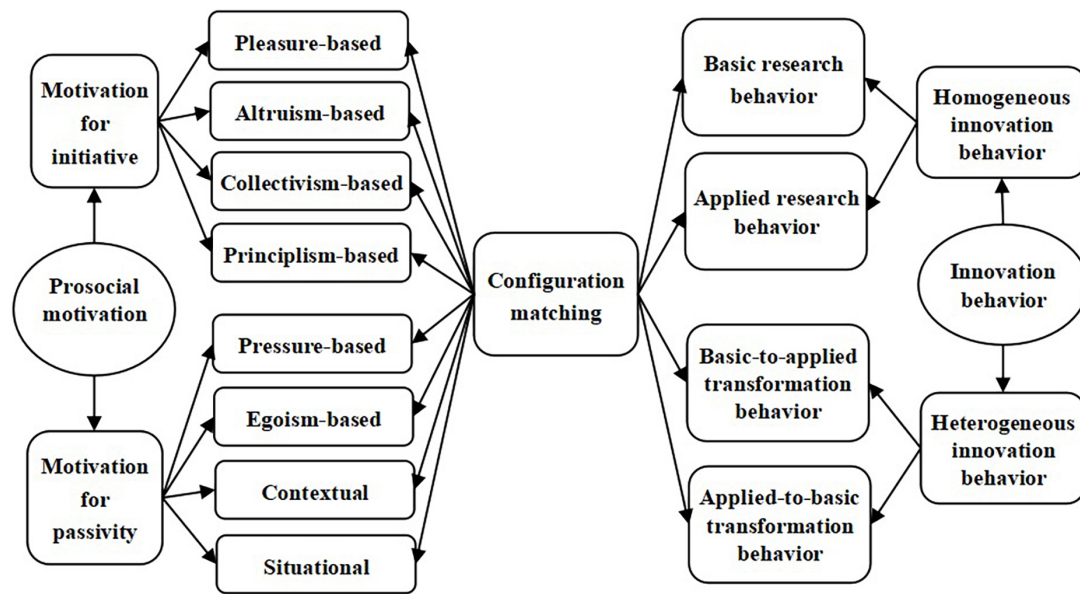


FIGURE 1

Theoretical model of the effect of multidimensional prosocial motivations on different types of innovation behaviors.

respondents in different industries were random. Conclusively, the questionnaire's data collection could be deemed reliable and comprehensive.

## Research method

Qualitative comparative analysis (QCA) is a type of research method to solve complex social problems that various reasons induced (Ragin, 2008). It focuses on exploring similar or different configurations from dependent variables. Fuzzy-set qualitative comparative analysis (fsQCA) can avoid information loss and improve data accuracy in the process of data transformation. It not only integrates the quantitative research method and qualitative research method to explore the advantages of different levels of elements but also fully considers the subtle influence of different degrees of factors on the results.

## Variable measurement

The measures of prosocial motivation refer to the studies of Gebauer et al. (2008), Batson et al. (2011), and Grant and Berry (2011). Specifically, measures of pleasure-based and pressure-based motivations refer to the scale of Gebauer et al. (2008). Measures of global, contextual, and situational motivations refer to the scale of Grant and Berry (2011). And measures of egoism-based, altruism-based, collectivism-based, and principlism-based motivations draw on the scale of Batson et al. (2011). There are a total of 28 items to test prosocial motivations. After

removing the trap item, the reliability (Cronbach's  $\alpha$ ) of every scale is all above 0.7 and the factor loadings of the same variable measured in Table 3 are all above 0.55, which indicates good reliability and validity.

Measures of employees' innovation behaviors are based on the scale of Kleysen and Street (2001) and Nagane and Sumikura (2020). Specifically, the measurement items of basic and applied research behaviors refer to the scale of Kleysen and Street (2001), with a total of eight items. The reliability (Cronbach's  $\alpha$ ) of every scale is all above 0.9 and the factor loadings of the same variable measured in Table 3 are all above 0.55. It indicates that the questionnaire results have good reliability and validity. The items of basic-to-applied transformation behavior refer to the scale of Nagane and Sumikura (2020), with a total of seven items. Combined with the similarity between applied-to-basic and basic-to-applied transformation situations, the measurement items of applied-to-basic transformation behavior are revised, with a total of five items. The reliability (Cronbach's  $\alpha$ ) of every scale is all above 0.9 and the factor loadings of the same variable measured in the table are all above 0.55. In addition,  $p$ -value in the Bartlett test is less than 0.05. It also shows that the questionnaire has good reliability and validity.

## Empirical analysis

### Necessity test

Before the configuration analysis, the high level and non-high level of each condition require a necessity test

TABLE 3 Analysis of the reliability and the validity.

Item in study 1	Factor loading	Types of prosocial motivation	Cronbach's alpha	Item in study 2	Factor loading	Types of prosocial motivation	Cronbach's alpha
YY1	0.859	Pleasure-based type	0.7	YY1	0.851	Pleasure-based type	0.71
YY2	0.855			YY2	0.809		
LT1	0.72	Altruism-based type	0.79	LT1	0.637	Altruism-based type	0.81
LT2	0.707			LT2	0.678		
LT3	0.733			LT3	0.8		
LT4	0.626			LT4	0.718		
JT1	0.76	Collectivism-based type	0.88	JT1	0.791	Collectivism-based type	0.88
JT2	0.687			JT2	0.634		
JT3	0.838			JT3	0.84		
JT4	0.765			JT4	0.826		
XN1	0.715	Principlism-based type	0.82	XN1	0.727	Principlism-based type	0.83
XN2	0.754			XN2	0.705		
XN3	0.632			XN3	0.674		
XN4	0.641			XN4	0.67		
YL1	0.776	Pressure-based type	0.7	YL1	0.658	Pressure-based type	0.72
YL2	0.606			YL2	0.694		
YL3	0.795			YL3	0.675		
YL4	0.704			YL4	0.783		
LJ1	0.722	Egoism-based type	0.81	LJ1	0.676	Egoism-based type	0.86
LJ2	0.843			LJ2	0.832		
LJ3	0.795			LJ3	0.8		
LJ4	0.886			LJ4	0.77		
QJ1	0.68	Contextual type	0.82	QJ1	0.647	Contextual type	0.78
QJ2	0.721			QJ2	0.755		
QJ3	0.679			QJ3	0.667		
QJ4	0.624			QJ4	0.661		
QK1	0.597	Situational type	0.77	QK2	0.65	Situational type	0.79
QK2	0.622			QK4	0.683		
AR1	0.81	Basic research behavior	0.91	FR1	0.555	Applied research behavior	0.93
AR2	0.854			FR2	0.56		
AR3	0.798			FR3	0.539		
AR4	0.782			FR4	0.656		
AR5	0.654			FR5	0.766		
AR6	0.614			FR6	0.809		
AR7	0.614			FR7	0.773		
AR8	0.765			FR8	0.776		
TS1	0.874	Basic-to-applied transformation behavior	0.95	ST1	0.851	Applied-to-basic transformation behavior	0.95
TS2	0.899			ST2	0.894		
TS3	0.895			ST3	0.838		
TS4	0.889			ST4	0.821		
TS5	0.879			ST5	0.801		
TS6	0.834						
TS7	0.639						

(see Table 4). The condition is determined to be necessary for the result when its consistency level is greater than 0.9. The test finds that principlism-based motivation is necessary for both highly/non-highly basic research behavior and highly/non-highly basic-to-applied transformation behavior. The situational type is essential for the behaviors of highly applied research and highly applied-to-basic transformation. And the severe absence of egoism-based type is a necessary condition for non-highly basic-to-applied transformation behavior. This study retains these necessary conditions in further analysis.

## Configuration analysis

### Configuration analysis of highly homogeneous innovation behaviors

As can be seen from Table 5, two configurations are leading to highly basic research behavior, which are combinations of “altruism-based × collectivism-based × principlism-based × pressure-based × contextual × situational” (configuration 1), and “~pleasure-based × altruism-based × collectivism-based × principlism-based × ~egoism-based × contextual × situational motivation” (configuration

TABLE 4 Necessity test of the previous conditions.

Condition variable	Outcome variable							
	Highly basic research behavior	Non-highly basic research behavior	Highly applied research behavior	Non-highly applied research behavior	Highly basic-to-applied transformation behavior	Non-highly basic-to-applied transformation behavior	Highly applied-to-basic transformation behavior	Non-highly applied-to-basic transformation behavior
Pleasure-based motivation	0.503	0.631	0.576	0.650	0.467	0.695	0.576	0.650
~Pleasure-based motivation	0.789	0.844	0.762	0.789	0.771	0.850	0.762	0.789
Altruism-based motivation	0.829	0.864	0.819	0.800	0.795	0.874	0.819	0.800
~Altruism-based motivation	0.524	0.709	0.574	0.711	0.485	0.767	0.574	0.711
Collectivism-based motivation	0.841	0.851	0.883	0.824	0.815	0.864	0.883	0.824
~Collectivism-based motivation	0.491	0.688	0.499	0.672	0.459	0.762	0.499	0.672
Principlism-based motivation	0.918	0.902	0.848	0.818	0.90	0.927	0.848	0.818
~Principlism-based motivation	0.390	0.599	0.549	0.700	0.369	0.672	0.549	0.699
Pressure-based motivation	0.809	0.847	0.815	0.853	0.772	0.876	0.815	0.853
~Pressure-based motivation	0.535	0.711	0.580	0.660	0.505	0.758	0.580	0.660
Egoism-based motivation	0.555	0.677	0.620	0.720	0.530	0.722	0.620	0.721
~Egoism-based motivation	0.771	0.852	0.767	0.782	0.741	0.900	0.767	0.782
Contextual motivation	0.875	0.818	0.847	0.771	0.820	0.826	0.847	0.771
~Contextual motivation	0.479	0.757	0.534	0.724	0.450	0.792	0.534	0.724
Situational motivation	0.882	0.814	0.924	0.861	0.845	0.848	0.924	0.861
~Situational motivation	0.432	0.697	0.440	0.611	0.420	0.758	0.440	0.611



TABLE 5 Configuration solutions to highly basic research behavior and highly applied research behavior.

Types of prosocial motivation	Configuration solutions to highly basic research behavior		Configuration solutions to highly applied research behavior			
	Configuration 1	Configuration 2	Configuration 3	Configuration 4	Configuration 5	Configuration 6
Pleasure-based type		⊗		•		•
Altruism-based type	•	•	•	•	•	
Collectivism-based type	•	•	•	•	•	•
Principlism-based type	●	●	•	•	•	•
Pressure-based type	•				•	•
Egoism-based type		⊗	⊗			⊗
Contextual type	•	•	•	•	•	•
Situational type	•	•	●	●	●	●
Consistency	0.950	0.944	0.988	0.977	0.982	0.988
Original coverage	0.610	0.528	0.509	0.389	0.522	0.323
Unique coverage	0.135	0.053	0.034	0.008	0.031	0.013

The small black circle “•” indicates the presence of a secondary condition. The big black circle “●” indicates the presence of a core condition. And the thin circle with “⊗” indicates the absence of a secondary condition.

2). The consistency and the coverage rate of configuration 1 are 0.95 and 0.61, respectively, which are higher than those of configuration 2. And both configurations 1 and 2 can explain that more than half of the innovators have this combination of prosocial motivations to realize highly basic research behavior. The common point of the two configurations is that the principlism-based type of motive plays a core role. It happens because the basic research behavior is generally decoupled from the market, and the research activities conducted are relatively independent without attaching to the interests and the needs of others. To obtain basic research achievements in a simple and exploratory environment without interests chasing, a stable personality tendency like research faith to the prosocial motivation on life and intrinsic values is very important. This finding is also shared by Liu et al. (2022) that the members of scientific research have a belief in making innovations that will have a significant impact on their attitudes toward research challenges and the knowledge interactions with other members. Another common point is that altruism-based, collectivism-based, contextual, and situational motives all assist in reaching highly basic research behavior with the core condition. The basic research behavior is a type of complex and long-term innovation behavior, so leading it to the high innovation behavior needs divergent prosocial motivations inside, which can meet employees' spiritual pursuit in different ways for a long time. It not only needs teamwork but also allows the employees to respond selectively to the same situation and allows an employee to respond according to different situations. Including the motives above, the egoism-based type is not essential but can be optional in configuration 1, for the reason that the sense of self-achievement can be shown differently for different employees in the basic research department. This conclusion clarifies the previous conclusion that egoism-based motivation has no definite effect on basic research behavior

(Tian et al., 2021), and further confirms that self-achievement motivation can be the best predictor of an individual's high innovation behaviors in addition to professional quality and cognitive ability, but the positive effect of it on knowledge sharing weakens when employees excessively pursue success and consider the benefits of work (Higgins, 1998; Elliot et al., 2018). Configuration 1 explains more than configuration 2 because basic researchers with pressure-based motive tend to be more innovative than the researchers without pleasure-based and egoism-based motives with the premise of the same other motives working. Specifically, neither the motive to please others nor to achieve oneself excessively contributes to highly basic research behavior. But if pressure-based motivation exists, both motives can probably exist in the configuration of highly basic research behavior, for employees sometimes work for eliminating external pressure.

Four configurations lead to highly applied research behavior (see Table 5). Configurations 3–5 are relatively similar, which are the combinations of “altruism-based × collectivism-based × principlism-based × ~egoism-based × contextual × situational,” “pleasure-based × altruism-based × collectivism-based × principlism-based × contextual × situational,” and “altruism-based × collectivism-based × principlism-based × pressure-based × contextual × situational motivation.” The coverage rate of configuration 5 is 0.522, which is the highest among the four pathways. And both configurations 3 and 5 can explain more than half of the innovators possess this combination of prosocial motivations to realize highly applied research behavior. In common, the four configurations share the situational motivation that plays a core role in highly applied research behavior. It happens because the behavior of applied research possesses the market-oriented characteristics of innovation, which is subject to the changeable market. To

achieve highly applied research behavior, it requires employees to respond selectively to prosocial motivations based on the direction of market development. It is worth noting that applied researchers need to stand up and deal with unexpected situations in the research process. The result has been explored from the study by [Tian et al. \(2021\)](#) that applied researchers often need to invest more time, energy, and resources in their work to absorb and master domain and creative skills and form more flexible cognitive structures and in-depth strategies to deal with challenging problems. Another common point among the four configurations is that collectivism-based, principlism-based, contextual, and situational motivations all assist in reaching highly applied research behavior in the configuration. This point is the same as highly basic research behavior for applied research is also a complex activity in a long run. Configuration 5 is more convincing to explain the behavior than configurations 3 and 4, because the pressure-based motivation in configuration 5 may play a more significant role, and there exists the absence of egoism-based type in configuration 3 and the presence of pleasure-based type in configuration 4, when all other motivations work. The same as highly basic research behavior, external pressure is a good drive for applied innovators to conduct the research, for their work is challenging and should be adapted to the changing times.

Highly basic and highly applied research behaviors share in common collectivism-based, principlism-based, contextual, and situational motivations which play a supporting role in configurations. But the core conditions between the two are different. The former gets the prosocial motivation for initiative as the core condition, and the latter gets the passive motivation as the core. The most important reason this happens is that the achievements obtained from applied research meet the conditions of exclusivity and effectiveness, which is different from highly basic research behavior and may lead to knowledge hiding when conducting innovation activities. Meanwhile, applied research needs innovators to consider all aspects of the applying process and to emphasize technical cooperation to maximize benefits, which is suitable for the market behavior. However, basic research behavior is out of market behavior, as a type of innovation behavior protected and supported by the government and social organizations. So, basic research members need more intrinsically active motivations than applied research members. In addition, the number of configuration solutions in highly applied research behavior is more than that in highly basic research behavior. It gets more pathways to lead to highly applied research behavior, which is in line with the characteristics of market diversification and research types.

### Configuration analysis of highly heterogeneous innovation behaviors

There are two configurations leading to highly basic-to-applied transformation behavior (see [Table 6](#)).

Configurations 7 and 8 are the combinations of “altruism-based × collectivism-based × principlism-based × pressure-based × contextual × situational,” and “~pleasure-based × altruism-based × collectivism-based × principlism-based × ~egoism-based × contextual × situational motivation.” The coverage rate of configuration 7 is 0.544, which is higher than that of configuration 8. Compared with highly basic research behavior, only configuration 7 can explain that more than half of the innovators have this combination of prosocial motivations to realize this type of highly innovation behavior. It takes place because basic-to-applied transformation activity puts forward more requirements for the innovators. The first and the most important reason it happens is that basic and applied research behaviors are heterogeneous innovation behaviors. The transformation process has to overcome knowledge heterogeneity, which not only proposes some requirements for the ability and preferences of employees in the department but also can be affected by the emergent environment and emotional conditions. The second reason is that the concern of innovation behavior changes from meeting spiritual needs to cooperating with team members, and the concern of innovation achievements needs to change from being out of the market to meeting the market application. So, it is harder for innovators to achieve highly basic-to-applied transformation behavior when compared with highly basic research behavior. This finding has been verified by [Sun Y. et al. \(2020\)](#) that knowledge diversity and heterogeneity may harm knowledge coupling, and further confirmed by [Liu et al. \(2022\)](#) that transformation behavior has to invest more time, energy, and resources to achieve high innovation behavior. Besides, it is the same as highly basic research behavior that altruism-based, collectivism-based, contextual, and situational motivations all assist in reaching highly basic-to-applied transformation behavior. Although basic-to-applied transformation research is an applied research activity for a technological breakthrough, it is still based on the innovation knowledge and prosocial motivation possessed by the innovators themselves, which cannot be separated from the psychological characteristics of the ontology and innovative characteristics of the activity.

Highly applied-to-basic transformation behavior also has four configurations (see [Table 6](#)). The coverage rate of configuration 11 is 0.585, which is the highest among the four pathways. Both configurations 9 and 11 can explain that more than half of the innovators have these kinds of personality traits and states to realize this type of high innovation behavior. They are almost the same as that of highly applied research behavior. Both of them have situational motivation which plays a core role. Common ground is difficult to develop in applied-to-basic transformation activities because crowd members lack a common organizational or situational context, show minimal commitment to pursuing a common goal, and enter or leave conversations at any point ([Faraj et al., 2011](#); [Viscusi and Tucci, 2018](#)). So, applied-to-basic transformation behavior needs more

TABLE 6 Configuration solutions for high transformation behaviors between basic research and applied research.

Types of prosocial motivation	Configuration solutions to highly basic-to-applied transformation behavior		Configuration solutions to highly applied-to-basic transformation behavior			
	Configuration 7	Configuration 8	Configuration 9	Configuration 10	Configuration 11	Configuration 12
Pleasure-based type		⊗		•		•
Altruism-based type	•	•	•	•	•	
Collectivism-based type	•	•	•	•	•	•
Principlism-based type	●	●	•	•	•	•
Pressure-based type	•				•	•
Egoism-based type		⊗	⊗			⊗
Contextual type	•	•	•	•	•	•
Situational type	•	•	●	●	●	●
Consistency	0.953	0.956	0.907	0.915	0.900	0.943
Original coverage	0.544	0.476	0.570	0.445	0.585	0.377
Unique coverage	0.120	0.051	0.035	0.008	0.030	0.014

The small black circle “•” indicates the presence of a secondary condition. The big black circle “●” indicates the presence of a core condition. And the thin circle with “⊗” indicates the absence of a secondary condition.

situational motivation to achieve high innovation behavior. Among four configurations, collectivism-based, principlism-based, contextual, and situational motivations all assist in reaching highly innovation behavior. The reason it causes is that applied-to-basic transformation researchers still have the same prosocial motivation to continue the research based on the original discipline, and exert their unique motivation advantages.

Both highly basic-to-applied and highly applied-to-basic transformation behaviors share in common collectivism-based, principlism-based, contextual, and situational motivations that play a supporting role in configurations. But the core conditions between the two are different. Both of them get one prosocial motivation for initiative and passivity as the core condition, respectively. Employees participating in applied-to-basic research activities should have a certain understanding of the organization, interpretation, and perception in a particular situation, and then decide what behavior they should have (Bandura, 1999). However, employees in basic-to-applied research activities take the accountability for knowledge acquisition and regard academic achievement and honor as an important spirit pursuit, which can lead to highly basic-to-applied transformation behavior without attaching great importance to the situations (Liu et al., 2022). So, highly applied-to-basic research behavior needs more passive motivations than highly basic-to-applied research behavior.

The fsQCA method has the characteristic of asymmetry, that is, the preconditioned configuration in which a certain result appears or does not appear is not opposite. To fully explore the prosocial motivation of employees’ innovation behavior, further analysis of the condition configuration leading to a non-high level of innovation behaviors is required (see Tables 7, 8).

### Configuration analysis of non-highly homogeneous innovation behaviors

As can be seen from Table 7, there are two configurations that induce non-highly basic research behavior. Configurations 1 and 2 are “pleasure-based × altruism-based × ~collectivism-based × principlism-based × pressure-based × ~egoism-based × contextual × situational,” and “~pleasure-based × altruism-based × collectivism-based × principlism-based × pressure-based × ~egoism-based × contextual × ~situational motivation” respectively. The consistency of configuration 2 is 0.838, which is higher than that of configuration 1. But the coverage rate of configuration 1 is 0.554, which is higher than that of configuration 2. It reflects that configuration 1 can explain that more than half of the innovators have this combination of prosocial motivations, which result in non-highly basic research behavior. The severe absence of collectivism-based and egoism-based motivations plays a core role in configuration 1, and the severe absence of egoism-based and situational motivations plays a core role in configuration 2. Because the basic research is the exploration of an unknown field and its research period is very long, employees with a high lack of collectivism-based and egoism-based motivations, or their high lack of both egoism-based motivation and different feedback in different situations, will go against their spiritual pursuit of self-achievements and result in non-highly basic research behavior. Thus, this finding verifies the conclusion of Elliot et al. (2018) that the severe lack of self-achievement motivation with no group thinking or situational approach results in a non-highly basic research behavior. Meanwhile, basic research activities have long-term and continuous requirements for research work, which do not seek profit, and have high requirements for knowledge dissemination and work tacit understanding, so the employees

TABLE 7 Configuration solutions to non-highly basic research behavior and non-highly applied research behavior.

Types of prosocial motivation	Configuration solutions to non-highly basic research behavior		Configuration solutions to non-highly applied research behavior	
	Configuration 1	Configuration 2	Configuration 3	Configuration 4
Pleasure-based type	•	⊗	•	•
Altruism-based type	•	•	⊗	•
Collectivism-based type	⊗	•	•	•
Principlism-based type	●	●	•	•
Pressure-based type	•	•	●	⊗
Egoism-based type	⊗	⊗	⊗	●
Contextual type	•	•	•	•
Situational type	•	⊗	•	•
Consistency	0.814	0.838	0.845	0.854
Original coverage	0.554	0.497	0.520	0.505
Unique coverage	0.121	0.064	0.056	0.041

The small black circle “•” indicates the presence of a secondary condition. The big black circle “●” indicates the presence of a core condition. The thin circle with “⊗” indicates the absence of a secondary condition, and the bold circle with “⊗” indicates the absence of a core condition.

TABLE 8 Configuration solutions to non-high transformation behaviors between basic research and applied research.

Types of prosocial motivation	Configuration solutions to non-highly basic-to-applied transformation behavior	Configuration solutions to non-highly applied-to-basic transformation behavior			
	Configuration 5	Configuration 6	Configuration 7	Configuration 8	Configuration 9
Pleasure-based type	⊗	●		●	
Altruism-based type	•	•	•		•
Collectivism-based type	•	•	•	•	•
Principlism-based type	●	•	•	•	•
Pressure-based type			⊗	•	•
Egoism-based type	⊗		⊗	⊗	●
Contextual type	•	•	•	•	•
Situational type	•	•	•	•	•
Consistency	0.528	0.762	0.778	0.850	0.796
Original coverage	0.691	0.481	0.485	0.442	0.512
Unique coverage	0.047	0.003	0.028	0.008	0.029

The small black circle “•” indicates the presence of a secondary condition. The big black circle “●” indicates the presence of a core condition. The thin circle with “⊗” indicates the absence of a secondary condition, and the bold circle with “⊗” indicates the absence of a core condition.

participating in it also need a sense of self-achievement to satisfy their spiritual pursuits. If the employees in the basic research department only blindly carry out altruistic activities but ignore their need, it is not conducive to a highly basic research behavior.

There are also two configurations inducing non-highly applied research behavior (see Table 7), which are configurations 3 and 4. The coverage rate of the former is 0.520, which is higher than that of the latter. And the consistency of the latter is 0.854, which slightly higher than that of the former. Both configurations can explain more than half of the innovators who have this combination of prosocial motivations conduct non-highly applied research behavior.

The two configurations are quite different. The former has a severe absence of the altruism-based motivation and the presence of the pressure-based type as the core conditions, while the latter possesses a severe absence of the pressure-based motivation and the presence of the egoism-based type as the key conditions. The latter happens because the applied research behavior exists in varying degrees, and its market trend and technical cooperation lead innovators to utilitarian thought. Thus, it promotes the performance of the egoism-based type. But if the innovators focus too much on the sense of self-achievement and lose the guidance of the stress, it will lead the applied research behavior to a non-high level of innovation. The reason the former happens is that

the applied research is an innovative activity fundamentally. Employees in the applied research department need a free and relaxed external environment to achieve high innovation behavior. When the environment exerts too much pressure on the innovators and they are highly lacking altruistic motivation without the egoism-based type as the secondary condition, the innovators will lose the motivation to innovate further. This finding has been proposed by Škerlavaj et al. (2018) that employees who perceive greater pressure to help others will hide knowledge when they are low in altruistic motives.

### Configuration analysis of non-highly heterogeneous innovation behaviors

As can be seen from Table 8, there is only one configuration that induces non-highly basic-to-applied transformation behavior. The coverage rate and the consistency of configuration are 0.691 and 0.528, respectively. It can explain that 69.1% of the innovators have this combination of prosocial motivations to lead to non-high innovation behavior. In addition, the severe absence of the egoism-based type plays a core role. It happens because the lack of a sense of self-achievement will make the employees in the basic research department lose the incentive to incubate the achievement further. They may have an insufficient impetus to transform basic research achievements to applied research achievements. So to make sure the state of the egoism-based motivation inside the innovators is very important. It should not be essential but can be optional, which has been shown in the highly basic research behavior and also verified by Elliot et al. (2018).

Furthermore, as shown in Table 8, there are four configurations inducing non-highly applied-to-basic transformation behavior. First, configurations 7 and 9 are quite different, which are “altruism-based  $\times$  collectivism-based  $\times$  principlism-based  $\times$   $\sim$ pressure-based  $\times$   $\sim$ egoism-based  $\times$  contextual  $\times$  situational,” and “altruism-based  $\times$  collectivism-based  $\times$  principlism-based  $\times$  pressure-based  $\times$  egoism-based  $\times$  contextual  $\times$  situational motive,” respectively. The coverage rate of configuration 9 is 0.512, which is the highest among the four. Its consistency is 0.796. It means that configuration 9 accounts for more than half of the innovators to have the combination of prosocial motivations to result in this type of non-high innovation behavior. Specifically, egoism-based motivation plays a key role in configuration 9, while a high lack of pressure-based motive plays a core role in configuration 7. As an excessive focus on self-achievement and promotion prospects can lead employees into profit circles, it goes against highly applied-to-basic transformation behavior. However, if the innovators in the applied-to-basic transformation department lack a sense of self-achievement and external pressure, it will also make the innovation behavior worse. Configurations 6 and 8 are

similar, namely the combination of “pleasure-based  $\times$  altruism-based  $\times$  collectivism-based  $\times$  principlism-based  $\times$  contextual  $\times$  situational,” and “pleasure-based  $\times$  collectivism-based  $\times$  principlism-based  $\times$  pressure-based  $\times$   $\sim$ egoism-based  $\times$  contextual  $\times$  situational motive.” They share the pleasure-based motive as a core condition, while the latter lacks the egoism-based type as a secondary condition when the altruism-based type is optional and the pressure-based type exists with the same other motive as the former. Due to the needed focus on the pleasantness and the healthy development of body and mind of others, there is a lack of efficiency and decisiveness in innovation. Such case results in non-highly applied-to-basic transformation behavior.

### Comparison of innovation behaviors of initiative and passivity

According to the motivated information processing theory, the desires of individuals can shape the way they react to information (De Dreu, 2006; Nijstad and De Dreu, 2012). Generally speaking, the closer the innovators' desire is to the intrinsic motivation, the lower the degree of information processing of the innovators. In other words, the closer the innovators' desire is to the extrinsic motivation, the higher the information processing degree of the innovators, and the lower the efficiency of the innovator in making prosocial decisions.

Overall, in the comparison of configuration solutions of highly homogeneous innovation behaviors, there are four configurations in highly applied research behavior and only two configurations in highly basic research behavior. However, there is a core condition of actively prosocial motivation of principlism-based type in highly basic research behavior, but a core condition of passively prosocial motivation of situational type in highly applied research behavior. So, highly basic research behavior needs more actively prosocial motivations than highly applied research behavior. Furthermore, since the configuration solutions of highly heterogeneous innovation behaviors are similar to that of highly homogeneous innovation behaviors, highly basic-to-applied transformation behavior also needs more active prosocial motivations than highly applied-to-basic transformation behavior. In addition, both configurations in highly basic research behavior can explain that more than half of the innovators have this combination of prosocial motivations to realize highly basic research behavior, but only one configuration in highly applied research behavior can explain that. It means that highly basic research behavior needs more active prosocial motivations than highly basic-to-applied transformation behavior, and highly basic-to-applied transformation behavior needs more active prosocial motivations than highly applied research behavior. Then, because the explanation of the configurations of prosocial motivation in highly applied-to-basic transformation behavior is less powerful than that in highly applied research behavior, the former needs less active prosocial motivations than the



latter. Consequently, the actively prosocial degree of different types of high innovation behaviors from strong to weak are highly basic research behavior, highly basic-to-applied transformation behavior, highly applied research behavior, and highly applied-to-basic transformation behavior (see **Figure 2**). It has been explored by Škerlavaj et al. (2018) that prosocial motivation and intrinsic motivation have a significant influence on knowledge sharing. They found that in organizational knowledge management, the more consistent the dominant prosocial motivation of knowledge contributors is with their intrinsic motivation, the higher the knowledge sharing level of knowledge contributors will be, and consequently, a low level of knowledge hiding.

In the comparison of configuration solutions of non-highly homogeneous and heterogeneous innovation behaviors, the former has more solutions of the absence of passive motivations in the configurations than the latter. So non-highly homogeneous behaviors for innovation depend on more passively prosocial motivations than non-highly heterogeneous behaviors. Meanwhile, within the homogeneous configurations, non-highly basic research behavior has two configurations which lack one or two passive prosocial motivations and only one initiative prosocial motivation in each configuration, while non-highly applied research behavior also has two configurations which lack one or zero initiative prosocial motivation and one passive prosocial motivation in each configuration. Hence, the passively prosocial degree of different types of non-high innovation behaviors from strong to weak are non-highly basic research behavior, non-highly applied research behavior, non-highly applied-to-basic transformation behavior, and non-highly basic-to-applied transformation behavior.

## Discussion and implications

### Discussion

Prosocial motivation plays an important role in employees' innovation behaviors by improving the interaction between basic research and applied research. Based on the research

type decomposition, this study investigated the influence of prosocial motivations on employees' innovation behaviors. On one hand, prosocial motivations include not only motivations for initiative but also motivations for passivity. On the other hand, according to the production of innovation achievements, innovation behavior can be specifically divided into basic research behavior, applied research behavior, basic-to-applied transformation behavior, and applied-to-basic transformation behavior. Among them, basic research behavior and applied research behavior are homogeneous innovation behaviors, whereas basic-to-applied and applied-to-basic transformation behaviors are heterogeneous innovation behaviors. The results can be shown in four significant findings.

First, highly basic and highly applied research behaviors share in common collectivism-based, principlism-based, contextual, and situational motivations which play a supporting role. But the core conditions between the two kinds of research are the prosocial motivation for initiative as core condition and the motivation for passivity as core condition, respectively.

Second, both highly basic-to-applied and highly applied-to-basic transformation behaviors share the same core conditions and secondary conditions with highly basic and highly applied research behaviors, respectively, because high transformation behaviors still require innovators in different fields to have the same prosocial motivation and to continue the research based on the original discipline foundation.

Third, the behaviors of non-highly basic research and non-highly basic-to-applied transformation share the absence of egoism-based motivation as the core condition in common. But the former has some absent conditions of motivations to lead to non-high innovation behavior. Then the common point between the behaviors of non-highly basic-to-applied and non-highly applied-to-basic transformation is the absent condition of pressure-based motivation as the key condition. But the former's severe lack of altruism-based motivation leads to non-high innovation behavior in transformation research.

Fourth, we also analyze active and passive prosocial degree of all types of high/non-high innovation behaviors. The actively prosocial degree of different types of high innovation behaviors from strong to weak are highly basic research behavior,

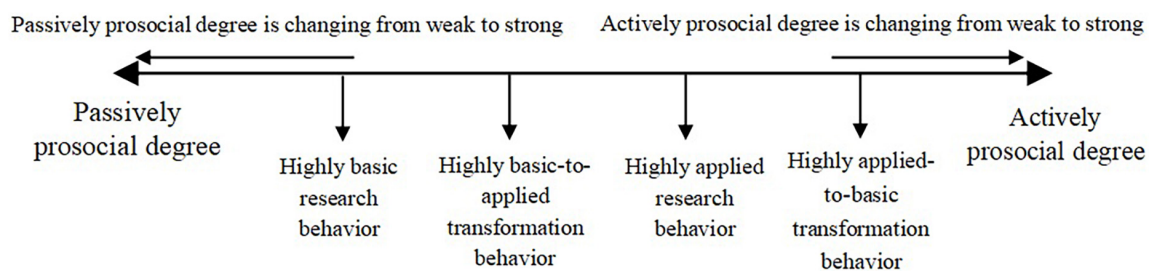


FIGURE 2  
Active and passive prosocial levels of different types of high innovation behaviors.

highly basic-to-applied transformation behavior, highly applied research behavior, and highly applied-to-basic transformation behavior. The passively prosocial degree of different types of non-high behaviors from strong to weak are non-highly basic research behavior, non-highly applied research behavior, non-highly applied-to-basic transformation behavior, and non-highly basic-to-applied transformation behavior.

## Theoretical implications

Our research takes a step toward resolving the controversy about the link between prosocial motivations and innovation behaviors. Although the effect of prosocial motivation on innovation behavior has been widely explored (Gebauer et al., 2008; Pian et al., 2019), little research has addressed active and passive prosocial degree of different types of innovation behaviors. We proposed and found that this relationship is contingent on the configurations of prosocial motivations. For innovators who have strongly active prosocial motivations, configuration with some intrinsic motivations like principlism-based motivation is good for them to conduct basic research or basic-to-applied research. Meanwhile, they may have weakly passive prosocial motivations. If innovators have weakly active motivations, for example, the configuration has passive motivation like pressure-based motivation, it may result in non-highly basic research behavior. Therefore, the configuration of prosocial motivations helps researchers explain the reasons why prosocial motivation cannot lead to innovation behavior and extends the explanation of prosocial motivation.

In addition, our research presents a new relational view of innovation by considering the production of innovation achievements. Although several researchers have studied the effect of prosocial motivation on basic and applied research, they are conducted separately (Hoever et al., 2012; Kim and Choi, 2018), without considering how prosocial motivation affects different behaviors when they interact with each other. So, we discuss the impact of prosocial motivation not only on different types of innovation behaviors but also on the interaction between them. Configurations of prosocial motivation help researchers explore the way to overcome the difference between the psychological characteristics of innovators within the research departments and that of innovators between the research departments. Our study finds out that employees with highly basic research behavior or highly applied research behavior have different configurations of prosocial motivations. The difference in the configuration of employees' prosocial motivations also can be shown in different types of highly heterogeneous innovation behaviors. Hence, our findings enrich the studies of innovation behaviors from the perspective of prosocial motivations.

## Practical implications

In addition to being of theoretical interest, our findings shed light on the practice of prosocial motivations and innovation behaviors for organizations and their employees. The conclusions of the research will help managers in different research activities understand the internal mechanism of stimulating employees' innovation behaviors from the perspective of the combination of prosocial motivations. We suggest that simply considering a single type of prosocial motivation may not be enough, particularly when the problems being solved are ill-structured, such as strategic formulations. Our contribution to research on innovation behavior is to identify the effects of multi-dimensional prosocial motivations as a specific mechanism of knowledge coupling.

To achieve high innovation behaviors from the perspective of multi-dimensional prosocial motivations, innovation activities of all kinds can share the same practical implications in some aspects. It is necessary to create an innovative atmosphere, such as periodically organizing brainstorming and regular meetings and setting a good example to encourage employees to make research with excellence, which can promote the learning and sharing of knowledge and experience among employees. What is more, employees should be provided with as much organizational support as possible such as encouraging them to participate in training and lectures on research methods and attending national and international professional conferences to enhance professional knowledge and skills (Lee et al., 2020; Shie et al., 2020). The above methods can enhance their active prosocial motivation. Moreover, employees in all research departments need to recognize their identity and value based on the organization to engage in creative work more effectively. In addition, managers also need to allow them to participate in more research projects and enrich their work experience, which can encourage them to set higher achievement goals. Most importantly, leaders can also continuously strengthen their positive evaluation of group identity to further motivate their achievement motivation and independent innovation.

The conclusion also tells us about the breakthrough of differentiated management among different innovation activities. The leaders of the scientific research activities should pay attention to psychological incentives for innovators to meet their pursuit of spiritual rewards, whereas the leaders of the applied research activities should focus on situational management to diversify incentive methods to meet the prosocial needs of innovators, for the members in the applied research activities need more situational prosocial motivation. So, to motivate innovators to engage in more innovation activities, innovation behaviors should be encouraged in a way that incorporates various kinds of incentives and tolerances for differences and heterogeneity, as

the information system not only acts as an enabler but also shapes the innovation outcomes (Majchrzak and Malhotra, 2013). In this regard, using different prosocial motivations appropriately and strategically will be the key to encouraging innovators' prosocial interaction in the innovation process (Boudreau et al., 2011; Boudreau and Lakhani, 2015; Lakhani, 2016).

## Limitations and future research

Although this study has produced interesting findings and contributed to both theory and practice, it has several limitations. First, we analyzed texts from innovation behavior without discerning the industry sector or other environmental and market contexts. As such, we do not know how idea integration is affected by contextual conditions. We also did not have data on innovators' industry experience and expertise, and therefore, do not know how that would affect the relationships we found. Second, the results of the study are based on data in the Chinese context, which may limit the generalization to other countries. Future research should use data from diverse countries to verify the validity of our results. Finally, our focus is solely on prosocial motivation as the source of innovation behavior. Individuals can become involved in innovation behavior to gain personal benefits, personal intrinsic rewards, or due to other proself motives. In this study, due to our interest in prosocial motivation, we did not develop other directions. We strongly encourage future researchers to delineate a separate model of proself motivation leading to various outcomes through innovation behavior and explore its boundary conditions.

## Conclusion

Considering that one dimension with difference changes the whole process of employees' innovation behavior, the influence of multiple prosocial characteristics on innovation behaviors is complex and the causes of high and non-high innovation behaviors cannot be reversed. Accordingly, we regarded prosocial motivations as a whole, took prosocial motivation as the antecedent of innovation behavior, and constructed a model by integrating prosocial theory with innovation behavior theory to discover multiple and complex causality relationships between condition configurations consisting of various prosocial types and innovation behaviors to ensure conclusion universality. We discovered that the same level of innovation behavior depends on the configuration that consists of various prosocial types rather than a certain motivation. A certain

configuration of motivations may produce different levels of certain innovation behavior. Multiple and complex causality relationships exist between condition configurations consisting of various prosocial types and innovation behaviors, which enlighten us on how to strengthen the positive effects and avoid negative effects of prosocial types on innovation behaviors to provide practical inspiration for the training of innovation talents.

## Data availability statement

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

## Author contributions

YL: conceptualization, methodology, and writing – review and editing. BZ: writing – original draft preparation, review and editing. LZ: investigation, data validation, and supervision. WL: software and data curation. All authors contributed to the article and approved the submitted version.

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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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# Will exposure to different consequences of prosocial behavior always lead to subsequent prosocial behavior among adolescents: An experimental study of short videos

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The relationship between exposure to prosocial media content and prosocial behavior has been extensively explored. However, previous studies mainly explore the effect of prosocial media content exposure by comparing an individual's exposure to the different types of content (i.e., prosocial content or neutral content), and generally focus on traditional media and video games, with less attention given to the increasingly popular new media platforms. In this study, we explored new dimensions by considering individuals' exposure to different consequences of the same prosocial behavior (i.e., reward, punishment, or no consequences) in the context of short videos. Drawing upon Social Cognitive Theory and the General Learning Model, this experimental study identified the effect of such exposure on subsequent prosocial behavior among adolescents. We found that compared to the no consequences group, exposure to the reward consequence did not significantly predict moral elevation and subsequent prosocial behavior. Meanwhile, exposure to the punishment consequence had a significantly negative effect on subsequent prosocial behavior *via* moral elevation. Furthermore, the results revealed that empathy moderated the relationship between moral elevation and prosocial behavior, and moral elevation only positively predicted prosocial behavior among those with low empathy. Theoretically, this study deepens our understanding of the impact of exposure to different consequences of prosocial behavior on adolescents' subsequent

prosocial behavior, and highlights the importance of moral elevation and empathy to understand the underlying mechanism. The study also provides some practical implications for parents and practitioners to nurture prosocial behavior among adolescents.

#### KEYWORDS

prosocial media content exposure, prosocial behavior, moral elevation, empathy, late adolescents

## Introduction

Prosocial behavior is a voluntary and intentional behavior resulting in others' benefits (Eisenberg and Miller, 1987). Research on this topic originated in psychology with McDougall (1908), who argued that prosocial behavior was the result of "tender emotions" created by the parental instinct, and has burgeoned since Darley and Latane (1968)'s scientific inquiry into the non-responsive bystanders in the brutal murder of Katherine "Kitty" Genovese in 1964. Recent research shows that performing prosocial behavior is not only helpful for others, but also beneficial for actors themselves, particularly for adolescents (Penner et al., 2005; Aknin et al., 2018). For instance, adolescents' prosocial behavior is proved to be positively associated with their academic performance (Gerbino et al., 2018), friendship quality (Closson, 2009), well-being (Son and Padilla-Walker, 2020), and achievement at later life stages (Toumbourou, 2016). Moreover, given that adolescence is the stage when one's values and worldviews are formed, it is often recognized as a key period for prosocial development (Foulkes et al., 2018). Therefore, scholars have explored the predictors of prosocial behavior to better nurture and advance adolescents' prosocial behavior (Eisenberg, 2003; Carlo et al., 2011; Imuta et al., 2016; Li et al., 2022).

In the field of media study, considerable research endeavors have been devoted to establishing the relationship between exposure to prosocial media content and individuals' prosocial behavior in the past several decades (Saleem et al., 2012; Greitemeyer and Mügge, 2014; Prot et al., 2014; Mares and Stephenson, 2017; Ruth, 2017; Coyne et al., 2018). For instance, a study found that children who were exposed to prosocial television news donated more money to charities compared to those who watched neutral news (de Leeuw et al., 2015). Likewise, exposure to Disney animation movies in which the main character helped friends effectively facilitated children's prosocial behavior toward their friends in real life (de Leeuw and van der Laan, 2018). A laboratory experiment on music consumption revealed a similar result that participants' empathy and prosocial behavior significantly increased after they listened to music with prosocial lyrics (Greitemeyer, 2009a,b). In general, the positive effect of consuming prosocial media content has

been repeatedly confirmed with few exceptions (Coyne and Padilla-Walker, 2015; Padilla-Walker et al., 2015).

The issue with most of the previous studies, however, is that they explored the effect of prosocial media content on prosocial behavior by comparing an individual's exposure to different types of content, such as prosocial content vs. neutral content. In fact, prosocial content delivered in the media is much more complicated and defies simple categorization. For instance, people are sometimes exposed to media content that depicts performance of a certain prosocial behavior with different outcomes: positive or negative. A positive outcome may come in the form of receiving a verbal compliment, an honorary title, or a material reward, while a negative outcome in the form of being misunderstood, blackmailed, or even being at the risk of an arrest (Smith et al., 2006). This kind of media content, such as the sensational Peng Yu case in 2007<sup>1</sup> (Wang et al., 2019) and similar events that occurred more recently in China, reflects what often happens in our society, i.e., "good things happen to good people" or "no good deed goes unpunished." Considering the prevalence of such media content, research at a more nuanced level needs to be conducted by taking into consideration individuals' exposure to different consequences of the same prosocial behavior.

In addition, a review of the literature on prosocial media content exposure and prosocial behavior yielded another observation. Most extant studies were conducted in such traditional media contexts as television (de Leeuw et al., 2015; Padilla-Walker et al., 2015), movies (de Leeuw and van der Laan, 2018), and music (Greitemeyer, 2009b). Despite the extension into video games (Gentile et al., 2009; Greitemeyer and Osswald, 2009; Greitemeyer and Mügge, 2014; Prot et al., 2014), little attention has been given to new media such as the increasingly popular short videos. Short videos are considered short in

1. Peng Yu case is a civil lawsuit in China brought before the Nanjing District Court in 2007. In 2006, Peng Yu, a young man, encountered an old lady called Xu Shoulun after she had fallen and broken her femur. Peng Yu assisted Xu Shoulun and brought her to a local hospital for care. However, Xu Shoulun accused Peng Yu of having caused her to fall and demanded that he pay her medical expenses. The court decided in favor of the plaintiff, reasoning that despite the lack of concrete evidence, "no one would in good conscience help someone unless they felt guilty."

length, from several seconds to several minutes depending on the platform (Wang and Wu, 2021). Because of their short length, they are more easily shared on today's social media compared to television programs and movies. In fact, short videos have already gained rapid growth and attracted millions of users worldwide (Omar and Dequan, 2020). According to industry reports, the number of daily active users on TikTok, one of the most attractive short video platforms, has already reached 400 million in China (Marszałek, 2020) and 800 million worldwide (DataReportal, 2022). Among these active users, young people aged between 16 and 24 are the predominant users (Beer, 2019), and their average daily time spent on TikTok is 45 min (Holmes, 2019). Meanwhile, due to the bite-sized duration, short videos often need to present the content in a more vivid and even dramatic way to attract people's attention compared to traditional media (Peng, 2018). The consumption of short videos thus may elicit users' strong cognitive and emotional responses (Li et al., 2020), which have been proven to be the important processes underlying people's prosocial decision-making (Rahal and Fiedler, 2022). Therefore, it is necessary to go beyond the contexts of traditional media and video games to explore the effect of consuming prosocial media content in the increasingly popular short video arena.

In sum, to better understand the relationship between prosocial media content exposure and subsequent social behavior, we intend to explore new dimensions by examining individuals' exposure to different consequences of the same prosocial behavior (i.e., reward, punishment, or no consequences) in the context of short videos. Late adolescents are sampled because they are in a crucial developmental period of worldview exploration marked by instability and uncertainty (Arnett, 2000; McLean, 2005) and thus are easily susceptible to external influences. Meanwhile, late adolescents are old enough to self-report a measurable impact on their moral change, and actual behavior. Drawing on Social Cognitive Theory (SCT) and the General Learning Model (GLM), we built a moderated mediation model with moral elevation as a mediator and empathy as a moderator, and then conducted data analyses to test the proposed hypotheses.

## Theoretical background and hypothesis development

### The effects of exposure to different consequences of prosocial behavior

According to the SCT, people can learn behaviors vicariously by observing other people's actions and the ensuing consequences (Bandura, 1986). This observational

learning process can occur in person or from media displays. Due to the individual's limited time, resources, and biological restrictions, people cannot acquire all their knowledge and behaviors directly from personal experiences. Instead, most people's attitudes, values, and behavioral patterns are shaped by what they observe in their media environment (Bandura, 2001). However, it is important to emphasize that although people might acquire certain behaviors from role models in mediated environments, they will not perform all the learned behaviors in real life.

To a great extent, observationally learned behaviors depend on vicarious motivations (Bandura, 2001), which mainly stem from the consequences of role models' behavior. Specifically, when the observed character gains reward outcomes for his/her behavior, observers may be incentivized to perform a similar behavior. In contrast, when the character receives punishments for his/her behavior, it could discourage observers from imitating the displayed actions (Bandura, 1969, 2001, 2004). The classic experiment based on Social Learning Theory is Bandura's (1965) Bobo Doll study. This early experiment demonstrates that different outcomes of a behavior can have varying influences on observers' adoption of such behavior, although it focused on aggressive behavior rather than prosocial behavior.

In today's media environment, people are likely to be repeatedly exposed to media characters experiencing different consequences for their actions, which in turn might elicit their cognition and behavioral change (Mayrhofer and Matthes, 2020). For example, Mayrhofer and Naderer (2019) found that the portrayal of positive consequences of consuming alcohol in movies or TV dramas increases positive expectations and attitudes about alcohol among those with low alcohol consumption. In the domain of media and moral behaviors, there also existed a few studies investigating how exposure to media characters experiencing different consequences for their actions influence individuals' moral-related behaviors. For example, Lee et al. (2014) found that listening to "George Washington" stories, which emphasized the positive consequences of being honest, would increase children's truth-telling behaviors. Similarly, Yao and Enright (2020) randomly assigned kindergarten children to listen to either a moral story with good consequences or a control story with no consequences, and they found children in the reward group shared more candies with other kids compared with those in the control group. These studies show that observing characters behaving altruistically with good consequences can effectively promote an observer's execution of prosocial behavior. Based on the results of these studies, we can also argue that exposure to the punishment consequence of prosocial behavior will discourage people from imitating the same prosocial behavior to a great extent.



In short, based on the rationale of the SCT and previous empirical studies, we hypothesize as follows:

H1: Individuals exposed to the reward consequence of prosocial behavior demonstrate more subsequent prosocial behavior.

H2: Individuals exposed to the punishment consequence of prosocial behavior demonstrate less subsequent prosocial behavior.

## The mediating role of moral elevation

The GLM is informed by the SCT and related social-cognitive research. This framework posits that situational (e.g., media exposure) and individual factors jointly influence a person's cognition, feelings, and physiological arousal, which affect their ensuing behaviors (Buckley and Anderson, 2006). Studies have demonstrated that exposure to prosocial media successfully activated individuals' accessibility of prosocial thoughts (Greitemeyer, 2011). However, compared to studies on cognitive change (such as moral judgment and moral reasoning) triggered by viewing prosocial media content (Eisenberg, 1986; Walker, 2004; Carlo, 2006), the research on emotional responses to such content has been seldom examined. In fact, when people are watching prosocial or morally virtuous video clips, their moral-related emotions, as indicated by the GLM, might be activated. More research thus needs to be done to understand the mechanism behind such responses.

Moral elevation is a moral emotion that can be potentially induced when people witness others' virtuous acts or prosocial behavior (Ding et al., 2018). As a multi-dimensional construct, elevation emotion consists of several components such as thoughts, feeling, motivation, and physiological changes. For example, after seeing moral behavior in others, observers may experience a sense of warmth and pleasantness, have uplifted and inspired feeling, possess optimistic thoughts about humanity, desire to be a better person, and emulate the observed moral behavior (Pohling and Diessner, 2016; Thomson and Siegel, 2017). In the field of media psychology, evidence from several empirical studies suggests that people's moral elevation will increase when they are exposed to prosocial content in video clips (Oliver et al., 2012, 2015; Lai et al., 2014; Krämer et al., 2021).

However, the change of moral elevation could be more complicated if individuals are exposed to different consequences of prosocial media content. In addition to the experience of moral elevation triggered by the observed prosocial behavior itself, the reward consequence may also induce feelings of appreciation and admiration. A study by Pohling and Diessner (2016) revealed that the state of moral elevation is an emotion

which could be strengthened by admiration and appreciation. Consequently, it is reasonable to argue that observers may experience a higher level of moral elevation when they find that the media character receives the reward outcome after engaging in a certain prosocial behavior, compared to those exposed to prosocial media content with no consequences.

By contrast, when people see someone doing a good deed yet receiving punishment, they will judge such an outcome as injustice because it violates the moral standard of fairness (Graham et al., 2013). Numerous studies have shown that observing such unethical outcomes happened to another person can trigger witnesses' moral outrage, a mixed feeling of anger and disgust (Wakslak et al., 2007; Salerno and Peter-Hagene, 2013; Antonetti and Maklan, 2016). Conceptually, moral outrage has opposing emotional valence toward moral elevation; thus, the increased moral anger will inhibit the feeling of moral elevation. Moreover, the feeling and expressions of moral outrage are much more easily amplified by digital media due to its technological affordances (Crockett, 2017). Therefore, we argue that observers may experience a lower level of moral elevation when they find the media character in short videos gets punished after performing a certain prosocial behavior.

H3a: Compared to exposure to prosocial behavior with no consequences, exposure to the reward consequence has a positive relationship with individuals' moral elevation.

H3b: Compared to exposure to prosocial behavior with no consequences, exposure to the punishment consequence has a negative relationship with individuals' moral elevation.

At the same time, people who experience moral elevation have a strong motivation and tendency to emulate moral exemplars and behave in a prosocial manner (Haidt, 2003). Moral elevation has been consistently found to be a significant predictor of people's prosocial behavior. For instance, Schnall et al. (2010) found that participants experiencing moral elevation spent much more time helping experimenters with tedious tasks than those in the control group. Freeman et al. (2009) showed that the experience of moral elevation led people to donate more money to charitable organizations. Other studies also indicated that individuals who have experienced moral elevation are more likely to offer help and develop more life goals related to morality (Algoe and Haidt, 2009; Van de Vyver and Abrams, 2015). Thus, we propose the following hypotheses:

H4: Moral elevation positively predicts subsequent prosocial behavior.

In sum, based on the theoretical assumptions and extant literature, we argue that compared to exposure to prosocial behavior with no consequences, exposure to reward and punishment consequence predicts individuals' moral elevation

positively and negatively. And then we expect a positive relationship between moral elevation and subsequent prosocial behavior. Given these conceptual arguments, the variable of exposure to different consequences of prosocial behavior, moral elevation, and subsequent prosocial behavior are linked. Therefore, we hypothesize:

H5a: Moral elevation mediates the relationship between exposure to the reward consequence and subsequent prosocial behavior.

H5b: Moral elevation mediates the relationship between exposure to the punishment consequence and subsequent prosocial behavior.

## The moderating role of empathy

As the GLM suggests, personal factors interact with media exposure to impact people's decision-making. Empathy is one such factor, and its role is especially important when it comes to individuals' altruistic behavior. Defined as an "other-oriented emotion elicited by and congruent with the perceived welfare of someone in need" (Batson, 2011, p. 2), empathy includes tenderness, sympathy, and compassion (Batson, 2011). According to the empathy-altruism hypothesis, Batson (2011) argued that individuals' empathy is associated with their altruistic motivation and prosocial behavior. People who are in low levels of empathy are usually more aggressive and suffer interpersonal problems (Vachon et al., 2014; Mitsopoulou and Giovazolias, 2015). Meanwhile, moral elevation seems to be an effective way of mitigating the detrimental effects of low empathy since it is effective in instigating subsequent prosocial actions (Haidt, 2003). Therefore, we are curious about the conjoined role of moral elevation and empathy in promoting prosocial behavior.

The scarcity of published literature on this issue also suggests a need to further understand the interplay between moral elevation and empathy. Although no study directly examined the relationship between these two constructs, a few pieces of literature addressed the interactive effects of moral emotions and empathy-related concepts on prosocial behaviors, which could provide insights for our study. For instance, Zuffianò et al. (2015) examined the effect of the interrelationship between respect for moral others (a positive emotion which is similar to moral elevation in our study) and sympathy (a concept similar to empathy in that both imply caring for another person albeit minute differences) in promoting children's sharing behavior. They found that respect for moral others was positively associated with sharing behavior only among children who were in the low sympathy group. Oriol et al. (2020) investigated the interactive effect of self-transcendent aspiration (a concept close to moral elevation) and empathy on gratitude

(an important predictor for prosocial behaviors), and found that the effect of self-transcendent aspiration on gratitude was stronger for people with low empathy than those with high empathy. These studies suggest that moral elevation may play a compensatory role in facilitating prosocial behavior for people with low empathy. Based on previous studies, we argue that moral elevation serves as a compensatory function to some extent in promoting prosocial behavior for individuals with a low level of empathy.

H6: Empathy moderates the influence of moral elevation on prosocial behavior, and moral elevation has a greater positive effect on subsequent prosocial behavior in people with low empathy compared to those with high empathy.

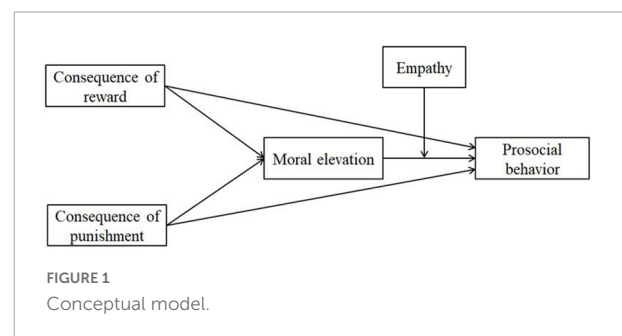
Based on the above hypotheses, the conceptual model for this research was depicted in Figure 1.

## Materials and methods

### Participants

Experimental research was adopted for this study, considering it is the best way to infer causality (Bazaraa et al., 2022). Specifically, we chose a between-group design to collect data from the target population which in our study is late adolescents, young people about 17–19 years old as defined by Eisenberg et al. (1995). There were two reasons for us to focus on late adolescents. First, adolescents are in an important phase of prosocial development and they are also susceptible to external influences, thus deserving more academic attention. Second, compared to those in early or middle adolescence, those in late adolescence are old enough to self-report a measurable impact on their moral change and actual behavior.

We recruited senior high school students and college freshmen from a middle school and a university located in Shanghai, China. Before recruiting participants, we used G\*Power to calculate the minimum sample size. The results showed that 121 participants are needed to achieve a medium



effect size of 0.15 and a minimum power of 0.8 (Faul et al., 2007) in multiple regression with ten predictors (two independent variables, one mediator, one moderator, one interaction term, and five covariates). In total, 124 students participated in our laboratory experiment. Among them, the mean age is 17.960 ( $SD = 1.393$ ), 47.6% are female, 57.3% are the single child in their family, and the majority (80.6%) reported that they had no religious beliefs. Despite the non-probability sampling for data collection, the sample distribution basically matched the profile of Chinese adolescents, particularly in terms of gender and religious beliefs (Gao, 2016; Office of the Leading Group of the State Council for the Seventh National Population Census, 2022).

## Procedures

The study adhered to the tenets of the Declaration of Helsinki, and all of the procedures were approved by the authors' Institutional Review Board (No. H20211771). All participants were invited to our college laboratory one by one and were told that the purpose of our experiment was to examine how watching short videos influences their cognitive abilities. To minimize the potential harm caused by environmental and other factors, we invited the participants to the same physical laboratory to participate in the experiment, and the research procedures were carried out consistently from the first participant to the last one.

First, they filled out the consent form and completed a pre-test questionnaire on demographic information and empathy. Then, they were randomly assigned to the different groups, namely, different consequences of prosocial behavior: getting a reward ( $N = 43$ ), getting a punishment ( $N = 41$ ), or no consequences ( $N = 40$ ). To ensure that participants carefully watched these video clips, they were informed to take a memory test related to the content in the video afterward.

After viewing a version of the short videos, participants were asked to answer manipulation check questions and moral elevation measures. They were also required to write down the amount they would like to donate from their incentive money after reading a hypothetical charitable request. Next, we checked whether the participants had any suspicion regarding the relationship between watching short videos and the donation task, and found no one suspected the purpose of our experiment. Finally, we debriefed the participants, explaining the real objective of our study, and thanked them for their participation with 20 RMB cash.

## Stimulus

In order to find appropriate experiment stimulus for this study, we first searched for relevant short videos on TikTok, using keywords such as "helping" and "good deed." This resulted

in hundreds of clips whose content included but was not limited to strangers' helping elderly people and drivers' returning wallets to the owner. Following a rigorous selection process, we chose three short videos from the search results. The criteria for selection were 3-fold. The content must contain clear references to typical prosocial behavior, the images should be clear enough to discern, and the subtitles need to be easy for re-editing.

After that, one professional video-editor was recruited to edit the three short videos. Three versions for each short video were created, each corresponding to one of the three conditions in our study: the reward condition, the punishment condition, and the control condition. In order to maximally reduce the potential impacts of other factors, all the elements of the short video were kept the same except for the subtitles appearing on the screen at the end of the video. Finally, all three versions from the same condition were put into the same group: the reward group, the punishment group, and the control group (the details of the stimulus material provided in the [Appendix](#)).

## Pilot testing of videos

To guarantee the effectiveness of these short videos, we conducted a pilot test. We anticipated that participants could discern the different consequences of prosocial behavior portrayed in the video clips while maintaining the same evaluation of other dimensions (i.e., objectiveness, credibility, relevance, and amusement of the short videos) across different groups.

We recruited 30 participants and randomly assigned them to the reward and punishment conditions. The participants were then instructed to answer to what extent they agree that (1) the helpers in the short videos got a reward, and (2) the helpers in the short videos got a punishment. Participants were asked to rate on five-point scales ranging from one ("strongly disagree") to five ("strongly agree"). Also, they were asked to evaluate the objectiveness, credibility, relevance, and amusement of the short videos. As we expected, compared to those in the punishment group ( $M = 2.444$ ,  $SD = 1.247$ ), participants in the reward group ( $M = 4.250$ ,  $SD = 0.754$ ) reported significantly higher scores that the helpers got reward [ $t_{(28)} = -4.484$ ,  $p < 0.001$ ]. Likewise, compared to those in the reward group ( $M = 1.333$ ,  $SD = 0.492$ ), participants in the punishment group ( $M = 3.111$ ,  $SD = 1.183$ ) scored significantly higher on the punishment question [ $t_{(28)} = 4.909$ ,  $p < 0.001$ ]. No significant differences were found between the two groups in their assessment of the objectiveness, credibility, relevance, and amusement of the short videos they watched. Thus, the stimulus was appropriate to be used in our experiment.

## Measures

### Pre-experimental measures

**Demographics:** Participants were required to report their gender, age, religious belief, and whether they are the single child

in their families. Past research suggested that these demographic variables were significant predictors of prosocial behavior (Bekkers and Wiepking, 2011; Wiepking and Bekkers, 2012; Watanabe and Lee, 2016). Thus, these factors were included as covariates in our study.

**Empathy:** Given the important role of empathy, especially the emotional empathy, in predicting adolescents' prosocial behavior (Zhang et al., 2021), empathy was measured by the dimension of empathic concern in the Interpersonal Reactivity Index (Davis, 1983). We adopted the seven items and participants rated the extent to which they disagree or agree on a five-point scale (1 = strongly disagree, and 5 = strongly agree). Example items included "I am often quite touched by things that I see happen," "I would describe myself as a pretty soft-hearted person," and "When I see people being taken advantage of, I feel kind of protective toward them." All the items were averaged to indicate the degree of empathy, and a higher score indicates a higher level of empathy. We examined the reliability and validity of this scale by using confirmatory factor analyses, and the results showed that it had good internal reliability and construct validity:  $\chi^2/df = 1.723$ ,  $p = 0.026$ , IFI = 0.967, CFI = 0.966, GFI = 0.941, RMSEA = 0.077, and SRMR = 0.063 (Cronbach's  $\alpha = 0.701$ ).

### Post-experimental measures

**Manipulation check questions:** Participants were asked to rate on a five-point Likert scale (1 = strongly disagree, 5 = strongly agree) to what extent they agree that (1) the helpers in the short videos got a reward and (2) the helpers in the short videos got a punishment.

**Moral elevation:** Eight items were adopted from the study of Aquino et al. (2011) which measured participants' view of humanity and their desire to become a better person after seeing prosocial actions in the short videos. Examples include "There is still some good in the world," "The world is full of kindness and generosity," "The actions of most people are admirable." Participants were asked to rate these items using a five-point Likert scale ranging from one ("strongly disagree") to five ("strongly agree"). All items were averaged to indicate the degree of their moral elevation. We conducted confirmatory factor analyses of the scale and it was demonstrated to have good internal reliability and construct validity:  $\chi^2/df = 1.390$ ,  $p = 0.148$ , IFI = 0.952, CFI = 0.949, GFI = 0.956, RMSEA = 0.056, and SRMR = 0.054 (Cronbach's  $\alpha = 0.820$ ).

**Prosocial behavior:** In the present study, prosocial behavior was represented by the participants' donation behavior. Participants were exposed to a donation request for a hypothetical charitable project. Describing the life struggles of the old who suffer from cataracts, the project claimed to raise money to help cure the elderly. At the end of the request, participants were instructed as follow: "If you decide to donate

a portion of your payment to this project, we will pay that amount directly to the charity, and compensate you with the remaining amount" (Thomson and Siegel, 2017, p. 54). Then, participants were asked how much money they would like to donate (ranging from 0–20 RMB). The monetary amount they chose to donate was measured as their prosocial behavior ( $M = 8.826$ ,  $SD = 7.062$ ).

## Data analyses

Before testing our hypotheses, we made the no consequences group (control group) the reference group. Thus, consequence of reward (i.e., reward vs. no consequences) and consequence of punishment (i.e., punishment vs. no consequences) were created as independent variables. PROCESS macro for SPSS was adopted to test the hypotheses, and demographic variables were entered into each model as covariates.

## Results

### Manipulation check and descriptive statistics

In our study, we found that participants in the reward group ( $M = 4.581$ ,  $SD = 0.698$ ) reported that the helpers in the short videos received significantly more rewards than those in the control group [ $M = 3.000$ ,  $SD = 1.396$ ,  $t_{(81)} = 6.597$ ,  $p < 0.001$ ]. Also, compared to the control group ( $M = 1.275$ ,  $SD = 0.599$ ), participants in the punishment condition ( $M = 3.488$ ,  $SD = 1.247$ ) scored significantly higher in response to the question to what extent they agreed the helpers in the short videos received a punishment [ $t_{(79)} = -10.216$ ,  $p < 0.001$ ]. These results indicated we successfully manipulated the consequences of helpers' prosocial behavior in the video clips.

Additionally, we also found that participant's gender [ $\chi^2_{(2)} = 0.659$ ,  $p = 0.719$ ], monthly disposable income [ $\chi^2_{(10)} = 14.935$ ,  $p = 0.134$ ], single-child status [ $\chi^2_{(2)} = 5.614$ ,  $p = 0.060$ ], religious belief [ $\chi^2_{(2)} = 3.346$ ,  $p = 0.188$ ] are independent across the different experimental conditions. The ANOVA test [ $F_{(2,121)} = 6.082$ ,  $p = 0.003$ ] and *post hoc* comparisons revealed that participants' age was higher in the control group ( $M = 18.500$ ,  $SD = 0.934$ ) compared to the punishment group ( $M = 17.463$ ,  $SD = 1.733$ ), and there was no significant difference in age between the reward group ( $M = 17.930$ ,  $SD = 1.223$ ) and the punishment group ( $p = 0.113$ ). In addition, The ANOVA test also showed that participants' empathy was independent from the different experimental conditions [ $F_{(2,121)} = 0.809$ ,  $p = 0.448$ ]. These results suggested that



these factors are basically equally distributed across the experimental conditions.

The descriptive statistics of moral elevation, empathy and prosocial behavior in each condition were presented in [Table 1](#).

## Moderated mediation analysis

To test our hypotheses, we conducted a moderated mediation analysis using PROCESS Macro for SPSS model 14 ([Hayes, 2017](#)), in which the group was entered as the independent variable, prosocial behavior as the dependent variable, moral elevation as the mediator, and empathy as the moderator. Since the independent variable of the group was a nominal variable with three categories, we dummied it with the control condition as the baseline group, resulting in two specific independent variables: X1 (the reward group) and X2 (the punishment group). In addition, following the suggestions of [Rosenthal and Cummings \(2021\)](#) on considering covariates in addition to experimental effects in data analysis, we controlled demographic factors (e.g., gender, age, single child status, religious belief, and monthly disposable income) in the model examination to better understand the impact of different consequences of prosocial behavior on participants' moral elevation and subsequent prosocial behavior.

We first examined the regression analyses output of the two models with moral elevation and prosocial behavior as dependent variables respectively (see [Table 2](#)). Model 1 showed that compared to the control group, the punishment consequence significantly predicted participants' moral elevation (Coeff. =  $-0.517$ ,  $p < 0.001$ ), whereas the effect of the reward consequence on moral elevation was not significant (Coeff. =  $0.080$ ,  $p = 0.533$ ). In Model 2, the results showed that neither the reward consequence (Coeff. =  $0.961$ ,  $p = 0.531$ ) nor the punishment consequence (Coeff. =  $1.206$ ,  $p = 0.481$ ) significantly predicted prosocial behavior compared to the control group. Moral elevation (Coeff. =  $3.306$ ,

$p = 0.008$ ) significantly predicted prosocial behavior, whereas, empathy did not (Coeff. =  $0.244$ ,  $p = 0.835$ ). Furthermore, the interactive effect of moral elevation and empathy was significant (Coeff. =  $-4.745$ ,  $p = 0.017$ ), supporting the moderating effect of empathy on the relationship between moral elevation and prosocial behavior. To better understand this interactive effect, we conducted a simple slope test and plotted the relationship when empathy was below and above one standard deviation of the mean. As can be seen in [Figure 2](#), for adolescents with low empathy, moral elevation positively predicted prosocial behavior (effect =  $5.987$ ,  $p = 0.001$ ); however, this effect was not significant for those with high empathy (effect =  $0.624$ ,  $p = 0.667$ ).

To test the conditional indirect effects, we then employed the bootstrap confidence interval recommended by [Preacher and Hayes \(2004\)](#). If a confidence interval for the indirect effect does not straddle zero, it can statistically support that M mediates the effect of X on Y at that value of the moderator ([Hayes and Rockwood, 2017](#)). As is displayed in [Table 3](#), a 95% bootstrap confident interval based on 5,000 bootstrap samples indicated Path 1 (the reward consequence → moral elevation → prosocial behavior) was not contingent upon empathy level, since the 95% bootstrap confident interval of the index of moderated mediation straddled zero ( $-1.812, 0.887$ ). In contrast, Path 2 (the punishment consequence → moral elevation → prosocial behavior) was contingent upon empathy level since the corresponding CI value was entirely above zero ( $0.468, 5.672$ ). To be specific, among those with low empathy, the specific indirect effect of the punishment consequence on prosocial behavior through moral elevation was significant (effect size =  $-3.094$ , BootCI:  $[-5.859, -1.114]$ ), whereas among those with high empathy, the specific indirect effect was non-significant (effect size =  $-0.322$ , BootCI:  $[-1.777, 1.424]$ ).

## Discussion

Drawing upon the SCT and the GLM, this experimental study examined the effects of exposure to different consequences of prosocial behavior on adolescents' subsequent prosocial behavior in the context of short videos. The study found that compared to the no consequences group, exposure to the reward consequence did not significantly predict moral elevation and subsequent prosocial behavior. Meanwhile, exposure to the punishment consequence had a significantly negative effect on subsequent prosocial behavior *via* moral elevation. Furthermore, the results revealed that empathy moderated the relationship between moral elevation and prosocial behavior and moral elevation only positively predicted prosocial behavior among those with low empathy. More discussion of the key findings is presented as follows.

TABLE 1 Descriptive statistics.

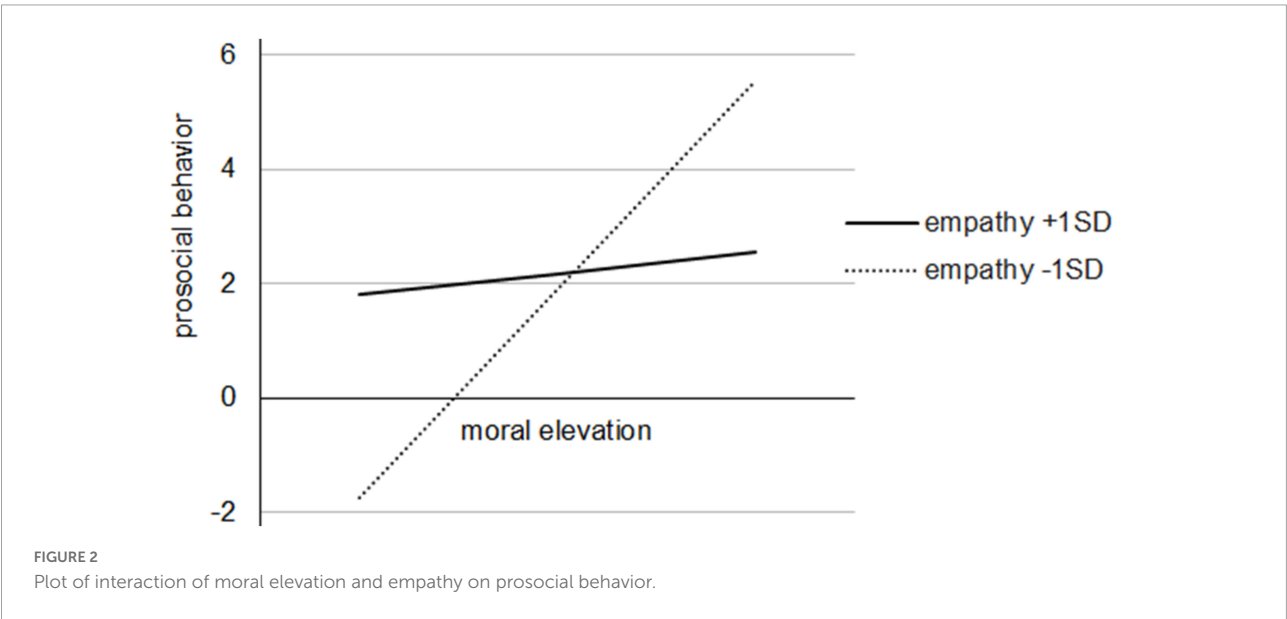
Variables	Experimental conditions	Mean [95% CI]	SD
Moral elevation	Control group	3.888 [3.719, 4.056]	0.528
	Reward group	3.971 [3.826, 4.116]	0.470
	Punishment group	3.402 [3.195, 3.610]	0.657
Empathy	Control group	3.571 [3.409, 3.734]	0.509
	Reward group	3.728 [3.548, 3.908]	0.585
	Punishment group	3.631 [3.442, 3.819]	0.598
Prosocial behavior	Control group	9.275 [7.194, 11.356]	6.508
	Reward group	9.430 [7.203, 11.657]	7.236
	Punishment group	7.754 [5.407, 10.100]	7.435



TABLE 2 Testing of the moderated mediation model.

Antecedents	Consequent					
	Model 1 (moral elevation)			Model 2 (prosocial behavior)		
	Coeff.	SE	<i>p</i>	Coeff.	SE	<i>p</i>
X1 (Reward group)	0.080	0.127	0.533	0.961	1.528	0.531
X2 (Punishment group)	−0.517	0.132	<0.001	1.206	1.707	0.481
Mediator (Moral elevation)	—	—	—	3.306	1.216	0.008
Moderator (Empathy)	—	—	—	0.244	1.168	0.835
Moral elevation × Empathy	—	—	—	−4.745	1.963	0.017
Constant	1.115	1.020	0.276	−2.037	12.324	0.869
<b>Covariates</b>						
Gender <sup>a</sup>	0.071	0.103	<0.001	1.826	1.223	0.141
Age	−0.073	0.052	0.162	0.349	0.632	0.582
Single children <sup>b</sup>	0.090	0.114	0.433	0.440	1.379	0.750
Religious beliefs <sup>c</sup>	−0.020	0.149	0.894	−0.417	1.780	0.815
Monthly disposable income	0.060	0.050	0.232	0.738	0.608	0.228
	$R^2 = 0.196$			$R^2 = 0.184$		
	$F_{(7,116)} = 4.048, p < 0.001$			$F_{(10,113)} = 2.547, p = 0.008$		

<sup>a</sup>Male = 0, female = 1. <sup>b</sup>Yes = 0, no = 1. <sup>c</sup>Yes = 0, no = 1.



Surprisingly, contrary to our expectation, the results did not reveal any significant effects of the reward consequence stimulus on observers' moral elevation or their prosocial behavior. The discrepancy between this finding and our expectation based on the SCT (Bandura, 2001) and previous empirical studies (e.g., Lee et al., 2014; Yao and Enright, 2020) could be possibly explained by the long-term effects of moral education in China. Chinese students normally receive moral education based on the

national curricula since an early age for nearly 10 years in school settings (Cheng, 2019). The textbooks in the curriculum of moral education present various moral exemplars, aiming at encouraging children to emulate their prosocial behavior (Han et al., 2018). Such long-term moral education might lead to two social-psychological consequences.

One consequence is the desensitization of prosocial media content, which refers to a decrease in cognitive

TABLE 3 Indices of moderated mediation with 95% bootstrap confidence intervals.

Path	Index of moderated mediation				Empathy							
					Low				High			
	Index	Boot SE	Boot LLCI	Boot ULCI	Effect	Boot SE	Boot LLCI	Boot ULCI	Effect	Boot SE	Boot LLCI	Boot ULCI
Path 1	−0.377	0.650	−1.812	0.887	0.476	0.748	−1.038	2.052	0.050	0.224	−0.400	0.564
Path 2	2.452	1.323	0.468	5.672	−3.094	1.215	−5.859	−1.114	−0.322	0.790	−1.777	1.424

Path 1: the reward consequence → moral elevation → prosocial behavior; Path 2: the punishment consequence → moral elevation → prosocial behavior.

or emotional responses to repeated exposure to moral-related media content (Krahé et al., 2011). Thus, when the participants in our research were exposed to the reward consequence of prosocial behavior, their emotional arousal would be difficult to trigger. Consequently, no evidence of the influence of reward stimulus on moral elevation or prosocial behavior was found. The other possible consequence is the process of social norm internalization (Cheng, 2019). After receiving long-term moral education, students will gradually internalize societal norms (such as the social responsibility to help others in need) into their personal beliefs, and might think that doing good deeds is inspired by their intrinsic motivations rather than external rewards and incentives. Studies have shown that prosocial behavior motivated by personal norms is independent of external environments stimulus (van der Linden, 2011). Therefore, the participants in our experiment would have little or no behavioral responses when they witnessed prosocial behavior with external reward incentives.

The story of the punishment condition is somewhat different from the reward condition. Specifically, the study revealed that compared to the control condition with no consequences, the punishment stimulus had a negative effect on participants' moral elevation and subsequent prosocial behavior. The different effects of the punishment/reward consequences of prosocial behavior on observers are interesting, and the possible explanation might be a "negativity bias." As a kind of cognitive bias, negativity bias refers to people's propensity to engage in quick autonomous cognitive processing and pay more attention to negative information than positive information (Rozin and Royzman, 2001). More importantly, negative events tend to elicit more prominent and stronger emotional responses in people than positive events (Carretié et al., 2009). Thus, the participants in our study were easily aroused by the punishment stimulus and experienced stronger moral emotions compared to those exposed to the reward stimulus.

Another finding worth discussing is the moderation effect of empathy, which provides us with an insightful look into the interrelated effect of moral elevation and empathy on ensuing prosocial behavior. In line with Zuffianò et al.'s (2015)

study, we found that there was a positive relationship between moral elevation and prosocial behavior in adolescents with low empathy, yet such a relationship diminished among those with high empathy. This result indicates that moral elevation serves as a compensatory function to some extent in promoting prosocial behavior for individuals with a low level of empathy. In other words, the influence of the punishment consequence on adolescents' subsequent prosocial behavior *via* moral elevation was contingent on the level of empathy, which helped us understand the underlying mechanism at a more nuanced level.

## Implications and limitations

Our study has made several theoretical contributions. First, it yields a more nuanced view concerning the influence of media content exposure on adolescents' subsequent prosocial behavior by focusing on the different consequences of the same prosocial behavior depicted in the media. Most of the previous studies explored the effect of prosocial media exposure by comparing an individual's exposure to the different types of content, such as prosocial content vs. neutral content. Our study took a different approach to address this issue. We distinguished between reward and punishment consequences from the same prosocial behavior, and examined people's altruistic outcomes after being exposed to either consequence. Second, to the best of the authors' knowledge, our research study represents the first attempt to investigate such an important topic in the context of short videos. Considering its uniqueness and increasing popularity among people's life, our study enriches and extends the current knowledge on the effect of prosocial media exposure by going beyond the traditional media context on which most of the extant studies focus. Third, by introducing moral elevation as the mediator and empathy as the moderator into the proposed model, our study uncovered the psychological mechanism which shed light on adolescents' prosocial learning process in the context of the new media environment, namely, how and when exposure to the different consequences of prosocial behavior influences their subsequent prosocial behavior. Lastly,

our findings lend support to the application of the SCT and the GLM in this study, which in turn provide new evidence to support the explanatory power of these two theories in a new context.

Our study also has some implications for practice. Considering that exposure to the punishment consequence of prosocial behavior will decrease young viewers' moral elevation and prosocial behavior, measures could be taken by parents and practitioners (such as school teachers) to develop their morals and behavior in a more prosocial way. For example, adolescents should be protected from frequent exposure to short videos containing the consequential punishment, and psychological intervention is needed to moderate the negative outcomes when they are found to have consumed excessive amount of such media content. Also, adolescents should be guided to discern and stand against the actions of "porcelain bumping" depicted in the media content<sup>2</sup> (Li, 2019), which corresponds to helpers' getting punished after their performing prosocial behavior in our study. What's more, keeping the moderating effect of empathy in mind, short video platforms can fully take advantage of big data to discern adolescents with different levels of empathy, and recommend more videos with rewards for good deeds to those with lower empathy in order to nurture their prosocial behavior.

Despite the above contributions, this study suffers several limitations. First, our study analyzed the short-term effects of prosocial media exposure on individuals' prosocial behavior in adolescents. Longitudinal studies on exposure to different consequences of media prosocial behavior are needed for more insightful results. Second, we used donation behavior to represent adolescents' prosocial behavior. Since there are other types of prosocial behavior such as helping and sharing (Gross et al., 2015), a more comprehensive measure of prosocial behavior needs to be considered in future research. Third, given the fact that moral elevation is only one facet of the multidimensional construct of moral emotion, it is necessary to consider other moral emotions, such as guilt or disgust, as possible intervening variables to gain a more comprehensive understanding of the underlying mechanism.

## Data availability statement

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

<sup>2</sup> "Porcelain bumping" is called "Pengci" in Chinese, which refers to a practice in contemporary China whereby scammers feign injury or financial loss in public to extort money from strangers. It originates from the act that crooks deliberately put fragile porcelain in a place where it can easily be bumped in order to claim the compensations.

## Ethics statement

The studies involving human participants were reviewed and approved by the Institutional Review Board of Shanghai Jiao Tong University (No. H20211771). Written informed consent to participate in this study was provided by the participants' legal guardian/next of kin.

## Author contributions

WL: conceptualization, methodology, data analysis, writing – review and editing, and funding acquisition. YM: methodology, investigation, data analysis, and writing. BH: investigation and data analysis. All authors contributed to the article and approved the submitted version.

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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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Appendix

APPENDIX TABLE 1 Detailed materials of manipulated story plots for short video stimulus.

	Plot description of video clip	Manipulation in the reward group	Manipulation in the punishment group	Manipulation in the control group
Story 1	The taxi driver Qi Junlan found a wallet in her cab, which contained cash, ID cards, and bank cards. She immediately contacted the owner of the lost wallet.	The owner got the wallet back, and gave some money to the driver as a form of gratitude.	The owner insisted that the driver stole the cash and called the police. Driver Qi felt deeply wronged.	The owner got his wallet back.
Story 2	A female teacher met an old man who had fallen down on the road and drove him to the hospital.	The old man's family members thanked the teacher and gave her a silk banner as an award for her school.	The old man's family members accused the female teacher for hitting the old man and asked for medical compensation.	The teacher drove the old man to the hospital and left.
Story 3	A high school student helped an old man who fell from his bike.	The old man contacted the student's school, and expressed his gratitude to the boy for his good deeds.	The old man contacted the student's school, and insisted that it was the boy who had knocked him down, and asked for medical compensation.	The student helped the old man up and then left.



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# The effects of mindfulness upbringing perception on social entrepreneurship orientation: A moderated mediation model of prosocial motivation and perceived pressure from external stakeholders

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Driven by economic and social benefits, social enterprises create new development models that combine wealth creation, social welfare provision, and environmental improvement through innovative approaches. The social entrepreneurship orientation reflects the behavioral tendency to transplant entrepreneurship orientation into the field of social value creation. It is a strategy to balance and integrate economic interests and social interests, which has a significant impact on social entrepreneurship performance. The purpose of this study is to explore the internal mechanism of the impact of social entrepreneurs' mindfulness upbringing perception on social entrepreneurship orientation. To reveal the internal mechanism, we propose a moderated and mediation model of prosocial motivation and perceived pressure from external stakeholders. In this study, random sampling was conducted among social start-ups in China. In order to improve the accuracy of the scale, a pre-survey was conducted before the formal survey. The data analysis results of the pre-survey showed that the scale in this study was suitable for the Chinese context and had good external validity. Through using survey data from social entrepreneurs in China, hierarchical regression analysis and bootstrapping model are adapted to test and verify mediation and moderation effects. The results show that mindfulness upbringing perception indeed positively influences social entrepreneurship orientation directly and partly through the mediating effect of prosocial motivation. Moreover, findings suggest the perceived pressure from external stakeholders negatively moderates not only the relationship between prosocial motivation and social entrepreneurship orientation but also the overall mediation model. This indicates that social entrepreneurs with low perceived pressure from external stakeholders will improve their social entrepreneurship orientation rapidly when their prosocial level is high. Based on these findings, we conclude that social entrepreneurship orientation may be achieved more effectively through the complex process of mindfulness upbringing perception, prosocial motivation, and perceived

pressure from external stakeholders. Finally, the study proposes the theoretical and practical implications and suggestions for follow-up research.

#### KEYWORDS

mindfulness upbringing, prosocial motivation, social entrepreneurship orientation, perceived pressure from external stakeholders, a moderated mediation model

## Introduction

### Theoretical basis and hypothesis

#### Mindfulness upbringing perception

Family upbringing refers to a series of activities in which parents create the desired emotional atmosphere around their children in the process of child-rearing, which is embodied in parents' attitude, behavior, and non-verbal elements towards their children (Jean et al., 2016; He et al., 2019; Gauthier et al., 2021). There are different types of parenting (Sedikides et al., 2015). In the most classic classification method, Baumrind (1966) and Maccoby and Martin (1983) defined four types according to parents' "requirements" and "responses" to their children: authoritarian, authoritative, permissive, and neglective. In recent years, the taxonomy of family upbringing has received renewed attention, and "new" types have been conceptualized, such as strict upbringing that reflects parents' attitudes towards their children (Hoover et al., 2022), narcissistic parenting focusing on parental psychological experience (Evans et al., 2018), and overparenting examining the degree of monitoring of children (Duff, 2022). Different parenting styles determine the level of parenting mindfulness. The characteristics of Chinese family upbringing have also received attention in recent years. For example, Liu et al. (2011) studied the problem of overparenting in China; Adcock et al. (2021) believe that the parenting style advocated in traditional Chinese culture is similar to authoritarian parenting. That is, parents tend to respond negatively to the needs of their children, emphasize expectations on their children and require them to abide by rules strictly. In addition, Tseng and Reeve (2011) comparative study found that Chinese parents in The United States were more autocratic than European parents in terms of upbringing.

Interestingly, however, children of Chinese descent were more likely than children of European descent to think their parents' punishment was fair (Lidia et al., 2022). These results suggest that Chinese parenting and its functions have subtle characteristics different from those of the West. The level of parenting mindfulness varies with different parenting styles (Egan et al., 2022). In the context of Chinese culture, most social entrepreneurs mentioned in the interview that their perception of family mindfulness upbringing in childhood influenced their career choice (Hirshberg et al., 2022). Although they and their parents did not know what mindfulness upbringing was then, the parenting style their parents gave them when they were young

more or less affected their entrepreneurial motivation in the future. Therefore, mindfulness upbringing plays a crucial role in social entrepreneurship orientation, but the complex internal mechanism is not very clear (Beauchaine et al., 2013; Ishak et al., 2015).

Mindfulness parenting was proposed by Kabat-Zinn and other scholars in the 1980s. It extends mindfulness theory and mindfulness therapy in Zen and psychology in family education. It refers to parents' conscious and non-judgmental attention and awareness of their own and their children's internal state and the interaction process of parenting in the context of this moment (Tellez Infantes et al., 2022). Mindfulness upbringing perception affects not only the health and life of children, such as health risk motivation and lifestyles (Juul et al., 2022), extroversion, and prosocial motivation but also their work and career, including the formation of adolescent human capital, children's sense of occupational efficacy, occupational adaptability (Ohtsubo and Watanabe, 2013), and even attitudes to change (Imas, 2014). One reason why mindfulness upbringing perception influences children's social entrepreneurship orientation may lie in the similarities between social entrepreneurship and parenting, such as the emphasis on vision and strategy, leading by example, two-way communication, trust and integrity, and the realization of social values (Mary-Hunter and Brayden, 2019). These intersections make parents naturally become role models in developing their children's social entrepreneurship orientation. According to social learning theory (Frolli et al., 2021), the concept of role model is helpful in understanding the formation of social entrepreneurship orientation: social entrepreneurship behavior is the result of socialization -- in socialization, parents have relatively close and frequent contact with them, thus becoming an important role model of social entrepreneurship orientation for the latter (Dunfield and Kuhlmeier, 2013). Specifically, in the process of mindfulness upbringing perception influencing the development of social entrepreneurship orientation, the actual bridge may include not only parents' attitudes and behaviors but also children's reactions (Michael and Cunningham, 1988; Stephan, 2011; Hair et al., 2013; Barker and Lori, 2021; Frank et al., 2021; Nascan et al., 2021). External stress is one of the most apparent constraining factors -- increasing external stress diminishes the effect of mindfulness upbringing perception. However, this is not so much a function of external pressure as a reflection of individual initiative (Li, 2021). Amodu and Ama (2016) proposed reflected modeling to explain the above phenomenon: with the increase of external

pressure, individuals will be exposed to the role model of social entrepreneurship orientation, such as external stakeholders, and then reflect on the value of parents as the role model of social entrepreneurship orientation (Ramus and Killmer, 2010). Therefore, the development of social entrepreneurship orientation results from individual integration of various role models of social entrepreneurship orientation (Kraus et al., 2017; Zaninotto et al., 2022).

## Social entrepreneurship orientation

Social entrepreneurship is driven by various social issues (wealth gap, aging, environmental protection) that accompany global economic development (Kallmuenzer and Peters, 2017). Compared with commercial enterprises, social enterprises focus on creating social value, while with charitable organizations and non-profit organizations, social enterprises have a specific economic value creation function, which can be used to subsidize philanthropic donations and government subsidies (Nandamuri and Gowthami, 2015). Social entrepreneurs play a decisive leadership role in social entrepreneurship (Alex, 2014; Gali et al., 2020). Driven by a vital social mission, they are skilled at identifying and discovering social problems and business solutions that others cannot find to provide public services (Sengupta and Sahay, 2017). Through active social entrepreneurship, they meet diverse social needs in various fields and help the government solve multiple social problems, such as unemployment, urban-rural gap, unfair distribution, imperfect social security system, and environmental damage (Gauthier et al., 2021). Driven by the combination of economic and social benefits, social enterprises have established new development models through innovative ways that combine the functions of creating wealth, providing social welfare, and improving the environment (Shin and Park, 2019). Social entrepreneurship is double-oriented in terms of competition and public interest. According to Dees' view of the continuum spectrum of social entrepreneurship, dual orientation is a relationship of "one body and two sides," which realizes complementarity, adjustment and dynamic balance in the development process based on situational changes (Freiling et al., 2014). Although public-interest orientation (social value) is the ultimate goal, competitive orientation (economic means) is indispensable, which is an important prerequisite for social entrepreneurship to realize self-management, and self-financing (Dwivedi and Weerawardena, 2018). The two complement each other and jointly promote the sustainable development of social entrepreneurship, which is also an essential reason why social entrepreneurship is different from traditional public welfare and philanthropy (Zafar et al., 2022).

In entrepreneurial activities, economic goods and social values should shift from "conflict" to "integration" (Calic and Mosakowski, 2016). Self-interest-driven entrepreneurship that damages social interests should be restrained to guide the improvement of entrepreneurial quality (Moreno and Casillas, 2010). Social entrepreneurship can be regarded as entrepreneurship guided by social goals. At the same time, the

positive effects of social entrepreneurship on inclusive economic development can be seen as changing the internal thinking mode of entrepreneurial activities and inspiring entrepreneurs to become more thoughtful. Social entrepreneurship orientation developed from entrepreneurship orientation (Devi et al., 2015). Entrepreneurial orientation, derived from strategic choice theory, refers to activities related to firm behavior, decision making, and organizational process. Social entrepreneurship orientation reflects the behavioral tendency to transplant entrepreneurship orientation into the field of social value creation (Cassia et al., 2014). In the face of such a complex variety of social needs and social problems, as well as the lack of natural resources for public welfare undertakings, it is a topic of great practical significance for social entrepreneurs to make entrepreneurial decisions and form social solid influence by choosing the entrepreneurial's tendency with both profit and social "double bottom line" (Talebi et al., 2015). It is of great significance to identify the pre-influencing factors of social entrepreneurship tendency to promote the performance growth of social enterprises, solve social criticism, and break the welfare deadlock and promote the sustainable development of society (Brndle et al., 2019). This is also the necessity of this study.

## Mediating effect of prosocial motivation

Motivation refers to a desire or reason to act, and "prosocial" literally means an intention to help or benefit another person (Bardacke and Duncan, 2014; Mohammad et al., 2018). The prosocial motivation of social entrepreneurs is the desire to benefit other people or groups through social entrepreneurship activities. To understand prosocial structure more deeply, it is necessary to place the viewpoint of prosocial motivation in the basic framework of motivation (Autera, 2015). Psychologists believe that motivation has three levels of universality: global, situational, and episodic. The scope of these three levels decreases, and the constraint conditions increase (Sarbandi et al., 2015). International motivation focuses on the relatively stable personality orientation of social enterprise entrepreneurs, with specific goals and actions across time and situations. Situational motivation focuses on the motivation of social enterprise entrepreneurs for a particular field or category of behavior and changes moderately in time and context. Episodic refers to the highly variable motivation of social enterprise entrepreneurs for a specific behavior at a particular time (Warriner et al., 2018). Therefore, in extreme cases, global motivation can be regarded as a personal trait inherent in the entrepreneur, while situational motivation and episodic motivation are more of a flexible ability and tendency to adapt to change. In response, the prosocial motivation of social entrepreneurs can be divided into three dimensions (Duncan and Shaddix, 2015). Global prosocial motivation refers to the tendency of social enterprise entrepreneurs to care about the interests of others and try to protect and promote the well-being of others through social entrepreneurship activities (Rodríguez-Meirinhos et al., 2021). The situational prosocial motivation of social entrepreneurs refers to the desire of social enterprise entrepreneurs



to benefit other people of a specific category through a specific field, operation process, or business model (Davis et al., 2014). Entrepreneurial behaviors under situational prosocial motivation include a car wash business for unemployed mentally disabled people and a handicraft business for rural women with low education levels. Episodic prosocial motivation refers to the desire of social enterprise entrepreneurs to benefit others in a particular group in a particular situation (Abatemarco, 2014). For example, going back to the previous models, one social entrepreneur started a car wash business for unemployed mentally disabled people in western China, and another social entrepreneur wanted to create a handicraft business for poorly educated women in the economically underdeveloped west and central regions of China, etc.

According to the emotional contagion theory, entrepreneurs who receive mindfulness training in the early years tend to form organizational ethics and paradoxical leadership within the organization and are good at creating a loose and harmonious environment within the organization, and creating an atmosphere and awareness of social entrepreneurship in the organization (Gannon, 2015). At this time, if they face the support of resources, it will undoubtedly strengthen the intensity of social entrepreneurship (Bang et al., 2021). Thus, the competitive and public-welfare-oriented social entrepreneurship strategy can be effectively triggered. Therefore, this study proposes the following hypotheses:

*Hypothesis1:* Mindfulness upbringing perception has a positive impact on social entrepreneurship orientation.

*H1a:* Mindfulness upbringing perception positively influences competitive orientation.

*H1b:* Mindfulness upbringing perception positively influences public-welfare orientation.

According to self-determination theory, prosocial motivation is introspective, result-oriented, and future-oriented (Ying and Wang, 2019; Garon et al., 2021). Family upbringing plays a vital role in the intergenerational transmission of family cultural capital and the cultivation of children's social communication ability and positive psychological quality (Sulphery and Salim, 2020; Moussaoui Lisa et al., 2022). Social entrepreneurs who received full mindfulness training in the early stage generally expressed those parents can timely and acutely perceive and respond to the needs of their children, give them adequate care, support and understanding, and encourage the cultivation of independent ability (Medeiros et al., 2015). Based on the self-determination theory, this study explores the effects of mindful upbringing perception on entrepreneurial motivation from the perspective of motivation synergy. It introduces prosocial motivation into the mechanism of the interaction between mindful upbringing

perception and social entrepreneurship motivation (Lee et al., 2021). Mindful parenting perception stimulates prosocial motivation in social entrepreneurs. This action path is mainly realized through the following mechanisms: First of all, the parent-child relationship is closer under the mindful parenting style, the children's negative emotional experience of insecurity is significantly reduced, and it is easier to establish a trusting relationship with others, thus strengthening the prosocial motivation of the children (Lin and Desai, 2022). Secondly, under the mindfulness parenting style, when parents meet their children's needs for independent development, children are more inclined to actively think and master strategies to deal with difficulties, and then improve their sense of self-efficacy. It also encourages children to have a strong sense of responsibility and emotional regulation ability in the face of complex tasks, and to acquire effective coping styles and solutions (Kohut et al., 2016). And then develop a high level of self-efficacy and environmental control, forming a solid pro-social motivation (Gunilla et al., 2018). Thirdly, the stronger the perception of mindful parenting, the easier it is to cultivate and accumulate resilience and strengthen prosocial motivation (Hooi et al., 2016; Purevdulam, 2017). These arguments suggest the following hypothesis:

*Hypothesis2:* Mindfulness upbringing perception is positively associated with prosocial motivation.

According to the resource dependence theory, the prosocial motivation of entrepreneurs brings the harmonious relationship between enterprises and customers, suppliers and competitors, which will undoubtedly trigger enterprises to develop new products and services in a forward-looking manner, so as to perceive market changes in advance and take advanced actions to achieve better market performance (He, 2018). In addition, individuals with prosocial motivation will consider the interests of others in organizational activities. They will bring more information and knowledge sharing inside and outside the organization, which intangibly intensifying the competitive orientation. Therefore, prosocial motivation has a positive impact on the competitive direction of enterprise social entrepreneurship (Gordon and Chapman, 2018). According to the motivational information processing theory, prosocial motivation helps individuals jump out of the limitations of their perspective, improve their sensitivity to others' views and needs, enhance their ability of perspective-taking and viewpoint integration, and generate positive emotions to enhance the level of creativity (Bruin et al., 2014). Social entrepreneurial enterprises are more inclined to absorb external heterogeneous knowledge, promote cross-border search and opportunity identification, and establish their competitive advantages. They are more prone to be aggressive and achieve better performance in the market, which is the essence of competition orientation (Meamar et al., 2016). According to social network theory, prosocial traits help social entrepreneurs form political connections, technological connections, business connections, and other social capital to

establish a win-win mechanism among government, market, and the environment through prosocial motivation (Burgdorf et al., 2019). Legitimacy is enhanced, optimal uniqueness is acquired, and the enterprise is driven to build competitive advantage and grow (Gampelaere et al., 2018). Therefore, prosocial motivation can positively predict the competitive orientation of social entrepreneurship.

According to self-determination theory, when social enterprise entrepreneurs perceive that the enterprise fulfills its social responsibility and attaches importance to external stakeholders, they can improve the public welfare orientation of social entrepreneurship from top to bottom through emotional identification and consistency of values (Gl et al., 2020). Unlike prosocial behavior, prosocial motivation refers to the willingness to consider the interests of others and to devote energy to them. According to empathy theory, entrepreneurs with strong prosocial motivation are better able to identify gaps in the market. In the context of social entrepreneurship, prosocial motivation enables entrepreneurs to be highly sensitive to other people's views and needs, have positive emotions, perspective-taking and dedication consciousness, which will make entrepreneurial activities of enterprises more social orientation, thus triggering enterprises' social entrepreneurship and public welfare orientation (Gampelaere, 2020). First, individuals driven by prosocial motivation focus on the fairness of outcome distribution. Since individuals consider themselves and others as a whole to combine benefits, harmony and mutual win become the key to cooperation (Caiado et al., 2020). Secondly, social enterprises founded by entrepreneurs with pro-social motivation exhibit ethical characteristics such as fairness, trust and care, which help to build a good and fair working environment and improve the perception of corporate ethics of social enterprise entrepreneurs (Crawford et al., 2015). The prosocial motivation of social entrepreneurs can stimulate organizational loyalty, increase the closeness of work between individuals, and promote initiative, and empathy, helping organizational citizenship behavior of social enterprise entrepreneurs (Gheibi et al., 2020). When individuals have prosocial motivation, on the one hand, they will consider the interests of others more and have more dedication and a sense of mission on an individual basis (Corthorn, 2018). On the other hand, they will devote more time, energy, and wisdom to the organization, resulting in stronger public welfare motivation. Thirdly, motivation information processing theory believes that motivation affects behavior, and the motivation of social enterprise entrepreneurs determines how they process information. According to this theory, when social enterprise entrepreneurs have prosocial motivation, they are more willing to consider problems and obtain information from the perspective of others. They have more willing to cooperate and share information (Burgdorf and Szabó, 2021). Under the influence of prosocial motivation, social enterprise entrepreneurs will produce more positive role behaviors (including in-role behaviors and out-of-role behaviors) in the organization and have stronger social entrepreneurship public-interest orientation compared with entrepreneurs with

self-interested motivation. Relevant studies show that the intrinsic work motivation of social enterprise entrepreneurs has a good predictive effect on their positive emotional experience, creative behavior, job persistence, job satisfaction, and social capital accumulation (Grant and Berry, 2011; Alexander, 2017). Individuals with pro-social motivation can redouble their efforts to maximize mutual benefits based on trusting cooperation, which is the essence of social entrepreneurship and public welfare orientation (Rayan and Ahmad, 2017). This study assumes that an entrepreneur can enhance their prosocial motivation to act in the process of the reinforcement of social entrepreneurship motivation, leading to the following hypothesis:

*Hypothesis3:* Prosocial motivation positively influence social entrepreneurship orientation.

*H3a:* Prosocial motivation positively influences competitive orientation.

*H3b:* Prosocial motivation positively influences public-welfare orientation.

Mindfulness upbringing perception may facilitate the enhancement process of prosocial motivation, which leads to social entrepreneurship orientation. These arguments suggest the following hypothesis:

*Hypothesis4:* Prosocial motivation mediating between mindfulness upbringing perception and social entrepreneurship orientation.

*H4a:* prosocial motivation mediating between mindfulness upbringing perception and social entrepreneurship competitive orientation.

*H4b:* Prosocial motivation mediating between mindfulness upbringing perception and social entrepreneurship public-welfare orientation.

## Moderating effect of perceived pressure from external stakeholders

A moderation effect occurs when there is a third variable between the independent and dependent variables (Chang, 2013; Ahmad, 2016; Gannon et al., 2017). This third variable is called a moderator, which changes the strength or direction of the connection between the two variables. Moderators are generally introduced in previous studies when the relations are inconsistent (Bednall et al., 2013; Shin and Park, 2019). According to earlier investigations, the relation between prosocial motivation and

social entrepreneurship orientation appears elusive. Some studies insist that high and intense prosocial motivation enhances the sustained investment in the psychology and behavior of entrepreneurs more effectively (Walker et al., 2020; Aparicio et al., 2021). In contrast, other studies maintain a negative relationship, describing a large firm's failure to continue entrepreneurship in the emerging market despite having sufficient and high prosocial motivation (Mousavi and Dabiri, 2021). This ambiguous relationship between prosocial motivation and social entrepreneurship orientation suggests the existence of a moderator.

There have been many attempts to confirm the existence of a moderator in fostering and upgrading social entrepreneurship orientation (El-Bassiouny and Letmathe, 2018; Baghestan et al., 2021). The relationship between social entrepreneurship orientation and its determinants or outcomes can be altered not only by endogenous factors, such as personal ability, but also by exogenous elements including the cultural environment in which entrepreneurs grow up (Calam, 2016; Altantsetseg, 2017). Many studies have shown that thinking modes determine behavior patterns (Bardacke and Duncan, 2014). However, few studies have investigated the impact of the golden mean thinking mode of Confucian traditional culture despite it being a good predictor of future behavior. The effect of prosocial motivation on social entrepreneurship orientation is expected to be of different strengths depending on Perceived pressure from external stakeholders.

Under intense pressure from external stakeholders, individuals will constantly monitor the changes in the environment, pay attention to whether their behavior deviates from the goals of stakeholders, adjust their behavior through self-reflection, and take into account various positions and different viewpoints from external stakeholders when solving disputes, adopt a multi-dimensional approach, easy to compromise (Malis et al., 2017). In other words, under the influence of solid pressure perception, individuals should not only be aware of their inner self and adjust their external self-behavior but also change according to the external environment (Hervieux et al., 2012; Shlonsky et al., 2016). Therefore, external stakeholder pressure means that individuals must not only be aware of their inner self but also adjust and be aware of their external self-performance from the perspective of different stakeholders (Dryzin-Amit et al., 2022). Perceived pressure from external stakeholders has rarely been investigated as a moderator in the process of fostering and upgrading social entrepreneurship orientation, even though it is one of the most established and researched variables in entrepreneurship literature (Xiao-Yan, 2013; Parent et al., 2015; Gali et al., 2020).

Based on this logic, this study assumes that the strength of prosocial motivation could be altered by Perceived pressure from external stakeholders (DunCa and Bardacke, 2010; Gvelesiani, 2016). The researchers regard Perceived pressure from external stakeholders as a moderator at the personal level. This view is aligned with social network theory, whereby the influence of social

networking on business performance is moderated by cultural factors (Baloglu, 2017; Lückenbach et al., 2019; Hajjaliani et al., 2021). Therefore, the researchers predict that there will be a strong relationship between prosocial motivation and social entrepreneurship orientation when Perceived pressure from external stakeholders is high, leading to the following hypothesis:

*Hypothesis5:* Perceived pressure from external stakeholders moderates the relationship between prosocial motivation and social entrepreneurship orientation. This positive relationship is much stronger for those with a high degree of Perceived pressure from external stakeholders.

*H5a:* Perceived pressure from external stakeholders moderates the relationship between prosocial motivation and social entrepreneurship competitive orientation.

*H5b:* Perceived pressure from external stakeholders moderates the relationship between prosocial motivation and social entrepreneurship public-welfare orientation.

Assuming that Perceived pressure from external stakeholders moderates the relationship between prosocial motivation and social entrepreneurship orientation, it is also plausible that an entrepreneur's characteristics might conditionally affect the strength of the indirect relationship between mindfulness upbringing perception and social entrepreneurship orientation (Wang et al., 2022). In other words, the effect gained from trustworthy networks on social entrepreneurship orientation (mediation effect) may be mediated by Perceived pressure from external stakeholders, thereby demonstrating a moderated mediation effect. As the researchers assume a strong association between prosocial motivation and social entrepreneurship orientation when Perceived pressure from external stakeholders is high, the researchers expect that Perceived pressure from external stakeholders will positively moderate the mediation effect (He et al., 2019). That is, the mediation effect will be stronger when Perceived pressure from external stakeholders is high, as claimed in the following hypothesis:

*Hypothesis6:* Perceived pressure from external stakeholders moderates the indirect effect of mindfulness upbringing perception on social entrepreneurship orientation (via prosocial motivation, respectively). Specifically, prosocial motivation positively mediates the indirect effect when Perceived pressure from external stakeholders is high.

*H6a:* Perceived pressure from external stakeholders moderates the indirect effect of mindfulness upbringing perception on social entrepreneurship competitive orientation (via prosocial motivation, respectively).

*H6b*: Perceived pressure from external stakeholders moderates the indirect effect of mindfulness upbringing perception on social entrepreneurship public-welfare orientation (via prosocial motivation, respectively).

Based on the above-proposed hypotheses and the theoretical foundation, the conceptual association among variables is presented below in Figure 1.

## Materials and methods

### Sample selection and data collection

The investigation of this study was divided into two parts: pre-investigation and formal investigation. Before the formal survey, the researchers conducted a pre-survey in February 2021, which targeted 500 social start-ups recommended by China Social Enterprise Forum. These social start-ups are representative enterprises. In February 2021, the researchers took the initiative to contact these enterprises and distributed 490 questionnaires. All items were assessed on a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). The pre-survey was divided into two stages. In the first stage (2021.3–2021.4), researchers interviewed social enterprise founders face-to-face (356) or online (122) and then formed the data of the first round of questionnaire (the first round only included control variables, mindful parenting perception and prosocial motivation). A total of 478 questionnaires were received in the first round. The recovery rate was 97.6%. The second stage of data recovery (August, 2021.8–September, 2021.9) will be carried out about 3 months later, or through a combination of online interview (44) and offline interview (434). The founders of 478 social entrepreneurship enterprises who successfully submitted the questionnaire at the first time point were asked to fill in the questionnaire (the second round of questionnaire only included the perception of mindfulness education, prosocial motivation, social entrepreneurship motivation, and external pressure perception), and 476 questionnaires were recovered, with a recovery rate of 99.6%. Since the questionnaires administered at both stages included both mindful parenting and prosocial

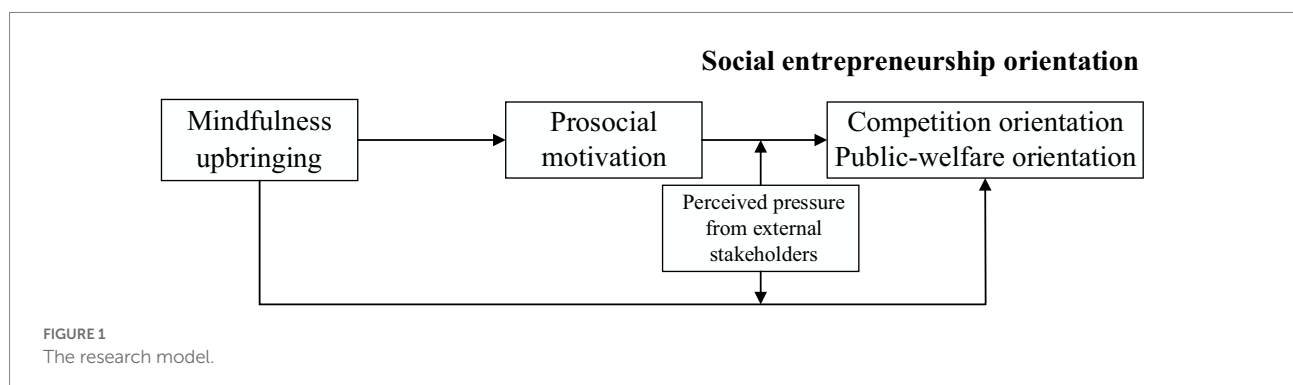
motivation, the researchers compared the responses to the questionnaires received at the two stages for the same social start-up (each social start-up has a unique ID number). The questionnaire with the same score of these two variables in the two rounds of answers was retained as one valid questionnaire, and a total of 380 valid questionnaires were collected during the pre-survey.

The questionnaire collected from the pre-survey was found to be of good quality after inspection. Therefore, this means that the scale of variables has good external validity, is in line with the Chinese situation, and is reasonable. We can conduct a formal investigation, which was conducted from the end of September 2021 to February 2022.

Since 2015, the research team has focused on social entrepreneurship and established cooperative relationships with domestic recognized social entrepreneurship research and service institutions such as EN-pai Public Welfare Platform and China Social Enterprise Forum (Annual Conference), accumulating rich case data. These institutions and forums provide communication and service platforms for social entrepreneurship participants across the country, giving great support to the random selection of research objects in this study. The object of the formal survey was 1,000 social start-ups randomly selected from the database of the national recognized social entrepreneurship research and service institutions such as Enpai Public Welfare Platform and China Social Enterprise Forum (Annual Meeting).

To clarify the causal inference and alleviate the problem of standard method variance (CMV), the researchers separated measurement occasions (Widyalkara, 2016). The data were collected at three time points, one month apart. The formal questionnaire was completed in three stages (T1/T2/T3). In order to avoid the deviation of social desirability, the data in the three stages were emphasized to be used only for research and kept strictly confidential.

The first round (T1) survey measured self-reported mindfulness upbringing perception (the level of mindfulness upbringing perception from their parents during childhood and adolescence received) and collected demographic information of the participants. At this stage, 1,000 questionnaires were distributed online (138) and offline (862), and 890 questionnaires





were collected (136 online and 754 offline), with an effective recovery rate of 89%.

The second round (T2) survey measured prosocial motivation and perceived pressure from external stakeholders. The questionnaire at this stage is for social enterprise founders who successfully submit the questionnaire at the first point in time to fill out. A total of 890 questionnaires were distributed through online distribution (134) and offline distribution (756), and a total of 792 questionnaires were recovered (101 online and 691 offline), and the effective recovery rate was 88.9%.

The third round (T3) survey measured social entrepreneurship orientation. No monetary incentive was offered to the participants. The questionnaire at this stage is for social enterprise founders who successfully submit the questionnaire at the second time point to fill out. At this stage, a total of 792 questionnaires were distributed through online distribution (99) and offline distribution (693), and a total of 690 questionnaires were recovered (80 online and 610 offline). The effective recovery rate was 87.1%. After excluding missing data and outliers based on boxplot analyses, 558 responses were analyzed.

The detailed process of data collection and the number of questionnaires collected at each time point are shown in the Figure 2.

Among these participants, the majority were male (50.7%). The researchers calculated the following statistics based on demographic data. The results of the descriptive statistical analysis of sample enterprises are shown in Table 1. 240 respondents were in their 30s (43.0%), 218 respondents in their 40s (39.1%), 67 respondents in their 50s (12.0%), and 33 respondents were in their 60s (5.9%). Among all respondents, 196 had a bachelor's degree or higher (35.1%). "Electric, electronics, communication and precision" was the most popular industrial category, accounting for 47.7% of all respondents. Regarding their work experience, 40.9% of all respondents had 1–3 years of experience working within the same industry. Table 1 presents the demographic information of the research sample.

Through the F test and T test of the online and offline overall sample data, it is found that the *p* values are all greater than the significance level of 0.05, indicating that there is no significant difference in the data, and the mixed use will not have a great impact on the reliability of the research results.

## Variable measurement

The perception of mindfulness upbringing refers to the respondents' perception of the extent to which their parents practiced mindfulness upbringing during their childhood family education (Mansehra, 2018). Parents' mindful upbringing plays an essential role in developing their children's mental health and social adaptability (Duarte et al., 2019). The measurement of entrepreneurs' mindfulness upbringing perception was based on the rationale proposed by (Rodrigo et al., 2021). Upbringing perception mainly includes five dimensions: attentive listening of

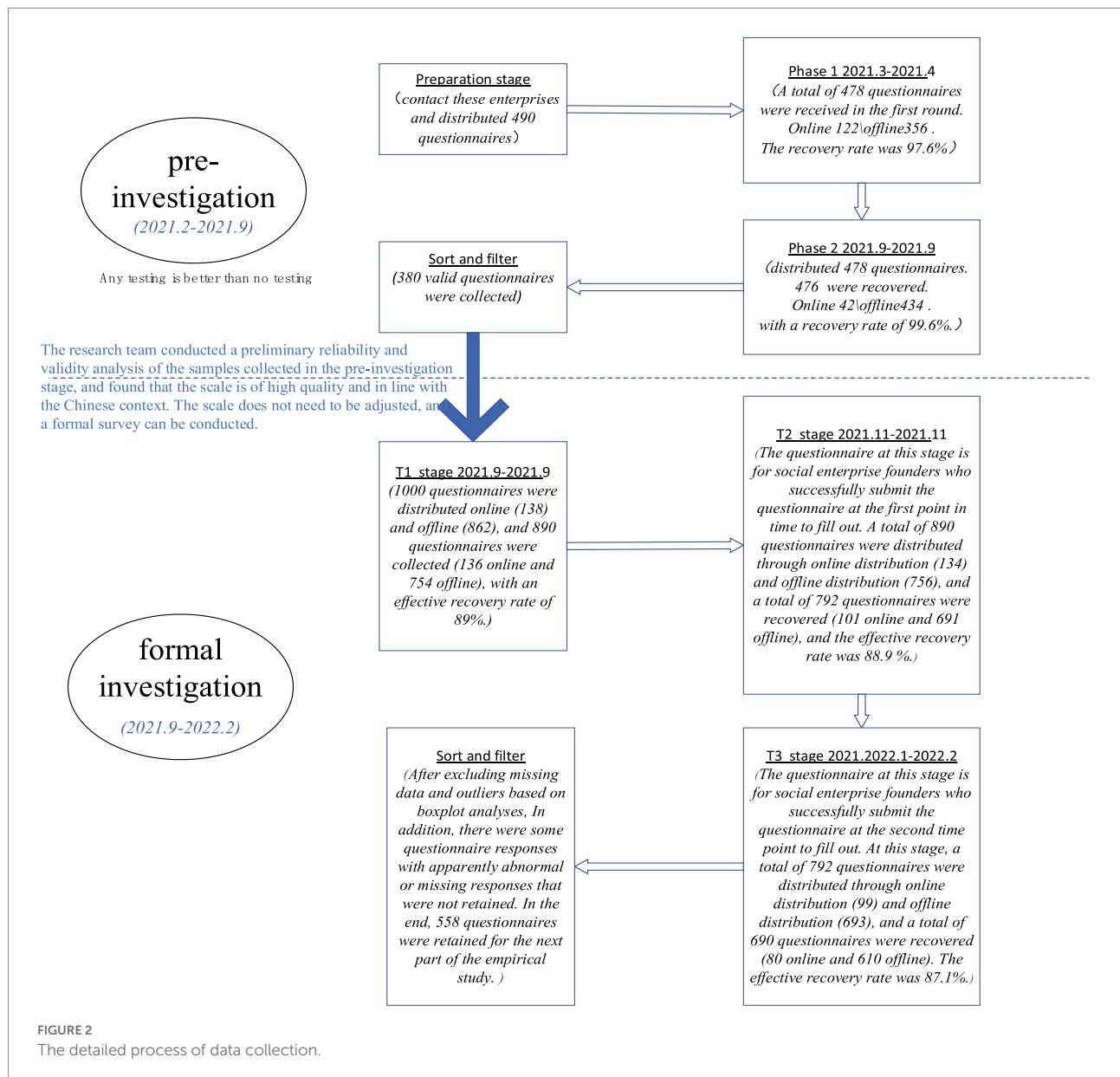
parents, non-judgmental acceptance of themselves, and their children, emotional awareness of themselves and their children, self-regulation in parent–child relationship, and compassion for themselves and their children. Accordingly, the measure of mindful upbringing perception is divided into five dimensions. Items included "In the family, you can feel that your parents are listening attentively to what you express"; "your parents are more accepting of themselves and you without judgment"; "your parents are more aware of their emotions and your emotions"; "you can feel parents' self-regulation in parent–child relationship"; "you can feel parents' compassion for themselves and you." For this construct, Cronbach's Alpha was 0.990. According to Chandra (2016), reliability of 0.70 or better is recommended (Chandra, 2016). Hence, this value has sound scale reliability.

In essence, prosocial behavior belongs to a broad category of interpersonal interaction (Rodrigo et al., 2021), including voluntary activities of helping others, sharing and cooperating to safeguard others' interests (Crick et al., 2010). Prosocial behavior is characterized by social interaction (Honig and Hopp, 2019), high social approval (Crick et al., 2010) altruism, and reciprocity (Fatima and Bilal, 2019). The prosocial motivation scale developed by Crick et al. (2010) was used to measure the degree of the willingness of social entrepreneurs to make efforts to meet their interests from the perspective of the interests of the public. The prosocial motivation scale including five items, sample items included "I want to make a positive impact on others through my work," "I'm willing to volunteer my time and energy, not to get paid more." For this construct, Cronbach's alpha was 0.987.

Perceived pressure from external stakeholder's scale was developed by Garcés-Ayerbe et al. (2012), which measures external stakeholder pressure closely related to the operational activities of social enterprises from four aspects: customers, competitors, partners, and government, included four items. Sample items were including "Our customers prefer products and services with social impact/social value," "Competitors' products or services receive positive social evaluations compared to ours," "Our partners pay great attention to social impact and solve social problems in their products and services," "The local government prefers social enterprises with positive social impact and provides certain policy support." For this construct, Cronbach's alpha was 0.973.

Social entrepreneurship orientation is measured from two dimensions: competition orientation and public welfare orientation. ①The competitive orientation scale is developed by Narver and Slater (2017). Competition orientation reflects the degree of economic emphasis in the process of social entrepreneurship, a 7-point Likert scale with three items. Sample items included "I want my company to maintain a sense of superiority in the industry, become the center of attention, and continue to be seen and noticed," "When I run a business, I tend to turn work into a competition," "I hope my company can beat other companies in the industry and become a winner." For this construct, Cronbach's alpha was 0.985. ②The public-welfare orientation scale adopts Cooke's





organizational culture scale (Cooke and Rousseau, 1988) and other scales of humanitarian care (Darmanto and Bukirom, 2021), as well as the public-welfare orientation scale revised according to the survey. The public-welfare orientation reflects the emphasis of the social entrepreneurship process, which is a 7-point Likert scale containing five items. Sample items included “My business tries to help others grow and develop,” “I hope my company can beat other companies in the industry and become a winner,” “I hope my company can solve social conflicts constructively,” “My business can recognize and care for the needs of others in its operation.” For this construct, Cronbach’s Alpha was 0.991.

Control variables. The control variables in this study include the industry field of social entrepreneurs, Work experience in the same industry, and the gender, age and education level of social

entrepreneurs (Cooke and Rousseau, 1988; Garcés-Ayerbe et al., 2012; Narver and Slater, 2017; Parajuli et al., 2019; Halberstadt et al., 2020).

## Empirical analysis and results

To test the hypotheses this study has used a moderated mediation model. It is a statistical method that comprises mathematical and statistical approaches for examining data to identify relationships between variables (Duarte et al., 2019; Moisés et al., 2019). SPSS and PROCESS3.3 were used to analyze the data in this study. These are useful for measuring mediating and moderating effects and are suitable for the exploratory nature of study analysis (Korneiko, 2017). In recent years the number of

TABLE 1 Demographics of survey respondents (N=558).

Variable	Category	N	Percentage (%)
gender	Male	283	50.7%
	Female	275	49.3%
Age	The 20s	0	0.0%
	The 30s	240	43.0%
	The 40s	218	39.1%
	The 50s	67	12.0%
	The 60s	33	5.9%
Education	Junior college and below	20	3.6%
	Bachelor's degree	196	35.1%
	Master's degree	235	42.1%
	Doctoral degree	107	19.2%
	Nonmetal, metals, machine equipment	163	29.2%
Industry type	Computer and office machine	87	15.6%
	Electric, electronics, communication and precision	266	47.7%
	Daily supplies	35	6.3%
	Other	7	1.3%
Work experience in the same industry	1–3	228	40.9%
	4–5	160	28.7%
	6–8	139	24.9%
	9–	31	5.6%

published articles using a moderated mediation model increased significantly.

## Reliability analysis

It is essential to check the reliability and validity of measurement tools (de Waal and Suchak, 2010). Reliability analysis verifies the internal consistency of the scale, that is, whether different items can measure the same content or concept independently. Cronbach's Alpha coefficient is mainly used in this study to investigate the internal consistency of the scale. Cronbach's Alpha coefficient is between 0 and 1. If the  $\alpha$  coefficient does not exceed 0.6, internal reliability is generally considered inadequate. When the  $\alpha$  coefficient reaches 0.7–0.8, the scale has considerable reliability. When the  $\alpha$  coefficient comes 0.8–0.9, the scale's reliability is excellent (Alexander, 2017). As shown in Table 2, the total reliability of this study is 0.986, greater than 0.9. Cronbach's Alpha of all dimensions of the scale is greater than 0.9. The results show that the scale and dimensions have high reliability, good stability and consistency and can be used for in-depth analysis means detailed analysis of mediating and moderating effects between variables in section 3.4 and 3.5.

## Validity analysis

KMO sample measure and Bartlett sphere test should be used to verify partial correlation and simple correlation coefficient of various variable items before factor analysis (Wiguna and Manzilati, 2014). Data are suitable for factor analysis only when correlation is high (Dwivedi and Weerawardena, 2018). KMO and Bartlett test results of all variables in this study are shown in Appendix 1. KMO value is 0.938, greater than 0.9, indicating that the data are suitable for factor analysis (Sulphey and Salim, 2020). Bartlett sphericity test chi-square value is 25705.260 ( $p < 0.01$ ), indicating that the relationship between items of user variables is good and factor analysis can be carried out. Explain the eigenvalues of the total variance observation scale and the sum of the squares of the rotating loads as well as the cumulative percentage of the main observation items. More than 50% indicates compliance with factor analysis requirements (Fatima and Bilal, 2019). As can be seen from the variance interpretation rate after rotation (Appendix 1), a total of five factors were extracted, accounting for 94.497% of the total variance, more than 50%, indicating that the extracted 5 factors could better explain the information contained in the original variable. From the factor load result, the factor load of each dimension item was greater than 0.6, and each item was within its original defined dimension without variable confusion, indicating that the model had high structural validity (Brndle et al., 2019). Then, confirmative factor analysis questionnaire structure validity was used in AMOS24.0. The model fitting results showed that the absolute fit index was demonstrated in Appendix 1, with GFI, AGFI, NFI, IFI, TLI, and CFI all greater than 0.8, indicating that the structure validity passed the test.

## Correlation analysis

Table 2 shows the descriptive statistics and correlations for the variables included in the study. In the correlation analysis of various numerical variables, the commonly used statistical analysis method is the Pearson correlation coefficient (Fina et al., 2017). Academics use it to measure correlations between economic phenomenon or variables. The academia reveals and reflects the correlation between different things or variables through numerical quantification (Garon and Nassif, 2021). As seen from Table 3, the mean values of mindfulness upbringing perception, prosocial motivation, social entrepreneurship competition orientation, and social entrepreneurship public-welfare orientation are 4.05, 3.62, 4.06, and 4.99, respectively. These values are in the middle. It indicates that the mindfulness upbringing perception, prosocial motivation, social entrepreneurship competition orientation and social entrepreneurship public-welfare orientation need to be improved. The average level of perceived pressure from external stakeholders is 2.88, indicating that perceived pressure from external stakeholders is at a low level. All the variables showed a positive

TABLE 2 The specific content and reliability test of each dimension of the scale (N=558).

Variable		Items	CITC	Cronbach's Alpha	
X Mindfulness upbringing perception	5	In the family, you can feel that your parents are listening attentively to what you express	0.833	0.984	0.990
		Your parents are more accepting of themselves and you without judgment	0.849	0.984	
		Your parents are more aware of their emotions and your emotions	0.832	0.984	
		You can feel parents' self-regulation in the parent-child relationship	0.821	0.984	
		You can feel parents' compassion for themselves, and you	0.841	0.984	
M Prosocial motivation	5	I want to make a positive impact on others through my work	0.797	0.984	0.987
		I'm willing to volunteer my time and energy, not to get paid more	0.790	0.984	
		I do not help people with the goal to receive their thanks and return	0.772	0.984	
		I tend to help others, even if there is no benefit	0.782	0.984	
		I think it's best to help people when they do not know	0.815	0.984	
W Perceived pressure from external stakeholders	4	Our customers prefer products and services with social impact/social value	0.709	0.984	0.973
		Competitors' products or services receive positive social evaluations compared to ours	0.689	0.984	
		Our partners pay great attention to social impact and solve social problems in their products and services	0.687	0.984	
		The local government prefers social enterprises with positive social impact and provides particular policy support	0.688	0.984	
Y1 Social entrepreneurship competition orientation	3	I want my company to maintain a sense of superiority in the industry, become the center of attention, and continue to be seen and noticed	0.843	0.984	0.985
		When I run a business, I tend to turn work into a competition	0.856	0.983	
		I hope my company can beat other companies in the industry and become a winner	0.848	0.984	
		Our business strategy orientation is driven by our belief in how to create more significant value for our customers	0.827	0.984	

(Continued)

TABLE 2 (Continued)

Variable		Items	CITC	Cronbach's Alpha	
Y2 Social entrepreneurship public-welfare orientation	5	My business tries to help others grow and develop	0.881	0.983	0.991
		I want my business to give positive rewards to others	0.878	0.983	
		I hope my company can solve social conflicts constructively	0.885	0.983	
		My business can recognize and care for the needs of others in its operation	0.891	0.983	

$N = 558$ ; independent variable X stands for mindfulness upbringing perception; dependent variable Y1 stands for social entrepreneurship competition orientation; dependent variable Y2 stands for social entrepreneurship public-welfare orientation; mediator variable M stands for prosocial motivation; moderator variable W stands for perceived pressure from external stakeholders.

TABLE 3 Correlation test ( $N = 558$ ).

	Mean	SD	Mindfulness upbringing perception	Prosocial motivation	Perceived pressure from external stakeholders	Competition orientation	Public-welfare orientation
Mindfulness upbringing perception	4.05	1.940	1				
Prosocial motivation	3.62	1.742	0.693**	1			
Perceived pressure from external stakeholders	2.88	1.493	0.556**	0.391**	1		
Competition orientation	4.06	1.608	0.712**	0.689**	0.684**	1	
Public-welfare orientation	4.99	1.740	0.722**	0.725**	0.722**	0.749**	1

\*Correlation is significant at  $p < 0.05$  (two-tailed test).

\*\*Correlation is significant at  $p < 0.01$  (two-tailed test).

correlation. As shown in Table 3. This provides preliminary support for the above research hypothesis 1, 2, 3, 4.

## Mediation effect of prosocial motivation

The researchers adopted Bednall et al. (2013) suggestion to test the mediation effect of prosocial motivation between mindfulness upbringing perception and social entrepreneurship orientation (Social entrepreneurship competition orientation & public-welfare orientation). According to Bednall et al., four requirements need to be met to assess the mediation effect. First, the independent variable X and the mediation variable M should each be regressed on the dependent variable Y (Y1 & Y2). The variable X should also be regressed on the variable M. Partial mediation impact is confirmed if the variable X remains powerful and its effect becomes smaller while controlling the variable

M. Full mediation effect occurs if the variable X is no longer significant (Details et al., 2019).

Hierarchical regression was used to test the direct effects of mindfulness upbringing perception on competitive orientation and public welfare exposure. The results are shown in Table 3. According to model 2, mindfulness upbringing perception has a substantial positive effect on competitive orientation ( $\beta = 0.590$ ,  $p < 0.001$ ), and  $R^2$  in model 2 is significantly increased compared with  $R^2$  in model 1, and the change of  $R^2$  is significant at 0.01 level, indicating that mindfulness upbringing perception has a significant effect on competitive orientation compared with control variables. Hypothesis 1A is verified. Similarly, it can be seen from Model 6 that mindfulness upbringing perception has a significant positive effect on public-welfare orientation ( $\beta = 0.647$ ,  $p < 0.001$ ), and the  $R^2$  of Model 6 is significantly higher than that of model 5, and the change of  $R^2$  is significant at the level of 0.01, indicating that compared with the control

variable, mindfulness upbringing perception has a significant impact on public-welfare orientation. Hypothesis 1b is verified. In addition, the age of social entrepreneurs has a positive effect on the competitiveness orientation, which also confirms that older entrepreneurs are more conducive to the competitiveness orientation, which is also consistent with the phenomenon that a large percentage of successful social entrepreneurs are middle-aged. Still, age has no significant positive effect on the improvement of public-welfare exposure.

Then the researchers examine the mediating impact of prosocial motivation on mindfulness upbringing perception and competitive orientation. According to Model 2 in Table 4, mindfulness upbringing perception has a significant positive impact on competitive orientation ( $\beta = 0.590, p < 0.001$ ). According to model 3 in Table 3, mindfulness upbringing perception has a significant positive impact on prosocial motivation ( $\beta = 0.6257, p < 0.001$ ). The results show that prosocial motivation has a substantial positive effect on competitive orientation ( $\beta = 0.3436, p < 0.001$ ). Still, the effect of mindfulness upbringing perception on competitive orientation is still significant, but the regression coefficient is 0.590 ( $\beta = 0.590, p < 0.001$ ) decreased to 0.3748 ( $\beta = 0.3748, p < 0.001$ ), suggesting that prosocial motivation plays a partial mediating role in the relationship between mindfulness upbringing perception and competitive orientation. Similarly, according to Models 7 and 8, prosocial motivation plays a partially mediating role in the relationship between mindfulness upbringing perception and public welfare orientation.

Moreover, the Bootstrap method was then used to examine further the mediating effect of the model (Sabbagh, 2018). The Bootstrap aping was observed 1,000 times. As table 5 showed, the 95% confidence interval  $CI = (0.1559, 0.2774)$ , excluding 0, showed that the indirect impact of mindfulness upbringing perception on competitive exposure was substantial through prosocial motivation. The effect value was 0.2150, and the direct effect of mindfulness upbringing perception in the relationship between competitive orientation was significant (95% confidence interval  $CI = 0.2988, 0.4508$ ), excluding 0, the effect value was 0.3748, indicating that the partial mediating effect of prosocial motivation in the relationship between mindfulness upbringing perception and competitive orientation was supported again. Similarly, the partial mediating role of prosocial motivation in the relationship between mindfulness upbringing perception and public welfare orientation was supported again. The results of mediating effect further indicated that prosocial motivation had a partial mediating effect between mindfulness upbringing perception and competitive orientation & public welfare orientation.

## Moderating effect of perceived pressure from external stakeholders

As shown in Table 6, M9 and M10 take competition orientation and public welfare orientation as dependent variables,

respectively. Based on M3 and M7, perceived pressure from external stakeholders and the intersection term (perceived pressure from external stakeholders & mindfulness upbringing perception) are added. As can be seen from Table M9 and M10, the regression coefficient of the intersection term (perceived pressure from external stakeholders & mindfulness upbringing perception) on competition orientation and public welfare orientation both have reached significant levels. Therefore, perceived pressure from external stakeholders negatively moderates the relationship between mindfulness parenting and social entrepreneurship orientation (competition orientation & public-welfare orientation).

To show the moderating effect of perceived pressure from external stakeholders more clearly, the moderating effect chart was drawn. To more clearly show the moderating effect in perceived pressure from external stakeholders on the relationship between mindfulness upbringing perception and social entrepreneurship orientation (competition orientation and public-welfare orientation), the researchers describe the difference of the moderating effect of mindfulness upbringing perception on social entrepreneurship orientation in different levels of perceived pressure from external stakeholders with one standard deviation higher and one standard deviation lower than the mean, respectively. As shown in Figures 3, 4, compared with social entrepreneurs with a higher level of perceived pressure from external stakeholders, the regression line of competition orientation and public welfare orientation of social entrepreneurs with a lower level of perceived pressure from external stakeholders presents steeper trends. In lower levels of perceived pressure from external stakeholders, the positive effect of mindfulness upbringing perception on social entrepreneurship orientation is more substantial; However, at a higher level of perceived pressure from external stakeholders, the impact of mindfulness upbringing perception on social entrepreneurship orientation has little difference. In conclusion, perceived pressure from external stakeholders inhibits the positive effect of mindfulness upbringing perception on social entrepreneurship orientation (competition orientation and public-welfare orientation).

To further verify the significance of the above moderating effect, a simple slope test and slope difference test are conducted, and the results are shown in Table 7. When social entrepreneurs were under a higher level of perceived pressure from external stakeholders, the positive effect of mindfulness upbringing perception on competitive orientation was lower ( $\beta = 0.3167, p < 0.001$ ), and when social entrepreneurs were under lower-level perceived pressure from external stakeholders, the positive effect of mindfulness upbringing perception on competitive orientation was significantly increased ( $\beta = 0.4594, p < 0.001$ ). When social entrepreneurs are under different levels of perceived pressure from external stakeholders, the effect of mindful cultivation on competitive orientation is significantly different. Similarly, when social entrepreneurs are under a higher and lower-level perceived pressure from external stakeholders, there are significant differences



TABLE 4 Test results of direct effect and mediating effect (N=558).

	Competition orientation				Public-welfare orientation			
	M1	M2	M3	M4	M5	M6	M7	M8
	Control Variables→Competition orientation	Control Variables+Mindfulness upbringing perception → competitive orientation	Control Variables+Mindfulness upbringing perception→Prosocial motivation	Control Variables+Mindfulness upbringing perception+Prosocial motivation→Competition orientation	Control Variables→Public- welfare orientation	Control Variables+Mindfulness upbringing perception →public-welfare orientation	Control Variables+Mindfulness upbringing perception→Prosocial motivation	Control Variables+Mindfulness upbringing perception+Prosocial motivation→Public- welfare orientation
Constant	3.852**(7.333)	1.440* (3.710)	1.5913** (3.6889)	0.8927* (2.4421)	5.610 (9.883)	2.963**(7.183)	1.5913** (3.6889)	2.2871**(6.0705)
Entrepreneurial experience	0.109 (0.659)	−0.030 −0.261	−0.2262 (−1.7491)	0.0474 (0.4387)	0.067 (0.374)	−0.08 (−0.696)	−0.2262 (1.7491)	0.0101(0.0905)
Age	0.184*(1.857)	0.198* (2.845)	0.0860(1.1130)	0.1681** (2.6101)	0.130(1.211)	0.145(1.957)	0.0860 (1.1130)	0.1081(1.6281)
Education Level	−0.016 (0.184)	0.021 0.341	0.0700 (1.0152)	−0.0029 (−0.0503)	−0.087 (−0.911)	−0.046 (−0.698)	0.0700 (1.0152)	−0.0758 (1.2788)
Regions for Entrepreneurship	0.034(0.192)	−0.003 −0.026	−0.1476 (−1.0713)	0.0475 (0.4135)	−0.213 (−1.115)	−0.254 (−1.925)	−0.1476 (−1.071)	−0.1909 (1.6131)
Enterprise scale	−0.146 (1.683)	−0.079 −1.299	−0.0935 (−1.3816)	−0.0470 (−0.8316)	−0.177 (−1.892)	−0.104 (−1.606)	−0.0935 (−1.382)	−0.0642 (1.1034)
Mindfulness upbringing perception		0.590* (19.707)	0.6257** (18.8053)	0.3748** (9.6951)		0.647** (20.333)	0.6257** (18.805)	0.3811** (9.5661)
Prosocial motivation				0.3436** (7.9739)				0.4249** (9.5648)
$R^2$	0.016		0.4925	0.5884	0.019	0.523	0.4925	0.6265
Adjusted $R^2$	0.003		0.476	0.584	0.006	0.514	0.476	0.613
F.	1.239, $p = 0.000$	60.317, $p = 0.000$	60.3207, $p = 0.000$	75.9754, $p = 0.000$	1.442, $p = 0.000$	61.330, $p = 0.000$	60.3207, $p = 0.000$	89.1480, $p = 0.000$

N = 558; independent variable X stands for mindfulness upbringing perception; dependent variable Y1 stands for social entrepreneurship competition orientation; dependent variable Y2 stands for social entrepreneurship public-welfare orientation; mediator variable M stands for prosocial motivation; moderator variable W stands for perceived pressure from external stakeholders.

\*Correlation is significant at  $p < 0.05$  (two-tailed test).

\*\*Correlation is significant at  $p < 0.01$  (two-tailed test).

TABLE 5 Mediating effect Bootstrapping test results (N=558).

Effect of path	Coefficient	Coefficient	Boot 95% CI
Mindfulness upbringing perception → prosocial motivation → competitive orientation	Direct effect	0.3748	(0.2988, 0.4508)
Mindfulness upbringing perception → prosocial motivation → public-welfare orientation	Indirect effect	0.2150	(0.1559, 0.2774)
Mindfulness upbringing perception → prosocial motivation → competitive orientation	Direct effect	0.3811	(0.3028, 0.4595)
Mindfulness upbringing perception → prosocial motivation → public-welfare orientation	Indirect effect	0.2659	(0.2078, 0.3289)

in the impact of mindfulness upbringing perception on public-service orientation. Therefore, perceived pressure from external stakeholders has a negative moderating effect on the main result.

To further verify the moderated mediating effects. In this study, the PROCESS plug-in was used to test the mediated role according to Wen Zhonglin et al. The researchers adopted the Bootstrapping method to test the significance of the mediating effect of perceived pressure from external stakeholders at different levels. The effective value of the moderating effect was obtained. The results are shown in Table 8. When social entrepreneurs are under high-level pressure from external stakeholders, the indirect impact of mindfulness upbringing perception on competitive orientation and public welfare orientation is significant through prosocial motivation, 95% confidence interval is CI = (0.1420, 0.2903), CI = (0.0910, 0.1930), excluding 0. The effect values were 0.2124 and 0.1390. With the change of perceived pressure from external stakeholder's level from high to low, the indirect effect of mindfulness upbringing perception on competitive orientation and public benefit orientation increased from 0.2117 to 0.2124 and 0.1390 to 0.3684, respectively, with a 95% confidence interval CI = (0. 1,377, 0. 0. 2,873), CI = (0.2892, 0.4451), excluding 0. Therefore, perceived pressure from external stakeholders significantly negatively moderates the mediating effect of prosocial motivation in the relationship between mindfulness parenting and social entrepreneurship orientation (competition orientation & public welfare orientation).

## Discussion

### Implications

#### Theoretical implications

The possible theoretical contributions of this study are mainly reflected in three aspects:

TABLE 6 Test of moderating effect of the main effect (N=558).

Dependent variable	Competition orientation	Public-welfare orientation
	M9	M10
Constant	0.4961(1.2197)	0.9596*(2.4375)
Entrepreneurial experience	−0.0850(−0.8354)	−0.1208(−1.2261)
Age	0.1147(1.8793)	0.0442(0.7485)
Education Level	0.0298(0.5510)	−0.0339(−0.6478)
Regions for Entrepreneurship	0.0945(0.8725)	−0.1491 (−1.4218)
Enterprise scale	−0.0501(−0.9416)	−0.0769(−1.4953)
Mindfulness upbringing perception	0.5103**(8.0701)	0.7675** (12.5383)
Perceived pressure from external stakeholders	0.6316**(6.1876)	1.1254**(11.3900)
Mindfulness upbringing perception* perceived pressure from external stakeholders	−0.0408** (−1.9960)	−0.1292** (−6.5379)
R <sup>2</sup>	0.6364	0.7090
F	81.1733, <i>p</i> = 0.000	113.0019, <i>p</i> = 0.000

\*\**p* < 0.01; \**p* < 0.05.

First, it deepens the research on the connotation, impact and effect mechanism of mindfulness upbringing perception. The academic research has not reached a consensus on the connotation definition and functional characteristics of social entrepreneurs' mindfulness upbringing perception in the Context of Chinese culture, and there are debates on capital, culture, and ethics. Different from previous research, this article follows the evolution history and injection time development characteristics based on social learning theory thoroughly, discusses mindfulness breeding perception of social entrepreneurs to social entrepreneurship orientation (competition orientation and public interest orientation) and the internal mechanism, the influence of this for mindfulness breeding nature has specific theoretical meaning. It also enriches the relevant researches on the mechanism and consequences of social entrepreneurs' perception of family mindfulness upbringing.

Second, it has enriched the research on antecedent variables of social entrepreneurship orientation (competitive orientation and public welfare orientation) from the perspective of individual factors. It is of great significance to explore the antecedent variables of social entrepreneurship orientation (competitive orientation and public welfare orientation) to deeply understand the origin of social entrepreneurship orientation (competitive orientation and public-welfare orientation) and to cultivate social entrepreneurship orientation (competitive orientation and public welfare orientation). Existing researches mainly focus on the influence of individual spiritual traits or personal value such as self-confidence, optimism, and hope, and the resulting psychological resources such as trust and commitment on forming

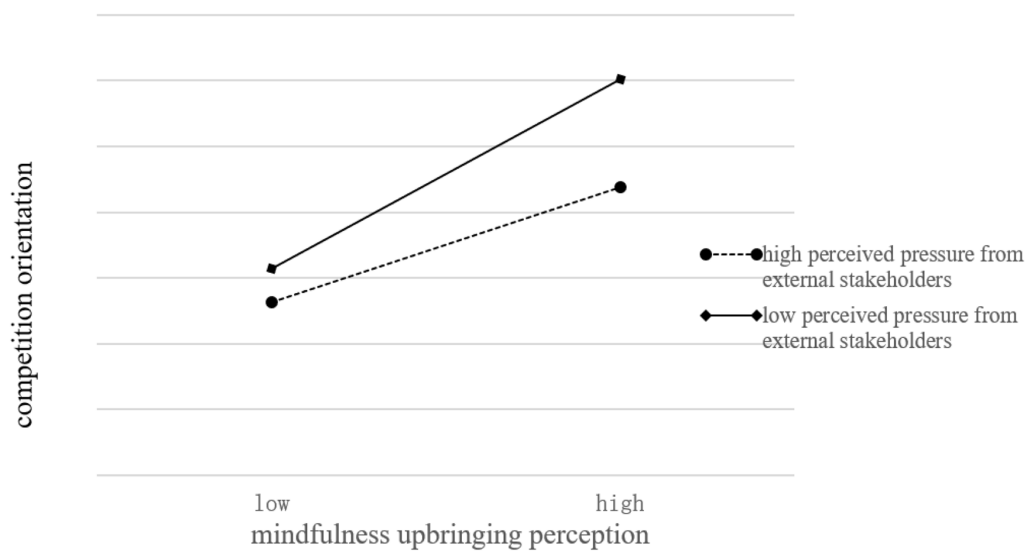


FIGURE 3  
The moderating effect chart (mindfulness upbringing perception and competition orientation).

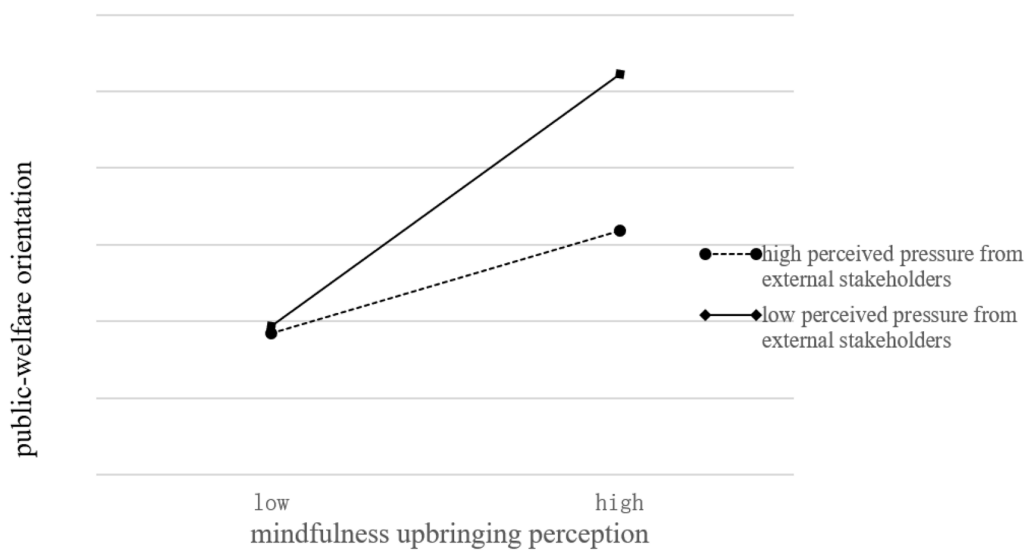


FIGURE 4  
The moderating effect chart (mindfulness upbringing perception and public-welfare orientation).

social entrepreneurship orientation (competitive orientation and public-welfare orientation). This study further discusses the influence and internal mechanism of higher individual values, such as the prosocial motivation of social entrepreneurs. And this study which forms an essential supplement to existing relevant research.

Thirdly, it finds the “key” connecting the prosocial motivation of social entrepreneurs with the orientation of social entrepreneurship (competition orientation and public-welfare orientation). In this study, the prosocial motivation of social entrepreneurs is defined as a kind of introspective, result-oriented,

and future-oriented. It is manifested in the specific entrepreneurial values that inspire and integrate their stakeholders to jointly create social value and meet the social needs that cannot be completed by the existing system, market, and government. Most current studies on the relationship between individual values and entrepreneurial orientation explore the internal relationship between them from the perspective of social capital accumulation. This study, referring to the literature of motivational information processing theory and emotional contagion theory, discusses the mediating effect of prosocial motivation on the relationship between social entrepreneurs’ mindfulness upbringing perception

TABLE 7 Simple slope test and slope difference test results (N=558).

Effect of path	Moderator	Coefficient	S.E	LLCI-ULCI(95% confidence interval)
Mindfulness upbringing perception → competitive orientation	High level of perceived pressure from external stakeholders	0.3167	0.0525	(0.2135, 0.4200)
	Mean level of perceived pressure from external stakeholders	0.3881	0.0320	(0.3251, 0.4510)
	Low level of perceived pressure from external stakeholders	0.4594	0.0430	(0.3748, 0.5439)
	High level of perceived pressure from external stakeholders	0.1537	0.0508	(0.0538, 0.2537)
	Mean level of perceived pressure from external stakeholders	0.3799	0.0310	(0.3189, 0.4408)
	Low level of perceived pressure from external stakeholders	0.6060	0.0416	(0.5241, 0.6878)

and social entrepreneurship orientation (competitive orientation and public-welfare orientation). This study also builds a new bridge for the study of the relationship between individual values and entrepreneurship orientation.

### Practical implications

In practice, the results of this study have implications for social entrepreneurs to objectively examine their own internal and external conditions, improve the decision-making level of social entrepreneurship, and strengthen the guarantee conditions of social entrepreneurship orientation.

1. Pay attention to the role of mindfulness cultivation perception and attach importance to prosocial motivation. Children's perception of their parents' mindful upbringing plays a vital role in developing their prosocial motivation and social adaptability. First, parents should improve their awareness and management of their feelings. Parents should reduce negative

TABLE 8 The moderated mediation test sheet (N=558).

The indirect effect	Moderator	Coefficient	S.E	LLCI-ULCI(95% confidence interval)
Mindfulness upbringing perception → prosocial motivation → competitive orientation	High level of perceived pressure from external stakeholders(M + 1SD)	0.2117	0	(0.1420, 0.2903)
	Mean level of perceived pressure from external stakeholders(M)	0.2121	0	(0.1595, 0.2667)
	Low level of perceived pressure from external stakeholders(M-1SD)	0.2124	0.0387	(0.1377, 0.2873)
Mindfulness upbringing perception → prosocial motivation → public-welfare orientation	High level of perceived pressure from external stakeholders(M + 1SD)	0.1390	0	(0.0910, 0.1930)
	Mean level of perceived pressure from external stakeholders(M)	0.2537	0.0229	(0.2097, 0.2985)
	Low level of perceived pressure from external stakeholders(M-1SD)	0.3684	0.0401	(0.2892, 0.4451)

emotions or out-of-control emotions caused by children's destructive behaviors or attitudes in the process of raising children, adjust themselves in time, and avoid negative feelings or ignore them when children express negative emotions. Parents' conscious choice of appropriate ways to respond to their children is conducive to forming children's pro-social motivation. It can also strengthen their social entrepreneurship public welfare motivation and competitive motivation. Secondly, parents should not be sensitive to the content of their children's speech, but should also effectively use nonverbal cues to improve their understanding and sensitivity to their children's emotional expression and understanding by judging their children's voice tone, facial expressions, and body language. Parents should not only convey understanding and acceptance to their children, but also provide clear codes of conduct and discipline rules for their children, and set expectations for their children. Finally, mindfulness training or curriculum programs improve the level of mindfulness, promote the formation of positive parent-child interaction, promote pro-social motivation, social entrepreneurship, public-welfare motivation, and competitive motivation.

2. Be alert to the intensity of stakeholder pressure on social entrepreneurs. To treat the environmental pressure from stakeholders, social entrepreneurs are encouraged to develop stakeholder-centered policies and corporate strategies, emphasizing communication, to mitigate the negative effect of stress on public-welfare orientation and competition orientation.

## Limitations and future research directions

Inevitably, there are some limitations in this study. First, in terms of sample data, this study collects the data needed for the research through a sample survey of Chinese social entrepreneurship enterprises. However, due to the inherent defects of the sampling survey and the impact of the epidemic, the effective recovery rate in some regions is low, leading to some deviation between the statistical distribution of sample enterprises and the actual situation, which has a particular impact on the representativeness of sample data and may reduce the universality of the research conclusions. In the future, the sampling will be more scientific, and the survey scope will be expanded. Longitudinal multi-point tracking research will be used to more accurately and deeply understand the relationship between mindfulness parenting perception and social entrepreneurship orientation. Second, this study only focuses on prosocial motivation as the “key” to opening the black box of the relationship between mindfulness upbringing perception and social entrepreneurship orientation and fails to comprehensively and systematically reveal the complex mechanism of the relationship between mindfulness upbringing perceptions and social entrepreneurship orientation. There are more transfer factors and complex mechanisms between the perception of mindfulness upbringing and different orientation of social entrepreneurship at the individual level. Future research needs to look for new “keys” from different perspectives.

## Conclusion

The purpose of this study is to explore the internal mechanism of the impact of mindfulness parenting perception on social entrepreneur orientation. To reveal the internal mechanism, the researchers propose a moderated and mediation model of prosocial motivation and perceived pressure from external stakeholders. Using survey data from social entrepreneurs in China, hierarchical regression analysis and bootstrapping model are adapted to test and verify mediation and moderation effects. (1) The results show that mindfulness upbringing perception indeed positively influences social entrepreneurship orientation directly. (2) Mindfulness upbringing perception indeed positively influence social entrepreneurship orientation partly through the mediating effect of prosocial motivation. (3) Moreover, findings suggest that perceived pressure from external stakeholders negatively moderates not only the relationship between prosocial motivation and social entrepreneurship orientation but also the overall mediation model. This demonstrates that social entrepreneurs with low-level perceived pressure from external stakeholders improve their social entrepreneurship orientation quickly when they have high prosocial levels. Based on these findings, the researchers conclude that social entrepreneurship

orientation may be achieved more effectively through the complex process of mindfulness upbringing perception, prosocial motivation and perceived pressure from external stakeholders. (4) External stakeholder pressure has a restraining effect on the positive effect of mindfulness upbringing perception and public welfare orientation. Under a high external stakeholder pressure, the promotion effect of mindfulness upbringing perception on public-welfare orientation will be significantly inhibited. Compared with public-welfare orientation, external stakeholder pressure has a weaker negative moderating effect on the positive relationship between mindfulness upbringing perception and competitive orientation. In other words, external stakeholder pressure has a more significant negative impact on the public-welfare orientation. Under high stakeholder pressure, social entrepreneurs will suffer more significant damage to the public welfare orientation of social entrepreneurship, while competition orientation will be less negatively affected.

## 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 in the article/supplementary material.

## Ethics statement

The studies involving human participants were reviewed and approved by the Nanjing University of Posts and Telecommunications. The participants provided their written informed consent to participate in this study.

## Author contributions

TS contributed to developing the theoretical framework and overall writing of the manuscript. XT contributed to data collection, data analysis, and editing. All authors contributed to the article and approved the submitted version.

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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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Appendix 1 旋轉元件矩陣<sup>a</sup>

	元件				
	1	2	3	4	5
MINDFULNESS UPBRINGING PERCEPTION	0.949				
MINDFULNESS UPBRINGING PERCEPTION 2	0.882				
MINDFULNESS UPBRINGING PERCEPTION 1	0.852				
MINDFULNESS UPBRINGING PERCEPTION 3	0.848				
MINDFULNESS UPBRINGING PERCEPTION 4	0.704				
MINDFULNESS UPBRINGING PERCEPTION 5	0.580				
PROSOCIAL MOTIVATION		0.947			
PROSOCIAL MOTIVATION 4		0.936			
PROSOCIAL MOTIVATION 1		0.802			
PROSOCIAL MOTIVATION 2		0.769			
PROSOCIAL MOTIVATION 3		0.742			
PROSOCIAL MOTIVATION 5		0.730			
PERCEIVED PRESSURE FROM EXTERNAL STAKEHOLDERS			0.890		
PERCEIVED PRESSURE FROM EXTERNAL STAKEHOLDERS 4			0.882		
PERCEIVED PRESSURE FROM EXTERNAL STAKEHOLDERS 3			0.789		
PERCEIVED PRESSURE FROM EXTERNAL STAKEHOLDERS 2			0.781		
PERCEIVED PRESSURE FROM EXTERNAL STAKEHOLDERS 1			0.738		
PUBLIC-WELFARE ORIENTATION				0.869	
PUBLIC-WELFARE ORIENTATION 1				0.755	
PUBLIC-WELFARE ORIENTATION 2				0.729	
PUBLIC-WELFARE ORIENTATION 3				0.676	
PUBLIC-WELFARE ORIENTATION 4				0.649	
PUBLIC-WELFARE ORIENTATION 5				0.592	
COMPETITION ORIENTATION					0.896
PUBLIC-WELFARE ORIENTATION 2					0.812
COMPETITION ORIENTATION 1					0.731
COMPETITION ORIENTATION 3					0.696

擷取方法:主體元件分析。 轉軸方法:具有 *Kaiser* 正規化的最大變異法。 *a*. 在 6 疊代中收斂循環。





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# Dark tetrad personality traits also play a role in bullying victimization

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Bullying refers to physical and/or psychological mistreatment or abuse by one individual or group toward another individual or group. Bullying is widespread in our society and carries considerable negative consequences. This phenomenon is caused by multiple factors, which include personality. Much more attention has been paid to the study of the perpetrators' negative personality traits than the victims. Several studies have examined the relationship between these traits—the Dark Triad or Dark Tetrad—and being a victim of bullying (or mobbing) in adults, especially in the workplace. However, only two studies have been located that have studied these relationships in adolescents. Therefore, this study aimed to analyze the relationship between being a victim of bullying and the Dark Tetrad traits, delving into the specific contribution of Machiavellianism, narcissism, psychopathy, and sadism in victims of bullying in Spanish adolescents. A cross-sectional study was carried out by administering the Short Dark Triad, the Assessment of Sadistic Personality, and the Peer Bullying Questionnaire to 393 adolescents aged 12–18 years ( $M = 14.18$ ;  $SD = 2.52$ ; 53.7% male). The Dark Tetrad traits predicted the victimization variables in the seven models analyzed, with the verbal abuse model being the model with the largest contribution. Of the four dark traits, sadism stands out as the trait with the highest specific contribution. Our results indicate, despite not implying a causal relationship, that those people with high scores in the Dark Tetrad traits tend to be more victimized by bullying. Knowing the personality traits of the bullying perpetrators and their victims, practitioners will have a complete picture of the personality variables that play a role in preventing bullying and its associated victimization.

## KEYWORDS

bullying, victimization, Dark Tetrad, narcissism, machiavellianism, psychopathy, sadism

## Introduction

### Bullying

Bullying, or peer bullying, is a type of aggression that refers to physical and/or psychological mistreatment or abuse by one individual or group toward another individual. This type of aggression can occur in different contexts (i.e., inside or outside the school, face-to-face, or online) and in many different ways (e.g., directly aggressing, threatening, or verbally abusing), making it a widespread phenomenon (Olweus, 1978; Magaz et al., 2016; Sorrentino et al., 2019). Therefore, with this variety of possibilities, the bullying prevalence rates are variable between studies depending on the measures used and the sample considered. However, the research on this topic states that up to 40% of children and youth have been involved in bullying behaviors as victims (e.g., Zych et al., 2016; Sorrentino et al., 2019; Biswas et al., 2020; Fuentes Chacón et al., 2020; Larrain and Garaigordobil, 2020).

Considering these high prevalence rates of bullying victimization, we must consider the consequences of being victimized by a bully. Suffering from bullying negatively affects the physical, mental, and socio-emotional health, as well as the wellbeing of the children who are bullied (Bond et al., 2001; Camerini et al., 2020). These consequences can range from depression or anxiety symptoms to behavioral disorders, substance abuse, or even suicidal behaviors (e.g., Reijntjes et al., 2010; Holt et al., 2015; De Lara, 2018).

Recent research has focused on analyzing the risk factors most associated with both experiencing and perpetrating bullying, which aids in the design of more targeted intervention programs (e.g., Huang et al., 2019; Ng et al., 2020; Martínez-Martínez et al., 2021). On the one hand, some of the risk factors that make someone more prone to suffering bullying are being male, having a disability or other health problems, having a low mood and poor self-perception, feeling lonely and having feelings of dissatisfaction with life, having few cognitive skills, having a poor relationship with peers or parents, having few economic resources and perceiving a lower quality of life, having a sexual orientation other than heterosexual, etc. (Puértolas Jiménez and Montiel Juan, 2017; Fuentes Chacón et al., 2020; Kahle, 2020).

On the other hand, the main characteristics that have been associated with the perpetration of bullying behaviors are high levels of anger and self-esteem, perceived high empathy, exposure to pornography, traditional masculinity, low levels of social and parental support, higher levels of school attachment, alcohol consumption, lack of emotional control, etc. (Leemis et al., 2019; Qian et al., 2020). Furthermore, individual personality differences have also been shown to play an important role in involvement in bullying situations, both as

a bully and as a victim (e.g., Mitsopoulou and Giovazolias, 2015; Zhang et al., 2021).

### Bullying and personality (the Dark Tetrad traits)

Personality traits like honesty-humility, emotionality, agreeableness, and openness to experience were negatively related to bullying perpetration (Pronk et al., 2021). However, different results have appeared while studying different populations. For example, Volk et al. (2018) pointed out that those participants with lower scores in honesty-humility and conscientiousness were more prone to perpetrating bullying, while those with lower scores in extraversion suffered from it. Notwithstanding, these authors also found a more complex relationship between personality and bullying in their Chinese sample, highlighting the importance of studying these connections in different cultures.

However, when personality is used to explain antisocial or criminal behaviors, a group of traits tends to predict these behaviors beyond general personality models. This is the Dark Tetrad of personality. First described as The Dark Triad by Paulhus and Williams (2002), three “dark” personality traits were described: subclinical psychopathy refers to a pattern of callousness and impulsivity; machiavellianism, which refers to the manipulation and lack of morality; and subclinical narcissism, which would broadly refer to a grandiose sense of identity with the necessity of admiration (Jones and Paulhus, 2014). With the increase of the investigation into these traits, the trait of everyday sadism was included. This trait would briefly describe a person who derives pleasure or joy from others’ suffering (Chabrol et al., 2009; O’Meara et al., 2011).

On the one hand, studies that have analyzed the relationships between the negative personality traits of bullies have found positive connections. This indicates that those with high scores in the dark personality traits tend to be more involved in performance bullying behaviors (Goodboy and Martin, 2015). Specifically, the Dark Triad trait that predicted bullying the strongest was mainly psychopathy (Goodboy and Martin, 2015; Gul and Fatima, 2016). In contrast, while looking at cyberbullying behaviors, two of the three Dark Triad traits tend to predict them, with those with higher scores in machiavellianism and psychopathy being more involved in these behaviors (Aguilar Cumbicus and Resett, 2002). When looking at the four traits of the Dark Tetrad in conjunction with other sociodemographic variables and the Big Five traits, psychopathy, machiavellianism, and sadism appeared to predict bullying (Van Geel et al., 2017).

On the other hand, the negative personality traits have not only shown a predictive ability for the perpetration of antisocial and criminal behavior but from being bullied and

victimized by it (e.g., Hayes et al., 2021; Pineda et al., 2021a; Pineda et al.<sup>1</sup>). In the bullying context, most studies have been developed in work contexts to study mobbing victimization (i.e., bullying victimization in the workplace). Previous studies have found mixed results regarding the most decisive trait predicting workplace bullying victimization, but all of them agree that machiavellianism does predict this victimization (Linton and Power, 2013; Parker, 2019; Fernández-del-Río et al., 2021).

To our knowledge, only two studies have examined these relationships between dark personality traits and bullying victimization in adolescents. One of them (Gul and Fatima, 2016) was conducted with 479 Pakistani adolescents aged 13–18 years ( $M = 15.11$ ;  $SD = 1.24$ ; 245 male), and an instrument with three scales was used to assess victimization: social, physical, and verbal victimization. Gul and Fatima (2016) asserted that only psychopathy from the Dark Triad correlated positively with being a victim of bullying in adolescent girls. However, in this study, regression models showed that none of the three traits predicted bullying victimization in the sample of boys and girls. However, this finding might be explained by the lack of assessment of the direct predictive ability of the Dark Triad traits for victimization since not only are the three Dark Triad traits included in the regression model, but also the effect of bullying perpetration is included in this relationship.

The other study (Boele et al., 2017) was conducted with 1,108 adolescents, mostly Dutch; victimization was measured simply by asking by whom they were bullied. Its results showed no significant correlations with the three Dark Triad traits. As in the previous study, these results could be biased by the type of instrument used.

## The present study

Most studies have focused on analyzing the “dark” personalities of bullies, leaving aside the possible presence of these traits in their victims. Knowing the characteristics of both bullies and victims can facilitate the design of more specific intervention programs, as well as the design of prevention programs to work with personality factors that may predispose to victimization and bullying (Gul and Fatima, 2016; Choi and Park, 2018; Reisen et al., 2019; Martínez-Martínez et al., 2021).

Studies analyzing the relationship between these traits and bullying victimization (in different contexts) suggest that the positive relationship discovered may be because some are also victims or become victims after being bullies (Fanti and Henrich, 2015; Choi and Park, 2018; Reisen et al., 2019). This relationship could also be due to the negative traits of those

who perpetrate bullying and do not consider the consequences of being victimized similarly (Foulkes, 2019).

In addition to focusing on victimization, as a particular strength of this study, it is noteworthy that the two studies described above (Gul and Fatima, 2016; Boele et al., 2017) did not measure the trait of everyday sadism, which has shown a crucial predictive ability in victimization situations (Pineda et al., 2020, 2021a). Moreover, none of them assessed the types of bullying victimization separately (i.e., being abused, excluded, threatened, and assaulted face-to-face or online), making it difficult to obtain more specific results.

To fill this gap, the main aim of this study was to analyze the influence of the Dark Tetrad traits on bullying victimization behaviors in a Spanish adolescent sample. Furthermore, we aimed to analyze the specific contributions of each of these four traits (i.e., machiavellianism, narcissism, psychopathy, and sadism) in being victimized by bullying in different ways (i.e., being abused, excluded, threatened, or aggressed) and in different contexts (i.e., face-to-face and online).

Therefore, this is the first study to analyze the predictive ability of the Dark Tetrad traits for adolescent victimization. Following previous literature (albeit with not very consistent results) that assessed these or similar relationships, we expect to obtain a positive correlation between psychopathy ( $H_1$ ) and machiavellianism ( $H_2$ ), and no significant correlation with narcissism ( $H_3$ ). Regarding everyday sadism, although no studies have previously assessed this relationship specifically with adolescents, we hypothesize a positive relationship between scoring high in sadism and being victimized by bullying ( $H_4$ ). This hypothesis appears since sadism has also been shown to be a personality predictor of victimization in other situations where the pleasure of inflicting pain can incur some costs (Pineda et al., 2020, 2021a). Finally, as being a perpetrator of bullying is related to suffering from it, we also anticipate that higher scores in the Dark Tetrad traits, mainly psychopathy and sadism, will predict higher victimization behaviors—in all the different victimization subtypes ( $H_5$ ).

## Materials and methods

### Participants and procedure

The sample consisted of 393 adolescents (53.7% male and 46.3% female) from four high schools in the Province of Alicante. The mean age of the participants was 14.18 years ( $SD = 1.30$ , range 12–18 years), and they were students in the first, second, third, and fourth years of compulsory secondary education and the first year of high school. Participants were able to complete the survey in two ways: on paper or in an online format through the DetectaWeb platform (Piqueras et al.,

<sup>1</sup> Pineda, D., Martínez-Martínez, A., Galán, M.; Rico-Bordera, P., Piqueras, J. A., The Dark Tetrad and Online Sexual Victimization: The Guilty Sadism, unpublished.

2017). The survey was carried out during the 2018–2019 and 2019–2020 academic years.

The project received approval from the university's ethics committee to carry out the study (Reference DPS.JPR.04.16). Participants were asked to submit an informed consent document signed by a parent.

## Measures

### Peer bullying questionnaire (CAI)

The CAI is a Spanish self-report that measures bullying behavior among peers (Magaz et al., 2016). It includes two scales, the Bullying Behavior Scale (CAI-CA) and the Gender Bullying Behavior Scale (CAI-CAG), but in this paper, only the CAI-CA was used. It comprises 39 items, with seven subscales: physical abuse (e.g., they kick me), verbal abuse (e.g., they insult me), direct social exclusion (e.g., they stop me from playing with them), indirect social exclusion (e.g., they stop talking to me), threats (e.g., they threaten to tell you things about my family or me), cyberbullying (e.g., they send me cell phone messages or emails to insult or threaten me), and object-based aggression (e.g., they hit me with objects, for example, with sticks, scissors, rocks, etc.).

This instrument is answered on a Likert-type scale from 0 = *never* to 2 = *many times*. The reliability of scales in the original study ranged from 0.45 and 0.83 (Cronbach's Alpha: physical abuse = 0.79, verbal abuse = 0.83, direct social exclusion = 0.77, indirect social exclusion = 0.58, threats = 0.70, cyberbullying = 0.45, and object-based aggression = 0.56 (Magaz et al., 2016).

### Short Dark Triad

The Short Dark Triad (SD3) is a short self-reported instrument that measures the three personality traits of the Dark Triad: machiavellianism (e.g., I tend to manipulate people to get what I want), narcissism (e.g., people see me as a leader), and psychopathy (e.g., I tend to have no remorse; Jones and Paulhus, 2014). It consists of 27 items, with nine items per trait, that are answered on a Likert-type scale from 0 = *strongly disagree* to 4 = *strongly agree*. It has been validated in Spain, showing good psychometric properties (Cronbach's alpha: Machiavellianism = 0.73, narcissism = 0.61, and psychopathy = 0.68) (Pineda et al., 2020).

### Assessment of sadistic personality

The Assessment of Sadistic Personality (ASP) is a 9-item unidimensional scale that measures everyday sadism (I have made fun of other people to let them know I am in control). It is answered on a Likert-type scale from 0 = *strongly disagree* to 4 = *strongly agree* (Plouffe et al., 2017). The original version shows adequate consistency, with a Cronbach's alpha of 0.83. The validation with a Spanish sample also shows adequate internal

consistency indices, with a Cronbach's alpha and McDonald's Omega of 0.75 (Pineda et al., 2021b).

## Data analysis

Descriptive statistics were calculated using the SPSS statistical software (version 23; <https://www.ibm.com/es-es/analytics/spss-statistics-software>). Means and standard deviations were obtained to know the scores on each instrument administered to the participants. For the calculation of the internal consistencies (reliability of the instruments), SPSS and the statistical program Jamovi (version 1.6.23; <https://www.jamovi.org/>) were used, which offered the values of Cronbach's alpha and McDonald's Omega.

Correlations were also calculated with SPSS to know both the magnitude and the direction (positive or negative) of the relationships between the different variables. Regression models were also calculated with this statistical program to determine the predictive ability of the Dark Tetrad traits for the seven factors of bullying as victimization (criterion variables). Therefore, seven regression models were calculated; in the first block, the specific contribution of the sociodemographic variables (sex and age) was considered. The four Dark Tetrad traits were added in the second block to determine their influence. The percentages of the total variance explained ( $SR^2$ ) were calculated for each variable.

## Results

### Descriptive statistics and internal consistency of the instruments

Attending to the descriptive statistics (Table 1) of the Dark Tetrad traits, the sample of this study obtained the highest scores in narcissism and the lowest in sadism. In relation to the victimization variables, the sample obtained higher scores on the scales that measure victimization by physical and verbal aggression and lower scores on the scale that measures the possibility of being threatened.

All instrument factors showed acceptable and good internal consistency indices (with alphas and omegas ranging between 0.69 and 0.87), except for narcissism, threats, object-based aggression, and indirect social exclusion, with lower reliabilities (alphas and omegas between 0.53 and 0.63; see Table 1).

### Association between bullying as victimization and Dark Tetrad traits

The four Dark Tetrad traits presented significant positive correlations with bullying as victimization

TABLE 1 Means and standard deviations for response rates.

Total (N = 393)					
	Range of scores	M	SD	Cronbach's alpha	McDonald's omega
<b>Dark Tetrad</b>					
Machiavellianism	0–36	11.33	5.47	0.73	0.75
Narcissism	0–36	14.20	4.78	0.55	0.59
Psychopathy	0–36	9.54	5.33	0.69	0.73
Sadism	0–36	5.72	5.81	0.81	0.87
<b>Bullying as victimization</b>					
Physical abuse	0–16	1.02	2.18	0.85	0.86
Verbal abuse	0–22	2.33	3.28	0.85	0.86
Direct social exclusion	0–10	0.46	1.25	0.78	0.80
Indirect social exclusion	0–8	0.59	1.11	0.53	0.73
Threats	0–8	0.09	0.45	0.60	0.63
Cyberbullying	0–8	0.12	0.59	0.73	0.76
Object-based aggression	0–6	0.16	0.57	0.59	0.60

factors (see Table 2). Machiavellianism presented significant positive correlations with being physically and verbally abused and with being directly and indirectly excluded; narcissism, on the other hand, correlated positively with being physically abused ( $p < 0.05$ ); and finally, sadism and psychopathy showed significant ( $p < 0.01$ ) direct correlations with all the bullying as victimization dimensions.

## Predictive ability of the Dark Tetrad traits on bullying as victimization

Regarding the predictive ability of the Dark Tetrad traits for bullying as victimization, the interest lies in analyzing the influence of the traits for each of the seven bullying factors separately (see Table 3). The results showed that the sociodemographic variables (age and gender) in all seven models presented a null contribution (0%) of the total explained variance of bullying as a victimization factor. However, when Dark Tetrad traits were included in the models, the models became significant. These traits explained up to 14.00% ( $p = 0.001$ ) of bullying victimization behaviors, with verbal abuse being the model with the highest contribution. Of the four dark traits, sadism stands out as the trait with the highest specific contribution (reaching  $SR^2 = 7.67\%$ ).

More specifically, sadism is significantly (and positively) associated with six of the seven victimization variables (it predicts all variables except indirect social exclusion). In contrast, psychopathy is significantly associated (also positively) with only two of the victimization variables (it predicts verbal abuse and direct social exclusion). Narcissism is significantly

associated with only one of the variables (it predicts indirect social exclusion), but, unlike the previous traits, it does so in a negative sense. Finally, machiavellianism is not significantly associated with any of the seven variables.

## Discussion

The main aim of this paper was to analyze the relationship between being victimized by bullying and the Dark Tetrad traits, delving into the specific contributions of machiavellianism, narcissism, psychopathy, and sadism in different ways of bullying victimization in Spanish adolescents.

Firstly, the results obtained regarding the relationships between the traits of the Dark Tetrad and the different factors of bullying as victimization report interesting findings. Even though the four traits are considered negative or antisocial, significant positive relationships have been found. This finding might be explained since some bullies are or can also be victims and vice versa. Some authors conclude that this may be due to the tendency of some victims to react to the aggressions suffered. Moreover, on many occasions, victims may not perceive themselves as aggressors when, in fact, they do engage in bullying behaviors (e.g., Lopes-Neto, 2005; Silva et al., 2012; Choi and Park, 2018; Reisen et al., 2019). A recent study concludes that another possible cause is the cognitive restructuring and moral disengagement that victims of bullying may undergo. Thus, these individuals might learn that aggression is an effective behavior, which would eventually cause them to also perform the bullying behaviors, but they might also misinterpret their own victimization, considering the aggressive behaviors as normal (Falla et al., 2022).



TABLE 2 Bivariate correlations between dark tetrad personality traits and seven types of bullying victimization behaviors.

	Machiavellianism	Narcissism	Psychopathy	Sadism
Physical abuse	0.16**	0.11*	0.20**	0.23**
Verbal abuse	0.16**	0.06	0.24**	0.33**
Direct social exclusion	0.10*	−0.01	0.20**	0.26**
Indirect social exclusion	0.17**	0.01	0.21**	0.24**
Threats	0.04	0.02	0.13**	0.19**
Cyberbullying	0.05	0.05	0.13**	0.27**
Object-based aggression	0.04	0.04	0.13**	0.19**

\*p &lt; 0.05, \*\*p &lt; 0.01.

Regarding the links between the traits and the bullying dimensions, positive correlations were obtained between the seven factors that make up bullying victimization and psychopathy and sadism, supporting  $H_1$  and  $H_4$ . Therefore, those who score high on psychopathy or sadism tend to also present higher scores in all the bullying victimization subtypes. In the case of machiavellianism, this positive correlation is found with fewer subtypes of bullying victimization. Therefore,  $H_2$  is partially supported. Finally, narcissism was correlated with one of the victimization subtypes (physical abuse), so  $H_3$  is rejected.

These results confront the findings of [Gul and Fatima \(2016\)](#), in which the only Dark Triad trait correlated with being a victim of bullying in a sample of girls was psychopathy. Similarly, they are also contrary to those found by [Boele et al. \(2017\)](#), who obtained no significant correlations with any of the Dark Triad traits. Moreover, the results are also inconsistent when comparing our results with those found in other studies with different sample populations (e.g., young adults or workers). Some studies have found correlations with the three traits of the Dark Triad ([Parker, 2019](#); [Hayes et al., 2021](#)), while others only with Machiavellianism when analyzing the traits of the Dark Tetrad ([Fernández-del-Río et al., 2021](#)). In turn, other studies that have analyzed these relationships with some of the traits separately have also found positive correlations between presenting high scores in psychopathy or narcissism and being a victim of bullying (e.g., [Fanti and Henrich, 2015](#); [Backe and Dankvardt, 2018](#); [Antoniadou et al., 2019](#); [Despoti et al., 2021](#)). In the case of the positive relationship between being a victim and having narcissistic traits, one study concluded that perhaps people with these traits become victims after having been bullies. They consider that they may have engaged in bullying behaviors to increase their social status, which would eventually have a counterproductive effect and, over time, place them in a victimized position ([Fanti and Henrich, 2015](#)). This could explain the positive relationship found in this study between narcissism and one of the factors of victimization (being a victim of physical abuse).

Secondly, regression models conducted to determine the predictive ability of the personality traits composing the Dark Tetrad for bullying as victimization factors also partially presented the expected results ( $H_5$ ). Overall, these personality traits explain up to 14.00% of bullying victimization behaviors, contrary to the findings presented by [Gul and Fatima \(2016\)](#). Although it is impossible to establish the causality of the relationship, it can be affirmed that some people who suffer certain bullying behaviors (especially verbal abuse and cyberbullying) tend to present higher scores in the Dark Tetrad personality traits. The Dark Tetrad trait that tends to predict the possibility of being victimized by bullying the most is everyday sadism. This finding replicates previous pointing to the everyday sadism trait as a personality factor that tends to be present in those who suffer from different antisocial behaviors ([Pineda et al., 2021a,b](#)). It might be explained due to the pleasure that people with high punctuations in sadism obtain from perpetrating these behaviors, which makes them not consider the consequences of being victimized in the same way ([Foulkes, 2019](#)).

Mixed results have been found regarding the predictive ability of the other Dark Tetrad traits. While psychopathy tends to be a positive predictor of all victimization behaviors, narcissism and Machiavellianism present different relationships. Previous studies have also shown psychopathy as a possible predictor of bullying victimization ([Linton and Power, 2013](#); [Parker, 2019](#)). Perhaps, the callous personality of those with higher scores in psychopathy makes them less disturbed by suffering from bullying. Thus, they also continue their common behaviors as perpetrators in a dyadic relationship. On the other hand, although very weak, narcissism tends to predict not being victimized by almost all the bullying subtypes, which is congruent with the study by [Fernández-del-Río et al. \(2021\)](#). Narcissism, as in other contexts studied (e.g., with emotional intelligence, wellbeing, or civic engagement), is associated in the opposite direction to psychopathy and machiavellianism due to the way of behaving associated with their sense of entitlement or grandiosity.

TABLE 3 The predictive capacity of the Dark Tetrad for bullying as victimization.

Criterion variable	Predictor variable	Step 1				Step 2			
		$\beta$	$t$	$r_{x,y}$	$sr^2$	$\beta$	$t$	$r_{x,y}$	$sr^2$
Physical abuse	Age	−0.07	−1.23	−0.07	0.48%	−0.13	−2.31*	−0.13	1.56%
	Gender	0.10	1.8	0.10	1.04%	0.12	2.10*	0.11	1.28%
	Machiavellianism					0.07	0.94	0.05	0.26%
	Narcissism					−0.06	−0.94	−0.05	0.26%
	Psychopathy					0.14	1.88	0.01	1.04%
	Sadism					0.16	2.47*	0.13	1.77%
	$R^2$			0.01				0.09	
	$F$			2.21				5.27***	
Verbal abuse	Age	0.02	0.37	0.02	0.04%	−0.05	−0.94	−0.05	0.24%
	Gender	0.10	1.74	0.10	0.94%	0.12	2.22*	0.12	1.37%
	Machiavellianism					−0.01	−0.11	−0.01	0.00%
	Narcissism					−0.10	−1.63	−0.09	0.74%
	Psychopathy					0.15	2.08*	0.11	1.21%
	Sadism					0.28	4.46***	0.24	5.52%
	$R^2$			0.01				0.14	
	$F$			1.66				8.09***	
Direct social exclusion	Age	−0.04	−0.66	−0.04	0.14%	−0.09	−1.52	−0.08	0.69%
	Gender	0.01	0.21	0.01	0.01%	0.03	0.55	0.03	0.09%
	Machiavellianism					−0.07	−0.99	−0.05	0.29%
	Narcissism					−0.12	−1.9	−0.10	1.08%
	Psychopathy					0.18	2.43*	0.13	1.77%
	Sadism					0.18	2.73**	0.15	2.22%
	$R^2$			0.01				0.07	
	$F$			0.23				3.95**	
Indirect social exclusion	Age	−0.01	−0.07	−0.01	0%	−0.05	−0.97	−0.05	0.28%
	Gender	0.09	1.52	0.09	0.72%	0.10	1.79	0.10	0.96%
	Machiavellianism					0.10	1.4	0.08	0.58%
	Narcissism					−0.14	−2.21*	−0.12	1.46%
	Psychopathy					0.14	1.86	0.10	1.04%
	Sadism					0.10	1.59	0.09	0.74%
	$R^2$			0.01				0.07	
	$F$			1.52				3.85**	
Threats	Age	0.05	0.82	0.05	0.21%	0.01	0.15	0.01	0.01%
	Gender	0.04	0.67	0.04	0.14%	0.05	0.92	0.05	0.26%
	Machiavellianism					−0.12	−1.62	−0.09	0.81%
	Narcissism					−0.03	−0.50	−0.03	0.07%
	Psychopathy					0.13	1.66	0.09	0.83%
	Sadism					0.19	2.87**	0.16	2.5%
	$R^2$			0.01				0.06	
	$F$			0.63				3.04**	
Cyberbullying	Age	0.09	1.52	0.09	0.72%	0.04	0.74	0.04	0.16%
	Gender	0.07	1.21	0.07	0.45%	0.08	1.51	0.08	0.66%
	Machiavellianism					−0.13	−1.86	−0.10	1.00%
	Narcissism					0.02	0.34	0.02	0.03%
	Psychopathy					0.01	0.09	0.01	0.00%

(Continued)

TABLE 3 (Continued)

Criterion variable	Predictor variable	Step 1				Step 2			
		$\beta$	$t$	$r_{x,y}$	$sr^2$	$\beta$	$t$	$r_{x,y}$	$sr^2$
Object-based aggression	Sadism					0.34	5.16***	0.28	7.67%
	$R^2$		0.01					0.11	
	$F$		2.09					6.1***	
	Age	0.12	1.87	0.10	1.08%	0.08	1.32	0.07	0.53%
	Gender	0.06	1.18	0.07	0.44%	0.08	1.36	0.08	0.56%
	Machiavellianism					−0.09	−1.23	−0.07	0.46%
	Narcissism					−0.02	−0.34	−0.02	0.04%
	Psychopathy					0.10	1.35	0.08	0.56%
	Sadism					0.14	2.16*	0.12	1.44%
	$R^2$		0.02					0.05	
	$F$		2.7					2.61*	

\* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ .

(Rico-Bordera et al., unpublished<sup>2</sup>; Schreyer et al., 2021; Van Groningen et al., 2021). Finally, machiavellianism presents mixed findings with regard to the different victimization subtypes. Again, weak links were found. In summary, people with high scores in machiavellianism, convergent with their nature and with previous studies, tend to be slightly more involved in less observable behaviors such as indirect social exclusion and not be involved in more visible ones like threats or cyberbullying (Jones and Paulhus, 2014; Parker, 2019).

The results obtained in this study highlight the need for further research in this field, especially in adolescents. When an intervention is proposed, both bullies and victims are targeted (e.g., Ng et al., 2020; Martínez-Martínez et al., 2021). Thus, we propose that controlling or at least considering the personality traits that might be maintaining the victim's condition would be interesting.

To date, to our knowledge, only two studies have analyzed the traits of the Dark Triad (i.e., psychopathy, Machiavellianism, and narcissism) in adolescent victims of bullying (Gul and Fatima, 2016; Boele et al., 2017). In contrast to these studies, we have analyzed the association between Dark Tetrad traits (including every day sadism) and different victimization behaviors. Moreover, we analyzed it directly (i.e., without introducing other variables in the regression model). In the study by Gul and Fatima (2016), the association was controlled for the effect of bullying perpetration. In that study, bullying perpetration explains most of the variance because being a victim and perpetrating these behaviors tend to appear together (e.g., Choi and Park, 2018; Reisen et al., 2019) without

considering the effect on the victimization of the personality variables alone.

## Limitations and future lines of research

This study presents several limitations. A first limitation implies, as previously stated, the low internal consistency of some of the factors (around 0.60). Specifically, the low internal consistency reliabilities are found in the dimensions measuring the narcissistic trait and those measuring being a victim of threats and object-based aggression. This could be due to the limitations that the scales used in this study could present (for example, problems in the wording or interpretation of the items). In addition, it is essential to note that self-reports, as is well known, have biases in their measurement, such as social desirability. Therefore, the participants may have slightly modified their answers due to social desirability (Abernethy, 2015; Althubaiti, 2016).

A second limitation relates to the low scores obtained in relation to having experienced bullying behaviors. Stronger relationships between the different constructs might be obtained by replicating this study with a larger sample of adolescents who have experienced bullying. Future research should replicate the present study with larger sample size and include more diverse samples to account for differences in negative personality traits by gender, race, socioeconomic status, and sexual orientation. As mentioned earlier in this study, certain groups of people may be more prone to bullying, such as people with low economic resources or people with a sexual orientation other than heterosexual (Fuentes Chacón et al., 2020; Kahle, 2020).

Likewise, it is likely that our findings cannot be generalized to other samples of different ages since. As mentioned throughout the discussion, our results differ from those obtained in other studies on young people or adults. Similarly, it may

<sup>2</sup> Rico-Bordera, P., Piqueras, J. A., Soto-Sanz, V., Rodríguez-Jiménez, T., Marzo, J. C., Galán, M., et al. (2021). Civic engagement and personality: the influence of the Big Five personality traits and the Dark Triad on engagement in civic behaviours. unpublished.

not be generalizable to other cultures since our results differ from those obtained in the two localized studies that analyzed these relationships with adolescents as we did (Gul and Fatima, 2016; Boele et al., 2017). In addition, Volk et al. (2018) already mentioned the importance of analyzing these relations in different cultures.

Finally, regarding these points, there is the last limitation of not having a longitudinal study, which would allow the establishment of the direction of causal relationships. As with the current design, it is not possible to state whether personality traits are a cause or consequence of bullying behaviors. For these reasons, it is considered necessary to replicate the study with a larger sample, which would guarantee the generalizability of the results. Furthermore, it would also be interesting to include a measure of bullying perpetration to help practitioners develop programs that consider the differences in personality of the agents involved in this behavior.

## Conclusion

Bullying remains a problem of great social relevance. For this reason, professionals in the field of psychology keep studying both the predictors of this problem and how to eradicate it. Knowing the personality traits of the people who carry out the bullying behaviors and those who suffer them is also an obvious need. Given this importance and the scarcity of studies that address it—especially those that analyze the personalities of bullied people—this is the first study that analyses the relationship between the darkest personality traits (i.e., the Dark Tetrad) and suffering from bullying in a Spanish sample.

A sociocultural shared belief is that “being bad” or presenting negative or dark personality tendencies usually determines malevolent behaviors, such as bullying, but it is less usual to expect that these same traits are related to suffering victimization. Given the cross-sectional nature of this study, it cannot be concluded with certainty whether victimization caused individuals to develop dark personalities or whether victims were already predisposed to these darker traits, but the need to know the personality of these victims is just as relevant as knowing the personality of bullies in order, for example, to design prevention and intervention programs aimed at all actors in bullying (perpetrators and victims). For now, this study shows that some of the traits of the Dark Tetrad, mainly sadism and psychopathy, are related to being a victim of bullying.

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## Data availability statement

The datasets and analysis scripts used for this study can be found in the OSF repository: [https://osf.io/ej74h/?view\\_only=8b0697f31f294479bd2e658ebee9bf97](https://osf.io/ej74h/?view_only=8b0697f31f294479bd2e658ebee9bf97).

## Ethics statement

The studies involving human participants were reviewed and approved by Miguel Hernández University (reference DPS.JPR.04.16). Written informed consent was obtained from all participants' legal guardian/next of kin for their participation in this study.

## Author contributions

DP designed the study and oversaw all aspects of study implementation. JP acquired permissions for the research. AM-M and MG collected the data. MG managed the database. PR-B and JP performed the statistical analyses. PR-B wrote the first draft of the article. All authors reviewed the last version and approved the final manuscript.

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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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# Ripples in the pond: Evidence for contagious cooperative role modeling through moral elevation and calling in a small pre-study

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Existing research has identified the importance of role models in the imitation of cooperative behaviors. This Pre-Study attempted to explore the contagion effects of cooperative models. Drawing on goal contagion theory, we proposed that encountering cooperative models could catalyze participants' cooperation when participants joined new groups without role models, and that moral elevation and calling would play a chain-mediating role in this process. To test the hypothesis, we designed a four-person public goods game consisting of two phases in which participants were formed into teams with different people in each phase. We randomly assigned 108 participants to either a consistent contributor (CC) or control condition. The only difference was that participants in the CC condition encountered a cooperative role model (i.e., CC) in the first phase, while those in the control group did not. The results moderately supported all hypotheses. Briefly, our findings provide empirical evidence supporting the two processes of goal contagion theory: when individuals encounter a CC, they first make inferences about the CC's goal, as reflected by moral elevation, and then adopt the model's prosocial goals (i.e., calling), resulting in increased cooperative behaviors in new groups. These findings could extend our understanding of the contagion effect of cooperative modeling, but require high-powered replication studies before such conclusions can be drawn.

## KEYWORDS

prosocial modeling, cooperation, public goods, goal contagion, moral elevation, calling

## Introduction

The sustainability of cooperation remains a critical issue in various fields, such as in coping with the COVID-19 pandemic and environmental protection. In responding to the COVID-19 crisis, identifying potential threats, sharing critical information, complying with safety guidelines, and adopting preventative behaviors all require cooperation at the

government and individual levels (Capraro et al., 2021; Yong and Choy, 2021). In addition, environmental protection requires cooperation not only among different countries but also across generations (Van Lange and Rand, 2022). Thus, understanding human cooperation is necessary for dealing with these issues.

The traditional rational choice theory suggests that maintaining cooperation through voluntary contributions is not sustainable (Andreoni, 1988; Fehr and Schmidt, 1999). Further, when studying cooperation, researchers have often made examinations at the micro level within the context of social dilemma situations comprising conflicts between private and collective interests (Dawes, 1980; Fleishman, 1988; Yuan et al., 2022). Specifically, in a social dilemma, individuals who choose not to cooperate always gain greater benefits than cooperators, whereas everyone benefits more when everyone cooperates than when everyone does not cooperate (Dawes, 1980; Chen, 2022). In such a context, the presence of a free rider—namely, an individual or group of individuals who benefit from a group endeavor to which they did not contribute—could easily destabilize group cooperation (Andreoni, 1988; Panchanathan and Boyd, 2004; Naso, 2020). Consequently, researchers are interested in solutions that can improve or spread cooperation. Some academics believe that structural solutions, such as sanctions and rewards, can be beneficial in maintaining cooperation (Fehr and Gächter, 2002; De Quervain et al., 2004; Fehr and Fischbacher, 2004; Kiyonari and Barclay, 2008). However, a growing body of evidence demonstrates that such solutions are typically more resource-intensive, diminish individuals' inner motivation to cooperate, and sanctions can attract a vicious cycle of retaliation (Deci et al., 1999; Mulder et al., 2006; Dreber et al., 2008; Herrmann et al., 2008). Then, due to their low cost and capacity to alter people's perceptions of the extrinsic environment, motivational solutions are gaining traction among academicians (Van Lange et al., 2013; Iwai and de Azevedo, 2016; Zhang et al., 2019).

One typical example of such motivational solutions is role modeling, which has recently been identified as crucial to the emergence, development, and establishment of cooperation (House et al., 2020; Jung et al., 2020). According to the culture-gene coevolution theory, the greatest difference between humans and other species is that humans, as a cultural species, rely heavily on the vast amount of social knowledge they have collected over generations (Chudek et al., 2013). Further, humans can obtain social knowledge through direct experience, inheritance from parents (vertical genetic transmission), and learning from non-parental role models (horizontal cultural transmission) (Creanza et al., 2017). Among the various types of social knowledge, cooperation is significant because it can assist groups, unions, or even societies in coping with competition and dangers in nature (Nowak and Highfield, 2011; Francois et al., 2018). Apart from that, researchers have claimed that humans biologically evolved for cooperation due to having a unique motivation to share their understanding of the goals, intentions, and perceptions of others, as well as certain forms of cognitive representation for doing so (Tomasello et al., 2005). Consequently, cooperation has

become an evolutionary superior strategy that is widely acquired and transmitted through dual genetic and cultural inheritance systems (Henrich and Muthukrishna, 2021).

Empirical studies have found converging evidence regarding the effects of modeling on cooperation, and one of the most typical effects is the consistent contributor (CC) effect. In the public goods dilemma, one of the classic and widely used social dilemmas to investigate group cooperation, Weber and Murnighan (2008) reported a CC effect whereby individuals observed a group member who consistently contributed own endowment to the public account (i.e., a manifestation of very determined cooperative behavior); this observation then led individuals to follow the role model and increase their cooperative behaviors.

Previous studies have generally focused on participants' cooperative behaviors in the presence of CCs (Gill et al., 2013; Zhang et al., 2019); however, only a few research have examined participants' cooperative behaviors after they left the environment with the CCs and entered a new environment (Suri and Watts, 2011). As a matter of fact, instant imitation is simply the starting point for the cooperative modeling effect. It is vital that individuals continue to demonstrate cooperative behaviors outside the group or context in which the role model (e.g., a CC) performs such behaviors. This is because, if an individual's cooperative behavior is limited to the environment in which the role model is present, the cooperative model can only impact the groups to which the role model is exposed. Conversely, if individuals can acquire the role models' cooperative behaviors and maintain them upon entering a new environment, they may become "cooperative models" in the new setting or group. Through this contagion effect, the influence of a single cooperative model can be transmitted to a large number of people, just like "ripples in a pond." Furthermore, examinations to clarify the breadth of the effect of cooperative role models can improve our understanding of culture-gene coevolution theory. Therefore, this study sought to determine whether there is a CC contagion effect and its potential underlying mechanisms.

## CC effect

The CC effect refers to the phenomenon of increased cooperative behavior in group members induced by a CC, as observed in a public goods dilemma (Weber and Murnighan, 2008; Zhang et al., 2019). In a classic all-or-none public goods game, a group of individuals will each receive a certain number of tokens, and they must each choose whether to contribute these tokens to a public account or their personal accounts. Individuals receive a set amount of dividends from the public account regardless of their contribution to it. Consequently, not contributing to the public account (i.e., selfish behavior) is typically considered a rational strategy in such a dilemma, while contributing to the public account (i.e., cooperative behavior) is thought highly by people. The existence of the CC effect has been confirmed in many variants of public goods games, such as

all-or-none, continuous, and step-level public goods games (Weber and Murnighan, 2008; Gill et al., 2013; Zhang et al., 2019).

Several divergent accounts for explaining the CC effect have been proposed. Some scholars have explained this phenomenon using social norms. Using the “logic of appropriateness framework” to explain the CC effect, academicians claimed that the presence of a CC sends a clear signal to the group members that cooperation is appropriate behavior in the present context, implying that cooperation is the group norm (Weber et al., 2004; Weber and Murnighan, 2008). In the minority influence framework, researchers added that by consistently modeling cooperative behavior, minority individuals are able to challenge accepted norms of self-interest and transition them to cooperative norms (Grant and Patil, 2012). Other scientists have corroborated the mediating role of moral elevation—which is defined as an emotional experience of a warm and uplifting feeling experienced when individuals see unanticipated acts of kindness by other persons (Haidt, 2000), on the CC effect (Gill et al., 2013; Zhang et al., 2019; Huang et al., 2022).

## The contagion of cooperative modeling

Researchers have described the contagion of prosocial modeling in the form of Person A-B-C as generalized reciprocity (Tsvetkova and Macy, 2014), upstream reciprocity (Norbutas and Corten, 2018), or pay-it-forward (Gray et al., 2014). While extensive literature has provided consistent evidence regarding the contagion effect of helping modeling behaviors (Gray et al., 2014; Tsvetkova and Macy, 2014; Alvarez and van Leeuwen, 2015; Chancellor et al., 2018; Eriksson and Ferreira, 2021), there is still uncertainty regarding the contagion effect of cooperative modeling.

Some studies have indicated that when individuals experience cooperative modeling behaviors, they also perform cooperative behaviors upon entering new settings, thus demonstrating the contagion effect of cooperative modeling. For example, a study reported that cooperative behavior could cascade in human social networks, continue over time, and extend up to three degrees of separation (Fowler and Christakis, 2010). Another study discovered that group leaders who have the power to punish team members also have a contagious impact as cooperative role models, meaning that their cooperative behavior affects group members' cooperative behavior both inside and outside the group (Harrell, 2019).

However, not all studies have found favorable results regarding the contagion effect of cooperative modeling behaviors. While Suri and Watts (2011) confirmed the CC effect in a web-based, networked public goods game, they did not find evidence for the CC contagion effect. Their interpretation of this was that the presence of CCs might encourage free riding. Similarly, Jordan et al. (2013) reported that cooperative modeling behavior is infectious in a relatively fixed group, but not viral in more dynamic networks. This was measured by moving participants into different groups after each round of a public goods game.

Consequently, this study investigated the contagion effect of CCs. In a recent detailed meta-analytic review of prosocial modeling, Jung et al. (2020) compared four frameworks that might explain the psychological mechanisms of prosocial role models: behavioral mimicry, goal contagion, situational pressure, and experimenter effect. The result supports the goal contagion theory, which contends that prosocial role models motivate other individuals to mimic their behavior by adopting similar prosocial goals (Aarts et al., 2004; Corcoran et al., 2020). Although this meta-analysis did not include a series of publications on CC, it is still quite instructive. Motivated by goal contagion theory, we contend that group members who experience a CC acquire the prosocial goals of the CC, exhibiting cooperative behavior as a result, even when joining a new/different group or context.

## The chain-mediating role of moral elevation and calling

### The goal contagion theory

The goal contagion theory claims that when individuals observe or experience others' behavior, they infer the goal of the other's behavior and may decide to adopt the goal (Aarts et al., 2004; Corcoran et al., 2020). Goal contagion is typically viewed as a two-stage process, inferring the goal of the role model and adopting that goal (Brohmer et al., 2019; Corcoran et al., 2020). Goal inference includes an explicit conscious component and may also include implicit unconscious automatic processing (Dik and Aarts, 2007; Corcoran et al., 2020). Because implicit and explicit goal inference may coexist, researchers have encountered many problems with the measurement and validation of goal inference. First, explicit measures of goal inference can easily interfere with automatic processes, while some measures of implicit goal inference may prime some constructs related to the goal (Weingarten et al., 2016; Corcoran et al., 2020). Second, uniform standards for the measurement of goal inference are currently lacking, and many assessments often confound some other factors, such as goal adoption (Jia et al., 2014).

Under these conditions, the empirical validation of the mediating role of goal inference in goal contagion theory is extremely limited. For example, Dik and Aarts (2007) measured explicit goal inference in an experiment but did not find a mediating role in the goal contagion effect. Corcoran et al. (2020) tried to disentangle explicit and implicit inference as potential mediators in the goal contagion effect, but did not find evidence for either process. Meanwhile, goal adoption is frequently assessed by an individual's goal-directed behavior or their inclination to engage in it (Brohmer et al., 2021), and seldom have researchers found unambiguous evidence in support of a specific goal adoption process.

Due to the difficulties in measuring this two-stage process, few studies have empirically examined them separately, not to mention in the context of cooperative modeling. Consequently, this study attempts to separately validate the two processes of goal

contagion theory to provide insights into the mechanisms underlying the CC contagion effect. To achieve this objective, we innovatively introduced moral elevation and calling as proxy variables for goal inference and goal adoption.

## Moral elevation

As aforementioned, moral elevation refers to a warm and uplifting feeling related to unanticipated kindness by others (Haidt, 2000), and scholars have stated that it triggers with the attention to and the observation and praise of others' moral behavior of others, therefore describing it as a positive other-praising emotion (Thomson and Siegel, 2017). It is also described as involving feelings of self-transcendence (Haidt and Morris, 2009; Van Cappellen et al., 2013). Researchers have already confirmed the full mediating role of moral elevation in the positive relationship between CC presence and group members' cooperative behaviors (Zhang et al., 2019). However, we expect it to also play a vital role in the CC contagion effect, as followers.

First, a key prerequisite for moral elevation is that individuals need to develop positive appraisals of the moral behavior of others and attribute the cause of the behavior to others' virtue. For example, Van de Vyver and Abrams (2015) demonstrated that positive evaluations of others' moral virtue mediated the generation of individuals' elevation after they viewed videos of others' moral behavior. Similarly, Ash (2017) confirmed that those who watched a black-savior-themed movie experienced moral elevation through a positive assessment of the savior's morality. Put differently, moral elevation is the emotional reaction of a person who has completed a goal inference regarding a role model and confirms the prosocial nature of that goal. Another study, wherein participants were asked to read a story and evaluate whether the leader in the story sacrificed himself to help the company, shows that the participants' positive perception of the leader's behavior and goal induced the participants' positive evaluation of own job by stimulating moral elevation. Thus, we argue that individuals' moral elevation because of observing others' virtuous behaviors is a reflection of individuals' explicit inference about others' prosocial goals. Since goal inference is difficult to explicitly assess, moral elevation could be a superior alternative measurement (Vianello et al., 2010).

In addition, moral elevation can boost people's prosocial motivations and behaviors (Ding et al., 2018; Rullo et al., 2022). Algoe and Haidt (2009) discovered that participants who were aroused to a high level of moral elevation after watching a role model video reported: motivation to emulate the role model's behavior; prosocial motivation; the possibility of acting on these motivations. Another study found that participants were more eager to take part in further unpaid research and invest time and energy to help researchers with additional tasks when they were inspired by a high level of moral elevation due to watching videos of others' positive ethical behavior (Schnall et al., 2010).

As such, it would be reasonable to expect that participants in CC groups may attribute CCs' behavior to the CCs' good qualities,

thus generating a feeling of moral elevation, which further influences their cooperative behavior beyond CC's setting.

## Calling

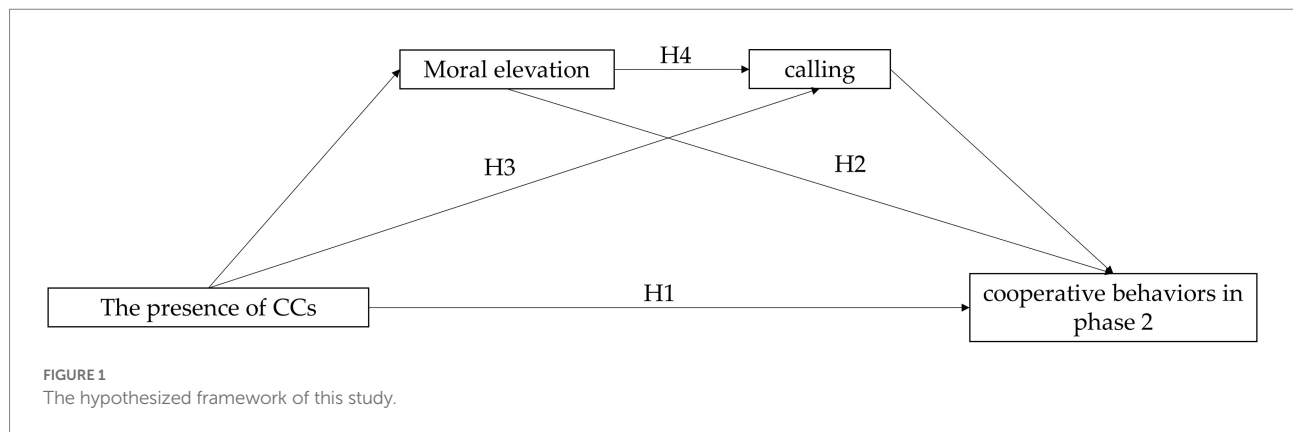
As explicitly evaluating the process through which individuals adopt the prosocial goals of CCs is problematic, we can measure individuals' prosocial goals after they encounter CCs. An example of a prosocial goal closely related to this topic is calling, referring to the goals of reaching beyond self-actualization and achieving a higher purpose for the greater good (Wong, 2013). Dik and Duffy (2009) defined this prosocial goal as a transcendent summons that is felt as coming from outside oneself, directing one to undertake a certain life role that emphasizes other-oriented values and goals as the main sources of motivation. Researchers show that Maslow further posited, in his new hierarchy of needs, that certain self-actualized individuals could be inspired to commit to the fulfillment of callings beyond themselves to reach a higher level of self-transcendence (Koltko-Rivera, 2006). Researchers have also described a calling as a sense of purpose, often directed outside of oneself in an altruistic manner (Selvam and Poulson, 2012). Following a thorough examination of the prior literature, Elangovan et al. (2010) stressed three key characteristics of calling that have persisted throughout the numerous ways interpretations of the term: action orientation, a sense of clarity of purpose and personal mission, and prosocial intentions. Consequently, they defined calling as a path of activity that pursues prosocial goals and expresses the convergence of a person's perception of what one wants to, and should do, and what one really does.

Of the three aforementioned core characteristics of calling, the prosocial intention has received ample support. For instance, a study focusing on zookeepers indicated that employees with a high level of calling exhibit more willingness to sacrifice their free time (non-work time) for their organizations (Bunderson and Thompson, 2009). Additionally, calling has been demonstrated to increase prosocial motivation in employees, which promotes green employee behavior (Zhang et al., 2021). In general, when someone expresses a sense of calling, it suggests that the person consciously identifies with one's prosocial goal. Further, when individuals get in contact with CCs, their inferences about the prosocial goals of CCs may lead to moral elevation, an emotion of self-transcendence (Haidt and Morris, 2009; Van Cappellen et al., 2013), which is also the source from which calling stems (Dik and Duffy, 2009). Thus, it seems reasonable to assume that the generation of moral elevation might lead to the feeling of calling. As such, we believe that the consideration of calling as a proxy variable for individuals' goal adoption after encountering a CC is appropriate, especially given its association with moral elevation.

## The current study

The first goal of the current study was to investigate the contagion effect of CC. According to the goal contagion theory, we argue that individuals who encounter a CC within





a group do not simply imitate its cooperative behavior (CC effect), but rather adopt the CC's prosocial goal and thus still exhibit cooperative behavior when entering a completely new group without the CC. Consequently, we propose the first hypothesis (H1):

*H1:* Participants in the CC group will make more cooperative decisions than those in the control group after leaving their group and entering a new group.

This research also aims to examine the appropriateness of goal contagion theory in explaining the contagion effect of CC. This theory indicates that individuals internalize role models' goals after inferring the goals underlying their behaviors, and then act on these goals. In the situation of encountering CCs, their behaviors are typically benevolent and are often perceived to be driven by prosocial goals. By considering the difficulties experienced by past researchers in directly measuring goal inference and goal adoption in the goal contagion process, this study innovatively proposes the use of moral elevation and calling as proxy variables for goal inference and goal adoption, respectively. Accordingly, we assume that after witnessing CC's cooperative behavior, individuals might attribute it to CC's virtues and characteristics, generating moral elevation and thus further driving individuals to adopt CC's prosocial goals, namely, to develop a sense of calling; this ultimately results in individuals performing cooperative behaviors in a new and different group without a CC.

To separately verify the roles of goal inference and goal adoption in the contagion effect of CC, we test the mediation hypotheses involving moral elevation and calling independently, leading to hypotheses 2 (H2) and 3 (H3):

*H2:* Moral elevation mediates the influence of CCs on participants' subsequent cooperative decisions after participants leave their group and enter a new group.

*H3:* Calling mediates the influence of CCs on participants' subsequent cooperative decisions after participants leave their group and enter a new group.

According to these arguments, we then propose hypothesis 4 (H4) regarding the chain-mediating role of moral elevation and calling in the CC contagion effect.

*H4:* Moral elevation and calling have a chain-mediating effect on the relationship between CCs and participants' subsequent cooperative decisions after participants leave their group and enter a new group.

All hypotheses are presented in [Figure 1](#).

## Materials and methods

### Participants and design

A hundred and twelve students from Zhejiang University were recruited through the university's online message board. Four participants were excluded because they either did not pass a test assessing the accuracy of their knowledge of the experimental rules, which was conducted after the experimental assistant explained the rules, or indicated confusion about the experimental rules at the end. The final sample comprised 108 participants (44 men and 64 women). Their average age was 21.48 years (*standard deviation* [SD] = 2.30).

The study had two conditions. Participants were randomly assigned to either the CC condition ( $n=60$ ) or the control condition ( $n=48$ ). Each condition comprised two phases. In the first phase, participants were formed into groups of four and had to play 15 rounds of an all-or-none public goods game. In the second phase, participants were moved to brand-new 4-person groups and played another 15 rounds of the same game in the new group. To control for the effects of social norms on individuals' cooperative behavior ([Farrow et al., 2017](#)), the three other group members (including the CC) who interacted with participants in both phases were computer-manipulated confederates with an average likelihood of cooperative behavior of 66.7% ([Gill et al., 2013](#)). The difference between the CC and control conditions was in the first phase, where one of the simulated team members in the CC condition was a CC that consistently made cooperative

TABLE 1 Participants' payoffs (tokens) matrix per round.

Participants' decision	No others contribute	One other contributes	Two others contribute	Three others contribute
Contribute to group account	30	60	90	120
Contribute to personal account	50	80	110	140

decisions (i.e., contributing all the tokens to the group account); the control condition contained no CCs. In the second phase, both conditions were identical.

Incentives in public goods games are often provided to imitate real-world dilemmas in which people face conflicts between their self-interests and group interests (Goeschl et al., 2020). As such, all participants were compensated with 15–20 RMB (approximately US\$2.2–3.0), depending on the number of tokens they earned during the experiment.

Before formal data collection, we conducted sample size calculations. First, according to G-Power software (Faul et al., 2007), considering an effect size (Cohen's *d*) of 0.645 between two independent groups, a power of 0.8 and  $\alpha$  of 0.05, each group required 39 participants ( $N = 78$ ). The effect size estimation was based on the lower limit confidence interval of the reported effect size for the CC effect in a previous study (Zhang et al., 2019).<sup>1</sup> Next, researchers state that if we were to use the percentile bootstrap to examine the mediation effect, the minimum sample size to satisfy medium effect sizes for both the a-path and b-path of the mediating model, while considering a power of 0.8 and an  $\alpha$  of 0.05, would be 78 participants (Fritz and MacKinnon, 2007). Consequently, the current sample size of 108 exceeded the minimum requirement to reach valid conclusions.

## All-or-none public goods game

The paradigm of the all-or-none public goods game was derived from Gill et al. (2013), and presented in the context of an environmental scenario (Pillutla and Chen, 1999; Zhang et al., 2019). Participants were asked to view themselves as corporate representatives attempting to build an environmental-protection-focused corporation with the cooperation of other group members.

At the onset of each round, every participant was given 50 tokens and was required to decide whether to donate all their tokens to an environmental group account (i.e., cooperative behavior) or contribute them to a personal account. The marginal *per capita* return (MPCR) for the group account is 0.6, which means each donation of 50 tokens into the group account results in a dividend of 30 tokens (i.e.,  $50 \times 0.6$ ) for each group member,

including the contributor. Participants' income for each round consisted of dividends from the group account and tokens in their personal account (see Table 1 for the payoff matrix). Participants were informed that everyone in the group would be randomly assigned an identity code, thus ensuring that the game would be played anonymously.

## Measures

### Moral elevation

Moral elevation was measured using a 9-item scale developed by Zhang et al. (2019) (see Supplementary Table S1). The scale was composed of three dimensions proposed by Aquino et al. (2011), namely emotional components (four items, sample item: "Please rate the level to which you felt moved after the public goods dilemma game"), views of humanity (three items, sample item: "Please rate the level to which you felt optimistic about humanity after the public goods dilemma game"), and desire to be a better person (two items, sample item: "I want to help others"). Participants answered each item on a 9-point Likert scale (1 = "did not feel at all," 9 = "felt very strongly"). The overall Cronbach's alpha was 0.91.

### Calling

Calling was measured using five items adapted from Fry and Matherly (2006), revised to fit the public goods dilemma (see Supplementary Table S2). A sample item is as follows: "Contributing to the environmental group account is personally meaningful to me." Participants answered each item on a 7-point Likert scale (1, strongly disagree; 7, strongly agree). Due to a technical error, we were not able to obtain the responses of 17 participants for the third item (i.e., "Contributing to the environmental group account is very important to me"), so we calculated the mean of their ratings for the other four items as the final mean value. The overall Cronbach's alpha was 0.87.

### Cooperative decision

Based on previous studies of CCs (Weber and Murnighan, 2008; Zhang et al., 2019), the total number of contributions to the group account in the last 10 rounds in both the first and second phases was defined as cooperative behavior. We excluded the decisions in the first five rounds from our analysis because, on average, it took the participants of a past research five rounds to get to know the new group members and to become aware of the presence of CCs (Zhang et al., 2019).

<sup>1</sup> To calculate the effect sizes, we obtained the following data from that study (Zhang et al., 2019): For the CC condition,  $n=100$ ,  $M=6.63$ ,  $SD=2.64$ , and for the control condition,  $n=96$ ,  $M=4.22$ ,  $SD=2.48$ . We were able to calculate Cohen's  $d=0.94$  with 95%CI [0.645, 1.235].

## Procedure

To better simulate real multi-person group decision-making, eight participants per game were invited to the laboratory. Upon arrival, each participant was seated in front of a shielded computer and provided informed consent documents to read and sign. They were then instructed to read the public goods game instructions and complete questions to verify that they understood the rules of the upcoming tasks.

The experiment was conducted on the z-Tree platform, a software that supports multi-person real-time decision-making interaction (Fischbacher, 2007). In the first phase of the experiment, participants were told that they were randomly assigned to an anonymous group of four, and were instructed to play 15 rounds of an all-or-none public goods game with three other group members. After 15 rounds, the participants completed a manipulation check question on a 7-point Likert scale (1, strongly disagree; 7, strongly agree). “There was someone in my group who always put their tokens in the group account” (Weber and Murnighan, 2008; Zhang et al., 2019). Subsequently, participants completed a questionnaire measuring moral elevation and calling.

Then, in the second phase, participants were notified that they were randomly assigned to a new group of four people, none of whom they had met before. This group was also informed to play 15 rounds of a public goods game. After the last round was completed, the participants were thanked for their time and dismissed.

## Statistical analyses

To test the different decisions in each round between the CC and control conditions, the present experiment used chi-square (crosstabs) tests. Independent t-tests were used to check the success of CC manipulation and to verify H1. Scholars noted that the Bayesian approach provides richer and more accurate information than classical inference using confidence intervals and *p* values (Kruschke, 2013; Wagenmakers et al., 2018; van de Schoot et al., 2021). As such, we also conducted a Bayesian independent t-test and reported the Bayes factor ( $BF_{10}$ ), indicating the likelihood for the data to support the alternative hypothesis over the null hypothesis in the model. A  $BF_{10}$  range between 1 and 3 indicated anecdotal evidence, a  $BF_{10}$  range between 3 and 10 indicated moderate evidence, and  $>10$  indicated strong evidence for the presence of the effect under consideration, meanwhile, a range between 1/3–1 indicated anecdotal evidence, 1/10–1/3 indicated moderate evidence, and  $<1/10$  indicated strong evidence for the absence of the effect (Wetzels and Wagenmakers, 2012).

To verify H2 and H3, mediation analyses were performed using Model 4 in the PROCESS Macro of SPSS developed by Hayes (2013). To verify H4, a chain-mediation analysis was performed using Model 6 of PROCESS Macro. The bootstrapping method, with 5,000 samples, was used to quantify indirect effects,

and 95% confidence intervals (CI) were generated for the best measure of the mediation effect and chain-mediation effect. If the CI contains zero, it indicates that there is no significant mediating effect at the 5% significance level.

The Bayesian analysis was carried out using JASP version 0.16.3 (JASP Team, 2022), and the rest of the analyses were performed using SPSS version 23.0 for Windows.

## Results

### Manipulation checks

In the first phase, the contribution rate of the CC group participants (72% from the 60 participants) in the first round was not significantly different from that of the control group participants (65% from the 48 participants,  $\chi^2 = 0.620$ ,  $p = 0.431$ , odds ratio (OR) = 1.387, 95%CI [0.614, 3.136]). This suggests that participants in the two conditions did not differ from the initial beliefs and expectations of the public goods game and their anonymous group members.

After the last round of the public goods game in the first phase, participants in the CC condition ( $M = 5.600$ ,  $SD = 2.019$ ) responded more positively to the question “There was someone in my group who always put their tokens in the group account” than did participants in the control condition ( $M = 3.583$ ,  $SD = 2.172$ ;  $t(106) = -4.988$ ,  $p < 0.001$ , Cohen’s  $d = 0.966$ ,  $BF_{10} = 6297.821$ ). This demonstrates the effectiveness of CC manipulation.

### CC effect in the public goods game

Figure 2 presents the average contribution rate of participants in the 30 rounds of the public goods game.

The results showed that, in the first phase, participants in the CC group ( $M = 6.467$ ,  $SD = 1.944$ ) exhibited significantly more cooperative behavior than participants in the control group ( $M = 5.563$ ,  $SD = 2.249$ ;  $t(106) = -2.240$ ,  $p = 0.027$ , Cohen’s  $d = 0.434$ ,  $BF_{10} = 1.876$ ). This again confirms the CC effect in the public goods dilemma.

## Hypothesis test

### The contagion effect of CCs

In the second phase, we first compared participants’ contributions in the first round in both conditions. The results revealed that the CC group (85% from the 60 participants) contributed significantly more frequently than the control group (67% from the 48 participants,  $\chi^2 = 5.038$ ,  $p = 0.025$ , OR = 2.833, 95%CI [1.119, 7.171]). This suggests that participants in the CC group showed significantly more cooperative behavior than participants in the control groups when playing with the new team in the public goods game.

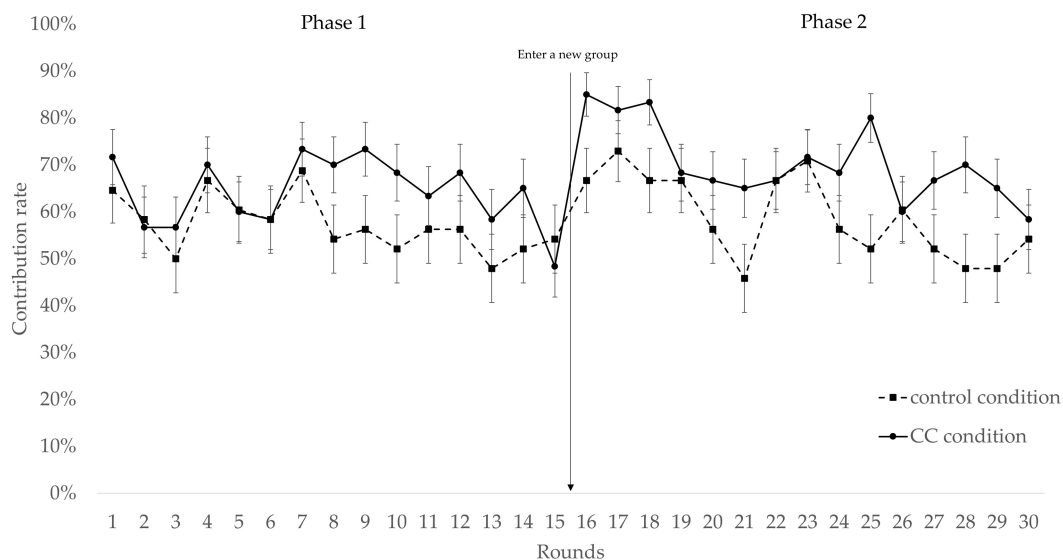


FIGURE 2

Participants' rate of contribution to the group account for the two phases of the all-or-none public goods game.

We then examined the difference in participants' contribution rates in the two conditions in the last 10 rounds of the second phase. The results revealed that participants in the CC condition ( $M=6.717$ ,  $SD=2.443$ ) were significantly more cooperative in the new group than those in the control condition ( $M=5.542$ ,  $SD=2.432$ ;  $t(106)=-2.489$ ,  $p=0.014$ , Cohen's  $d=0.482$ ,  $BF_{10}=3.127$ ), indicating moderate support for the CC contagion effect and H1.

### The mediating effect of moral elevation

Table 2 presents the results of the mediation analyses, and Table 3 shows the results of the bootstrap tests.

We examined the indirect effect of CCs on participants' cooperative decisions *via* moral elevation (see Figure 3A). In Model 1, the presence of a CC significantly predicted individuals' cooperative behavior in the second phase ( $b=1.175$ ,  $SE=0.472$ ,  $p=0.014$ ). In Model 2, the presence of a CC significantly predicted moral elevation ( $b=0.586$ ,  $SE=0.271$ ,  $p=0.033$ ). In Model 3, the presence of a CC and moral elevation significantly predicted individuals' cooperative behavior in the second phase. Moreover, the result of the bootstrapping analysis revealed a significant mediating effect of 0.202, with a 95% CI of [0.002, 0.523], which did not contain zero, thus supporting H2.

### The mediating effect of calling

We examined the indirect effect of the presence of a CC on participants' cooperative behavior *via* calling (see Figure 3B). In Model 1, the presence of a CC significantly predicted individuals' cooperative behavior in the second phase ( $b=1.175$ ,  $SE=0.472$ ,  $p=0.014$ ). In Model 4, the presence of a CC significantly predicted calling ( $b=0.405$ ,  $SE=0.189$ ,  $p=0.034$ ). In Model 5, the presence of a CC and calling significantly predicted individuals' cooperative

behaviors in the second phase. Moreover, the result of the bootstrapping analysis revealed a significant mediating effect of 0.426, with a 95% CI of [0.028, 1.058], which did not contain zero. Thus, H3 was supported.

### The chain-mediating effect of moral elevation and calling

The bootstrap test showed that the total mediating effect of moral elevation and calling was significant, with a total indirect effect of 0.491 and 95% CI of [0.061, 1.145], which did not contain zero. In addition, the chain-mediating effect of moral elevation and calling (Path 3) was significant, with an effect of 0.112 and 95% CI of [0.004, 0.293], which did not contain zero, and which lends support for H4.

Combined with the hypotheses supported above, it can be demonstrated that the presence of a CC influenced individuals' moral elevation and then influenced their callings, thus influencing their cooperative behaviors in the second phase. However, as shown in Figure 3C, the coefficient of the presence of a CC in Model 6 ( $b=0.292$ ,  $SE=0.186$ ,  $p=0.120$ ) and Model 7 ( $b=0.684$ ,  $SE=0.445$ ,  $p=0.127$ ) was not significant, and the coefficient of moral elevation in Model 7 was not significant ( $b=0.154$ ,  $SE=0.160$ ,  $p=0.340$ ). As we did not clarify whether we expect these paths to be present in the full chain mediation model, we evaluate the evidence in favor of H4 as moderate at best.

## Discussion

Plato has a classic parable that says "good actions give strength to ourselves and inspire good actions in others" (Capraro and

**TABLE 2** The results of the mediating effect of moral elevation and calling between the presence of a CC and participants' cooperative decisions in the second phase.

Model	IV	B	SE	$\beta$	t	p	95% CI		Fit index		
							LLCI	ULCI	R	R <sup>2</sup>	F
M1	DV: cooperative behaviors in the second phase										
	Constant	5.542	0.352		15.747	0.000	4.844	6.239	0.235	0.055	6.194*
M2	The presence of a CC	1.175	0.472	0.235	2.489	0.014	0.239	2.111			
	DV: elevation										
M2	Constant	4.729	0.202		23.397	0.000	4.328	5.130	0.205	0.042	4.664*
	The presence of a CC	0.586	0.271	0.205	2.160	0.033	0.048	1.123			
M3	DV: cooperative behaviors in the second phase										
	Constant	3.910	0.860		4.544	0.000	2.204	5.616	0.304	0.092	5.339**
M3	The presence of a CC	0.973	0.475	0.195	2.048	0.043	0.031	1.915			
	Moral elevation	0.345	0.167	0.197	2.072	0.041	0.015	0.675			
M4	DV: calling										
	Constant	5.416	0.141		38.447	0.000	5.136	5.695	0.204	0.042	4.597*
M4	The presence of a CC	0.405	0.189	0.204	2.144	0.034	0.031	0.780			
M5	DV: cooperative behaviors in the second phase										
	Constant	-0.150	1.240		-0.121	0.904	-2.609	2.309	0.472	0.222	15.015***
M5	The presence of a CC	0.749	0.440	0.150	1.704	0.091	-0.123	1.621			
	Calling	1.051	0.221	0.418	4.751	0.000	0.612	1.490			
M6	DV: calling										
	Constant	4.502	0.338		13.335	0.000	3.833	5.172	0.339	0.115	6.834**
M6	The presence of a CC	0.292	0.186	0.147	1.567	0.120	-0.078	0.662			
	Moral elevation	0.193	0.065	0.277	2.956	0.004	0.064	0.323			
M7	DV: cooperative behaviors in the second phase										
	Constant	-0.546	1.308		-0.418	0.677	-3.139	2.047	0.479	0.229	10.309***
M7	The presence of a CC	0.684	0.445	0.137	1.537	0.127	-0.199	1.566			
	Moral elevation	0.154	0.160	0.088	0.959	0.340	-0.164	0.472			
M7	Calling	0.990	0.230	0.393	4.298	0.000	0.533	1.447			

IV, independent variable; DV, dependent variable; B, unstandardized coefficient; SE, standard error;  $\beta$ , standardized coefficient; LLCI, lower limit confidence interval; ULCI, upper limit confidence interval.

\* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$ .

**TABLE 3** The chain-mediation effect and 95% confidence interval estimated by the bootstrap method.

Path	Effect	Standardized effect	SE	LLCI	ULCI
Indirect effect: condition→moral elevation→ cooperative behaviors	0.202	0.081	0.139	0.002	0.523
Indirect effect: condition→calling→ cooperative behaviors	0.426	0.171	0.268	0.028	1.058
Total indirect effect: condition→moral elevation→calling→cooperative behaviors	0.491	0.197	0.282	0.061	1.145
Indirect effect Path 1: condition→moral elevation→ cooperative behaviors	0.090	0.018	0.113	-0.097	0.363
Path 2: condition→calling→ cooperative behaviors	0.289	0.058	0.232	-0.058	0.836
Path 3: condition→moral elevation→calling→cooperative behaviors	0.112	0.022	0.076	0.004	0.293

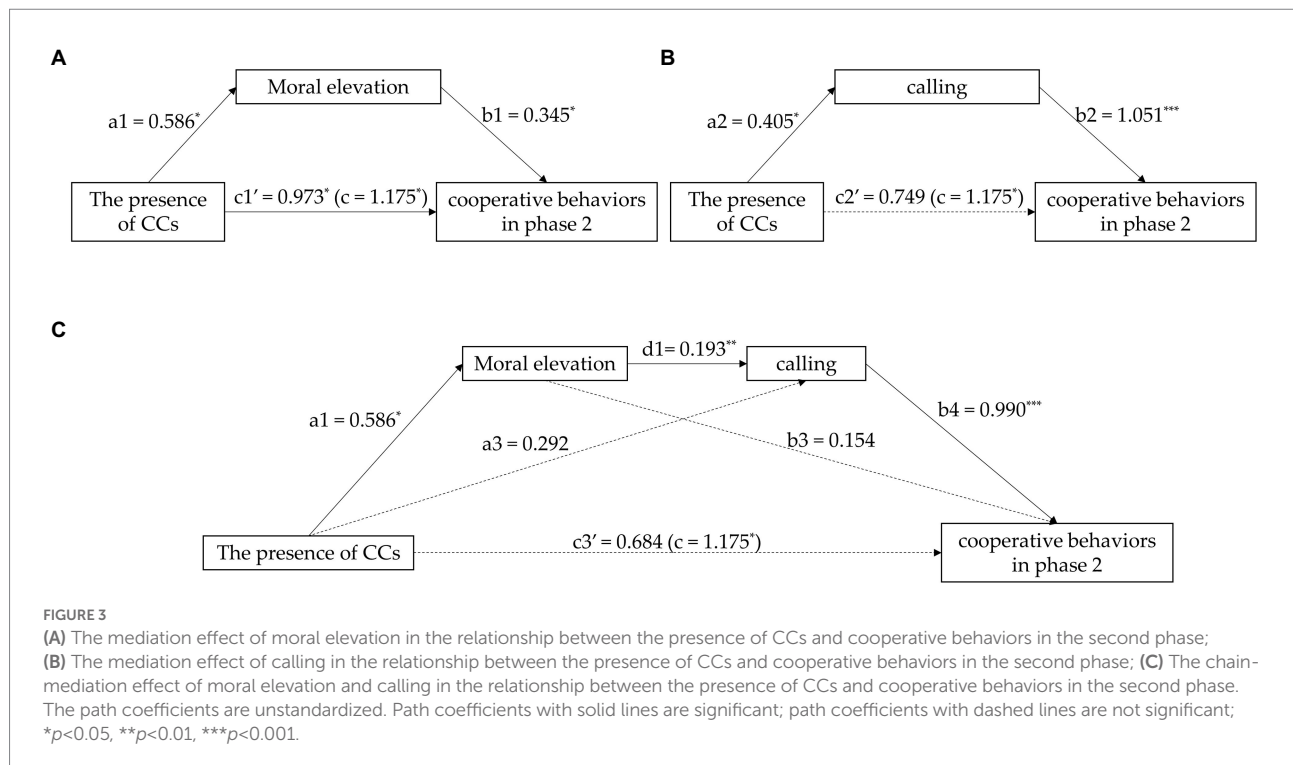
LLCI, lower limit confidence interval; ULCI, upper limit confidence interval.

Marcelletti, 2015). The contagion effect of helping implied by this statement has been validated in numerous studies (Tsvetkova and Macy, 2014; Chancellor et al., 2018; Norbutas and Corten, 2018; Jung et al., 2020). However, unlike helping role models, whose behaviors tend to be directed toward specific individuals, cooperative modeling behaviors are directed toward collectives without specific individual targets. As a result, it is still debatable

whether cooperative models have the same contagion effect (Suri and Watts, 2011; Jordan et al., 2013).

Therefore, the main objective of this preliminary study was to examine the contagion effect of cooperative modeling and the underlying psychological mechanisms. Using a public goods game with an environmental framework, we discovered that the presence of a CC not only inspired group members to cooperate more inside





the group but partially inspired them to more cooperative behavior in a subsequent game. Furthermore, drawing upon goal contagion theory, our findings highlighted the chain-mediating role of elevation and calling in the positive contagion effect of CC, thus supporting all our hypotheses. To the best of our knowledge, this study is the first to directly test the application of the two processes of goal contagion theory in a public goods game. We will start by discussing our findings using some specific theoretical perspectives.

First, the findings provide evidence for cooperative modeling literature by showing that the influence of cooperative role models on individuals' immediate cooperative behaviors inside a group extends to the cooperative behaviors of these influenced individuals when they are outside the group. This study used an anonymous public goods game and had two phases between which group members were changed, which excluded the potential influence of homogeneity caused by fixed social networks. Despite this, we still discovered that CCs had a moderate impact, verifying H1. This finding is consistent with the results of previous research revealing that cooperation can spread from person A to person B to person C (Fowler and Christakis, 2010; Harrell, 2019; Jung et al., 2020).

In addition, the results suggest the explanation of goal contagion theory for the contagion effect of cooperative modeling. Specifically, previous research (e.g., CC effect-related studies) tended to focus on individuals' imitative behaviors in the context of cooperative role models (Weber and Murnighan, 2008; Gill et al., 2013; Zhang et al., 2019) and various theories were devised to try and explain these behaviors, such as the logic appropriateness framework (Weber et al., 2004) and goal contagion theory (Jung et al., 2020). The former argues that individuals learn from CCs that cooperation is

appropriate behavior in their setting and may be dependent on CCs, whereas the latter argues that individuals adopt pro-social goals independent of CCs. The results of our measurements for participants' cooperative behaviors after they left the groups with CCs provide arguments to some extent for goal contagion theory.

Our research contributes to goal contagion theory by innovatively using moral elevation as a proxy variable of goal inference, and identifying this variable as a novel and important mediator. This theory posits that before an individual copies the cooperative model's behaviors, the individual must first discern the model's goals. Moral elevation is an emotional representation of an individual's ability to infer and appraise others' prosocial goals, and measuring it does not influence goal adoption, potentially addressing some of the obstacles previously faced in measuring explicit goal inference (Weber and Murnighan, 2008; Gill et al., 2013; Zhang et al., 2019). Previous research has discovered that moral elevation can motivate individuals to imitate CCs' cooperative behaviors (Zhang et al., 2019). Our study extends this evidence by demonstrating that the impact of moral elevation stretches to individuals' cooperative behaviors in a new group without CCs, and supporting the role of goal inference in the contagion effect of CC. While we caution that our result is a mere starting point for the application of goal contagion theory on cooperative behaviors, the use of moral elevation as an assessment of goal inference of others' prosocial behaviors could prove promising in future studies.

Apart from the goal contagion theory, the reputation-management hypothesis could be a potential alternative explanation for the positive effect of moral elevation on the cooperative behaviors of CC group members in a new group. It describes that each individual actively shows others good qualities

to develop and preserve their reputation, and then utilizes this reputation to obtain opportunities to align with others (Fessler and Haley, 2003; Radzvilavicius et al., 2019; Monroe, 2020). Individuals experience pressure when others improve their reputations through prosocial benevolence. Moral elevation is a cognitive strategy designed to deal with this pressure by eliciting object-indiscriminate benevolent behavior that enhances one's reputation in all dimensions (Fessler and Haley, 2003). Thus, in response to witnessing CC's cooperative behavior, members of the CC group might develop moral elevation to drive them to increase their object-indiscriminate cooperative behaviors to enhance their reputation. The fact that individuals from the CC groups showed more cooperative behaviors than in the control groups in both phases seems to provide evidence for the object-indiscriminate nature of benevolent behavior motivated by moral elevation.

Additionally, the current study underscores calling as another important mediator between the presence of a CC and individuals' cooperative behaviors in new groups. One of the key aspects of the goal contagion theory is that individuals must adopt the goals of role models before they perform similar behaviors. We provide evidence of this by measuring individuals' feelings of calling after playing 15 rounds of a public goods game with CCs. The findings indicated that the presence of a CC induces group members' calling, a prosocial goal that drives them to exhibit cooperative behavior after their contact with CCs. Previous studies have found positive outcomes for calling, such as more green employee behavior, higher willingness to sacrifice for work, better work performance, and higher levels of life satisfaction (Hall and Chandler, 2005; Bunderson and Thompson, 2009; Allan and Duffy, 2014; Zhang et al., 2021). Our study extends calling-related literature to the field of cooperation in a social context.

Lastly, this study is the first to explicitly suggest the application of the two processes of goal contagion in the contagion effect of cooperative modeling. In light of the fact that directly assessing these two key components of goal contagion has proven a challenging endeavor in earlier investigations (Dik and Aarts, 2007; Corcoran et al., 2020), the current study extends the literature by newly suggesting the novel use of moral elevation and calling as proxy variables of goal inference and goal adoption, respectively. As presented in Figure 3, the findings revealed that the presence of CCs promoted moral elevation in group members, resulting in a sense of calling, which led to a high level of cooperative behavior in new/different groups even after leaving groups with CCs. This finding on the full chain-mediation partially helps explain the contagiousness of cooperative modeling *via* goal contagion theory.

## Implications

Although we are enthusiastic that the results of this preliminary study might have important implications for the "sharing economy," "social media" or teams in large corporations (see details in the [Supplementary Material S1](#)), we want to discuss limitations and provide suggestions for future replication studies.

## Limitations and future study

Several limitations of this pre-study hinder us to draw stronger conclusions.

First, while novel, our measurement of moral elevation as a proxy for goal inference is limited to prosocial modeling contexts and thus may limit the generalizability of our results. This is because albeit moral elevation is a positive emotion that occurs after witnessing the prosocial behavior of others, goal contagion theory is not bounded to prosocial goals; instead, it encompasses a broader range of goals, such as dieting and achievement goals (Lee and Shapiro, 2016; King and Mendoza, 2020). Some researchers have attempted to employ implicit association tests; however, distinguishing between goal inference and goal adoption is challenging (Jia et al., 2014; Corcoran et al., 2020). Hence, future research should focus on developing appropriate assessment tools for goal inference.

Second, we used the public goods game paradigm in both phases to measure individuals' cooperative behavior, hindering the exclusion of the possibility that individuals learned the norms of this paradigm. In other words, the cooperative behavior exhibited by individuals after leaving CCs may be related not only to the adoption of CCs' prosocial goals but also to the fact that individuals learn from CCs that cooperation is the appropriate action in the paradigm of the public goods game. To prevent potential confounding, a different paradigm of cooperative behavior, such as common-pool resources, is recommended for future research.

Third, we set the average cooperation rate of the three computer-manipulated confederates (including the CC) in the control and CC groups at 66.7%, which limits the generalization of our results to a relatively cooperative group environment. There are several reasons why we set the percentage at 66.7%. First, we did not want the other two confederates to contribute so little that they became free riders, overshadowing the effect of the CC. Furthermore, previous similar studies discovered that people's expectations of others' cooperation rates in the first round were around 70%, as were their actual cooperation rates (Zhang et al., 2019). In line with this, the current study found an average cooperation rate of 69% in the first round. Therefore, we refer to the 66.7% cooperation rate set by Gill et al. (2013). However, we acknowledge that this is a relatively high number that shapes a relatively cooperative group norm for participants in both conditions, configuring a potential reason for participants in the CC group to have adopted prosocial goals. Follow-up studies can consider exploring the CC effect and its contagion in a group that is, on average, less pro-social, thus increasing the applicability of the relevant findings.

Fourth, our study revealed that cooperative behavior is contagious from A to B to C, but it did not consider the possibility that cooperative models inspire other prosocial behaviors in others. We discovered that cooperative models in public goods games have had an impact on participants' cooperation rate in the same game and a subsequent game. Prosocial goals, such as a

sense of calling, have been demonstrated to lead to a variety of positive consequences that are not restricted to cooperative behaviors (Bunderson and Thompson, 2009; Zhang et al., 2021). As a result, future research might consider the benefits of cooperative models on others' prosocial actions outside of the group, such as helping and sharing behaviors.

Fifth, the 95% CIs for some of our results are wide, which may be due to the lack of a large sample. Although we cannot make up for this deficiency, we used the Bayesian approach in our data analysis to gain additional information about the probability that our hypotheses were supported, given the data (Wagenmakers et al., 2018). The results of the Bayesian t-test provide moderate evidence for the existence of the contagion effect of CC. However, the Bayesian approach does not completely compensate for the small sample, and hence future studies should replicate this study using a more conservative sample size estimating approach.

Sixth, the small to moderate effect sizes for all hypotheses may require replication attempts in future studies. Although the investigation of the CC contagion effect obtained moderate effect size, the effect sizes regarding the mediating effect and the chain mediation were relatively small. In particular, we only found a standardized effect size of 0.022 for the chain mediation effect of moral elevation and calling, with a lower limit confidence interval very close to 0, which indicates a lack of robustness. In this case, we cannot rule out the possibility of sampling error unless a replication study is conducted using a larger sample size. Therefore, the results require additional support from data before conclusions should be drawn. A potential setup for such a study is outlined in the [Supplementary Material S2](#). Additionally, computational modeling has been proposed as a promising approach for advancing theories in psychological science (Guest and Martin, 2021; Robinaugh et al., 2021; Liu and Chen, 2022). Researchers suggest that it can ensure the quality, applicability, and authenticity of research by making the implicit model underlying the study explicit (Guest and Martin, 2021).

For future studies on this topic, we, therefore, suggest that researchers make use of our initial results and preregister a larger sample size for a potential replication study (see [Supplementary Material S2](#)) to meaningfully corroborate our findings. Computational modeling could additionally be used to clarify the theoretical considerations.

## Conclusion

In conclusion, this preliminary study discovered that cooperative modeling can not only inspire people's immediate cooperative behavior within groups but also later cooperative behavior outside of these initial groups, without the presence of a role model. This study's results potentially make some important contributions by suggesting the application of goal contagion theory to the CC contagion effect. Consistently experiencing the cooperative behaviors of CCs might inspire individuals' moral elevation, which could lead to a sense of calling, inducing them to

perform cooperative behaviors, regardless of the CC's presence. The novel use of moral elevation and calling as proxies for goal inference and goal adoption, respectively, may provide researchers with new perspectives on assessing the two-stage process of goal contagion theory in prosocial circumstances. These findings, hence, bear the potential to enhance our knowledge of the cooperative modeling contagion effect, but given our small sample size, high-powered replication studies are necessary before stronger conclusions can be drawn. We hope that other scholars will be stimulated by this preliminary study to make greater progress in the field of cooperation.

## 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 at: <https://osf.io/pvjkkx/>.

## Ethics statement

The studies involving human participants were reviewed and approved by Department of Psychology and Behavioral Sciences at Zhejiang University, China (2018-03-18). The patients/participants provided their written informed consent to participate in this study.

## Author contributions

QZ contributed to the study design, data collection, data analysis, interpretation of results, and writing and critical review of the manuscript. JM contributed to the study design, data collection, interpretation of results, and review of the manuscript. YW contributed to data analysis, the interpretation of results, and review of the manuscript. XL contributed to the review of the manuscript. CF contributed to the data collection and review of the manuscript. All authors have read and agreed to the published version of the manuscript.

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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.2022.1005772/full#supplementary-material>

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# CEO birth order and corporate social responsibility behaviors: The moderating effect of female sibling and age gap

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Corporate social responsibility (CSR) is one of the most important business strategies which helps enterprises obtain competitive advantage and improve performance. Scholars have conducted many beneficial studies on the driving factors of CSR behaviors from the perspective of CEO traits, but rarely focus on the impact of the CEO's early family experiences. This study aims to fill this research gap by investigating the influence of CEO birth order on firms' CSR behaviors, and further exploring the possible moderating effects of the presence of a female sibling and the age gap between the CEO and the closest sibling. This study takes Chinese non-financial private listed companies from 2010 to 2017 as the research samples, and empirically tests the relationship between CEO birth order and a firm's CSR behaviors. The empirical results show that CEO birth order negatively influences corporate social responsibility behaviors, and this relationship would be weakened when the CEO has a female sibling or the age gap between CEO and the closest sibling is larger. This paper extends the research on personal family factors from the field of social psychology to the business field and finds a new driving factor of corporate social responsibility behavior from the perspective of the CEOs' early family factors.

## KEYWORDS

CEO's early family experience, CEO birth order, corporate social responsibility behaviors, female sibling, age gap

## Introduction

Enterprises have to make differentiation strategies to better cope with market competition and provide social support to their stakeholders (Zhou et al., 2022). For example, some enterprises developed new social media technology and adopted online technology to meet the changing needs of stakeholders during the epidemic to reduce the economic losses under the crisis (Yu et al., 2022). More critically, the growing external stakeholder pressure has raised requirements higher for corporate social responsibility (Lu and Abeysekera, 2017). Generally, CSR is regarded as a more competitive strategy to promote firms' pro-environmental behaviors, and helps firms to

obtain good reputations and enhance their relationships with stakeholders (Tang et al., 2021), thereby promoting firms' sustainable business performances (Mubeen et al., 2021). Hence, how to promote CSR strategy is of great importance in helping enterprises maintain sustainable development in the post-epidemic era.

The driving factors of corporate social responsibility (CSR) strategy have received wide attention from both academic and practical fields. Among them, executives' traits are an important dimension to explain the choice of CSR strategy. Extant studies mainly focus on executives' demographic characteristics, educational background, and working experiences on corporate social behaviors (McCarthy et al., 2017; Tang et al., 2018; Al-Shammari et al., 2019). Little attention has been paid to the impact of executives' early family experiences on their behaviors in the CEO suit. And the childhood family experiences may greatly affect individuals' cognitive formation, personal preferences, and behaviors. Birth order is a natural difference that would influence individuals' early family interactions, which may predict individuals' psychological behavior (Taubman-Ben-Ari, 2018), and persist for the longest duration during adulthood (Whiteman et al., 2011).

Previous research about birth order mainly involved the sibling rivalry perspective, and explored the impact of birth order on individuals' risk-taking behaviors, such as smoking behavior (Slomkowski et al., 2005) and driving style (Taubman-Ben-Ari, 2018). Meanwhile, a few studies show that executives' birth order may also influence the firm's risk-taking behaviors where they work (Campbell et al., 2019). For example, Zheng L. J. et al. (2021) proposes that founders' birth order positively affects firms' innovation activities, which is usually known as one of the risk-taking behaviors. However, few studies have paid attention to sibling prosocial behaviors in addition to sibling rivalry, such as sharing, compassion, and help, especially in the business context. Considering that corporate social responsibility (CSR) behavior is usually seen as a typical prosocial behavior, this paper attempts to examine how executives' birth order affects corporate CSR behavior by considering their family traits.

In order to answer the above question, this paper takes Chinese non-financial private listed companies from 2010 to 2017 as the research samples, and employs a fixed effect model of panel data to empirically test the relationship between CEO birth order and the firms' CSR behaviors. We also examine the moderating effects of the presence of a female sibling and the age gap between CEO and the closest sibling. The empirical results show that there is a significant negative relationship between CEO birth order and corporate CSR behaviors. The results of further studies suggest that the presence of a female sibling weakens the negative impact of CEO birth order on firms' CSR behaviors. And the relationship between CEO birth order and CSR behaviors would also be weakened when the sibling age gap is larger.

This paper mainly contributes to three aspects: First, it enriches the studies of corporate social responsibility by exploring a new driving factor of CSR behavior from the perspective of CEOs' family traits. This paper explores how CEO birth order influences firms' CSR behaviors, and provides a new explanation of corporate CSR behaviors from executives' early family domain. Second, this study extends the research on the moderators of CEO birth order and CSR behaviors. To be specific, we mainly examine the moderating effects of the presence of a female sibling and the age gap between the CEO and the closest sibling and find that both the presence of a female sibling and a greater age gap would weaken the relationship between CEO birth order and CSR behaviors. Third, this paper advances the birth order research from sibling rivalry to sibling prosocial aspects. Previous studies mainly analyze the sibling effect on executives' behaviors based on the sibling rivalry view, while this paper integrates sibling prosocial tendencies and sibling rivalries into the same framework and proposes that sibling interaction may also shape executives' prosocial recognition and prosocial behaviors at their jobs.

The research arrangement of this paper is as follows: The second part is the literature review and hypotheses. The next part proposes the data and methodology. The fourth part reports the empirical analysis results, and the last part is the research conclusion and discussion of this paper.

## Literature review and hypotheses

### Sibling affection: Associate birth order with prosocial behaviors

Sibling relationship is an important motivator in shaping children's social recognition and behavioral tendencies persisting into their adulthood. Sibling interaction is characterized by affection, companionship, sharing, and helping, so that positive interaction with siblings may be conducive to form young children's prosocial preferences and then prosocial behaviors (Hughes et al., 2018). Through continual sibling prosocial interaction, children tend to imitate their elder siblings or parents' behaviors (Dunn and Munn, 1986), which enables children to learn how to share, cooperate, and help each other. These behaviors are prone to provide a behavioral mode for prosocial behaviors with others.

Sibling differences determine how children perceive the affection, warmth, competition, and conflict between siblings, which typically differ in age. Such age differences suggest that the elder children are more likely to express prosocial tendencies to their younger siblings by sharing, helping, and caretaking. Generally, when parents are busy with work and do not have enough time and energy to take care of the younger children, the elder children naturally take the responsibility for the younger siblings (Salmon et al., 2016). In this case, the elder siblings adopt

more other-regarding behaviors toward the younger siblings, such as affection, help, and sympathy (Recchia and Howe, 2009). The early family experience of caring for younger siblings in childhood makes earlier-born children more likely to consider the feelings of others with empathy and affection (Otterbring and Folwarczny, 2022), and promotes their self-regulation and prosocial behavior (Padilla-Walker et al., 2010). By contrast, later-born children are more likely to form a self-interest tendency and less other-regarding or prosocial preferences, because they are often taken care of by others (Campbell et al., 2019).

## Sibling rivalry: Associate birth order with prosocial behaviors

Sibling interaction might also be full of rivalries. Faced with sibling competition over family resources, children would try their best to show their own unique abilities and characteristics, so as to get special attention and treatment from parents and improve their ability to acquire family resources (Wang et al., 2009). Because children have individual differences, parents tend to adopt differential treatment and unequally allocate family resources according to their children's individual characteristics (Tucker et al., 2003). This differential treatment negatively affects the quality of interaction between siblings and reduces their prosocial tendency (Shanahan et al., 2008). Birth order is a natural difference that enables children to maximize family resources and parental investment in different ways (Blake, 1981), and would also influence children's attitude toward family members and others (Harper et al., 2016). Those early family sibling experiences determine individuals' behavioral decisions during childhood and thus the whole life span (Suitor and Pillemer, 2007).

Birth order greatly influences sibling rivalry. For earlier-born children, parents have enough time and energy to care for them, and the household resources would also be relatively sufficient. Under this circumstance, sibling rivalries over family resources are relatively weaker (Booth and Kee, 2009). Moreover, elder siblings usually have a stronger ability of competition for resources (Freese et al., 1999), thus they easily get more household resources (Hotz and Pantano, 2015) and involve less in sibling rivalries. However, the amount of family resources available to each child would gradually decrease with the increase of the sibling number (Zheng M. et al., 2021). Meanwhile, the competition and conflict for parents' attention and family resources may be more intensified (Weng et al., 2019). Therefore, later-born children have to compete for parents' attention, time, and household resources with their elder siblings (Whiteman et al., 2011). Later-born children tend to be more competitive and unfriendly, which in turn stimulates individuals' short-term self-interest and makes them pay more

attention to their own interests, thereby leading to more risky behaviors (Menesini et al., 2010; Solmeyer et al., 2013), antisocial behavior (Buist, 2010; Ensor et al., 2010) and fewer prosocial behaviors (Kretschmer and Pike, 2010; Buist and Vermande, 2014).

## CEO birth order and corporate social responsibility behavior

Family factors, such as family size, play a crucial role in entrepreneurship performance (Ge et al., 2022). Birth order is an important factor in personal early family life, and may shape individuals' recognition formation and behavioral tendencies (Zheng M. et al., 2021). Based on sibling affection literature, earlier-born siblings tend to exhibit more prosocial behaviors, while later-born individuals are usually engaged in less prosocial behaviors (Hughes et al., 2018). Birth order shapes individual's prosocial or antisocial preferences, so that executives' birth order may be closely related to the social responsibility behaviors of the company where they work. Therefore, we propose that CEOs' birth order negatively affects their prosocial behaviors and consequently firms' CSR behaviors. According to sibling interaction research, earlier-born individuals usually have a higher sense of family responsibility. And they are more likely to care for their younger sibling(s) and sympathize with others through their other-regarding tendencies (Salmon et al., 2016). This childhood affection experience shapes earlier-born individuals prosocial preferences and enables them to have a stronger motivation to participate in prosocial activities (Otterbring and Folwarczny, 2022). These findings suggest that earlier-born CEOs have a greater tendency to adopt prosocial behaviors toward employees, the public, and other stakeholders, and may implement more CSR behaviors through their business decisions. By contrast, later-born CEOs are often attendee and have fewer family responsibilities, so they are prone to engage in less prosocial behaviors.

In terms of sibling rivalry literature, CEO birth order affects parents' investment and the allocation of family resources; this early experience of sibling interaction was internalized into the CEOs' prosocial or antisocial bias. Earlier-born CEOs suffer less sibling rivalries and take much more family responsibility, which helps to form CEOs' prosocial orientations. This prosocial orientation improves the CSR behaviors that CEOs take in their executive suits. On the other hand, later-born CEOs have to compete more for family resources with their elder siblings, so they tend to form a sense of self-interest to maximize their own interests and less other-regarding preferences to others. This early family experience shapes CEOs' short-term self-interests and weakens their prosocial preferences, which would also reduce their attention on corporate social responsibility behaviors in the companies they occupy.

To sum up, the companies with the earlier-born CEOs might implement more social responsibility behaviors than those with the later-born CEOs. Based on the above analysis, this paper proposes the following hypothesis:

**Hypothesis 1:** CEO birth order is negatively correlated to firms' CSR behaviors.

## Moderating effect of the presence of a female sibling

Prior studies in sociology posit that women usually exhibit much stronger other-regarding preferences than men (Andreoni and Vesterlund, 2001; Dufwenberg and Muren, 2006; DellaVigna et al., 2013). And women often show a greater willingness and responsibility to help others (Kamas et al., 2008; Willer et al., 2015). Research on feminine ethics in the business field also indicates that women entrepreneurs often attach more importance on household affairs (Ge et al., 2022), and women executives focus more on stakeholders' interests and working relationships. Moreover, female directors or executives pay more attention to corporate social responsibility (Post et al., 2011; Atif et al., 2020) and charitable donations (Einolf, 2011).

Sibling interaction is a major family experience before adulthood, so the prosocial tendencies of female siblings could easily affect other siblings. The other-regarding preferences of women would be internalized into other siblings' behavioral tendencies through the family sibling interaction. When a CEO has an elder or little sister, the female sibling's other-regarding preferences are more likely to increase the focal CEO's prosocial orientation. Therefore, the presence of a female sibling moderates the relationship between CEO birth order and firms' CSR behaviors mainly through improving CEOs' prosocial preferences in their early family life, and weakens the negative influence of CEO birth order on firms' CSR behaviors. Hence, we posit the following hypothesis:

**Hypothesis 2:** The relationship between CEO birth order and corporate social responsibility behaviors would be weakened when the focal CEO has a female sibling.

## Moderating effect of sibling age gap

Since CEO birth order shapes their behavior tendencies during childhood (Sulloway, 2009), and sibling rivalry is one of the key mechanisms behind birth order effects (Wan et al., 2021), it follows that the factors which influence sibling rivalry may inevitably influence birth order effects and individuals' behavioral preferences. Accordingly,

we suppose that the negative effect of CEO birth order on corporate social responsibility behaviors would be strengthened when the sibling rivalry is greater. Instead, if an individual's early family experience had less sibling rivalries, the differential treatment generated by birth order might also accordingly reduce, thus the relationship between CEO birth order and CSR behaviors would also be weakened.

Relevant research has shown that age gap influences the extent of sibling rivalry (Sulloway and Zweigenhaft, 2010). A smaller age gap indicates that siblings have to compete more fiercely for the scarce family resources and parents' attention (Badger and Reddy, 2009). And the elder siblings are less likely to care for the younger siblings under the conditions of a smaller age gap. But when the age gap is larger, siblings may have less rivalries for family resources, and parents also have more time and attention for their children over a greater age space (De Haan, 2010). Moreover, it is much more likely for the elder siblings to support their younger sibling when the age gap is larger, and the later-born siblings may also easily exhibit affection for their elder siblings (Dunn and Munn, 1986).

Above all, a closer age gap intensifies sibling rivalry and makes siblings compete more for family resources and parents' time. In this case, there is less siblings' prosocial behaviors and more siblings' competition. Conversely, a larger age gap reduces sibling rivalry and increases siblings' other-regarding preferences by taking care of other siblings. It suggests that the negative effect of CEO birth order and corporate social responsibility behaviors would be weaker when there is a larger age gap between CEOs and the closest siblings, and stronger when the age gap is smaller. Then we assume the following hypothesis:

**Hypothesis 3:** The relationship between CEO birth order and corporate social responsibility behaviors would be weakened when the age gap between a CEO and the closest sibling is larger and strengthened when the age gap is smaller.

## Theoretical framework of research model

This study proposes a theoretical framework of the research model. This study investigates the relationship between CEO birth order and CSR behaviors of Chinese private firms, and further explores how the presence of a female sibling and age gap moderates the above relationship. Figure 1 describes the theoretical framework of the key factors. In this framework, CEO birth order is the independent variable, and CSR behavior is the dependent variable. Additionally, the presence of a female sibling and the sibling age gap are incorporated as the moderating variables. This study employs the fixed effects model



of panel data to examine the impact of CEO birth order on CSR behaviors.

## Materials and methods

### Data and samples

In this paper, the Chinese A-share private listed companies on the Shanghai Stock Exchange and Shenzhen Stock Exchange from 2010 to 2017 were taken as data samples. Due to the fact that the corporate social responsibility of state-owned enterprises is largely subject to government administrative intervention, it is hard to investigate the relationship between CEO personal traits and CSR performance. Therefore, we chose Chinese private enterprises as the research samples. Then we excluded ST and ST\* samples, which refers to the companies that have been granted special treatment because of two consecutive years of losses, to avoid financial abnormality. The financial listed companies were also eliminated because of their high level of leverage. And samples with missing data of CEO birth order and other control variables were also excluded. Finally, we obtained 817 valid samples.

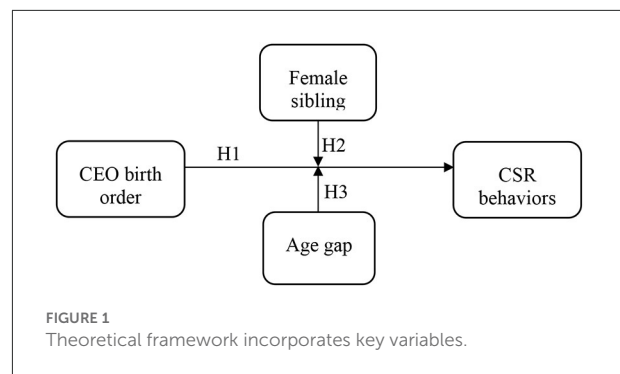
The data of corporate social responsibility (CSR) behaviors was obtained from the HeXun website. Considering that Huxun began to disclose the CSR Ratings of Chinese listed companies from 2010, we chose 2010 as the starting point of empirical samples. The original data of CEO siblings was obtained from the China Stock Market and Accounting Research (CSMAR) Database, which contains the detailed information about the gender and age of CEOs' relatives. Since the CSMAR database no longer discloses the executives' kinship data after 2017, this study sample period ends by 2017. Other control variables were all from the CSMAR Database except industry data from the WIND database. In order to avoid the influence of extreme values, all the continuous variables were winsorized at the 1% level.

### Variable definition

#### Dependent variable

##### Corporate social responsibility behaviors

According to Long et al. (2020), CSR behaviors are determined through the CSR ratings developed by HeXun, which has disclosed the social responsibility ratings of Chinese listed companies for many years and is usually used by Chinese scholars for CSR research. This CSR rating includes five aspects: responsibility for shareholders (30% weight), employees (15% weight), supply chain (15% weight), environment responsibility (20% weight), and social responsibility (20% weight). The HeXun CSR rating is mainly based on the corporate social responsibility reports and annual reports of Chinese listed companies, and could objectively and comprehensively measure



CSR performance even for companies without disclosing the CSR report.

The RKS CSR rating mainly targets Chinese listed companies that have disclosed corporate social responsibility reports, but cannot assign a CSR Rating of listed companies that have not disclosed CSR reports. However, the proportion of social responsibility reports disclosed by listed private enterprises is relatively low in China, and only 128 sample companies with CEO sibling data disclosed CSR reports from 2010 to 2017. Hence, we used HeXun CSR Ratings to measure firms' CSR behaviors instead of RKS CSR Ratings to ensure a relatively large sample size and objective research conclusion.

#### Independent variable

##### CEO birth order

We first obtained the CEOs' names from the position information of Top Management Team (TMT) of listed companies in CSMAR Database. Then we further acquired the CEOs' sibling data from the TMT relatives database and dropped the samples without siblings. Based on the age of the CEOs and their siblings, the data of CEO birth order and the age gap between CEOs and their closest siblings were gleaned. Following extant studies, CEO birth order is ranked as the order CEOs were born. More precisely, the value of 1 was assigned to CEOs who are the first-born, and 2 for the second-born, etc. With reference to De Haan (2010) and Campbell et al. (2019), the CEO birth order was treated as a continuous variable in the regression models. In addition, we excluded the samples where CEOs were the only child.

#### Moderating variables

##### Presence of a female sibling

On the basis of the gender information of CEO siblings, we determined whether there was a female sibling for the focal CEOs. The presence of a female sibling was measured by a dummy variable that assigned a value of 1 when the focal CEO has a female sibling, otherwise 0.

TABLE 1 Variable definition.

Variables		Symbol	Definition
Dependent variable		CSR	CSR ratings score disclosed by HeXun Website
Independent variable		Birth order	the value of 1 is assigned for a first-born CEO, 2 for the second-born, etc
Moderating variable		Female sib	Code as 1 when a CEO has a female sibling, 0 otherwise
		Age gap	The age gap between CEO and the closest sibling
Control variable	CEO-level	Sib num	CEOs' number of siblings
		Degree	CEO' degree
		Gender	The gender of a CEO, 1 for male and 0 for female
		Overseas	Whether CEO has overseas study or work experience, "yes" marked 1, otherwise 0
	Corporate governance	BS	Number of board directors
		Fe ratio	Number of female directors/number of directors
		Ove ratio	Number of directors with overseas background/number of directors
	Firm-level	Inst	The number of institutional shareholders divided by the total number of shares
		H10	The sum of the squares held by the top ten shareholders
		ROE	Net income over average equity
		Size	The natural log of total assets
		Lev	Total liabilities/total assets
		Growth	the growth rate of sales income
		Industry	Industry dummy variable
		Year	Year dummy variable

### Age gap

The variable of age gap between CEOs and their closest siblings was measured as the absolute difference value of the age between focal CEOs and their closest siblings (e.g., [Buckles and Munnich, 2012](#)). For example, when a CEO is first-born, the immediate second-born sibling is the closest sibling.

### Control variables

With reference to prior studies on CSR behaviors, we introduced a list of CEO-level and firm-level control variables to avoid the regression bias. Relevant studies on birth order suggest that the number of siblings is inevitably related to birth order ([Booth and Kee, 2009](#)), so it was necessary to control CEOs' number of siblings in the regression models. Meanwhile, previous studies have shown that CEO personal traits may influence corporate social responsibility behaviors ([Cronqvist and Yu, 2017](#); [Hao et al., 2019](#)). Thus, we controlled for CEO degree, CEO gender (1 for female CEOs and 0 for male CEOs), and CEO overseas background (coded as 1 when the CEO had overseas study or work experience, otherwise 0).

Second, we included several firm-level control variables into the regression models. Firm size was measured as the natural log of total assets. Financial leverage was calculated by the ratio of total liability to total assets. Return of Equity (ROE) was measured by the net income over average equity ([Shaikat et al., 2016](#)). Growth was measured as the growth rate of sales

income. Additionally, we also controlled for governance-level variables. Board size (number of board directors), ratio of female directors (the proportion of female directors on board) ([Landry et al., 2016](#)), and ratio of directors with overseas background (the proportion of directors who have overseas study or work experience). The institutional shareholding ratio was measured as the number of institutional shareholders divided by the total number of shares ([Dyck et al., 2019](#)). H10 was calculated as the sum of the shares held by the top ten shareholders. Industry fixed effects and year fixed effects were all included in the regression models. [Table 1](#) reports the detailed definition of all the variables.

### Models

According to the research hypothesis, we established Model (1) to test the impact of CEO birth order on firms' CSR behaviors. Model (2) and (3) were established to examine the moderating effects of the presence of a female sibling and age gap between a CEO and the closest sibling, respectively. Birthorder\*Femalesib denotes the interaction term of CEO birth order and the dummy variable of the presence of a female sibling. Moreover, Birthorder\*Agegap is the interaction term of CEO birth order and age gap between the focal CEOs and their

TABLE 2 Descriptive statistics.

Variable	N	Mean	p50	SD	Range	Min	Max
CSR	817	24.85	22.53	13.77	74.23	−1.32	72.91
Birth order	817	1.53	1.00	0.68	3.00	1.00	4.00
Sib num	817	1.27	1.00	0.53	4.00	1.00	5.00
Degree	778	3.60	3.00	1.48	6.00	1.00	7.00
Gender	817	0.94	1.00	0.23	1.00	0.00	1.00
Overseas	817	0.10	0.00	0.31	1.00	0.00	1.00
Size	817	21.48	21.43	0.87	4.47	19.87	24.34
Lev	817	0.31	0.29	0.18	0.79	0.03	0.82
ROE	817	0.09	0.09	0.07	0.44	−0.12	0.33
Growth	817	3.36	0.21	10.12	62.45	−4.95	57.50
BS	817	9.17	9.00	2.07	10.00	5.00	15.00
Fe ratio	817	0.17	0.14	0.13	0.54	0.00	0.54
Ove ratio	817	0.11	0.10	0.12	0.54	0.00	0.54
Inst	768	24.88	16.89	22.77	80.44	0.02	80.45
H10	817	0.18	0.17	0.10	0.45	0.04	0.49

closest siblings.

$$\text{CSR} = \alpha + \alpha_1^* \text{Birthorder} + \alpha_i^* \text{Controls} + \text{Industry} + \text{Year} + \varepsilon \quad (1)$$

$$\text{CSR} = \beta + \beta_1^* \text{Birthorder} + \beta_2^* \text{Femalesib} + \beta_3^* \text{Birthorder}^* \text{Femalesib} + \beta_i^* \text{Controls} + \text{Industry} + \text{Year} + \varepsilon \quad (2)$$

$$\text{CSR} = \gamma + \gamma_1^* \text{Birthorder} + \gamma_2^* \text{Agegap} + \gamma_3^* \text{Birthorder}^* \text{Agegap} + \gamma_i^* \text{Controls} + \text{Industry} + \text{Year} + \varepsilon \quad (3)$$

Where  $\varepsilon$  is the residual error,  $\alpha_i$  denotes the coefficient of control variables. Where Controls includes CEO degree, CEO gender, CEO overseas background, firm size, financial leverage, Return of Equity, Growth, Board Size, ratio of female directors, ratio of directors with an overseas background, Institutional shareholding ratio, and H10.

## Results analysis

### Descriptive statistics and correlation analysis

Table 2 reports the descriptive statistics of the main variables. The average CSR score of the sample companies is 24.85, the standard deviation is 13.77, indicating that the performance of different companies in terms of CSR behaviors varies greatly. The mean of CEO birth order is 1.53, and the standard deviation is 0.68, showing that there is a small gap in CEOs' birth order among different companies.

From the descriptive statistics of the control variables, the average sibling number of the focal CEOs is 1.27. The average

degree of CEOs is 3.60, indicating that more than half of the CEOs have a bachelor degree or above. And 94% of the CEOs are male, and the proportion of female CEOs is very small. The percentage of female directors and directors with an overseas background on the board is 17 and 11%, respectively, indicating that the proportion of female directors is relatively low in the sample companies. The mean of H10 is only 0.18, which shows that there is still a high level of equity concentration. Descriptive statistics of all variables are shown in Table 2.

Table 3 reports the correlations and the variance inflation factor (VIF). The average VIFs is <2.0, far below the threshold of 10, so there is no serious multicollinearity problem in the regression process.

### Regression results analysis

Table 4 reports the multiple regression results of CEO birth order and the firms' CSR behaviors. Hypothesis 1 assumes that CEO birth order is negatively correlated to CSR behaviors. The results of Model 1 show that the estimated coefficient between CEO birth order and CSR is  $-4.5781$ , and significant at the confidence level of 5% ( $b = -4.5781$ ,  $p < 0.05$ ). Therefore, CEO birth order has a negative and statistically significant impact on firms' CSR behaviors. That is, earlier-born CEOs pay more attention to CSR than later-born CEOs. This conclusion also holds in Model 2 and Model 3 even when including the interaction terms. Hypothesis 1 is thus confirmed.

In Hypothesis 2, this study predicts that the presence of a female sibling would weaken the negative relationship between CEO birth order and CSR behaviors. The results of Model 2 report that the estimated coefficient of the interaction term of

TABLE 3 Correlations.

	CSR	Birth order	Sib num	Degree	Gender	Overseas	BS	Fe ratio	Ove ratio	Inst	H10	Size	Lev	ROE	Growth	VIF
CSR	1															
Birth order	0.026	1														1.25
Sib num	0.024	0.468***	1													1.33
Degree	0.101***	0.075**	0.122***	1												1.07
Gender	0.069**	0.003	0.074**	0.084**	1											1.06
Overseas	−0.027	−0.106***	−0.158***	0.135***	0.083**	1										1.21
BS	0.049	−0.092***	−0.046	0.054	0.051	0.104***	1									1.07
Fe ratio	0.024	−0.070**	0.01	−0.048	−0.147***	−0.115***	−0.100***	1								1.08
Ove ratio	0.101***	−0.051	−0.116***	0.055	0.068*	0.318***	0.044	0.007	1							1.24
Inst	0.264***	0.000	−0.02	−0.042	0.032	0.042	0.113***	−0.073**	0.087**	1						1.35
H10	0.069*	0.028	0.094***	−0.062*	−0.052	−0.084**	−0.089**	0.032	−0.070**	0.079**	1					1.10
Size	0.182***	−0.029	−0.01	0.028	0.049	0.033	0.149***	0.024	0.243***	0.441***	0.003	1				1.79
Lev	−0.132***	−0.018	−0.052	−0.094***	0.067*	0.006	0.012	−0.044	0.058*	0.170***	−0.008	0.496***	1			1.35
ROE	0.456***	−0.017	−0.047	0.018	0.045	−0.018	0.038	0.007	0.069**	0.232***	0.217***	0.180***	−0.01	1		1.28
Growth	0.000	0.048	0.112***	−0.003	−0.001	−0.02	−0.061*	−0.036	−0.059*	−0.117***	0.089**	−0.128***	−0.084**	0.252***	1	1.16

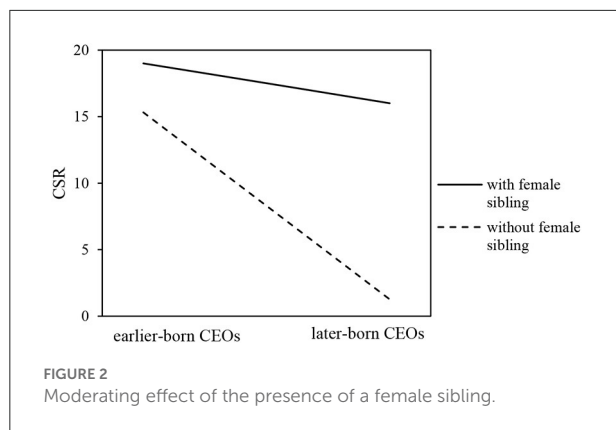
\*, \*\*, and \*\*\* refer to significance at 10, 5, and 1% level.

TABLE 4 Regression results.

Variables	(1) CSR	(2) CSR	(3) CSR
Birth order	−4.5781** (−2.11)	−5.1229** (−2.44)	−7.7931*** (−3.50)
Female sib		−15.3035*** (−3.02)	
Female sib * Birth order		17.2039*** (3.47)	
Age gap			−1.9840** (−2.12)
Age gap * Birth order			1.0217* (1.83)
Sib num	6.9376*** (3.89)	6.3234*** (3.86)	6.9203*** (3.98)
Degree	−0.5145 (−0.75)	−0.6427 (−0.91)	−0.4246 (−0.58)
Gender	−3.5711 (−0.87)	−16.6446*** (−4.75)	−5.9791 (−1.56)
Overseas	−7.4864** (−2.05)	−7.4206** (−2.05)	−8.2379** (−2.02)
ROE	75.1301*** (8.18)	74.9032*** (8.16)	75.5313*** (8.24)
Size	2.3201 (1.04)	2.2960 (1.03)	2.1775 (0.97)
Lev	−5.4126 (−1.06)	−5.7966 (−1.12)	−4.6132 (−0.88)
Growth	−0.1176*** (−4.37)	−0.1188*** (−4.38)	−0.1199*** (−4.42)
BS	−0.2530 (−0.77)	−0.2713 (−0.82)	−0.2320 (−0.71)
Fe ratio	18.6174** (2.17)	19.3041** (2.22)	17.8789** (2.07)
Ove ratio	−7.1997 (−1.16)	−7.6099 (−1.22)	−7.3347 (−1.19)
Inst	0.0317 (1.50)	0.0312 (1.46)	0.0326 (1.54)
H10	8.2985 (0.71)	8.8376 (0.75)	8.7674 (0.75)
Industry	Yes	Yes	Yes
Year	Yes	Yes	Yes
Constant	−28.5580 (−0.61)	−16.5185 (−0.35)	−16.9378 (−0.34)
Observations	733	733	733
Number of code	220	220	220
Adjusted R-squared	0.2597	0.2598	0.2612

\*, \*\*, and \*\*\* refer to significance at 10, 5, and 1% level. t-values are in parentheses.

the dummy variable of the presence of a female sibling and CEO birth order is 17.2039, and significant at the 1% level ( $b = 17.2039, p < 0.01$ ). The above results indicate that the presence



of a female sibling significantly weakens the negative impact of CEO birth order on firms' CSR behaviors. Hence, Hypothesis 2 is supported.

Hypothesis 3 theorizes the moderating effect of age gap on the relationship between CEO birth order and CSR behaviors. To examine this hypothesis, we introduce the interaction term of the age gap and CEO birth order in Model 3. The results of Table 3 suggest that age gap positively moderates the relationship between CEO birth order and CSR behaviors ( $b = 1.0217, p < 0.10$ ). Specifically, the negative impact of CEO birth order on firms' CSR behaviors would be weakened when the sibling age gap is larger, and strengthened when the age gap is smaller. The above results statistically support Hypothesis 3.

With reference to Li et al. (2022), we further compare two figures to display the moderating effect of the presence of a female sibling and the age gap. Figure 2 shows the moderating role of the presence of a female sibling. It is easy to see that the presence of a female sibling would weaken the relationship between CEO birth order and corporate social responsibility behaviors. Figure 3 represents the moderating effect of sibling age gap. It indicates that the relationship between CEO birth order and CSR behaviors is weaker when the age gap between a CEO and the closest sibling is larger and stronger when the age gap is smaller.

## Robustness and endogeneity

According to Campbell et al. (2019), we treat CEO birth order as three categories: first-born, middle-born, and last-born, and then generate three dummy variables when CEOs are first-born, middle-born, and last-born, respectively. Column 1 of Table 5 reports the regression results including the dummy variable when CEOs are first-born, which shows that the first-born CEOs are positively influenced toward CSR behaviors ( $b = 6.9568, p < 0.05$ ). Column 2 reports the result of the dummy variable of middle-born CEOs. The estimated coefficient



of the dummy variable of middle-born CEOs is negative but not significant, which may be the result of the limited samples. Column 3 in Table 5 displays the impact on CSR behaviors when CEOs are last-born. The result indicates that the last-born CEOs are a significantly and negatively impacted toward CSR behaviors ( $b = -4.7025, p < 0.10$ ). The above results suggest that later-born CEOs would exhibit less CSR than earlier-born CEOs.

In order to test the robustness of the moderating effect of the presence of a female sibling, we further divided the sample companies into two groups according to whether the focal CEO has a female sibling or not, to implement the regression process. Table 6 reports the grouped regression results. In Column 1, the result shows that when the focal CEO has a female sibling, the negative impact of birth order on CSR behaviors is relatively weakened. However, the result in Column 2 indicates that CEO birth order has a much stronger influence on CSR behaviors when the focal CEO is without a female sibling ( $b = -4.6836, p < 0.05$ ). Therefore, the negative relationship between CEO birth order and CSR behaviors is weakened when a CEO has a female sibling and strengthened when a CEO is without a female sibling.

Based on the study of Baer et al. (2005), we further used a discrete measurement of age gap to test the moderating effect of the closest sibling age gap. Specifically, we created a dummy variable and code as 1 when the age gap between a CEO and the closest sibling is more than 3 years. Column 1 of Table 7 reports the result including the dummy variable of the closest age gap, which shows that a larger age gap weakens the negative impact of CEO birth order on CSR behaviors ( $b = 5.7597, p < 0.01$ ). The result also statistically supports Hypothesis 3. Moreover, we divided the samples into two groups on the basis of the age gap dummy variable to repeat the regression process of Model 1. The grouped results also indicate that a smaller age gap would strengthen the negative relationship between CEO birth order and CSR behaviors ( $b = -7.1490, p < 0.01$ ).

According to Weng et al. (2019), we used a two-stage Heckman selection model and two exogenous variables to tackle the possible endogeneity bias caused by sample selection. The



TABLE 5 Robustness with birth order dummy variables.

Variables	(1) CSR	(2) CSR	(3) CSR
Dum_first	6.9568** (2.13)		
Dum_middle		−0.3858 (−0.09)	
Dum_last			−4.7025* (−1.72)
Sib num	6.2586 (0.97)	6.0827 (0.93)	6.2044 (0.96)
Degree	−0.2105 (−0.31)	−0.1926 (−0.27)	−0.4618 (−0.66)
Gender	−7.5500 (−1.28)	−5.9540 (−0.86)	−2.8692 (−0.47)
Overseas	−6.6522* (−1.68)	−7.8217** (−1.99)	−7.0535* (−1.79)
ROE	90.3607*** (9.13)	92.2907*** (9.31)	91.6389*** (9.28)
Size	3.1804** (2.05)	3.3181** (2.13)	3.2469** (2.09)
Lev	−6.1716 (−1.16)	−5.9536 (−1.11)	−6.5662 (−1.23)
Growth	−0.0501 (−0.99)	−0.0478 (−0.94)	−0.0532 (−1.05)
BS	−0.2742 (−1.02)	−0.2447 (−0.90)	−0.2634 (−0.97)
Fe ratio	18.4846*** (2.75)	16.0886** (2.41)	18.0039*** (2.68)
Ove ratio	−6.8688 (−0.99)	−7.4336 (−1.06)	−7.7180 (−1.11)
Inst	0.0266 (0.91)	0.0288 (0.98)	0.0266 (0.91)
H10	0.8068 (0.06)	1.7926 (0.13)	4.0956 (0.29)
Industry	Yes	Yes	Yes
Year	Yes	Yes	Yes
Constant	−51.6337 (−1.53)	−51.7491 (−1.51)	−51.2151 (−1.51)
Observations	733	733	733
Number of code	220	220	220
Adjusted R-squared	−0.0563	−0.0662	−0.0597

\*, \*\*, and \*\*\* refer to significance at 10, 5, and 1% level. t-values are in parentheses.

first one was sex of first child. In Chinese traditional cultural context, when the first child is a girl, parents are more likely to have more than one child to ensure that there is a boy to maintain the family. Therefore, sex of first child may influence the number of siblings and then birth order. The second exogenous variable is the family planning policies. Weng et al. (2019) divided China's family planning policies into four phases

TABLE 6 Robustness of a female sibling.

Variables	Dum_fesib = 1 CSR	Dum_fesib = 0 CSR
Birth order	−0.9986 (−0.31)	−4.6836** (−2.20)
Sib num	− (−)	5.6713*** (3.56)
Degree	0.5335 (0.30)	−0.6067 (−0.81)
Overseas	−5.6750 (−0.82)	−9.6536** (−2.50)
ROE	35.1570** (2.52)	87.7599*** (6.79)
Size	3.0263 (0.88)	2.8578 (1.02)
Lev	6.7574 (0.50)	−6.3189 (−1.04)
Growth	−0.0824** (−2.05)	−0.1362*** (−3.10)
BS	−0.6521* (−1.70)	−0.1359 (−0.33)
Fe ratio	29.5311** (2.29)	17.0546 (1.49)
Ove ratio	−8.6656 (−0.76)	−6.3803 (−0.89)
Inst	0.0232 (0.77)	0.0354 (1.42)
H10	−5.3584 (−0.34)	18.2769 (1.17)
Industry	Yes	Yes
Year	Yes	Yes
Constant	−41.6787 (−0.64)	−44.2679 (−0.74)
Observations	185	548
Number of code	64	159
Adjusted R-squared	0.1576	0.2829

\*, \*\*, and \*\*\* refer to significance at 10, 5, and 1% level. t-values are in parentheses.

based on the birth quota. Therefore, we marked the four phases as 0–3 corresponding to CEO birth year, to reflect the degree of government control for birth quota. Table 8 shows the results with Mills generated by the two exogenous variables, which are still in line with our main conclusion.

## Conclusions and implications

### Conclusions and discussion

Enterprises are practicing CSR, business modes, and entrepreneurial networks with innovation and knowledge

TABLE 7 Robustness of age gap.

Variables	Dum_agegap = 1 Dum_agegap = 0		
	CSR	CSR	CSR
Birth order	−6.1481*** (−3.42)	−2.3854 (−0.88)	−7.1490*** (−3.22)
Dum_age gap	−13.3233** (−2.35)		−
Dum_age gap *	5.7597** (2.01)		−1.6661 (−1.18)
Sib num	6.9445*** (3.97)	8.4267*** (2.89)	−15.8540*** (−4.66)
Degree	−0.3826 (−0.51)	0.8671 (1.58)	−1.3283 (−0.29)
Gender	−6.3106 (−1.61)	−5.5161 (−1.53)	85.3011*** (6.44)
Overseas	−8.2978** (−2.07)	−17.6702*** (−5.65)	−1.1183 (−0.39)
ROE	76.0486*** (8.20)	66.7870*** (5.25)	5.7938 (0.88)
Size	2.1435 (0.95)	5.9549* (1.78)	−0.1016*** (−2.85)
Lev	−4.5124 (−0.86)	−17.2829** (−2.15)	−0.3874 (−0.93)
M/B	−0.1206*** (−4.43)	−0.1456*** (−2.78)	11.2006 (1.02)
Growth	−0.2285 (−0.70)	−0.2954 (−0.69)	−11.6294 (−1.59)
BS	18.1924** (2.14)	33.1415*** (2.66)	0.0227 (0.73)
Fe ratio	−7.1534 (−1.16)	−6.3524 (−0.67)	7.0830 (0.46)
Inst	0.0308 (1.47)	0.0626* (1.88)	69.1510 (1.10)
H10	9.1669 (0.77)	41.8737** (2.00)	375 109
Industry	Yes	Yes	Yes
Year	Yes	Yes	Yes
Constant	−18.5981 (−0.38)	−114.9483 (−1.59)	0.3226 (0.92)
Observations	733	358	375
Number of code	220	114	109
Adjusted R-squared	0.2611	0.2417	0.3196

\*, \*\*, and \*\*\* refer to significance at 10, 5, and 1% level. t-values are in parentheses.

sharing to improve business performance (Rahmat et al., 2022; Zhou et al., 2022). Among the above activities, CSR is often considered as the basis of competitive advantages and an important way to increase firms' value (Tang et al., 2021). CEOs are highly correlated with firms' CSR activities (Mubeen et al.,

TABLE 8 Heckman two-stage results.

Variables	(1)	(2)	(3)
	CSR	CSR	CSR
Mills	28.2629* (1.69)	30.4241* (1.77)	33.5120* (1.97)
Birth order	−2.9341* (−1.82)	−3.4880** (−2.38)	−4.4149** (−2.47)
Female sib		−16.6464*** (−3.20)	
Female sib * Birth order		28.9200*** (3.74)	
Age gap			−1.3907 (−1.46)
Age gap * Birth order			0.4935 (0.86)
Sib num	−1.4316 (−0.37)	−2.4066 (−0.62)	−1.4303 (−0.37)
Degree	−0.7586 (−0.90)	−0.8012 (−0.95)	−0.7817 (−0.87)
Gender	−3.7095 (−0.76)	−27.2194*** (−4.56)	−4.8931 (−0.91)
Overseas	−3.4804 (−0.76)	−3.2835 (−0.73)	−4.2418 (−0.83)
ROE	82.9547*** (8.36)	82.2366*** (8.28)	82.6667*** (8.34)
Size	2.6735 (1.13)	2.6453 (1.12)	2.5210 (1.06)
Lev	−1.2868 (−0.20)	−1.7659 (−0.28)	−1.2131 (−0.19)
Growth	−2.0542* (−1.78)	−2.1119* (−1.80)	−1.9746* (−1.72)
BS	−0.1519 (−0.43)	−0.1865 (−0.52)	−0.1432 (−0.40)
Fe ratio	26.3332** (2.56)	27.5067*** (2.63)	26.6336** (2.58)
Ove ratio	−12.8093* (−1.83)	−12.8900* (−1.83)	−12.8801* (−1.83)
Inst	0.0358 (1.25)	0.0319 (1.10)	0.0350 (1.21)
H10	4.7848 (0.42)	5.6483 (0.51)	4.4687 (0.39)
Industry	Yes	Yes	Yes
Year	Yes	Yes	Yes
Constant	−65.2247 (−1.08)	−50.2421 (−0.82)	−62.1835 (−1.02)
Observations	595	595	595
Number of code	170	170	170
Adjusted R-squared	0.2481	0.2492	0.2467

\*, \*\*, and \*\*\* refer to significance at 10, 5, and 1% level. t-values are in parentheses.

2021). Therefore, this study aims to investigate the driving factors of firms' CSR behaviors from the CEO perspective, and explores the relationship between CEO birth order and corporate CSR behaviors of Chinese private firms, through the moderating role of the presence of a female sibling and sibling age gap. This research combines sibling prosocial tendencies and sibling rivalry into a whole framework, and extends the research of sibling effect from family perspectives to a business context.

This paper constructs a theoretical framework to explore how CEO birth order influences corporate social responsibility behaviors. The study takes Chinese A-share private listed companies from 2010 to 2017 as data samples, to empirically test the relationship between CEO birth order and firms' CSR behaviors. The empirical results show that there is a significant and negative relationship between CEO birth order and firms' CSR behaviors. In other words, earlier-born CEOs tend to implement more CSR than later-born CEOs, while the later-born CEOs are inclined to take less CSR behaviors. The findings of this paper are basically consistent with the previous literature of sibling prosocial behaviors and sibling rivalry (Zheng L. J. et al., 2021; Zheng M. et al., 2021). It suggests that earlier-born individuals are more likely to exhibit prosocial behaviors to their siblings and others. By contrast, later-born individuals are generally the ones being cared for, so they are more self-concerned and have less prosocial preferences.

This study further investigates the moderating role of the presence of a female sibling and sibling age gap on the relationship between CEO birth order and firms' CSR behaviors. The results show that the influence of CEO birth order on CSR behaviors will be weakened when the focal CEO has a female sibling. The above results support the view of female socialization, which proposes women usually have higher social preferences and tend to positively influence their family members' prosocial behaviors (Cronqvist and Yu, 2017). Moreover, the negative relationship between CEO birth order and firms' CSR behaviors would be weaker when there is a larger age gap between a CEO and the closest sibling, and stronger when the age gap is smaller. The conclusion indicates that a smaller age gap intensifies the sibling rivalries and reduces siblings' prosocial bias, which is primarily in line with the study of Campbell et al. (2019).

## Implications

### Theoretical implication

This paper has three theoretical implications for the existing literature: First, the research on family sibling effect is extended from the field of social psychology to the business context. This paper enriches the studies on the influence of executives' early life experience on corporate strategic decision-making. The research on

family sibling effect in the field of social psychology mainly focus on the influence of sibling effect on an individual's internal psychology or external behavior. As an individual, a CEO's early family life inevitably affects their cognitive formation and behavior preferences, which will be brought forward to the strategic decision of the enterprises they manage.

Second, this study enriches the research on the driving factors of CSR and finds a new driving factor of CSR behaviors. Existing research has explored the driving factors of firms' CSR behaviors from the perspective of CEO traits and adulthood experiences (McCarthy et al., 2017; Tang et al., 2018; Hegde and Mishra, 2019), but few studies focus on the influence of CEOs' early family life experiences on CSR. From the perspective of CEOs' early family traits, this paper investigates the influence of CEO birth order on the CSR behaviors of the company they serve in the adulthood. Our research shows that CEO birth order shapes their personal prosocial tendency by influencing the sibling rivalry and prosocial preferences, which directly influences the firms' CSR behaviors.

Third, this paper expands the upper echelon theory by examining the effect of executives' family traits and childhood experiences on corporate social responsibility behaviors. Many studies based on the upper echelon theory have focused on the impact of CEOs' demographic characteristics and work experience on CSR behaviors (McGuire et al., 2003; Deckop et al., 2006; Tang et al., 2015, 2018), neglecting the important role of early family experiences on CEOs' behavioral preference and corporate decision-making. From the perspective of CEOs' early family experiences, this paper studies how birth order affects corporate social responsibility behaviors by influencing CEOs' prosocial tendencies, which is conducive to a profound understanding of the influence of CEOs' early experiences on their business behaviors and decision-making.

### Policy recommendations

There are also two main practical implications: First, it provides a further reference for listed companies that are concerned about corporate social responsibility to consider individuals' early family context when recruiting executives. For listed companies that pay attention to CSR, the number of siblings, birth order, and other early family environment should be taken into consideration when selecting CEOs, so as to ensure the effective performance of corporate social responsibility and maintain firms' sustainable development. Second, CEOs should be aware of the impact of birth order and other early family traits on their decision-making. Earlier-born CEOs tend to engage in more prosocial behaviors and take more appropriate social responsibility strategy. In contrast, later-born CEOs are more likely to adopt less CSR behaviors at their job. Therefore, CEOs

need to acknowledge the association between birth order and firms CSR performance when making strategic decisions. Third, the study encourages enterprises to establish effective corporate governance structure and mechanisms to supervise the behaviors of executives and make corporate decisions free from the influence of executives' personal preferences. The absence of effective supervision mechanisms increases executives' opportunism, which enables executives to make decisions based on personal preferences rather than corporate interests. Hence, it is necessary to improve corporate supervision mechanisms through the optimization of corporate governance structure and governance mechanisms.

### Research limitations

This study mainly has the following limitations: First, we theorized that CEO birth order influences firms' CSR behaviors through affecting sibling rivalry and shaping other-regarding preferences, but we cannot directly examine the birth order effect of the past sibling rivalry and family life experience. Although we further tested the hypothesis through moderators to provide additional evidence to our conclusion, there is still a need to explore a proper way to deeply investigate the internal mechanism behind CEO birth order effect. Second, we only chose Chinese private enterprises with CEO sibling data as research samples, there may be endogeneity problems especially caused by sample-selection bias. Although we have used a Heckman two-stage model to deal with the endogeneity problems, future studies are still needed to further investigate CEO sibling effect with more comprehensive samples. Third, this paper only studies the influence of CEOs' sibling effects on firms' CSR behaviors, but does not consider different situational contexts. Future research can further investigate the influence of regional economic development level, cultural factors, and other factors on CEOs' sibling effects and business behaviors. Fourth, due to the limitations of the research sample, this paper only uses the data from 2010 to 2017 for empirical analysis. Future research can further expand the research sample and examine the influence of situational factors, such as the COVID-19 epidemic.

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## 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

MZ provided the overall conceptual model and wrote the original manuscript. GR modified the manuscript and provided ideas and suggestions for revision. SW and ZJ provided supplementary data and analysis for the revision. All authors contributed to the article and approved the submitted version.

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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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# Dark triad and cyber aggression among Chinese adolescents during COVID-19: A moderated mediation model

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During the COVID-19 pandemic, the use of online learning has become a necessary choice for students, and would increase the probability of cyber aggression (CA). Despite the relationship between Dark Triad and CA previous was explored in previous research, the underlying psychological mechanism of CA in adolescents is still unclear. The current study aimed to examine the mediating role of moral disengagement (MD) and the moderating of gender in the relationship between Dark Triad and CA. A sample consists of 501 Chinese adolescents (246 females; 255 males) between the ages of 11~20. Participants completed the Dirty Dozen Scale, Moral Disengagement Scale, and Cyber Aggressive Behavior Scale. Results show that higher levels of dark personality were associated with higher levels of MD and CA. Moral disengagement partially mediated this positive effects of dark personality on CA. Moreover, gender moderated the mediation model. Specially, the positive relationship between dark triad personality and CA was stronger among females adolescents. These findings advance the understanding of how dark triad personality induces Chinese adolescents' cyber aggressive behavior.

## KEYWORDS

dark triad, cyber aggression, moral disengagement, gender differences, adolescents

## Introduction

Due to the rapid expansion of the internet and the popularization of computers and smartphones, cyber aggression (CA) has gradually become an important public health problem with serious implications for adolescents' social relations, academic performance and mental health (Grigg, 2010; Modecki et al., 2014). CA refers to a new kind of aggressive behavior in which online technology and mobile devices are used to harm others for malicious purposes (Grigg, 2010; Zhang and Zhao, 2020). Whenever one intends to harm an individual or group of individuals through internet, they are engaging in cyber aggressive behavior. Youth can also be victims of CA as well as perpetrators. For example, the number of adolescents who have attacked others on social media was approximately 52% (Festl and Quandt, 2013), and 75% of adolescents reported experiencing CA through their use of the internet (Chapin, 2016). The use of cyber aggressive behavior among teenagers presents a

significant threat, not just to the victims, but also to the perpetrators' mental and physical health. Number of research found that CA is linked to traditional bullying (Modecki et al., 2014), mental health problems (Mishna et al., 2018), substance use (Crane et al., 2021), delinquent behavior (Farrell et al., 2020), and suicidal ideation (Schenk and Fremouw, 2012). As a result, a large number of researchers have been devoted to exploring potential factors that can inhibit cyber aggressive behavior so as to weaken and reduce it.

In numerous disciplines, scholars explore the predictors of CA from a variety of perspectives. The focus of cognitive scientists, psychologists, and behavioral economists is often on individual factors such as negative emotions, self-control and personality trait (Pabian et al., 2015; Zhang and Zhao, 2020), while educationalists and sociologists usually emphasize external social forces, including social circumstances and moral norms (Wright et al., 2020; Bullo and Schulz, 2022). However, research involving Chinese adolescents remain scarce (Zhang and Zhao, 2020; Zhu et al., 2020), partly due to the restricted use of network electronic products. The occurrence of the COVID-19 pandemic has changed this status quo. Chinese children and adolescents have to learn online and interact with teachers and classmates through the Internet, which might significantly increase CA in adolescents. Hence, it is urgent to explore the potential influential factors of CA in order to reduce its negative impacts.

## Literature review and research hypotheses

### Dark triad and cyber aggressive behavior

Cyber aggression involves intentional damage delivered *via* digital means to another person or persons (Corcoran et al., 2015), including online stalking, harassment, flaming, use of profanities and group exclusion (Mladenović et al., 2021). Youth, in particular, are adversely affected by CA, which makes it an urgent issue for school districts, communities, and governments. According to the personality process model of CA (Gammon et al., 2011), the Dark Triad (DT) is an important predictor variable influencing CA. The dark triad consists of three interrelated characteristics, namely, Machiavellianism, psychopathy, and narcissism (Paulhus and Williams, 2002). Specifically, Machiavellianism is characterized by disregarding moral principles in order to accomplish goals (Jones and Paulhus, 2010); psychopathy is a personality trait represented by impulsivity, lack of responsibility and empathy (Patrick et al., 2009); narcissism is a normal and continuously distributed personality trait, which is often characterized by extreme arrogance, superiority, privilege and deprivation (Krizan and Herlache, 2018). These traits are characterized by some common features, e.g., violating social values (Kajonius et al., 2015), social aversive callousness (Jones and Paulhus, 2010), a fast and

exploitive life history strategy (Jonason and Webster, 2010), reduce empathy (Heym et al., 2019), disagreeableness, and impulsivity (Paulhus and Williams, 2002).

In general, the dark triad is associated with a wide variety of negative problems, such as antisocial behaviors (Sijtsema et al., 2019), delinquency (Alsheikh Ali, 2020), internet addiction (Lee and Lim, 2021), aggressive behaviors (Zhu and Jin, 2021), and cheating behavior (Nicholls et al., 2020). Moreover, number of studies have demonstrated that adolescents' dark triad traits are positively correlated with a wide range of aggression in real life, such as physical and verbal aggression (Jones and Neria, 2015), reactive/proactive aggression (Dinić and Wertag, 2018), relational aggression (Erzi, 2020), bullying (Davis et al., 2022), and driving aggression (Ball et al., 2018). In addition, previous empirical research also indicated that dark triad traits significantly predict adolescents' CA (Moor and Anderson, 2019; Zhang and Zhao, 2020; March and Marrington, 2021). Therefore, based on the above, current research highlights dark personality as an predisposing risk factor that significantly predicts potential cyber aggressive behavior. Based on the above analysis, we propose the following hypothesis. Hypothesis 1: High DT could result in higher adolescents' CA during the COVID-19 pandemic.

### Mediating effect of moral disengagement

In previous studies, it has been noted that dark triad personality traits in adolescents correlate with their CA (Pabian et al., 2015; Moor and Anderson, 2019), but the potential psychological mechanisms involved have never been fully understood. Moral disengagement (MD) is one potential explanation for the proposed influence of dark triad characteristics on adolescents' CA. MD is characterized by eight different cognitive mechanisms that enable individuals to violate internalized moral norms and to act unethically without guilt (Moore, 2015). According to social cognitive theory (SCT, Bandura 1989), individuals usually act in prosocial ways and avoid antisocial behaviors due to internal standards. However, people could adopt MD to rationalize their immoral acts, thereby reducing their negative self-judgment and guilty feelings (Bandura et al., 1996). Following this reasoning, numerous empirical and review studies had found that MD promotes various unethical behaviors in adolescents, including aggression, bullying, and cyber bullying (Killer et al., 2019; Bjärehed et al., 2020; Falla et al., 2021; Lo Cricchio et al., 2021). For example, a systematic review found that MD was significantly related to cyber bullying even after the roles of moderating variables were controlled (Lo Cricchio et al., 2021). Thus, MD in adolescents would be speculated as positively associated with their CA.

In addition, based on the life history theory (McDonald et al., 2012), the common characteristics of Dark triad, including

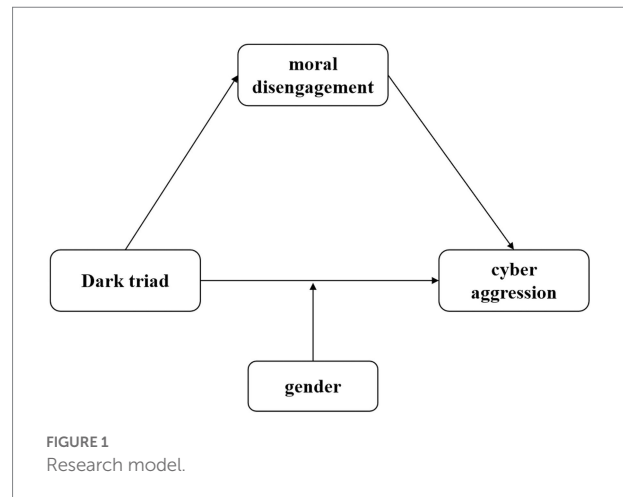
egoism, violating social values, and emotional coldness, might enhance promote the possibility of justifying immoral consequences through MD (Sijtsema et al., 2019). Some research have demonstrated that Dark Triad personality is associated with MD (Egan et al., 2015; Sijtsema et al., 2019; Erzi, 2020; Kapoor et al., 2021). Therefore, it is expected that the Dark triad personality will has a positive relationship with MD. In summary, it is hypothesized that adolescents with a higher Dark triad personality trait tend to rely more on MD strategies, which then could promotes their cyber saggession during the COVID-19 pandemic. In light of the above analysis, we develop the second hypothesis. Hypothesis 2: MD could mediate the association between DT and adolescents' CA.

## Moderating effect of gender

Gender is another important factor of interest for our research. Social role theory (SRT, Eagly and Wood, 1999) argues than men and women were assigned different gender roles and stereotypes, which make females act in a more selfless and communal oriented manner than males in a variety of social situations. Consequently, empirical and meta-analytical studies have found that males consistently reported higher scores on dark triad personality (Jones and Weiser, 2014; Muris et al., 2017). In addition, studies on CA indicated that women are prone to engage in relational and indirect CA, while men engage in more direct and physical CA (Carbone-Lopez et al., 2010; Nocera and Dahlen, 2020). Moreover, it might be that males are more prone to involvement in cyber aggressive behaviors than females, because of their higher levels of dark personality features.

In reality, findings regarding gender differences in relations between dark triad and CA are limited and inconclusive. Some researcher found that Machiavellianism (Kircaburun et al., 2018) and grandiose manipulative trait (a sub construct of psychopathy; Ciucci et al., 2014; Orue et al., 2016) better predict CA among men, whereas others indicated that callous-unemotional trait (another sub construct of psychopathy; Orue et al., 2016) and psychopathy (Zhu and Jin, 2021) was more strongly related to aggression in girls. However, other studies shown that gender could not moderate these relationship (Nocera and Dahlen, 2020; Wright et al., 2020). Thus, it becomes essential for examining the gender differences between these variables. Taken together, according to SRT and previous findings, we hypothesize that Dark triad personality are more strongly associated with CA for males than females. Therefore, we further propose the third hypothesis. Hypothesis 3: DT would be more strongly associated with CA for males than females.

To sum up, based on social cognitive theory and social role theory, the intention of present study is to investigate a moderated mediation model to outlines the mechanism underlying the connection between DT and Chinese



adolescents' CA during the COVID-19 pandemic. Figure 1 depicts the research model.

## Materials and methods

### Participants and procedure

As a method of testing the proposed model, questionnaire survey method was used in this study to collect research data. The data are mainly from junior high school students in Henan Province, China. An experienced research assistant distributed and gathered the survey data, and all aspects of the survey process were standardized. Students in one middle school were surveyed over a 2-week period in October 2020. Approval for this study was obtained from the ethics committee of the Faculty of Education, Henan Normal University.

Our survey consisted of three questionnaires. A number of commonly used control variables were also added to the study, such as age, gender, grade, etc. Data were collected in a voluntary and anonymous manner to prevent societal expectations and response biases. Specifically, we informed participants that all data would be used for scientific research and would not be linked to their personality traits or academic assessments. At any time, they can leave if they feel uncomfortable. A total of 600 questionnaires were distributed to students who took a group test, and 521 questionnaires were collected, with an initial recovery rate of 86.83%. As a result of suspicious responses and missing values, 20 of the 521 cases were removed. The effective response rate was 83.50% after removing 20 cases.

The final valid sample consisted of 255 boys (50.90%) and 246 girls (49.10%) between the ages of 11 and 20 ( $M = 14.01$ ,  $SD = 1.07$ ). Among them, 87 (17.37%) were in the seventh grade, 206 (41.12%) were in the eighth grade, and 208 (41.51%) were in the ninth grade. With the help of a well-trained research assistant, participants completed the measures voluntarily in regular schoolrooms. Subjects were required to provide written or oral informed consent. The research lasted approximately 25 min.

## Measures

### Dark triad

Adolescents' dark personality characteristics was evaluated by adopting the 12 items version of the Dirty Dozen Scale (DDS, Jonason and Webster, 2010). Each characteristic contains four items: Machiavellianism (e.g., "I have use flattery to get my way."), psychopathy (e.g., "I tend to be cynical.") and narcissism (e.g., "I tend to want others to admire me."). The Chinese version had been validated by Geng et al. (2015), and was used in this study. Participants assessed each item on a seven point scale ranging from 1 (strongly disagree) to 7 (strongly agree), with higher average score on the subscale reflecting higher dark personality. The Cronbach's  $\alpha$  of Machiavellianism, psychopathy and narcissism were 0.83, 0.70 and 0.84 in present study, respectively.

### Moral disengagement

Adolescents' MD was assessed by adopting the 8 items version of Moral Disengagement Scale (MDS, Moore et al., 2012). Questions for example, "Taking something without the owner's permission is okay as long as you are just borrowing it." The Chinese version has been validated (Zheng et al., 2019) and was used in the present study. Subjects was asked to rate the items on a five point scale (1 = totally disagree, 5 = totally agree), with higher the overall mean score implying a stronger level of MD. The Cronbach's  $\alpha$  coefficient of this scale is 0.88 in this study.

### Cyber aggression

The Cyber Aggressive Behavior Scale, developed by Zhao and Gao (2012) in China, was used to explore adolescents' CA. This scale consists of 31 items and two subscales: instrumental aggression and reactive aggression. This study only uses the instrumental aggression subscale which contains 15 items, e.g., "In order to get the results I want, I often insult and scold others when playing online games." All items were scored on a four-point scale (1 = never, 4 = always) by the participants, with higher the overall mean score reflecting a stronger level of cyber aggressive behavior. The Cronbach's  $\alpha$  coefficient of this scale with the current sample is 0.91.

## Data analysis

All data analysis were completed in SPSS 26.0 and Process macro developed by Hayes (2017). The first step was to calculate descriptive statistics for all variables and to perform correlation analysis on them. The second step was to examine the mediated role of MD by applying Model 4. After that, Model 5 was examined to determine whether gender could moderate the indirect path between MD and adolescents' CA. All study variables were standardized, and the bias-corrected bootstrapping method with 5,000 samples was conducted.

## Results

### Descriptive statistics and correlation analysis

The descriptive statistics are reported in Table 1. Gender differences were explored, and males scored significantly higher than females on the dark triad personality, MD, and CA scores. Correlational analysis is reported in Table 2. The results found that dark triad traits were positively related to MD and CA. A negative correlation was found between MD and CA. These results implied that individuals with a dark personality have stronger CA, which supports Hypothesis 1.

### Mediation effect analysis

To determine the mediating role of MD between DT and CA, mediation analysis was conducted by using Model 4. Gender and age were included as control variables to reduce potential confounding effects. A summary of the results was shown in Table 3. First, Machiavellianism had positive correlations with MD ( $\beta = 0.32, p < 0.001$ ), which in turn was positively related to CA ( $\beta = 0.23, p < 0.001$ ). Machiavellianism and CA were still significantly connected in a positive way ( $\beta = 0.31, p < 0.001$ ). Thus, Machiavellianism and CA are linked partly through MD ( $b = 0.07, 95\% \text{ CI} = [0.03, 0.12]$ ). In total, MD mediated 23.49% of the impact. Second, psychopathy was positively linked to MD ( $\beta = 0.28, p < 0.001$ ), which was, in turn, positively linked with CA ( $\beta = 0.23, p < 0.001$ ). The direct path between psychopathy and CA remained significant ( $\beta = 0.29, p < 0.001$ ). Hence, psychopathy and CA were associated partly through MD ( $b = 0.07, 95\% \text{ CI} = [0.03, 0.11]$ ). MD is responsible for 23.49 percent of the total impact. Third, narcissism positively predicted MD ( $\beta = 0.22, p < 0.001$ ), which in turn positively predicted CA ( $\beta = 0.27, p < 0.001$ ). There was a significant direct relationship between narcissism and CA ( $\beta = 0.19, p < 0.001$ ). Therefore, MD mediated the relationship between narcissism and CA ( $b = 0.06, 95\% \text{ CI} = [0.03, 0.10]$ ). The mediation effect of MD was responsible for 30.99% of the influence. In summary, these findings indicated that adolescents'

TABLE 1 Descriptive statistics according to gender and t-test scores.

	Female (N = 246)		Male (N = 255)		t
	M	SD	M	SD	
Machiavellianism	1.48	0.79	1.91	1.27	-4.57**
Psychopathy	1.83	0.91	2.14	1.18	-3.29**
Narcissism	2.74	1.44	3.29	1.65	-4.01**
Moral disengagement	1.47	0.60	1.77	0.79	-4.79**
Cyber aggression	1.16	0.34	1.24	0.36	-2.74**

\*\* $p < 0.01$ .



TABLE 2 Bivariate correlations matrix of all variables ( $N=501$ ).

	1	2	3	4	5
1. Machiavellianism	1.00				
2. Psychopathy	0.54**	1.00			
3. Narcissism	0.38**	0.40**	1.00		
4. Moral disengagement	0.35**	0.31**	0.28**	1.00	
5. Cyber aggression	0.32**	0.31*	0.22**	0.32**	1.00

\* $p < 0.05$ , \*\* $p < 0.01$ .TABLE 3 Testing the mediation effect of moral disengagement ( $N=501$ ).

Variables	Model 1 (CA)		Model 2 (MD)		Model 3 (CA)	
	$\beta$	$t$	$\beta$	$t$	$\beta$	$t$
Machiavellianism	0.31	7.12**	0.32	7.54**	0.23	5.29**
MD					0.23	5.06**
$R^2$	0.34		0.39		0.40	
$F$	21.69**		29.11**		23.48**	
Psychopathy	0.29	6.85**	0.28	6.58**	0.23	5.24**
MD					0.24	5.36**
$R^2$	0.33		0.36		0.40	
$F$	20.40**		24.31**		23.33**	
Narcissism	0.19	4.40**	0.22	5.13**	0.13	3.06**
MD					0.27	6.14**
$R^2$	0.25		0.32		0.36	
$F$	10.96**		18.35**		18.25**	

MD, moral disengagement; CA, cyber aggression. \*\* $p < 0.01$ .

MD mediates the connection between DT and CA. In light of this, Hypothesis 2 was confirmed.

## Moderated mediation effect analysis

Hypothesis 3 implied that gender might moderate the direct impact of DT on CA. Model 5 of the Process macro was adopted to examine this hypothesis. A summary of this results was shown in Table 4. Model 2 of Table 4 shown that the interaction between Machiavellianism and gender had a significantly negative association with CA ( $\beta = -0.10$ ,  $p < 0.05$ ). The slope test indicated that the influence of Machiavellianism on CA was stronger in females ( $\beta = 0.37$ ,  $p < 0.001$ ) than males ( $\beta = 0.18$ ,  $p < 0.001$ ; see Figure 2A). Moreover, the interaction between psychopathy and gender also had a significantly negative relationship with CA ( $\beta = -0.09$ ,  $p < 0.05$ ). The slope test implied that psychopathy was more effective in causing CA in women compared to males ( $\beta = 0.34$ ,  $p < 0.001$ ) than males ( $\beta = 0.16$ ,  $p < 0.01$ ; see Figure 2B). Finally, the interaction between narcissism and gender had a significantly negative connection to CA ( $\beta = -0.11$ ,  $p < 0.05$ ). The slope test indicated that the influence of narcissism on CA was stronger in females ( $\beta = 0.26$ ,  $p < 0.001$ ) than males ( $\beta = 0.04$ ,

$p > 0.05$ ; see Figure 2C). Because gender moderates the direct association between adolescents' DT and CA, Hypothesis 3 was verified.

## Discussion

The current study showed that dark triad were positively related to CA among Chinese adolescents, which supported Hypothesis 1. A increasing number of studies have shown that adolescents with high dark personalities tend to engage in aggression, CA, bullying, and antisocial behavior (Moor and Anderson, 2019; Zhang and Zhao, 2020; Zhu and Jin, 2021). In line with these previous studies, these findings observed that all subsets of dark triad personality could significantly predict adolescents' CA, which might be attributed to their common evil, malevolent and callous features (Book et al., 2015; Muris et al., 2017).

Consistent with Hypothesis 2, the findings showed that MD mediated the connection between all subsets of the dark triad personality and adolescents' CA. In other words, adolescents high in dark triad personality are more prone to justify immoral consequences, which consequently leads to a rise in cyberattacks. Researchers have previously found that dark triad personality shares some common characteristics, including egoism, violating social values, and emotional coldness, which might enhance the possibility of justifying immoral consequences through MD (Erzi, 2020; Kapoor et al., 2021). In line with these results in Western culture, this study found that dark personality is positively associated with MD among Chinese adolescents. Moreover, adolescents' MD was positively correlated with CA. Previous research has indicated that MD promotes various unethical behaviors in adolescents, including aggression, bullying, and cyber bullying (Bjärehed et al., 2020; Falla et al., 2021; Lo Cricchio et al., 2021). Consistent with these previous results, our findings supports social cognitive theory (Bandura, 1989) in Chinese culture. In summary, such findings revealed that MD plays a partial mediating role in the association between all dimensions of the dark personality and CA.

Another outstanding contribution of the current study was that gender moderated the association between all subsets of the dark triad personality and adolescents' CA. These findings help clarify patterns of gender differences in linking dark personality with adolescents' CA. Contrary to Hypothesis 3, it was observed that all subsets of dark triad personality traits are more strongly associated with CA for women than for men. Most previous studies have demonstrated that Machiavellianism (Kircaburun et al., 2018) and grandiose manipulative trait (a sub construct of psychopathy; Ciucci et al., 2014; Orue et al., 2016) better predict CA among men. In contrast to these findings, this research found that a females' dark personality was more strongly related to CA. Previous studies found that gender differences in CA were influenced by adolescents' age, gender stereotype, and the types of behaviors. Wright (2020) found that adolescents who display more

TABLE 4 Testing the moderated mediation model (N=501).

Variables	Model 1 (MD)			Model 2 (CA)		
	$\beta$	$t$	95% CI	$\beta$	$t$	95% CI
Machiavellianism	0.35	8.36**	[0.268–0.432]	0.27	5.66**	[0.181–0.373]
MD				0.23	5.09**	[0.139–0.314]
Gender				0.03	0.58	[–0.059–0.110]
Machiavellianism $\times$ Gender				–0.10	–2.01*	[–0.188–0.002]
$R^2$	0.36			0.41		
$F$	36.23**			19.71**		
Psychopathy	0.31	7.19**	[0.223–0.391]	0.25	5.55**	[0.160–0.335]
MD				0.25	5.58**	[0.161–0.335]
Gender				0.04	0.92	[–0.045–0.123]
Psychopathy $\times$ Gender				–0.09	–1.98*	[–0.172–0.001]
$R^2$	0.31			0.41		
$F$	27.17**			19.56**		
Narcissism	0.25	5.88**	[0.170–0.340]	0.15	3.39**	[0.063–0.235]
MD				0.27	6.21**	[0.187–0.359]
Gender				0.05	1.04	[–0.040–0.130]
Narcissism $\times$ Gender				–0.11	–2.56*	[–0.194–0.025]
$R^2$	0.26			0.37		
$F$	18.56**			16.07**		

Gender was coded as binary variable (0 = female and 1 = male). MD, moral disengagement; CA, cyber aggression. \*\* $p < 0.01$ .

feminine characteristics engaged in more cyber relational aggression through social networks and mobile devices. Hence, one potential explanation is that traditional Chinese women have stronger feminine traits, which might, in turn, enhance the effect of dark personality on CA. Furthermore, Barlett and Coyne (2014) indicated that age can modulate gender differences in cyberbullying, with females reporting more cyberbullying during early adolescence. Thus, another possibility could be that the sample was drawn from the early adolescent age range, which might further reinforce the connection between dark personality and girls' CA. More research needs to be conducted to examine the interaction of dark triad traits, gender and/or gender stereotypes on CA in different age ranges and types of CA.

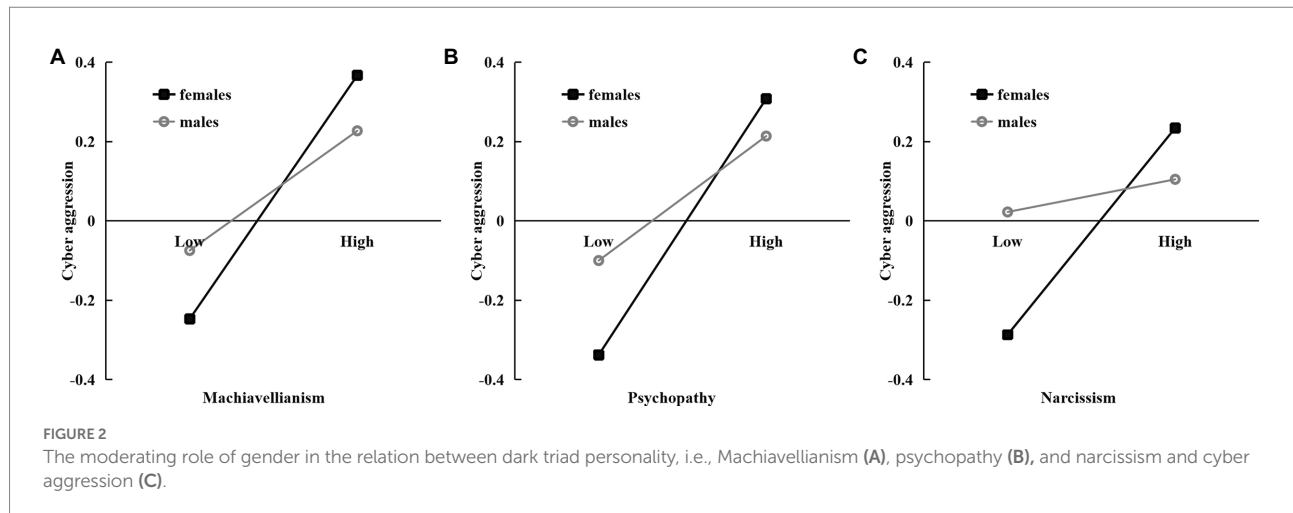
## Implications of the study

Moderated mediation models, not only reveal the cognitive mechanisms by which dark triad personality leads to cyber aggressive behavior (the mediating role of MD), but also shed light on the underlying individual differences (the moderating role of gender). These results answer the question of how dark triad personality induces aggressive behavior in junior high school students. The study also clarifies the question of among which group of people the direct predictive impact of dark triad personality on cyber aggressive behavior and the indirect effect of MD are more prominent. Therefore, training to weaken MD and effectively prevent and intervene with campus attacks contributes to building a harmonious campus and educational inspiration.

First, moral education work in junior high schools should focus on weakening dark triad personality consciousness. Through the promotion of traditional Chinese mean culture, the demonstration of collectivism, and the training of appropriate MD, students should be motivated to understand themselves objectively and accurately. This proper self-awareness avoids the negative results of excessive selfishness, thereby, effectively reducing campus aggression. Second, schools should provide effective moral attribution training to reduce the MD ability of junior high school students, and thereby realize the model and institutionalization of moral attribution training. Finally, in the process of moral education, educators should focus on dark triad personality intervention and moral attribution training for girls, thereby attenuating their moral detachment and reducing the occurrence of aggressive behavior.

## Limitations and future research

Similar to other studies, this study has various limitations. First, this research used a cross-sectional design, which might restrict its ability to determine causality. Further study should consider the use of longitudinal or experimental designs to confirm causal relations. Second, given that the subjects were recruited from the same junior middle school in China, the extent to which the findings generalize to other age groups is restricted. Future studies could recruit a sample representing the full age range and explore whether age moderates the proposed patterns. Finally, multiple factors (e.g., empathy and emotional intelligence)



may also affect the link between dark triad personality and CA. Future studies might try to incorporate more variables.

## Conclusion

The present study was conducted to examine the psychological mechanisms that might underlie CA in Chinese adolescents, which promoted a better understanding of the association between dark triad personality and CA. The results of present study shown that (1) The dark triad personality subtypes are all significantly positive for CA; (2) MD mediates the connection between all subsets of the dark triad and CA among adolescents; and (3) all subsets of dark triad personality are more effective in causing CA in women compared to males.

As a result of these findings, the literature on CA on university campuses is enriched in important ways. These results also contribute to a growing understanding of how dark triad personalities results in CA. Moreover, we revealed that that MD, as a set of cognitive strategies, can enhance the positive effect of dark triad personality on CA. All of these conclusions imply that school administrators and teachers should prevent overuse of MD strategies when designing psychological interventions to reduce CA, especially for girls.

## 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 University Ethics Committee at the Henan

Normal University. Written informed consent to participate in this study was provided by the participants' legal guardian/next of kin.

## Author contributions

CQ and ZZ designed the experiment. HZ and SB collected and analyzed the data. CQ, SB, and ZZ wrote the manuscript. All authors contributed to the article and approved the submitted version.

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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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# Workplace friendship, employee well-being and knowledge hiding: The moderating role of the perception of Chaxu climate

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In recent years, knowledge hiding has become a hot topic in the field of organizational behavior because of its great harm. However, relevant studies have focused only on the negative interpersonal antecedents of knowledge hiding but neglected the inhibition effect of positive informal relationships on the behavior. To fill this gap, the current study develops a moderated mediation model to investigate how and when workplace friendship has a negative impact on knowledge hiding. Drawing on social exchange theory (SET), we propose that workplace friendship inhibits knowledge hiding through the mediating role of employee well-being, with the Perception of Chaxu climate acting as a boundary condition. Using data from a two-wave time-lagged survey of 279 employees in China, the results show that workplace friendship has a negative impact on knowledge hiding behavior. Specifically, workplace friendship inhibits knowledge hiding by satisfied employee well-being, i.e., workplace friendship has a positive impact on employee well-being, while employee well-being has a negative impact on knowledge hiding. Perception of Chaxu Climate moderates the indirect effect, as the level of employee's Perception of Chaxu climate rises, the direct effect of workplace friendship on employee well-being is stronger, so as the indirect effect of workplace friendship on knowledge hiding. This article explores the mechanisms affecting employee knowledge hiding from a new interpersonal perspective of workplace friendship. It is enlightened that firms should pay attention to the management of workplace friendship, provide employee with opportunities to establish workplace friendship while providing proper guidance on the direction of workplace friendship and improving the quality of it, in order to promote employees' happiness perception and organizational knowledge management ability.

## KEYWORDS

workplace friendship, employee well-being, knowledge hiding, perception of Chaxu climate, social exchange theory

## Introduction

The knowledge-based view emphasizes that the enterprise is a knowledge-processing system that takes employees as the carrier to realize knowledge sharing in various ways to gain competitive advantages (Lakshman et al., 2021). Therefore, knowledge sharing has become a crucial way to promote employees' knowledge creation and sustainable development of enterprises (Batistič and Poell, 2022). However, most employees are unaware of the importance of knowledge sharing and may even consider knowledge as a limited resource that needs to be hidden (Qin et al., 2021). For example, a survey by Peng (2013) showed that 46 percent of Chinese employees admitted that they had knowledge hiding behavior to their colleagues when their colleagues asked them for "knowledge help," suggesting that knowledge hiding is widespread in companies (Jiang et al., 2019; He et al., 2021). Knowledge hiding refers to the behavior of employees who deliberately choose to conceal and retain knowledge for certain purposes when their colleagues ask them for help (Connelly et al., 2012). This behavior is prone to serious consequences for the organization and can hinder the effective sharing and utilization of knowledge in the workplace (Garg and Anand, 2020; Butt, 2021). And previous studies have also shown that it can damage interpersonal relationships, reduce creativity, and increase mistrust among employees, leading to a vicious circle (Černe et al., 2014). Therefore, understanding more about the causes of knowledge hiding behavior and inhibiting it has great significance for the common development of employees and organizations.

As a typical interactive behavior among organizational members, the influence of interpersonal factors on knowledge hiding has attracted the interest of many scholars (Zhao and Xia, 2019). Relevant studies have particularly focused on the negative interpersonal antecedents of the behavior, such as workplace ostracism, workplace negative gossip, and employee mistrust (Connelly et al., 2012; Zhao et al., 2016), expecting to understand the mechanism of the occurrence of knowledge hiding for better interventions (He et al., 2020), but neglecting the important role of positive coworker relationships in inhibiting this behavior. Among interpersonal relationships, workplace friendship, which has a double goal of being instrumental and valued, plays an extremely critical role in employees' behavioral attitudes and intentions (Enwereuzor et al., 2022). As a non-exclusive interpersonal relationship between organizational members involving trust, commitment, mutual affection, and common interests (Berman et al., 2002), workplace friendship not only triggers positive emotion, cognition, and organizational citizenship behavior among employees but will also inhibit the occurrence of negative individual behavior (Scott et al., 2018; Guohao et al., 2021; Enwereuzor et al., 2022). For example, Zhuang et al. (2020) found that creating a friendly working environment for employees in international tourist hotels can reduce their production deviance, political deviance, property deviance, and personal aggression. However, although scholars have argued that workplace friendship among colleagues can inhibit the occurrence

of negative behavior in organizations, the existing research does not provide a clear answer as to whether knowledge hiding, a type of interpersonal deviant behavior of employees, is negatively influenced by workplace friendship and what specific mechanism exists between them. Thus, it is especially valuable to explore the mechanism of workplace friendship's influence on employees' knowledge hiding behavior.

Furthermore, social exchange theory states that the similarities in individual characteristics drive both members to engage in a variety of high-quality exchange activities (Cropanzano et al., 2017). Since workplace friendship is a spontaneous and informal interpersonal relationship established by employees (Pillemer and Rothbard, 2018), knowing each other's role expectations, individuals on the team will help each other's role expectations by providing relevant resources based on friendship relations (Hsu et al., 2019). Therefore, we consider that reciprocal behaviors triggered by workplace friendship may satisfy organizational members' needs for job fulfillment and self-actualization and, in turn, positively affect employee well-being. Employee well-being refers to the overall quality of employees' experience and efficacy at work (Grant et al., 2007), which usually includes three dimensions: work, psychology, and life. It can reflect the individual's well-being in various ways and is closely related to issues such as work engagement, life satisfaction, and occupational health (Zheng et al., 2015). Previous research has shown that employee well-being as a healthy psychological mechanism has become an essential antecedent factor in the field of organizational behavior to explain employees' behavior and attitudes (Ahmed et al., 2020). Employees with high levels of well-being usually show a strong tendency to exhibit positive behaviors, they are willing to share their knowledge resources and expect to achieve a win-win situation between themselves and the organization through efficient knowledge management (Ali et al., 2021). Indeed, while the management literature emphasizes the importance of employee well-being in prompting better individual and organizational outcomes, few studies have investigated the well-being of Chinese employees and the behavioral tendencies of these employees to hide their knowledge in the context of workplace friendship. Therefore, to fill the above-mentioned gaps, this study incorporates employee well-being into the exploration of mediating mechanisms based on moral cleansing theory, in order to further clarify the intrinsic mechanisms of workplace friendship and employees' knowledge hiding behavior.

In addition, according to social exchange theory, the quality of interpersonal exchange is often influenced by many factors such as individual characteristics, values, and cultural backgrounds of employees (Cropanzano et al., 2017). Especially under the influence of Confucianism's "guanxi" and "circle" culture, the cognition and behavior of Chinese employees will have obvious characteristics of the Chaxu climate (He et al., 2017). This means that in workplace friendships, individuals also follow the social norms of proximity and inferiority, and habitually categorize themselves as "insiders" or "outsiders" on the basis of the difference in their relationship with the leader, which has a

destructive effect on the formation of reciprocal relationships among the organization/group (Song and Guo, 2022). As described by Shen et al. (2019), Among the traditional cultures, the Chaxu social structure with the value of “kinship and respect” is prevalent in Chinese companies, not only forming a Chaxu climate mainly characterized by the “circle culture” within the organization (Shen et al., 2019), but also plays an important role in shaping the mindset and behavior of Chinese employees (Chen et al., 2014). When employees perceive more pronounced differential treatment from their leaders, namely the more intense perception of a Chaxu climate, they may experience a stronger sense of “marginalization” (Chen et al., 2014) and even lose trust in other members (Wang et al., 2017), which in turn hinders knowledge exchange and sharing within the team (Peng and Zhao, 2011). However, few studies have explored the impact of employees’ perception of Chaxu climate on their own behavior (Shen et al., 2019). Therefore, we intend to introduce social exchange theory to explore the negative effect of workplace friendship *via* employee well-being on their knowledge hiding, and to examine the moderating effect of employees’ perception of Chaxu climate in this process. The theoretical model is shown in Figure 1.

This study contributes to the existing literature in the following ways. Firstly, this study extends the research related to knowledge hiding by identifying new antecedent factors. In past studies on the interpersonal antecedents of knowledge hiding, most tend to focus on negative factors or formal organizational relationships, while ignoring the influence of informal and positive interpersonal relationships. Therefore, this study contributes to the research concerning reducing and inhibiting knowledge hiding by exploring the negative influence of workplace friendship on employees’ knowledge hiding behavior based on the perspective of social exchange, shifting the focus of interpersonal antecedents of knowledge hiding from formal to informal relationships and from driving factors to hindering factors. Secondly, by identifying employee well-being as a mediating mechanism between workplace friendship and knowledge hiding

behavior, this study not only enriches the literature on the positive organizational utility of workplace friendship, but also expands the research relevant to employee well-being. In fact, although scholars believe that workplace friendship can inhibit the occurrence of negative behaviors in organizations, existing studies do not provide a clear answer to the question of whether knowledge hiding, as a type of interpersonal deviant behavior of employees, is inhibited by workplace friendship and whether employee well-being plays a mediating role in it. Therefore, our study goes beyond previous literature and empirically examines the role of workplace friendship in promoting employee well-being and how employee well-being is associated with knowledge hiding. Finally, this study identifies that employees’ perceptions of Chaxu climate negatively moderate workplace friendship through the effect of employee well-being on knowledge hiding, expanding the research perspective on the Chaxu climate. The current study mainly investigates the Chaxu climate as an antecedent or outcome variable, but few scholars have analyzed the moderating effect from the perspective of boundary conditions. Our study complements the research on the Chaxu climate by illustrating the moderating role in “workplace friendship-employee well-being-knowledge hiding.”

## Literature review and hypotheses

### Workplace friendship

Interpersonal relationships in organizations include work relationships (e.g., leader/subordinate) and workplace friendship (Berman et al., 2002; Mao and Hsieh, 2017). According to Berman et al. (2002), workplace friendship is defined as a non-exclusive interpersonal relationship in an organization that involves trust, commitment, mutual affection, and shared interests or values, which is often divided into two dimensions: friendship opportunity (i.e., allowing employees to establish informal relationships with each other) and friendship quality (i.e., the

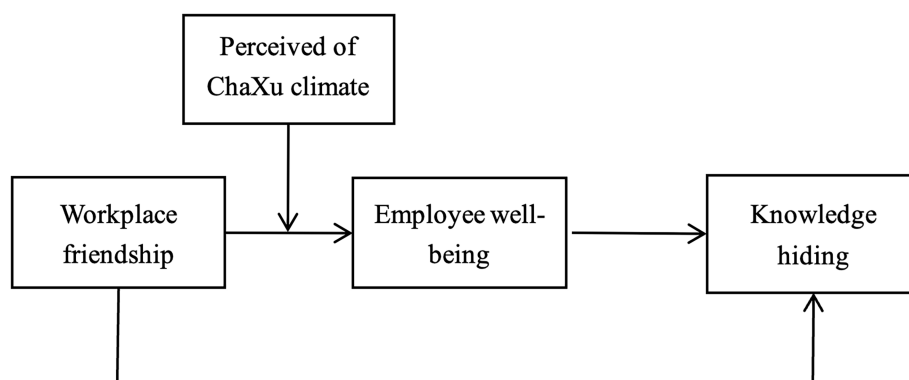


FIGURE 1  
Theoretical model.

extent to which the relationship is maintained between the two members to the friendship and the psychological gains it brings; Nielsen et al., 2000). Pillemer and Rothbard (2018) state that, unlike other positive work relationships, workplace friendship has the following four core characteristics: first, workplace friendship is voluntary relationship and employees establish it through autonomous rather than imposed choices (Yan et al., 2021). Second, workplace friendship is an informal relationship. Unlike other role relationships determined by formal organizational hierarchies, it relatively lacks “standard rituals or terminology” to limit role expectations (Choi and Ko, 2020). Third, workplace friendship is characterized by communal norms or expectations that one will provide support based on his/her needs rather than just reciprocity (Pillemer and Rothbard, 2018). Fourth, workplace friendship is driven by social affective goals (e.g., intimacy, trust) and was designed to meet the affective needs of employees (Hood et al., 2017).

These show that workplace friendship has stronger affective features than other work relationships and has significant impacts on employees’ attitudes, behaviors, and performance. Specially, in the aspect of attitudes, high workplace friendship usually leads to stronger interpersonal networks for individuals. They are more likely to receive supports from friends when completing tasks, and the sense of belonging can be substantially enhanced. As a result, they typically show high psychological security (Cao and Zhang, 2020), high job satisfaction (Fasbender and Drury, 2022) and affective commitment (Guohao et al., 2021). Regarding behavior, workplace friendship can effectively promote employees’ organizational citizenship behavior (Scott et al., 2018) and reduce deviance (Zhuang et al., 2020). These are because of two reasons, one is that workplace friendship facilitates employees’ access to more supportive resources which lead to an increased sense of organizational support (Xiao et al., 2020), and the other is that workplace friendship can stimulate positive reciprocity and develop positive affections and cognitions (Enwereuzor et al., 2022). Finally in terms of job performance, some studies have found that workplace friendship positively impacts job performance (Choi and Ko, 2020), while others have argued that individual in a friendship may experience more frequent and intense socio-affective disruptions because of social interactions, which leads to a decreased individual job performance (Pillemer and Rothbard, 2018). Still others have found that multiple workplace friendships may be a mixed blessing. While providing and restoring resources fostered by multiple relationships benefits employees’ job performance, this also weakens as employees suffer from emotional exhaustion and depletion of personal resources (Methot et al., 2016).

Based on social exchange theory, individuals have the need to reward the benefits of the relationship in order to keep a positive relationship they have received in social interactions, i.e., individuals maintain the positive efficacy by conducting behaviors that can benefit each other. It is the “mutual needs” which lead to social exchange behavior (Croppanzano et al., 2017). According to

this principle of “positive reciprocity,” when an employee’s personal needs are met, he/she will reciprocate to the friends. In practice, employees’ good friendship means there are strong affective connections between employees and colleagues, and between employees and the firm. With the improvement of the interactions, employees will receive stronger organizational supports and happiness perceptions, which will encourage them to show a “positive reciprocity” attitude to reward the organization. They will not only engage in pro-social behaviors (e.g., knowledge sharing) that directly benefit the firm (Enwereuzor et al., 2022), but also pay more attention to their own deviance and willingly reward the firm by inhibiting the deviance (Zhuang et al., 2020), including knowledge hiding. As suggested by Batistič and Poell (2022), if a colleague’s behavior shows his/her trust and concern, the employee will perceive a positive image of the colleague and feel an overall sense of responsibility or desire to reciprocate the behavior. This can lead to a reciprocal cycle, thus reducing knowledge hiding. Therefore, when faced with knowledge requests from colleagues, employees who have great friendships are more likely to response the requests by knowledge assistance in order to reward the colleagues/firm, i.e., they may show a lower intention of knowledge hiding.

## Workplace friendship and knowledge hiding

According to Connelly et al. (2012), knowledge hiding is defined as “the phenomenon of employees deliberately deceiving, misleading and concealing knowledge when facing colleagues’ requests for knowledge assistance,” which contains three specific forms: evasive hiding, playing dumb and rationalized hiding. As a kind of knowledge withholding behavior, knowledge hiding is not equivalent to the opposite of knowledge sharing (He et al., 2021), but the differences lie in the followings: firstly, knowledge not being shared is not entirely due to the individuals lack of willingness to share knowledge, but may also be a result of the non-deliberate ability factors, such as lack of knowledge or unfamiliarity with relevant knowledge; whereas knowledge hiding is the employees’ deliberate and purposeful hiding of the requested knowledge despite having the knowledge. Second, knowledge sharing is a proactive behavior, but knowledge hiding is a reactive behavior, i.e., knowledge hiding is a response to others’ knowledge requests (Burmeister et al., 2019). As described by Connelly et al. (2012), knowledge hiding is more of a bilateral interpersonal activity. Therefore, interpersonal relationships within the organization/team may play a critical role in the occurrence of it (Butt and Ahmad, 2019). For example (He et al., 2020), found that leader-member exchange relationship (LMX) and supervisor-subordinate guanxi (SSG) inhibit the occurrence of knowledge hiding through the mediating effect of psychological security. Similarly, as a part of the organization’s informal interpersonal relationships,



workplace friendship may also have an impact on employees' knowledge hiding.

As mentioned above, workplace friendship is a voluntary friendship formed by employees, which is not only a communal norm of equal reciprocity, but also creates conditions for them to receive instrumental and affective support (Mao et al., 2012). Except for promoting reciprocal behaviors among employees, we believe that workplace friendship may also inhibit individuals' knowledge hiding. Specially, we focus on the characteristic of workplace friendship that is "socio-affective goal-driven." Employees may perceive a stronger organizational culture of trust and reciprocity when the organization has a cordial communication climate, encourages informal communication among members, and provides conditions that enable the development of informal interpersonal relationships (i.e., more friendship opportunities). Along with further enhancement of such relationship (i.e., stronger friendship quality), employees will receive more supportive resources, such as psychological and affective resources (Xiao et al., 2020). These could meet employees' affective needs. Further, based on social exchange theory, employees are activated with reciprocal psychology as their affective needs are met (Yan et al., 2021), and they expect to reward their firms and colleagues by performing more pro-organizational behaviors (Berman et al., 2002). Because of such sense of reciprocity and belonging (He et al., 2020), the respondent is generous and free to provide his/her knowledge resources when faced with others' knowledge requests (Xia et al., 2021), rather than providing deceptive information (evasive hiding), making excuses (rationalized hiding) or pretending to be an ignorant (playing dumb).

Furthermore, social exchange theory suggests that individuals will assess the risks in the exchange and decide which attitude or behavior to adopt based on the result of the assessment (Zhang et al., 2022). Just as the core characteristic of workplace friendship—"common norms"—shows close and equal relationships among employees, friends care about each other's real needs and are willing to provide affective and resource support to the other, even when they receive nothing in return (Lee and Chon, 2020). From this point, the common norms in workplace friendship like an invisible psychological contract, which includes long-term trust, dedication, and affective exchange among friends. And this creates a nearly "zero-risk" social exchange situation for employees, resulting in the reinforcement of their reciprocal beliefs. Therefore, when individuals are confronted with knowledge requests from others, especially from their friends, they are more willing to engage in knowledge assistance in a positive and reciprocal manner rather than knowledge hiding. On the one hand, friends trust each other so that employees expect to be rewarded in the future (Brock et al., 2005). On the other hand, employees can obtain other resources from friends to compensate for the losses of knowledge resources (Pillemer and Rothbard, 2018). In summary, we propose the following hypothesis:

**H1:** Workplace friendship has a significant negative effect on knowledge hiding.

## The mediating role of employee well-being

Employee well-being refers to employees' evaluation of the overall quality of their positions and work experience. According to Zheng et al. (2015), employee well-being is mainly composed of three dimensions: life well-being (employees' satisfaction with their own life as a whole), work well-being (individuals' satisfaction with work-related factors, especially the positive emotions they experienced) and psychological well-being (individuals' psychological experience and satisfaction representation of their work and personal life). In essence, it is the employee's overall perception of their satisfaction with work and life, and the subjective experience expressed based on this perception. This comprehensive assessment not only includes whether the employee is competent in the current job, whether the requirements of the job or the environment are compatible with the employee's values and ambitions, but also reflects the affective experiences and states of satisfaction experienced by the employee. More importantly, it also reflects the quality of employee's social interactions with other members in the workplace (Zheng et al., 2015). Good social interactions increase communication and cooperation among members and satisfy employees' needs in terms of job fulfillment and affections, leading to higher well-being. While high-quality well-being has an impact on their attitudes and behaviors (Sharma et al., 2016), making them willing to participate in interpersonal interactions, show more caring and kindness to others (Ryff and Singer, 2008), and even share their own unique resources (Wang et al., 2017). Based on these, we examine the mediating role of employee well-being in the negative effect of workplace friendship on knowledge hiding.

We believe that social interactions in the workplace profoundly affect employee well-being (Agneessens and Wittek, 2008). According to social exchange theory (Cropanzano et al., 2017), those employees who have good friendships with their colleagues usually share similar values and career goals. This similarity leads them to trust each other (Requena, 2003) and is helpful for them to develop a positive exchange relationship. Subsequently, mutually supportive behaviors and exchanges between members will be triggered so that employee well-being can be enhanced. The nature of workplace friendship, such as equal reciprocity and shared exchange, means that good friends usually care about the working conditions and performance of employees (Mao et al., 2012), and they are willing to be sincere and open to mutual resource assistance to meet each other's role expectations (Hsu et al., 2019). Thus, individuals with high workplace friendships are usually more competent in their positions and achieve their career goals. And when an employee achieves such job satisfaction, the level of work well-being and



psychological well-being he feels is enhanced (Guerçi et al., 2022). Secondly, keeping a good friendship also represents a stable and special affective tie with others because of its affective exchange function (Zhang et al., 2022). The better the friendship between members, the smoother the affective exchange between them. When employees encounter difficulties or frustrations at work, friends can help them to release stress through appropriate affective care and communication (Pillemer and Rothbard, 2018) so that they will experience positive affections such as a sense of security and comfort (Hsu et al., 2019). As described by Zhang et al. (2018), work and family are interdependent, which means employees' relevant experiences at work can spill over into the home sphere. From this point of view, workplace friendship can not only lead to positive work experiences for individuals, but can also penetrate into other areas outside of work at the same time, creating a positive life experience that increases their life well-being and psychological well-being (Hsu et al., 2019). In summary, workplace friendship can contribute to the overall improvement of employee well-being by stimulating individuals' work well-being, life well-being, and psychological well-being.

Furthermore, we believe that better well-being leads to optimistic behavioral intentions (Chiu et al., 2013; Woo et al., 2015) and inhibits employees' negative behavioral tendencies. Specifically, employees who hold positive psychological traits and enjoy their current jobs usually care about the needs of others and willing to offer advice or help to them, which induce communications and interactions among members (Zheng et al., 2015). In such situations, knowledge is not viewed by them as a private unique competitive element, but as a shared resource that can support friends and enhance their own well-being (He et al., 2020). When such employees are confronted with knowledge requests from their peers, they believe that sharing the needed knowledge is not only effective in helping the peers to achieve their work goals, but also allows themselves to feel the joy of helping others which can satisfy their affective needs. Although knowledge providers may still analyze the implicit costs of implementing knowledge sharing, worry about their status in the organization or fear ridicule for providing ineffective knowledge (Anand et al., 2021), having a high quality of well-being does mean that the employees had gain job achievement or affective satisfaction, so they are able to accept the risks related to knowledge sharing. Therefore, we hypothesize that employee well-being can significantly inhibit the occurrence of knowledge hiding.

Putting all into consideration, we suggest that when there is a good friendship between employees, their well-being about the current jobs can be significantly increased so that they are more willing to provide the needed knowledge, which reduce or inhibit their knowledge hiding. Accordingly, the following hypothesis is proposed in this paper:

**H2:** The relationship between workplace friendship and knowledge hiding is mediated by employee well-being, i.e., workplace friendship positively impacts employee well-being,

and employee well-being negatively impacts their own knowledge hiding.

## The moderating role of perception of Chaxu climate

Although employees may be grateful or reciprocate to the organization or colleagues for workplace friendship, it is worth noting that not all employees will react to workplace friendship and employee well-being to the same extent. As discussed above, the interpersonal preferences and processes of employees in Chinese firms are not stable and are highly susceptible to the influence of traditional cultural factors, especially Confucianism. Confucianism emphasizes that when individuals interact with others, they should follow the social norms of Chaxu, "respect who they should respect" and "intimate who they should intimate," which is in line with the spirit of "Li" and "Yi" in traditional culture. Besides, individuals should conform the spirit of "Li" in Confucianism by treating others differently based on Chaxu. Further, "Ren," "Yi," and "Li" are consisting of Chaxu in the Chinese interactions, which has significant impacts on Chinese employees' thinking and behaviors, even on Chinese firm's operations and management (Liu et al., 2009). For example, Chinese leaders do not treat their subordinates equally, but habitually divide them into "insiders" or "outsiders" and treat them differently in terms of affective attachment and resource allocation (Peng and Zhao, 2011). Once this differentiated treatment is extended to the team level, the Chaxu climate that mainly characterized by a "circle culture" is gradually formed within the team (Shen et al., 2019).

Chaxu climate refers to the difference in relational distance between members around the resource controller in firms (usually the leader; Peng and Zhao, 2011), which is essentially an experience of differential treatment by the leader. Based on the degree of relational heterogeneity, the leader divides the members into those who are at the core of the relationship and those who are at the margins. This could lead to the employee's perception of Chaxu climate (Song and Guo, 2022). When there is a strong Chaxu climate in an organization, employees' perception of differential treatment by leaders are stronger, and the perception of marginalization leads to negative psychological experiences of neglect and indifference, making employees more likely to develop cognitive and behavioral biases (Huang et al., 2018). In addition, as mentioned above, employees depend on "mutual needs" to shape their social exchange relationships and behaviors with friends. Different perception of Chaxu climate obviously affects the rate of social exchange and interfere with the quality of reciprocal relationships between members and the willingness to engage in extra-role behaviors (Beck and Schmidt, 2013). Therefore, we hypothesize that employee perception of Chaxu climate may be an important boundary condition in the negative effect of workplace friendship *via* employee well-being

on their knowledge hiding and may play a negative moderating role.

Specifically, if employees perceive a stronger Chaxu climate, they may perceive large differences in the quantity and quality of resources that different members are able to receive from the leader. This can lead to a strong sense of differential treatment by the leader (Dhiman and Maheshwari, 2013). Here, the leader-centered working relationship plays a dominant role in all working relationships within the team, including friends (Song and Guo, 2022). In this situation, due to the different perception of Chaxu climate, the members in a friendship will focus more on the difference between their own identity and that of others (Neubert et al., 2008), and may naturally divide the friends into insiders and outsiders. This inevitably disrupts interpersonal exchange among friends (Beck and Schmidt, 2013), and harm employee well-being. For outsiders who are far from the leader, the higher perception of Chaxu climate leads to stronger perceptions of distrust and unfairness, triggering their stronger jealousy to the insiders (Dhiman and Maheshwari, 2013). This induces negative feelings such as hostility and resentment toward insiders from outsider, while employee well-being may be damaged as a result. Moreover, during processing of Chaxu situational information, the insiders can be hostile and defensive for consolidating their status. They may not only ignore or treat the outsiders with indifference, but also lose reciprocity (Beck and Schmidt, 2013). This may undermine employees' belonging and affective needs, as well as decrease employee well-being (Gregersen et al., 2016). Thus, for all workplace friends, employee well-being will decrease as the perception of Chaxu climate increases.

Conversely, if employees perceive a weak Chaxu climate, they may think that the quality and quantity of resources received by different members from leaders are same, which forms the perception of fairness climate. The mutual commitment and trust among friends can be further enhanced (Shen et al., 2019), and psychological or affective perceptions can be improved so that employee well-being can be increased (Hsu et al., 2019). Additionally, as described by Chen et al. (2014), employees' perception of Chaxu climate is often seen as a "barometer" of the relationship between subordinates and supervisors. The lower the perception of Chaxu climate, the closer the relationship between employees and supervisors, and the closer the distance between themselves and resources (Wang et al., 2017). From this perspective, employees with lower perception of Chaxu climate will experience a stronger sense of organizational support, which satisfies employees' belongingness and affective needs. As a result, employee well-being is enhanced (Craig and Kuykendall, 2019). Therefore, the positive impact of workplace friendship to employee well-being will be facilitated when employees have a lower perception of Chaxu climate. So, we propose that:

*H3: Employee perception of Chaxu climate negatively moderates the effect of workplace friendship on employee well-being, and vice versa.*

By integrating H1, H2, and H3, we expect that employees' perception of Chaxu climate plays a negative moderating role in the indirect effect of "workplace friendship on knowledge hiding *via* employee well-being." Specifically, based on social exchange theory, workplace friendship inhibits knowledge hiding, and employee well-being mediates the effect. However, considering the relational distance of individuals to their supervisors, the mechanism may be influenced by employees' perception of Chaxu climate. The positive effect of workplace friendship on employee well-being may be decreased when employees have a high perception of Chaxu climate. In this situation, the inhibitory effect of workplace friendship on knowledge hiding through employee well-being will be weakened. On the contrary, the positive effect of workplace friendship on employee well-being may be enhanced when employees have low perception of Chaxu climate. Further, the inhibitory effect of workplace friendship on knowledge hiding through employee well-being may also be enhanced as a result. Therefore, we hypothesized that:

*H4: Perception of Chaxu climate moderates the indirect effect of workplace friendship on knowledge hiding through employee well-being, i.e., the indirect effect is weaker when the perception of Chaxu climate is higher and vice versa.*

## Materials and methods

### Participants, procedures, and methods

In this study, questionnaires were used to collect data for testing the proposed research hypothesis. Firms in several provinces of China were selected with front-line employees as the sample. To reduce common method biases, we adopted a two-wave employee self-assessment questionnaire. According to Podsakoff et al. (2012), the time lag in data collection at different time phases should not be too long nor too short. In general, an optimal choice of time lag is 2–4 weeks (Wang et al., 2022). Therefore, we collected data in two different time points separated by 2 weeks. Specifically, We first explained the project to the head of the human resource management department of each enterprise. Once we obtained permission from the HR heads, they in turn helped us distribute the survey links and follow up with the data collection. Before the questionnaire, the respondents were selected randomly, asking whether they agreed to join the survey voluntarily and informing them that they could withdraw from the survey at any time.

At Time 1, we collected demographic information as well as the workplace friendship and asked them to rate their employee well-being, perceived of ChaXu climate levels. At Time 2, 2 weeks later, the employees were asked to evaluate their knowledge hiding behavior. Afterwards, the questionnaires distributed on the two different occasions were matched according to the questionnaire codes. Due to the travel constraints linked to the COVID-19 pandemic, it was inconvenient for us to have face-to-face contact

with the survey participants in 2022, so we used Wenjuanxing, a platform<sup>1</sup> that is widely used in China to carry out online surveys. By asking the employees to use the last four digits of their mobile phone numbers as the questionnaire references, we were able to match the participants at the two different time points. A total of 300 employees completed both online surveys. After excluding invalid samples, such as those that could not be matched between the two time points and those with incomplete information (e.g., involving too many missing items), we obtained 279 valid matching samples of subordinates, which represented a response rate of 93%.

## Measures

The scales used in this study were authoritative with good reliability and validity that are widely used by scholars. In order to ensure the consistency of the translated scales with the original scales, we strictly followed the principle of translation procedure. The original scale was translated (English to Chinese) and back-translated (Chinese to English) to generate the Chinese version of the measurement scale. Specifically, two postgraduates with outstanding academic research achievements in human resource management and high English proficiency were invited to translate the original English scale into Chinese, and then two other postgraduates with similar levels were invited to translate the above Chinese scale back into English, and two rounds of English-Chinese translation were conducted according to the above steps. In addition, a small pre-test was conducted before the survey, more precisely, the initial questionnaire pre-survey of this study was conducted in several industries in Fujian Province involving service, tourism, manufacturing and other industries, and the survey objects were 92 front-line employees of enterprises, which is concentrated in young and middle-aged employees, with medium and low educational backgrounds. After conduct CITC, reliability/validity analysis and CFA on the collected pre-survey data, the analysis results showed that all scales such as Workplace friendship, Perception of Chaxu climate, Employee well-being and Knowledge Hiding had good reliability and validity. A 5-point Likert scale was used for both the pre-test and the two-wave survey.

## Workplace friendship

The scale developed by Nielsen et al. (2000) was used, and nine items were finally retained according to the revision of Chinese scholar Jianmin Sun, such as “I have the opportunity to get to know my colleagues in my company; my company encourages communication among employees; I feel I can trust

other employees in my company; I have formed strong friendships at work, etc.” (Cronbach’s  $\alpha = 0.92$ ).

## Perception of Chaxu climate

The scale developed by Luo et al. (2016) was used, containing 11 items in 3 dimensions: mutual dependence, partial treatment, and trusted role. Typical items include “I feel that leaders treat subordinates very differently throughout the organization” and so on (Cronbach’s  $\alpha = 0.94$ ).

## Employee well-being

This variable was measured using a scale developed by Zheng et al. (2015), including 3 dimensions of life, work, and psychological well-being, each with six items, for a total of 18 items, such as “Most aspects of my life are close to my dream” (Cronbach’s  $\alpha = 0.93$ ).

## Knowledge hiding

We used the scale developed by Connelly et al. (2012) which contains 12 items in three dimensions. Typical items include “I agreed to help but did not really intend to do so” and “I would say I did not know, even though I did” (Cronbach’s  $\alpha = 0.91$ ).

## Controls

Previous scholars have pointed out that employees’ age, gender, educational background, and experience affect their attitudes and behaviors (Zhou et al., 2019). Therefore, we treated these factors as control variables. Specifically, we asked participants to report age and years of experience data, while educational background was measured in four categories: “less than college, college, bachelor’s degree, master’s degree and above.”

## Results

### Confirmative factor analysis

In this study, AMOS 24.0 was used to conduct confirmative factor analysis through five research variables of workplace friendship, perception of Chaxu climate, employee well-being, and knowledge hiding. The results are shown in Table 1. Among the models, the fit indices of the 4-factor model met the standards with  $\chi^2/df = 2.522$ , CFI = 0.880, TLI = 0.868, IFI = 0.880, and RMSEA = 0.074. And the 4-factor model fitted better than the 3-factor model, 2-factor model, and single-factor model, indicating good discrimination among the four variables.

<sup>1</sup> sojump.com

TABLE 1 The results of confirmative factor analysis.

Model	$\chi^2/df$	RMSEA	CFI	TLI	IFI
4-factor model + CMV: WF; CX; EW; KH; CMV	2.417	0.071	0.905	0.900	0.906
4-factor model: WF; CX; EW; KH	2.522	0.074	0.880	0.868	0.880
3-factor model: WF + CX; EW; KH	5.809	0.132	0.618	0.583	0.620
2-factor model: WF + CX + EW; KH	6.508	0.141	0.561	0.523	0.564
Single-factor model: WF + CX + EW + KH	7.624	0.154	0.471	0.426	0.474

WF is workplace friendship, CX is perception of Chaxu climate, EW is employee well-being, KH is knowledge hiding, CMV represents common method variance. "+" represents the combination of factors.

## Common method biases test

Although the two-wave self-assessment questionnaire used in this study can reduce common method biases (Podsakoff et al., 2003), we followed Podsakoff et al. (2003) to assess common method biases by introducing an unmeasured latent factor, i.e., common method variance (CMV) in the confirmative factor analysis to enhance the reproducibility of the findings. The results were shown in Table 1, compared with the fit of the 4-factor model, the fit indicators of the 4-factor model + CMV ( $\chi^2/df = 2.417$ , RMSEA = 0.071, CFI = 0.895, TLI = 0.877) not vary by more than 0.02, which shows that there is no significant common method biases in this study.

## Descriptive statistics and correlation analysis

The results of descriptive statistics and correlation analysis for each variable are presented in Table 2. The results indicate that workplace friendship has a positive correlation with employee well-being ( $r = 0.629$ ,  $p < 0.01$ ), and in terms of the correlation coefficient between workplace friendship and knowledge hiding ( $r = -0.296$ ,  $p < 0.01$ ), workplace friendship may have a direct negative effect on knowledge hiding. Additionally, it also shows that the coefficient between employee well-being and knowledge hiding is ( $r = -0.487$ ,  $p < 0.01$ ). Therefore, we can preliminarily conclude that there may be some negative relationships between workplace friendship, employee well-being and employee's knowledge hiding.

## Hypothesis test

**Main effect test.** To test the main effect H1, workplace friendship and knowledge hiding were first set as independent and

dependent variables separately. We can see from Table 3 that the workplace friendship positively affects employee knowledge hiding (M6,  $\beta = 0.293$ ,  $p < 0.001$ ) based on the introduction of control variables (gender, age, education backgrounds, and experiences). Thus, H1 was supported by the data.

**Mediating effect test.** As shown in Table 3, workplace friendship had a significant positive effect on employee well-being (M2,  $\beta = 0.487$ ,  $p < 0.001$ ), while employee well-being (M8,  $\beta = -0.628$ ,  $p < 0.001$ ) has a significant negative effect on knowledge hiding. In addition, using Bootstrapping repeated sampling 5,000 times analysis, workplace friendship was analyzed by putting workplace friendship and employee well-being, perception of Chaxu climate and knowledge hiding into the regression equation at the same time, we found that both the direct effect ( $\beta = -0.293$ ,  $p < 0.01$ ) and indirect effect ( $\beta = -0.312$ ,  $p < 0.01$ ) of workplace friendship on knowledge hiding reached the significance level. Meanwhile, the indirect effect of employee well-being in workplace friendship  $\rightarrow$  employee well-being  $\rightarrow$  knowledge hiding was ( $\beta = -0.312$ ,  $p < 0.001$ ) with 95% CI of  $[-0.483, -0.085]$  and 95% confidence interval excluding 0. Therefore, the indirect effect of employee well-being reached the significance level, but its direct effect ( $\beta = -0.157$ ,  $p > 0.05$ ) with 95% CI was  $[-0.328, 0.014]$  with 95% confidence interval including 0, thus its direct effect did not reach the significance level and employee well-being had a significant fully mediated effect between these two variables. Therefore, H2 was supported by the data (Table 4).

**Moderating effect test.** In order to reduce the influence of multicollinearity on the results, we standardized the variables before calculating the interaction terms. From Table 5, the interaction term between perception of Chaxu climate and workplace friendship negatively affects employee well-being ( $\beta = -0.192$ ,  $p < 0.001$ ) with a 95% CI of  $[-0.244, -0.141]$  and 95% confidence interval excluding 0. This indicates that the stronger the perception of Chaxu climate, the weaker the positive relationship between workplace friendship and employee well-being, which supports H3. And the effect of workplace friendship on employee well-being at different levels of perception of Chaxu climate is shown in Figure 2.

**Testing for moderated mediating effects.** This study followed the method recommended by Edwards and Lambert (2007) to examine the moderated mediating effect played by perception of Chaxu climate. As can be seen in Table 6, the indirect effect of workplace friendship on knowledge hiding reaches the significant level for both high ( $\beta = 0-0.204$ ,  $p < 0.001$ ) and low ( $\beta = 0-0.410$ ,  $p < 0.001$ ) perception of Chaxu climate with 95% confidence intervals that do not contain 0. So, H4 is supported by the data.

## Discussion

## Conclusion

Drawing on social exchange theory (SET), we explore how and when workplace friendship inhibits knowledge hiding from



TABLE 2 Descriptive statistics and correlation analysis.

Variables	Gender	Age	EB	Experiences	Workplace friendship	Perception of Chaxu climate	Employee well-being	Knowledge hiding
Gender	–							
Age	–0.178**	–						
EB	–0.029	–0.025	–					
Experiences	–0.260**	0.722**	–0.074	–				
WF	0.046	0.167**	0.060	0.219**	–			
CX	–0.092	–0.126*	0.079	–0.137**	–0.141**	–		
EW	–0.075	0.149*	0.214**	0.224**	0.629**	0.114	–	
KH	0.035	–0.017	–0.058**	–0.110	–0.296**	–0.221**	–0.487**	–
Means	1.53	2.03	2.98	2.92	4.069	2.826	4.133	2.053
SD	0.500	0.717	0.578	0.880	0.798	1.122	0.644	0.815

The numbers of sample is 279; \*\* represents  $p < 0.01$ , \* represents  $p < 0.05$ , two-tails test. EB is educational backgrounds. Age, gender, educational backgrounds, and experiences are control variables.

TABLE 3 The mediating effect.

Variables	Employee well-being				Knowledge hiding				
	M1	M2	M3	M4	M5	M6	M7	M8	M9
Gender	–0.007	–0.096	0.015	–0.065	0.003	0.056	–0.049	–0.002	–0.034
Age	–0.037	–0.042	–0.030	–0.032	0.154	0.157*	0.138	0.131	0.122
EB	0.259**	0.204***	0.250***	0.188***	–0.099	–0.066	–0.077	0.064	0.069
Experiences	0.197***	0.088	0.210**	0.102*	–0.197**	–0.131	–0.225**	–0.037	–0.098
WF		0.487***		0.505***		–0.293***			–0.038
EW								–0.628***	–0.566***
CX			0.760*	0.114***			–0.172***		–0.132**
R <sup>2</sup>	0.092	0.434	0.105	0.471	0.011	0.086	0.062	0.232	0.257
ΔR <sup>2</sup>	0.105	0.445	0.121	0.482	0.025	0.102	0.079	0.246	0.276

The numbers of sample is 279; \*\* represents  $p < 0.01$ , \* represents  $p < 0.05$ , two-tails test. EB is educational backgrounds. Age, gender, educational backgrounds, and experiences are control variables.

the perspective of employee's reciprocity. Using data from a two-wave time-lagged survey of 279 employees in China, the results show that workplace friendship positively impacts employee well-being and subsequently, negatively impacts knowledge hiding, i.e., employee well-being plays a mediating role between workplace friendship and employee well-being. Furthermore, employees' perception of Chaxu climate moderates the direct effect of workplace friendship on employee well-being and the indirect effect of workplace friendship on knowledge hiding *via* employee well-being. As the level of employee's Perception of Chaxu climate rises, the direct effect of workplace friendship on employee well-being is stronger, so as the indirect effect of workplace friendship on knowledge hiding, and vice versa.

## Theoretical contributions

This study makes several contributions to the existing literatures. First, we contribute to the study on antecedent

variables of knowledge hiding by exploring the effect of workplace friendship on employees' knowledge hiding. Most of the previous articles focus on formal organizational relationships or negative interpersonal factors (Anand et al., 2021; He et al., 2021), while ignoring informal interpersonal relationships, i.e., workplace friendship. For example, Zhao et al. (2016) found that workplace ostracism can increase employees' tendency to conduct knowledge hiding; and formal leader-member exchange relationships (LMX) in organizations can inhibit knowledge hiding (He et al., 2020). Therefore, our empirical study confirm that the reciprocal psychology induced by workplace friendship through the satisfaction of employees' job achievements and affective needs motivates them to adopt positive reciprocal behaviors for rewarding the firm/colleagues, which inhibits the occurrence of knowledge hiding.

Second, our study shows that workplace friendship negatively affects employees' knowledge hiding, which extending the research related to workplace friendship. Previous studies have argued that workplace friendship plays a central role in individual's work and life. As an informal interpersonal relationship in



TABLE 4 The results of bootstrap.

Type	Paths	Effects	SE	Boot 95%CI		Relative effect
				LL	UL	
The independent mediating effect of EW	WF → HK	−0.293**	0.061	−0.413	−0.174	–
	WF → HK	−0.157	0.087	−0.328	0.014	33.5%
	WF → EW → HK	−0.312***	0.102	−0.483	−0.085	66.5%

The numbers of sample is 279; \*\* represents  $p < 0.01$ , \* represents  $p < 0.05$ , two-tails test. EB is educational backgrounds. Age, gender, educational backgrounds, and experiences are control variables.

TABLE 5 Interactive effect.

Independent variables	Dependent variables	Effects	SE	95% CI		<i>p</i>
				LL	UL	
WF * CX	EW	−0.192***	0.026	−0.244	−0.141	0.000
	KH	0.103***	0.047	−0.229	−0.283	0.000

organizations, workplace friendship provides many advantages for employees. It not only offers them with instrumental and affective support for their development (Zhang et al., 2022), but also benefits teams and organizations by promoting cooperation and unity among colleagues (Xiao et al., 2020). Although workplace friendship has some obvious benefits, increasing research suggests that it may also have complex and negative effects. For example, workplace friendship may decrease individual performance by distracting employees from their focuses and task concentration (Pillemer and Rothbard, 2018). Our findings support that workplace friendship has a positive impact in organizations, i.e., it is positive to employee well-being. This is consistent with the argument that workplace friendship has a positive side and the empirical evidence that friendship is strongly correlated with positive reciprocity (Zhang et al., 2022). On the other hand, although previous studies have examined the effects of workplace friendship on employee positive behavior such as organizational citizenship behavior (Scott et al., 2018), and knowledge sharing (Enwereuzor et al., 2022), the attention has been focused on positive work behaviors. Few have focused on the impact of workplace friendship on the negative interpersonal behavior that is knowledge hiding (Zhuang et al., 2020). By empirically examining the role of workplace friendship in enhancing employee well-being and clarifying the relationship between employee well-being and knowledge hiding, our study advances the previous literature.

Third, our study helps to identify the antecedent of employee well-being and the inhibitory effect of this positive subjective experience on employees' negative behavior, thus contributing to the literature on employee well-being. For employees, high well-being not only promotes strong positive behavioral tendencies and reduces the negative workplace behaviors, but also improves organizational performance and shapes a win-win situation between employees and the organization through the improvement of their own productivity (Ali et al., 2021). However, its antecedents in the

aspects of workplace climate and organizational informal interpersonal are unclear. Although studies have examined the impacts of organizational-level factors on employee well-being (Nielsen et al., 2017), as well as the impacts of high-commitment work systems (Zhang et al., 2022), leadership style (Inceoglu et al., 2018), and supervisor-subordinate relationships (Van Vianen et al., 2022) on employee well-being, there is still a gap in understanding the role of workplace friendship, an informal interpersonal relationship, on the promotion of employee well-being. Furthermore, although the literature has examined the role of employee-related factors in the design and implementation of knowledge management strategies and has emphasized the importance of employee well-being in producing better individual and organizational outcomes, few have investigated Chinese employees' well-being and their behavioral tendencies to hide knowledge in the context of workplace friendship. Therefore, based on social exchange theory, we explore the mediating role of employee well-being in the path between workplace friendship and knowledge hiding, contributing to the research related to employee well-being.

Fourth, this study explores that perception of Chaxu climate negatively moderates the effect of workplace friendship on knowledge hiding through employee well-being, which contributes to relevant literature of perception of Chaxu climate. On the one hand, previous studies have mainly examined perception of Chaxu climate as an antecedent or outcome factors, few have analyzed the moderating role of it from the perspective of boundary conditions (Huang et al., 2018). The current study explored the moderating role of perception of Chaxu climate to employee well-being and knowledge hiding in a workplace friendship situation, which expands the research of perception of Chaxu climate. On the other hand, as suggested by Peng (2013), it is important to improve the research on the context of knowledge hiding. However, existing research has mainly focused on the organizational level (Men et al., 2020), while less attention has been paid to the boundary conditions of knowledge hiding in terms of individual differences (Zhao and Jiang, 2021). In addition, previous studies of perception of Chaxu climate are usually based on organizational or team, few have explored its impact on employees' knowledge hiding from individual perceptions (Peng and Zhao, 2011). Therefore, we respond to the call of previous scholars by applying individual perception of Chaxu climate to knowledge hiding and filling the above-mentioned theoretical gap.

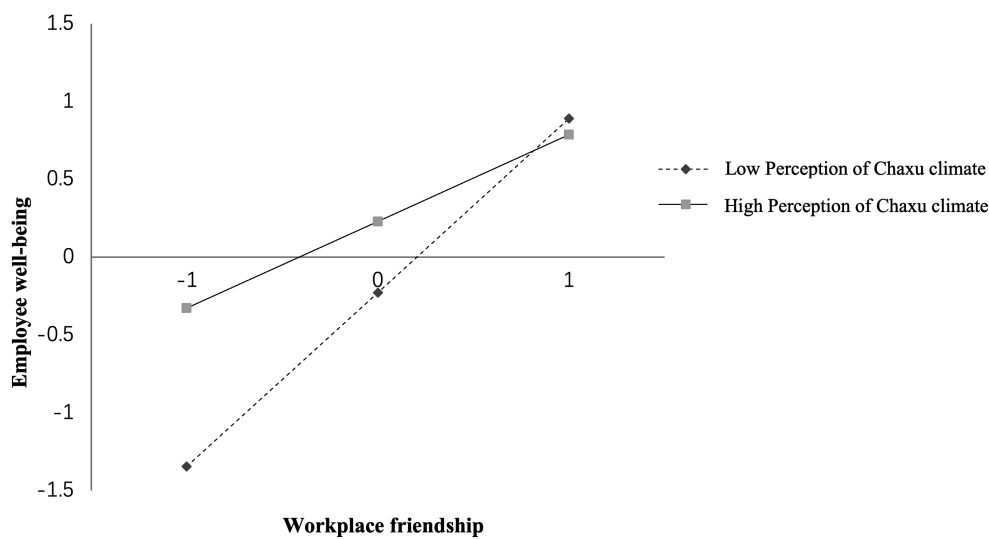


FIGURE 2

The moderating effect of perception of Chaxu climate on workplace friendship and employee well-being.

TABLE 6 The moderated mediating effect.

Level	Paths	Effects	SE	Boot 95%CI		p
				LL	UL	
Low CX	Total effect:	0.860***	0.059	0.744	0.976	0.000
	WF → EW					
	Direct effect:	-0.274**	0.128	-0.526	-0.022	0.034
	WF → HK					
	Indirect effect:	-0.410**	0.130	-0.616	-0.089	0.000
High CX	WF → EW → HK					
	Total effect:	0.428***	0.035	0.359	0.498	0.000
	WF → EW					
	Direct effect:	-0.041	0.071	-0.181	0.099	0.561
	WF → HK					
	Indirect effect:	-0.204**	0.086	-0.367	-0.031	0.000
	WF → EW → HK					

## Practical implications

Because flatter organizational structure can facilitate social interactions (Xiao et al., 2020), workplace friendship is more prevalent in current firms. Our study provides several important implications for practice. First, our findings show that workplace friendship has a significant inhibitory effect on employees' knowledge hiding, indicating that establishing and maintaining friendship is important for the development of employees and organizations. Therefore, we suggest that firms should pay attention to the management of workplace friendship, provide employee with opportunities to establish workplace friendship while providing proper guidance on the

direction of workplace friendship and improving the quality of it. Specifically, during the recruitment, managers can conduct some assessment to select employees who can easily get along with others and can further train employees to improve their skills in relation to colleagues through live simulations and role plays. In addition, organizations should improve formal communication channels (such as monthly meetings, seminars, etc.) and informal communication channels (such as e-mail, small gatherings, weekend trips, etc.) among employees to build effective communication mechanisms and platforms for them to form and establish workplace friendships.

Second, our findings demonstrate that employee well-being plays an important mediating role between workplace friendship and knowledge hiding. Therefore, managers should cultivate an environment full of happiness for reducing employees' psychological stress and interpersonal risks when they provide knowledge. We believe that managers can minimize knowledge hiding by developing an organizational climate of mutual commitment, trust, and positive reciprocity in their organizations. Based on this, managers need to keep an eye on how the organization is managed and try to create a safety environment for employees by providing support in terms of autonomy, etc. These could help to increase the psychological safety of employees when sharing knowledge. In this situation, the satisfaction of employees' psychological needs can improve the achievement of their self-worth and well-being, which in turn reduces or inhibits the motivation to hinder their colleagues' access to knowledge (e.g., knowledge hiding). Specifically, organizations can adopt a flexible HR management system that provides employees with quality learning and skill development programs, ensuring

that the requirements of the work are compatible with employees' values and ambitions for meeting their psychological needs.

Third, we also found that the effect of workplace friendship on employee well-being was stronger for employees with lower perception of Chaxu climate. Therefore, managers should value this moderating effect for facilitating employee well-being and knowledge sharing by reducing employees' perception of Chaxu climate. More specifically, managers should allocate organizational resources based on employees' abilities rather than biased relationships in order to treat each employee as fairly as possible. By creating a fair organizational climate through procedural and information fairness, managers can suppress the expansion of organizational Chaxu climate, enhance employee well-being and motivate employees' knowledge sharing. In addition, it is worth noting that the "knowledge stocks" of employees varies from person to person. Managers should decrease the perception of Chaxu climate for employees with large "knowledge stocks" through job rotation or multi-team collaboration to reduce knowledge hiding.

## Limitations and future directions

There are still some shortcomings in the followings: First, although this study used a two-wave questionnaire for data collection which improved the repeatability of the findings, there may still exist common method biases since we assess employee well-being and perception of Chaxu climate at the same time. Future research could introduce a longitudinal tracking data collection technique (e.g., empirical sampling method ESM), i.e., a questionnaire survey using "multiple days and multiple points per day" (Lanaj et al., 2014). Furthermore, experimental designs can help to provide more conclusive empirical evidence for causal relationships between variables (He et al., 2020). The scholars could use an experimental design to observe changes in employee well-being and knowledge hiding by manipulating workplace friendship and employee's perception of Chaxu climate. In addition, in terms of research design, this study only takes gender, age, education level and tenure as the control variables of this research. However, it is worth noting that due to great differences among individuals, workplace friendship may be affected by other factors on employees' happiness perception and knowledge hiding behavior, such as organizational size and type Employee types (such as knowledge workers and non-knowledge workers) and introversion/extroversion (Xiao et al., 2020). Therefore, more control factors can be considered in future studies to further improve the explanatory power of the model.

Based on social exchange theory, we used employee well-being as a mediating variable to reveal potential mechanism

between workplace friendship and knowledge hiding. Future studies can further adopt other mediating variables and theoretical perspectives to deepen the mechanism. For example, according to conservation of resources theory, people have the intention to "retain, protect, and develop resources" (Škerlavaj et al., 2018), and knowledge has long been considered as a vital personal resource, so employees may hide their knowledge for gaining more resource and/or avoiding resource loss. It may be an interesting direction to explain how workplace friendship affect employees' work resources and their knowledge hiding based on conservation of resources theory. Alternatively, employees' affections and cognition can be used as a mediating mechanism to explore the effect of workplace friendship on employees' knowledge hiding from the perspective of affective event theory.

Third, we did not take different dimensions of knowledge hiding (i.e., evasive hiding, playing dumb, and rationalized hiding) into consideration. Among these dimensions, playing dumb and evasive hiding are deceiving, while rationalized hiding is non-deceptive and it is mostly used to protect the benefits of others (Burmeister et al., 2019). For example, Peng (2013) noted that rationalized hiding helps reduce interpersonal risk and stimulates teamwork. Therefore, future research should explore various dimensions of knowledge hiding to find more targeted strategies to address the phenomenon. Furthermore, scholars can advance the research by exploring the unique antecedents of rationalized hiding. Particularly, since employees have motivations to protect information confidentiality or third-party profitability and will be motivated by moral factors when practicing rationalized hiding (Zhao and Xia, 2019), scholars could focus on those factors related to morality (e.g., moral identity, moral disengagement) and individual differences in predicting rationalized hiding among employees who value responsibility and commitment (e.g., organizational commitment).

Fourth, the findings suggest that workplace friendship are correlated to better employee well-being, which confirm the positive effect of workplace friendship. However, although many scholars share the view that workplace friendship leads to desirable organizational outcomes, there may also be a complex and dark side to it due to rapid changes in job responsibilities and social technologies (Pillemer and Rothbard, 2018). For example, workplace friendship may be in trouble if the actions required for employees to achieve instrumental goals conflict with their own social-emotional goals, or if situations such as those excluded from informal groups of colleagues feel marginalized and form their own subgroups, may lead to the emergence of silos and reduced inter-group communication (Carton and Cummings, 2012). So, we suggest that future research could try to explore the impact of workplace friendship on organization and employee by looking at the "dark" side or the "double-edged sword" effect of it.

## 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 were not required for the study on human participants in accordance with the local legislation and institutional requirements. Written informed consent was provided by participants to participate in this study.

## Author contributions

This study is a joint work of the six authors. PH, JW, and HZ contributed to the ideas of educational research, collection of data, and empirical analysis. CZ, QL, and XX contributed to the data analysis, design of research methods, and tables. PH, JW, HZ, and CZ participated in developing a research design, writing, and interpreting the analysis. All authors contributed to the article and approved the submitted version.

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# When combining injunctive and descriptive norms strengthens the hypocrisy effect: A test in the field of discrimination

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The induced-hypocrisy is a paradigm in which people promote a normative behavior (normative salience step) and then recall their past transgressions (transgression salience step). It is an effective two-step procedure for encouraging prosocial behaviors. This study aims to explore whether discrimination can be reduced using the hypocrisy paradigm combining two kinds of social norms, namely injunctive and descriptive norms. We assigned 80 participants to descriptive norm-related hypocrisy, injunctive norm-related hypocrisy, combined-norm hypocrisy, and control conditions. Results showed that intention to adopt active normative behaviors was higher in the combined-norms than in the single norm hypocrisy conditions. We observed the same pattern in reducing discriminatory behaviors in the Cyberball game, which measures passive discrimination (exclusion). Our findings have both practical and theoretical implications. First, they provide a new and effective means for producing behavioral changes in the field of discrimination. Second, they contribute to further investigating the explanatory processes underlying the hypocrisy effect.

## KEYWORDS

induced-hypocrisy paradigm, injunctive norm, descriptive norm, discrimination prevention, Cyberball game

## Introduction

Discrimination, defined as “the differential treatment of people on the basis of their membership in a given group” (Bodenhausen and Richeson, 2010, p. 343), is still a major societal issue in the 21st century. While many social groups are affected (e.g., elderly, homosexual, obese), immigrants and other people from foreign countries are commonly victims of discrimination (Kaas and Manger, 2012; Sasaki et al., 2017). In France, the occurrence of discrimination against foreign people is highlighted both in field surveys (e.g., DARES, 2021) and laboratory research (e.g., Mange et al., 2016; Gereke et al., 2020; Valfort, 2020). These discriminations have changed over the past few decades (e.g., Dovidio and Gaertner, 1996; Dovidio et al., 2002) from blatant and active forms (e.g., physical

assaults, insults, Molero et al., 2013) to more subtle and passive forms (e.g., avoiding contact with the person, Cuddy et al., 2007; reducing the amount of time spent interacting with them, Hebl et al., 2002). This shift from active to passive discriminations would itself be explained by the shift in societies from a prodiscrimination social norm to an antidiscrimination social norm whereby it is socially unacceptable to discriminate against others (Kite and Whitley, 2016). According to Cialdini and Trost (1998), “social norms are rules and standards that are understood by members of a group, and that guide and/or constrain social behavior without the force of laws” (p. 152). The purpose of this study is to further investigate the influence of the anti-discriminatory social norm in preventing discrimination against foreign people.

## Discrimination prevention: Activating social norms or focusing people on deviance

A great deal of research has been done to develop and test discrimination prevention strategies (see Kite and Whitley, 2013 and Paluck and Green, 2009 for reviews, and Paluck et al., 2021 for a meta-analysis). Because the expression of prejudice and discriminatory behaviors depends on contextual salient social norms (e.g., Watson, 1950; Reitzes, 1953; Crandall et al., 2002; see Sechrist and Stangor, 2005 for a review), normative strategies are among the most effective for preventing discrimination (Paluck and Green, 2009; Paluck et al., 2021). A brief review of the literature leads us to classify normative strategies for preventing discrimination into two types. The first consists in activating the antidiscrimination social norm whereas the second consists of focusing people on their deviance from this norm. More precisely, the activation of social norms has been widely investigated by researchers as a first route in an attempt to reduce discrimination. For example, Monteith et al. (1996) showed that the expression of prejudice toward the black (Study 1) and gay population (Study 2) was reduced when participants were exposed to antidiscrimination beliefs of confederates versus pro-discrimination beliefs. Similarly, in a set of studies conducted by Falomir-Pichastor and his colleagues in Switzerland (Falomir-Pichastor et al., 2004, 2013; Gabarrot et al., 2009, Study 1) and France (Falomir-Pichastor et al., 2007; Gabarrot et al., 2009, Study 2) antidiscrimination social norm salience, through providing to participants results of so-called studies, influences discriminatory behaviors (i.e., distribution of funds towards French and immigrants; Falomir-Pichastor et al., 2004, Studies 2 and 3).

In parallel, a second range of research has set out to study not the exposure to the norm but the consequences of deviance from this norm (see Monteith et al., 2016 for a review). To this end, Devine et al. (1991) developed a particular tool: the “Should-Would Discrepancy questionnaire.” Following two steps, people are asked (1) how they think they should (according to members of their in group) behave in interactions with members of a

discriminated out-group and then (2) how they think they would actually behave in these interactions. The results of several studies show that perceived discrepancy between what people should do and what they would really do in discrimination contexts arouses negative emotions (e.g., guilt, threat; Plant and Devine, 1998; Monteith et al., 2002; Fehr and Sassenberg, 2010). However, few studies show the practical relevance of this “Should-Would Discrepancy questionnaire” on effective reduction of discriminatory behavior (Amodio et al., 2007). Yet, people’s awareness of the gap between what is expected (the norm) and what is done (a behavior) is the cornerstone of a well-known paradigm – the Induced-Hypocrisy Paradigm (IHP, Aronson et al., 1991) – developed in the field of cognitive dissonance theory as applied to behavioral change (Festinger, 1957). It is this paradigm that we propose to use in this article as a tool for reducing discrimination.

## Reinforcing the deviance from the antidiscrimination norm to reinforce the hypocrisy effect

Induced hypocrisy (Aronson et al., 1991) is an efficient cognitive dissonance paradigm for encouraging normative behaviors in many fields (e.g., pro-environmental behaviors such as recycling waste, health behaviors such as use of condoms, see Liégeois et al., 2017 for a review, and Priolo et al., 2019 for a meta-analysis). In this two-step procedure, people promote a social norm (i.e., the “normative-salience step”) and then recall their own past failures to comply with it (the “transgressions-salience step”). Making salient this inconsistency generates the hypocrisy effect (Stone and Fernandez, 2008), leading people to adopt behaviors in accordance with the norm. When the IHP was created, the main and consensual explanation of its effect was self-consistency theory (Aronson, 1999), which focuses on the role of self-threat. However, more recent explanations, such as the deviation-from-norm approach (Liégeois et al., 2017), give social norms a central role in producing the hypocrisy effect.

This deviation-from-norm approach considers the behavioral change in the IHP as the reduction of the perceived gap between social normative beliefs and behaviors, which echoes previously cited writings by Devine. To give further proof of this, Priolo et al. (2016) showed that the hypocrisy effect could be obtained both when the first step made salient an injunctive norm (i.e., what most people approve of, Cialdini and Goldstein, 2004) or another type of social norms, i.e., the descriptive norm (i.e., what most people do). The results are consistent with their hypothesis and show that behavioral inconsistencies with descriptive or injunctive norms lead people to change their behavior (i.e., more donations for an ecological association). Besides, Liégeois et al.’s (2017) approach also assumes that the salience of social-normative beliefs is a key factor. The more people have access to their social normative beliefs, the higher the perception of discrepancy between normative beliefs and transgressions, and the greater the

hypocrisy effect. Therefore, a way to enhance the hypocrisy effect would be to strengthen the role of social norms in the normative-salience step of IHP.

Although the IHP appears to be highly suitable for the prevention of discrimination, it has only been tested once in this field (Son Hing et al., 2002). Furthermore, following Liégeois et al.'s (2017) approach of the IHP, the effectiveness of the hypocrisy procedure should be increased upon strengthening its normative-salience step. As social norms' theories, such as the theory of normative social behavior (Lapinski and Rimal, 2005; Chung and Rimal, 2016), and research (e.g., Kallgren et al., 2000) predict and show that the combination of injunctive norms and descriptive norms enhances the behavioral effect, we expect the hypocrisy effect to be enhanced by the combined activation of both injunctive and descriptive anti-discrimination norms. Indeed, perceiving our past behaviors as deviating not only from what the majority of people approve of but also from what they do (descriptive norm) should increase the deviation from normative beliefs and enhance behavior change. To test this hypothesis of an additive effect of combining two norms rather than one in the hypocrisy procedure, we conducted an experiment comparing a control group to three hypocrisy conditions (Descriptive norm-related hypocrisy vs. Injunctive norm-related hypocrisy vs. Combined-norm hypocrisy) on normative behavioral intention and on passive behaviors of discrimination.

## Materials and methods

### Sample

We collected data from 89 students who were not paid for their participation. Three participants were removed for errors in recording a measure, five for not recalling any transgression, and one for not recalling any transgression and suspicions related to a measure. Attrition was balanced across conditions. A total of 80 white participants ( $M_{age} = 19.6$ ,  $SD = 1.55$ ; 61 females) were included in the final sample for analyses. We followed Perugini et al. (2018) recommendations to compute the power analysis (see supplementary material for more details). This sample size enables to detect a medium (according to Cohen, 1988) or a large (according to Lovakov and Agadullina, 2021) effect size ( $f = 0.37$ ) with a statistical power of 0.80 and  $\alpha = 0.05$ .

### Materials

#### Activation of social norms

We manipulated the social-norm activation during the first normative-salience step of the IHP. We used the ingroup norm of antidiscrimination adapted from the work of Gabarrot et al. (2009). Participants were informed about the results of a supposed study carried out with a representative sample of students from their University. For the *descriptive norm* activation, two charts

informed participants that most students did not discriminate against French people of foreign origin (FPFO). Specifically, results indicated that over 80% of them allocated resources between FPFO and French people of French origin in an egalitarian way. These resources concerned housing and education benefits. For the *injunctive norm* activation, two charts informed participants that most students did not agree with discrimination against FPFO. Specifically, results indicated that most students considered it illegitimate to favor French people of French origin over FPFO in terms of housing (89.26%) and education benefits (82.25%). For the *combined-norms* activation (i.e., both *descriptive* and *injunctive norms*), two graphs indicated that most students did not legitimize discrimination and did not themselves discriminate against FPFO. Specifically, one chart was used to show the same information as for the descriptive activation, and another one was used to show the same information as for the injunctive activation. Finally, to be sure that these supposed results were taken into account, participants were asked to answer a comprehension question (Smith and Louis, 2008).

### Recall of past transgressions

Except participants of the control group, participants completed a questionnaire concerning their past behavior in five discrimination situations (i.e., criticizing, avoiding, keeping your distance from, staring at and being wary of a foreign person). They were asked to provide details about these situations, such as when it last happened, where they were, and who was concerned by the situation. This classically used questionnaire (Fried, 1998) facilitates participants' transgression recall to make them conscious of their own counter-normative acts.

### Dependent measures

We used measures of both active and passive discriminatory behaviors towards foreign people. We measured the participants' normative behavioral intention (i.e., intention to engage in active promotion of antidiscrimination), which is the most classic mean for measuring the hypocrisy effect (Priolo et al., 2019). However, because of the limitations of this type of measure, which would not allow to show a reduction in participants' discriminatory behaviors, we also used the exclusion of stigmatized targets in the Cyberball game (Pryor et al., 2013; Wesselmann et al., 2015) as a measure of passive discrimination against FPFO. The Cyberball game was chosen because it has several advantages. First, it offers a behavioral (here discriminatory) measure that can be used in the laboratory, whereas the use of behavioral measures in the induced-hypocrisy paradigm represents only a minority of studies (see Priolo et al., 2019). Second, unlike other measures of discriminatory behavior (e.g., allocation task, Anier et al., 2018 or organizational hierarchy task, Michinov et al., 2005), the Cyberball game allows to measure passive discriminations, related to the exclusion of a target. This makes the behavioral measure consistent with transgressions to be recalled by participants in the second step of the IHP (passive exclusion-type discriminations) and tests the effectiveness of the hypocrisy procedure on a form of

discrimination that focuses researchers' attention in terms of prevention. Third, the Cyberball game allows measuring deliberate but also less deliberate discriminatory behaviors (Pryor et al., 2013). Considering that we are activating social norms in our experimental procedure and that we know people are motivated to deliberately inhibit their discriminatory behaviors in order not to appear discriminatory (Devine et al., 2002), it seemed important to us to test the effect of our hypocrisy procedure on less deliberate behaviors.

### Behavioral intention

Participants were asked to indicate how long they were willing to spend distributing flyers as members of an antidiscrimination association. Concretely, they were asked to indicate a number of half hours they wished to allow (between 0 and 8) as well as their first name, last name and their email-address to be contacted by the association. There was no set time period (e.g., 1 day, 1 week, 1 month) indicated to participants to achieve their volunteering. The higher the level of volunteering, the greater the hypocrisy effect.

### Indicators of passive discriminatory behavior in the Cyberball game

In the Cyberball game, participants were seated in front of a computer and were instructed to play a Cyberball game. This was described to participants as a mental visualization task where they were asked to imagine playing a real-life ball-tossing game with other participants. Participants were informed that they were playing with three other students from their University, who in real-life were three bogus players pre-programmed by the experimenter. On screen, each player was represented by an animated "Cyberboy" figure. Above or to the side of each player

was a head-shot photo along with their first name. Using said photo and first name, one of the players was a black student (i.e., the target player), and the other two were white (see Figure 1 for female participants). To control the gender effect, all bogus players were men for male participants and women for female participants. Cyberball was programmed to carry on for 60 ball tosses and the three bogus players were programmed to equally included other participants. When participants received the ball, they elected to toss the ball to any of the players by clicking on their "Cyberboy" with the computer mouse.

The Cyberball game provided three indicators of discriminatory behavior (Pryor et al., 2013). The first one was the Cumulative Number of Tosses (CNT) to the black player across the entire game. The lower the CNT was, the greater the discrimination rate was. The second one was the Number of Tosses to white players Before Including the black player in the game (NTBI). The greater the NTBI was, the greater the discrimination rate was. These first two indicators reflected participants' deliberate and conscious choices. The third indicator was the Hesitation Given Inclusion (HGI) and represented the average latency across trials in throwing the ball to each player. The difference between the HGI for the black player and the mean HGI for the white players was used to measure less deliberate and less conscious behaviors. The higher the HGI was, the greater the discrimination rate was.

### Design and procedure

Participants were approached individually on the campus. After agreeing to participate, students were randomly assigned to one of four conditions. In the control condition, the dependent measures were directly proposed to the participants. In the three other

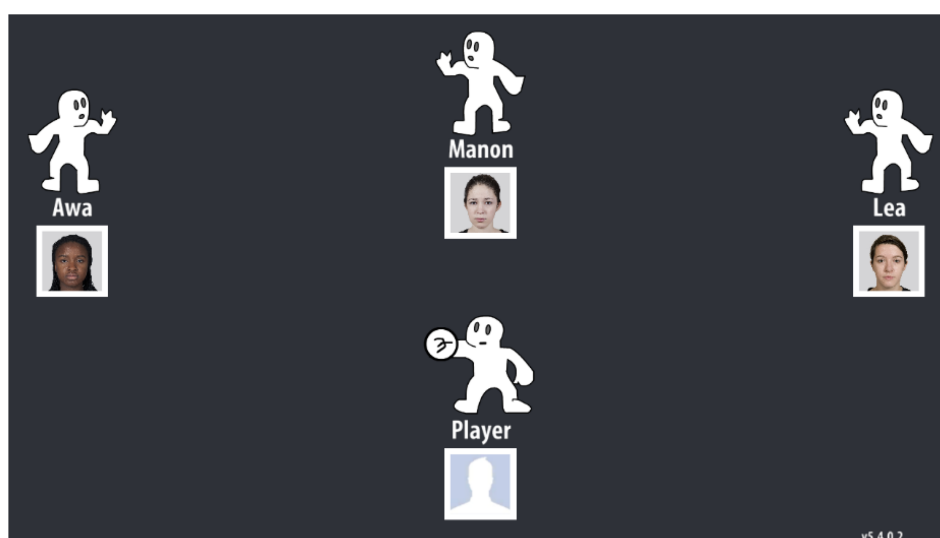


FIGURE 1

Illustration of the cyberball game for female participants. The bogus players' images were taken from the Langner et al. (2010) radboud faces database. Reproduced with permission from Langner et al. (2010), available at: <https://rafd.socsci.ru.nl/RaFD2/RaFD?p=main>.



hypocrisy conditions, namely descriptive norm-related hypocrisy, injunctive norm-related hypocrisy, and combined-norm hypocrisy, we activated the descriptive or injunctive normative beliefs or a combination of both. Then, participants completed the transgressions-salience step and, finally, the dependent variables. We debriefed all the participants in order to detect any suspicion about Cyberball (i.e., a realistic game with real persons). All the participants were convinced of this, except for one, who was removed from the analyses as previously indicated. Finally, participants were thanked for their participation.

## Hypotheses and data analysis

First, we expected that participants' time given to association (H1) would be greater in the combined-norm hypocrisy condition compared to descriptive norm-related hypocrisy and injunctive norm-related hypocrisy conditions, which would be greater than in the control condition. Second, we expected in the Cyberball game the number of throws to the target (CNT) to increase (H2), and the number of throws before target inclusion (NTBI) and the difference in time to include the target compared to the other two players (HGI) to decrease (H3 and H4) as follows: control condition, then descriptive norm-related hypocrisy and injunctive norm-related hypocrisy conditions, and finally, the combined-norm hypocrisy condition.

We analyzed data as described in the following two steps. In the first step, to test the effects of the norms in isolation, we ran  $2 \times 2$

ANOVAs with the following design: Injunctive norms (Present vs. Absent)  $\times$  Descriptive norms (Present vs. Absent). In the second step, we tested our specific hypotheses. We used the contrast method as recommended by many authors (Brauer and McClelland, 2005; Abdi and Williams, 2010; Judd et al., 2017), with the first contrast (i.e., interest contrast) testing our hypothesis (control =  $-1$ ; descriptive norm-related hypocrisy =  $0$ ; injunctive norm-related hypocrisy =  $0$ ; combined-norm hypocrisy =  $1$ ) and the two others being residuals (C2: control =  $0$ ; descriptive norm-related hypocrisy =  $-1$ ; injunctive norm-related hypocrisy =  $1$ ; combined-norms hypocrisy =  $0$ ; and C3: control =  $1$  descriptive norm-related hypocrisy =  $-1$ ; injunctive norm-related hypocrisy =  $-1$ ; combined-norms hypocrisy =  $1$ ). To conclude that the data were consistent with our hypotheses, three conditions had to be satisfied (Brauer and McClelland, 2005). The contrast of interest had to explain a significant part of the variance of the dependent variables while the two residuals had to be non-significant (i.e.,  $p > 0.05$ ).

## Results

As the number of transgressions recalled impacts the hypocrisy effect (Fointiat et al., 2008; Stone and Fernandez, 2011; Sénémeaud et al., 2014), we first verified that it did not vary across the three hypocrisy conditions (see supplementary material for statistical results).

Descriptive data are presented in Table 1 and statistical results of ANOVAs and linear regressions are displayed in Table 2.

TABLE 1 Means, standard deviations, and ratio for study variables across conditions.

Conditions	Measures	Volunteering		CNT	NTBI		HGI	
		<i>M</i>	<i>SD</i>	<i>Ratio</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Control		10.5	22.3	0.298	1.2	0.52	0.298	1.7
Descriptive norm-related hypocrisy		30	41.4	0.292	1.1	0.55	0.292	1.01
Injunctive norm-related hypocrisy		25.5	38.1	0.313	1.05	0.61	0.313	1.03
Combined-norm hypocrisy		45	42.9	0.324	0.8	0.77	0.324	0.918

*N* = 80. For volunteering, number of tosses before inclusion (NTBI) and hesitation given inclusion (HGI), data show the mean (standard deviation). For cumulative number of tosses (CNT), data show the ratio (number of tosses to the black player/number of tosses made in the game).

TABLE 2 Omnibus effects and planned comparisons for  $2 \times 2$  ANOVAs on the four dependent variables.

	Volunteering		CNT		NTBI		HGI	
	<i>F</i> ( $\eta^2$ )	Estimate ( <i>SE</i> )	<i>F</i> ( $\eta^2$ )	Estimate ( <i>SE</i> )	<i>F</i> ( $\eta^2$ )	Estimate ( <i>SE</i> )	<i>F</i> ( $\eta^2$ )	Estimate ( <i>SE</i> )
<i>Omnibus effects</i>								
Injunctive-norm	3.27 (0.039)		4.12* (0.051)		2.64 (0.33)		3.88 (0.045)	
Descriptive-norm	5.53* (0.065)		0.042 (0.00)		1.60 (0.02)		5.82** (0.067)	
INxDN interaction	0.0 (0.00)		0.56 (0.007)		0.29 (0.004)		1.09 (0.013)	
<i>Planned comparisons</i>								
Contrast of interest		0.320** (0.391)		0.026 (0.016)		−0.400* (0.196)		−1.18** (0.381)
Residual contrast 1		−0.042 (0.391)		0.021 (0.016)		−0.050 (0.196)		0.119 (0.381)
Residual contrast 2		−0.001 (0.553)		0.017 (0.023)		−0.150 (0.277)		−0.563 (0.539)

Statistically significant at \*  $p < 0.05$ ; \*\*  $p < 0.01$ ; \*\*\*  $p < 0.001$ .

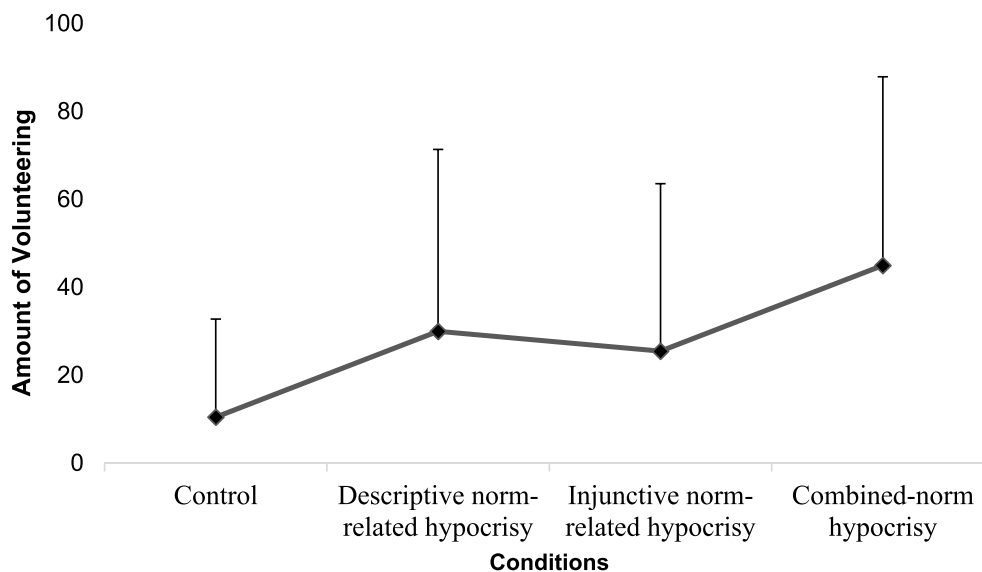


FIGURE 2

Participants' amount of volunteering. Volunteering of participants is shown for the four experimental conditions ( $N=80$ ). Volunteering was measured by asking participants how much time they were willing to give to a discrimination prevention association. Volunteering is in minutes and error bars show standard deviations.

## Omnibus effects and planned comparisons on the amount of volunteering

First, the omnibus model indicated a significant main effect of Descriptive-norm variable [ $F(1,76) = 5.53$ ,  $p = 0.021$ ,  $\eta^2 = 0.065$ ], and no significant main effect of Injunctive-norm variable [ $F(1,76) = 3.27$ ,  $p = 0.074$ ,  $\eta^2 = 0.039$ ] as well as no interaction effect [ $F(1,76) = 0.00$ ,  $p = 0.1$ ,  $\eta^2 = 0.00$ ]. Second, results of our planned comparisons indicated that the contrast of interest is significant,  $t = 2.94$ ,  $p = 0.004$ ,  $Estimate = 1.150$ , 95% CI [0.372, 1.928], and the two residual contrasts were not significant (see Table 2). Thus, results were consistent with our hypothesis (H1) showing a positive trend in participants' amount of volunteering from the control condition to the conditions of descriptive norm-related hypocrisy and injunctive norm-related hypocrisy and finally, the combined-norm hypocrisy condition (see Figure 2).

## Omnibus effects and planned comparisons on CNT

First, the omnibus model indicated a significant main effect of Injunctive-norm variable [ $F(1,76) = 4.12$ ,  $p = 0.046$ ,  $\eta^2 = 0.051$ ], and no significant main effect of Descriptive-norm variable [ $F(1,76) = 0.042$ ,  $p = 0.84$ ,  $\eta^2 = 0.00$ ] as well as no interaction effect [ $F(1,76) = 0.56$ ,  $p = 0.46$ ,  $\eta^2 = 0.007$ ]. Second, results of our planned comparisons indicated neither significant effect for the contrast of interest,  $t = 1.58$ ,  $p = 0.12$ ,  $Estimate = 0.026$ , 95% CI [-0.007, 0.058], nor for the both residual contrasts (see Table 2).

These results do not support our hypothesis (H2) as we do not observe a significant positive trend in participants' cumulative number of tosses for the black target from the control condition to the conditions of descriptive norm-related hypocrisy and injunctive norm-related hypocrisy and finally, the combined-norm hypocrisy condition.

## Omnibus effects and planned comparisons on NTBI

First, the omnibus model indicated no significant main effects of Injunctive-norm [ $F(1,76) = 2.64$ ,  $p = 0.11$ ,  $\eta^2 = 0.033$ ] and Descriptive-norm variable [ $F(1,76) = 1.60$ ,  $p = 0.21$ ,  $\eta^2 = 0.020$ ], and no interaction effect [ $F(1,76) = 0.29$ ,  $p = 0.59$ ,  $\eta^2 = 0.004$ ]. Second, results of our planned comparisons indicated a significant effect for the contrast of interest,  $t = -2.04$ ,  $p = 0.045$ ,  $Estimate = -0.40$ , 95% CI [-0.79, -0.010], but no significant effects for the both residual contrasts (see Table 2). Thus, results were consistent with our hypothesis (H3) showing a negative trend in participants' number of tosses before including the black target from the control condition to the descriptive norm-related hypocrisy and injunctive norm-related hypocrisy conditions and finally, the combined-norm hypocrisy condition.

## Omnibus effects and planned comparisons on HGI

First, the omnibus model indicated a significant main effect of Descriptive-norm variable [ $F(1,76) = 5.82$ ,  $p = 0.018$ ,  $\eta^2 = 0.067$ ],

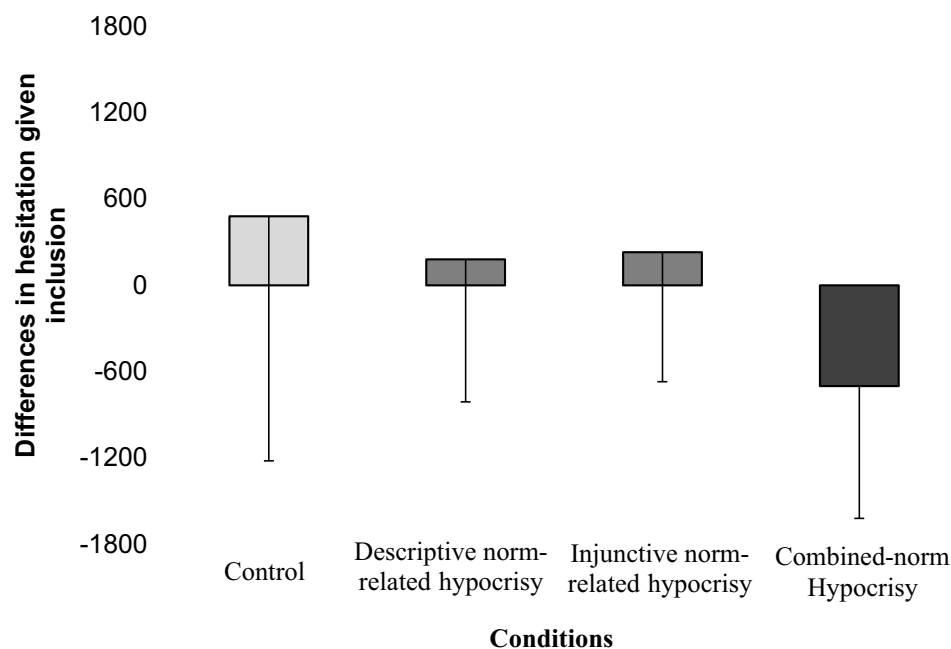


FIGURE 3

Differences in participants' hesitation given inclusion. Differences in participants' hesitation given inclusion (HGI) between the black player and the white players are shown for the four experimental conditions ( $N=80$ ). Differences in hesitation given inclusion were calculated by subtracting the average HGI scores of the white players from the HGI score of the black player. Scores are in milliseconds and error bars show standard deviations.

and no significant main effect of Injunctive-norm variable [ $F(1,76) = 3.88$ ,  $p = 0.052$ ,  $\eta^2 = 0.045$ ] as well as no interaction effect [ $F(1,76) = 1.09$ ,  $p = 0.30$ ,  $\eta^2 = 0.013$ ]. Second, results of our planned comparisons indicated a significant effect for the contrast of interest,  $t = -3.10$ ,  $p = 0.003$ , *Estimate* =  $-1.18$ , 95% CI [ $-1.94$ ,  $-0.42$ ], but no significant effects for the both residual contrasts (see Table 2). Thus, results were consistent with our hypothesis (H4) showing a negative trend in participants' hesitation given inclusion the black target from the control condition to the descriptive norm-related hypocrisy and injunctive norm-related hypocrisy conditions and finally, the combined-norm hypocrisy condition (see Figure 3).

## Discussion

This study had two objectives. First, we tested, within the IHP framework, the effect of perceived deviance from the antidiscrimination norm on reduction of discriminatory behaviors. Second, we examined whether IHP effects can be reinforced by the activation of the deviance from both injunctive and descriptive norms. Overall, results first show that the hypocrisy effect on behavioral antidiscrimination intention and passive discriminatory behaviors is reproduced. Indeed, recalling the antidiscrimination social norm (whether it is injunctive, descriptive or both) and past behaviors deviating from the norm, leads the participants to actively promote

antidiscrimination and to reduce their discriminatory behaviors. Second, results showed that the combined use of descriptive and injunctive norms in the IHP enhanced this hypocrisy effect, leading participants to further reduce their discriminatory behaviors. These results will be discussed with regard to two major implications. First, they provide a new and effective means to produce behavioral changes in the field of discrimination. Second, they contribute to further investigating the explanatory processes underlying the hypocrisy effect.

First, while IHP had demonstrated its effectiveness in many fields (see Priolo et al., 2019), it has only been tested once in the field of discrimination (Son Hing et al., 2002). Indeed, Son Hing et al. (2002) had shown that IHP could reduce budget restrictions among Asian students. Our study completes their findings, 20 years later, by showing that hypocrisy can also reduce interpersonal discrimination against French people from a foreign origin. According to us, this IHP applicability to the prevention of interpersonal discrimination is interesting in two ways. On the one hand, our results showed that the IHP impacts not only deliberate (i.e., behavioral intentions and NTBI indicator) but also less controllable discriminatory behaviors (i.e., HGI indicator in Cyberball, Pryor et al., 2013). These results are particularly interesting and innovative in the discrimination field, because more subtle, less deliberate discrimination remains an issue (Molero et al., 2013). They are also innovative when it comes to IHP field. Indeed, the hypocrisy effect is classically observed on conscious behaviors

(Liégeois et al., 2017). Apart from a few studies showing behavioral changes when people were unaware that their behaviors were measured (Dickerson et al., 1992), our study is the first to demonstrate that the IHP can impact unintentional and uncontrollable behaviors. The Associative-Propositional Evaluation model (Gawronski and Bodenhausen, 2006) could shed some light on this result. One might think that dissonance would not be totally reduced by the conscious way, needing to reduce the residual part of dissonance by another means (a less conscious routeway). In the IHP, a single dissonance reduction route is sometimes not sufficient (Fointiat et al., 2013). In any case, additional data are needed to specifically address this issue of less deliberate and unconscious behavioral change following the IHP. On the other hand, we believe that the IHP, because it fosters awareness of one's deviant behaviors, may be a necessary and therefore crucial preliminary step to regulate discriminatory behaviors. According to the self-regulation model of prejudice (Monteith et al., 1993, 2016), individuals are likely to perceive that their behaviors deviate from antidiscrimination norms. This perception would lead them to be willing to act "better" in the future (i.e., not to discriminate). They indeed become sensitive to environmental cues that may trigger these discriminatory behaviors, and thus can suppress and replace them with adapted and prejudice-free behaviors. However, two conditions appear to be important for this self-regulation process to take place: (i) people must be motivated to regulate and reduce their discriminatory behaviors (Devine et al., 2002) and (ii) people need to identify that their behaviors are discriminatory and counter-normative - which is not obvious for passive and subtle discriminations (Kite and Whitley, 2016). Although this first condition was not experimentally manipulated in our study, our proposed idea is that the IHP would fulfill both of these conditions. On the one hand, it fosters people's awareness of their indirect and subtle counter-normative behaviors by asking them to recall it. On the other hand, it helps motivate people to act in line with the norm. Thus, the hypocrisy paradigm seems to us a promising tool in the field of discrimination prevention and particularly in terms of reducing passive discrimination, which is currently the main issue. It should be further developed in order to increase people's motivation to effectively regulate their own discriminatory behaviors.

Second, our focus on the role of social norms as a reinforcer of behavioral change in the induced-hypocrisy paradigm addresses a gap in IHP literature. A great deal of research has investigated the role of the transgressions-salience step at the expense of the normative-salience step (see Stone and Fernandez, 2008 for a review). By showing the reinforcing role of joint activation of social norms in the normative-salience step on the hypocrisy effect, we first contribute to identifying the optimal conditions for applying the paradigm. More critically, we further our understanding of the processes underlying the hypocrisy effect. Indeed, the explanation in terms of self-consistency (Aronson, 1999) has been prevalent since the paradigm's genesis

and has rarely been challenged, except by the deviation-from-norm approach (Liégeois et al., 2017). A more integrative explanation has also been developed, based on the Self-Standard Model of dissonance (SSM, Stone and Cooper, 2001; Stone and Fernandez, 2008). According to the latter, induced hypocrisy could be explained either by a first pathway, that of the threat to self (i.e., a self-consistency effect) or by a second pathway, that of the deviation from the social norm. However, this second pathway clearly lacks experimental support. We suggest that our study may be one of the first experimental evidence of its existence. More specifically, according to Thøgersen (2006) taxonomy of norms, descriptive norms are integrated into the self in a lesser extent than injunctive norms. Therefore, under a self-consistency view (the first pathway in Stone and Cooper's SSM), the injunctive norm should have caused a greater *hypocrisy effect* than the descriptive norm because the more the self is threatened, the higher the hypocrisy effect. In this perspective too, the combined use of two norms should not have caused a greater effect than the injunctive. Yet, we observed exactly the opposite. Therefore, our results are consistent with the second pathway of SSM and the deviation-from-norm approach (Liégeois et al., 2017) which suggests that the hypocrisy effect could not only be due to self-threat but also to the awareness of norm deviation. Our further research will attempt to provide additional experimental evidence for this social norm deviation pathway, such as testing whether weakening social norms in the normative step reduces the hypocrisy effect.

## Limitations

First, our sample was composed only of participants who agreed to take part in an interpersonal relations study. This in itself may constitute a bias of self-selection. Second, we do not reach sufficient statistical power for some study measures. As some researchers (e.g., Christley, 2010) suggest that underpowered studies increase the likelihood of making type I error, future research should attempt to replicate this additive effect of combining two norms rather than one in the hypocrisy procedure. Third, significant results consistent with our hypotheses were obtained on three of four indicators, the effect of our experimental procedure was not significant on the Cyberball CNT indicator. The fact the CNT is a deliberate behavioral measure (i.e., to give or not to give the ball to the target) could explain it. While we know that people are motivated to inhibit the expression of their prejudices and discriminatory behaviors (e.g., Devine et al., 2002), participants have completed the Cyberball game after responding to the behavioral intention measure (volunteering to a discrimination prevention association) which may have made salient the social norm against discrimination. All of this may have (i) weakened the effect of our hypocrisy procedure on this deliberate measure and especially (ii) led participants in the control condition to not deliberately discriminate against the target. Our results seem to support this assumption since the participants in the control

condition sent the ball on average 29.8% of the time to the target (33% being a fair distribution). A ceiling effect could have been observed on this measure, not allowing to test the hypocrisy effect in optimal conditions. Therefore, future research could attempt to replicate the hypocrisy effect on discriminatory behavior by using the Cyberball game directly after the hypocrisy procedure. Fourth, our study is about the influence of group norms on behaviors and we know that the individual's group identity can moderate it. It would be interesting to assess the participants' level of identification with the group to better understand our results.

## Conclusion

Societal changes in terms of antidiscrimination norms have led people to inhibit the expression of their prejudices and discriminatory behaviors. People could thus be reluctant to recall them. This is probably the reason why the hypocrisy paradigm has rarely been applied to the field of discrimination prevention, since it is largely applied to transgressive behaviors that are easy to remember and recall. In this case, reinforcing the first IHP step of normative salience may be necessary to consider for inducing people's sense of hypocrisy. Our study suggests that the IHP may also be an effective solution for preventing discrimination if, without the realization of an optimal transgression-recall step, deviance from the norm is increased by reinforcing the anti-normative content of discrimination during the normative step.

## 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 at: [https://osf.io/ryg8t/?view\\_only=90e6af6fa1994e0f940e85fc09390779](https://osf.io/ryg8t/?view_only=90e6af6fa1994e0f940e85fc09390779). Preregistration details are available at <https://doi.org/10.17605/OSF.IO/HGB6W>.

## 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.

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## Author contributions

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## Supplementary material

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# Aggressive behavior, boredom, and protective factors among college students during closed-off management of the COVID-19 pandemic in China

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**Background:** Chinese colleges have implemented strict closed-off management in response to the outbreak of a new variant of the new coronavirus, Omicron. But such management measures may lead to more aggressive behavior. The study aimed to determine the associations between boredom and aggressive behavior with aggression and to examine the impact of boredom on aggression through the moderating role of cognitive flexibility.

**Methods:** The Multidimensional State Boredom Scale, the Reactive–Proactive Aggression Questionnaire, and the Cognitive Flexibility Inventory were applied to a sample of 719 college students who were in a closed-off management environment.

**Results:** For individuals with high cognitive flexibility, the relationship between state boredom and proactive aggression was not significant. The relationship between state boredom and proactive aggression was significantly positively correlated for individuals with low cognitive flexibility, especially low substitutability. Cognitive flexibility has no significant moderating effect on the relationship between state boredom and reactive aggression.

**Conclusion:** The findings highlighted the importance of boredom as a potential risk factor for aggression, while cognitive flexibility appears as a potential protective factor.

## KEYWORDS

COVID-19, boredom, cognitive flexibility, aggression, moderation

## Introduction

COVID-19, a novel coronavirus disease, has caused numerous infections worldwide. To break the transmission link of the virus and curb the outbreak of the COVID-19 pandemic, the Chinese government has taken aggressive public health monitoring and interventions, such as mass nucleic acid testing, contact tracing, travel restrictions, and avoiding crowd gathering (Cheng et al., 2021; Hu et al., 2021; Wan et al., 2022). As the Omicron variant has caused COVID-19 resurgences in many places, in cities with severe epidemics, primary and middle schools have to be closed and converted to online teaching, and colleges have implemented relatively closed-off management. Except for

necessary medical treatment, college students are not permitted to leave campus without special circumstances, in a bid to reduce the likelihood of COVID-19 (Robertson et al., 2012; Sun et al., 2021; Zhang et al., 2021; Tu et al., 2022; Zhang and Zhu, 2022).

Such strict quarantine and restrictive policies have greatly relieved the pressure on the healthcare system and played a role in keeping infection and death rates low (Fu et al., 2021; Ge et al., 2021; Bo et al., 2022). These policies, however, also affect normal study, socialization, and life, potentially leading to psychological and behavioral problems for college students (Copeland et al., 2021; Li et al., 2021a, b; Baleanu et al., 2022).

## Aggression

In general, aggression is defined as behavior with the immediate intention of harming another individual. Moreover, the perpetrator must believe that the behavior will cause harm to the target as well as the target must be motivated to avoid the behavior (Anderson and Bushman, 2002). Reactive aggression occurs in response to a real or perceived threat, whereas proactive aggression occurs in order to accomplish a specific goal (Miller and Lynam, 2006; Romero-Martínez et al., 2022). During the COVID-19 pandemic, many young people have been directly or indirectly exposed to violence and aggression during the pandemic (Field, 2021; Bera et al., 2022). Compared with people who were not under stay-at-home restrictions, individuals who were under lockdown status were more likely to be depressed, face more domestic violence risks (Humphreys et al., 2020; Mazza et al., 2020). A significant number of students showed more and more destructive and aggressive behavior (Pfefferbaum and North, 2020; Killgore et al., 2021; Ye et al., 2021). Not only that, the content of aggressive behavior also appears in dreams (Kilius et al., 2021). Researchers have examined changes in aggressive behavior before and after the epidemic, and found a rise in cyberbullying behaviors, physical aggression, verbal aggression (Barlett et al., 2021; Wang et al., 2022).

Various empirical studies show that the emotion regulation motivation may play an important role in aggression (Bushman et al., 2001; Robertson et al., 2012; DeWall et al., 2016; Chester et al., 2019). There is preliminary evidence in the literature that indicates that under-regulation of emotion is likely to be associated with aggressive behavior. The presence of uncomfortable emotions, which an individual cannot otherwise manage, is likely to increase his or her willingness to act aggressively (Robertson et al., 2012). In some situations, aggression allows the individual to externalize their internal emotional state and regulate others' behavior. A person may engage in aggressive behavior in the hope that it will make them feel better (Bushman et al., 2001). They believe that aggressive behavior could facilitates the control of emotional experiences, alleviates discomfort, and contributes to the achievement of goals (Bushman et al., 2001; Baumeister et al., 2007; Pfattheicher et al., 2021b).

## Boredom and aggression

Boredom is the adverse experience of wanting, but being unable, to engage in stimulating and satisfying activity (Eastwood et al., 2012; Van Tilburg and Igou, 2012; Elpidorou, 2018; Westgate and Wilson, 2018). There are two types of boredom: state boredom (an emotion that appears in a specific setting) and trait boredom (an individual's proneness to experience feelings of disinterest). According to the Meaning and Attention Components (MAC) model of boredom, boredom emerges when the task have little meaning or under stimulating (Mercer-Lynn et al., 2014; Westgate and Wilson, 2018; Liang et al., 2020). During the COVID-19, the reduced autonomy or perceived limitations in environment leads to a lower degree of individual arousal, cognitive resources may not optimally used (Liang et al., 2020; Weybright et al., 2022). Such monotonous and constrained quarantine environment is more likely to increase the risk that individuals will experience state boredom (Homel et al., 1992; Rupp and Vodanovich, 1997; Dahlen et al., 2004; Elpidorou, 2018). In order to fight it, individuals have to change their behavioral or cognitive patterns (Nett et al., 2011).

Findings from the psychological and neural sciences have shown that aggressive behavior can indeed reduce boredom and bring positive feelings to some extent (Raine et al., 2006). Such aggressive pleasures may have evolved from predatory behaviors that were later rewarded with reproductive benefits (Griskevicius et al., 2009; Chester, 2017; LIU et al., 2022). Various studies have shown that boredom is associated with aggressive behavior, such as dangerous driving (Dahlen et al., 2005), self-harm (Chapman and Dixon-Gordon, 2007; Nederkoorn et al., 2016), school bullying, and abusive behavior (Pfattheicher et al., 2021a), etc. In an empirical study, Homel, Tomsen, and Thommeny examined the relationship between boredom proneness and aggressive behavior. They founded that boredom affected adolescents' aggressive behaviors such as public violence and alcohol-related aggression (Homel et al., 1992). This view was confirmed by research by Rupp and Vodanovich, who found that a high total boredom score was positively correlated with aggression scores, significantly predicting the expression of aggressive behavior (Rupp and Vodanovich, 1997). Vodanovich concluded from a review of previous studies that individuals with high boredom have higher levels of aggression and are prone to bad social behaviors such as alcoholism, drug use, and violence (Vodanovich, 2003). People may even regulate their boredom through exposure to violent contents and through mediated aggression (Vandebosch and Poels, 2021).

## Moderating role of cognitive flexibility

It is worth noting that the current emotional state cannot determine whether an individual engages in aggression (Rupp and Vodanovich, 1997; Dahlen et al., 2004). Not all of us fought boredom with aggressive behavior during the COVID-19



pandemic. Both person factors (e.g., personality traits) as well as situational factors (e.g., aggressive cues) affect an individual's readiness to engage in aggression (Dahlen et al., 2004). Recent research has found that anticipating the emotions and the consequences of actions has a major impact on behavior (Chester et al., 2019). If individuals believe that aggression worsens their emotional state, their aggressive behavior will not increase or even decrease under negative emotions (Bushman et al., 1999).

Cognitive flexibility plays a key role in reappraising situations (Dennis and Vander Wal, 2010; Inozu et al., 2022). It refers to people's mental ability to switch cognitive sets to adapt to changing environmental stimuli (Martin and Rubin, 1994; Dennis and Vander Wal, 2010). Individuals with high cognitive flexibility solve problem through more constructive and adaptive cognition (e.g., focus on problem coping, focus on the positive, seek social support; Rende, 2000; Kalia et al., 2019). They perceive difficult situations as controllable and generate multiple alternative explanations for life events (Dennis and Vander Wal, 2010). Cognitive flexibility has been shown to be a protective factor against external and internal stress (Koesten et al., 2009; Dennis and Vander Wal, 2010; Murphy et al., 2012; Sağar, 2021). Rather than ruminate on the perceive inability to problem solve, it can motivate individuals to generate multiple alternative solutions (Dennis and Vander Wal, 2010). Individuals with cognitive flexibility may be able to reframe their understanding of global pandemics. It may enable them to reconsider behaviors that would mitigate their risk in a challenging environment (Bonanno and Burton, 2013).

In fact, people's attempts to regulate their emotion through aggression may be risky and counterproductive. Due to the fact that aggression can cause more physical and psychological harm to both parties, pleasure may be short-lived and soon replaced by discomfort. In addition, cultural values and beliefs may inhibit or encourage people's expressions of aggression (Bond, 2004). In the perspective of an individualist, aggression can be viewed as a method for achieving self-reliance and winning competitions, whereas in a collectivist perspective, aggression leads to an erosion of interpersonal relations and group harmony (Li et al., 2010). It appears that aggression may not be the most effective means of regulating emotions. By extending previous research on the relationship between boredom and aggressive behavior, exploring how the cognitive flexibility influence the decision-making, a deeper understanding of the mechanisms can be gained. We could provide individuals with better options for regulating emotions.

## The current study

In the present study, we sought to determine whether state boredom is associated with two forms of aggressive behaviors (proactive aggression and reactive aggression). In addition, cognitive flexibility was divided into two facets (control and alternative), enabling a more nuanced distinction between the variables. Based on a hierarchical regression model, we examined

whether cognitive flexibility moderates the relationship between state boredom and aggressive behavior. We hypothesized that there would be a significant positive relationship between the state boredom and aggressive behavior. Moreover, cognitive flexibility would show a significant negative relationship with aggressive behavior. Finally, cognitive flexibility would moderate the relationship between state boredom and aggressive behavior.

## Materials and methods

### Participants

719 Chinese participants (356 male; age range 18–22;  $M = 20.56$ ,  $SD = 2.33$ ) were recruited from a college in Shandong province in China to participate in this study in April 2022. As the Omicron variant has caused COVID-19 resurgences, these participants have been under the strict closed-off management for nearly 2 months.

Investigators explained the study to all participants before collecting any data. Each participant provided written consent prior to the beginning of the study, which was approved by the researchers' University Ethical Advisory Committee. All participants were required to indicate their demographic information and complete three questionnaires. They were tested independently, lasting approximately 25 min, and all received same research credit in exchange for participation. Researchers encouraged students to respond as truthfully as they could, highlighting that their answers would be kept confidential.

### Measures

#### State boredom

The Multidimensional State Boredom Scale (MSBS) is a self-reported 29-item scale developed by Fahlman et al. (2013). We used the Chinese version of Liu et al. (2013), which was revised according to Chinese cultural background. In accordance with both theoretical and empirical definitions of boredom, the boredom scale identifies five factors: disengagement, high arousal, low arousal, inattention and time perception. Using Likert 7 grade score (completely disagree–completely agree, in turn recorded as 1–7 points), the higher total 24 items score represents the higher levels of state boredom. In previous studies, the scale has shown good reliability and validity (Ng et al., 2015; Zhao et al., 2016; Liang et al., 2020). In this study, the Cronbach's alpha was 0.912.

#### Cognitive flexibility

The cognitive flexibility inventory (CFI) is a brief self-reported cognitive flexibility measurement tool developed by Dennis and Vander Wal (2010). The CFI measures aspects of cognitive flexibility that enable individuals to respond adaptively to stressful life events. We used the Chinese version of Wang et al. (2016), which was revised according to Chinese expression habit. The



scale consists of two dimensions (Alternatives and Control). The items use a 7-point Likert rating system with response options ranging from 1 (completely disagree) to 7 (completely agree). There are 13 items in the Alternatives subscale, which measures the ability of individuals to generate alternative explanations for occurrences and alternative solutions to problems. The Control subscale consists of 7 items, which measure an individual's tendency to perceive difficult situations as controllable. Items were reverse scored when necessary and summed. The higher total score represents the higher levels. In previous studies, the scale has shown good reliability and validity (Yu et al., 2020; Zhou et al., 2020; Zou et al., 2020). In this study, the Cronbach's alpha was 0.856.

### Aggressive behavior

The Reactive-Proactive Aggression Questionnaire (RPQ) is a brief self-report questionnaire designed to assess reactive and proactive aggression in adolescent (Raine et al., 2006). We used the Chinese version of Zhang et al. (2014) which was revised according to Chinese cultural background. The scale consists of two dimensions (proactive aggression and reactive aggression). It has a 6-point Likert rating system with response options ranging from 1 (not at all characteristic of me) to 6 (entirely characteristic of me), the higher total items score represents the higher levels of aggressive behavior. In previous studies, the scale has shown good reliability and validity (Fossati et al., 2009; Fung et al., 2009; Pechorro et al., 2017). In this study, the Cronbach's alpha was 0.877.

### Statistical analyses

SPSS 24.0 was used to process the data for this study. The first step was analyzing whether the data had a common method bias using Harman's single-factor test (Pm, 2003). In the second step, descriptive statistics and Pearson bivariate correlations were used to analyze the scores from the three questionnaires. As a final step, the moderation model was tested using the SPSS macro PROCESS (model 1) introduced by Hayes et al. (2017). The age and gender were entered as covariant into the moderation model. For the significant effects, pick-a-point approximation was used to interpret the results.

## Results

### Common method biases

By using factor analysis, a common variance analysis was applied to the three questionnaires. As a result of Bartlett's test of spherical, the chi-square reached significance. A total of 15 eigenvalues greater than one were extracted after principal component analysis. There was a first factor that explained 13.69% of the variance, which was less than the 40% required by the

critical standard (Pm, 2003). It appears that common method bias is not a major concern based on these results.

### Descriptive and bivariate correlations analysis

Table 1 provides descriptive statistics and a correlation matrix for state boredom, aggressive behavior and its sub-dimensions (proactive aggression and reactive aggression), and cognitive flexibility and its sub-dimensions (alternatives and control). Bivariate correlation analysis revealed a negative correlation between aggression and cognitive flexibility ( $r = -0.085$ ,  $p < 0.05$ ) and a positive correlation between aggression and boredom ( $r = 0.145$ ,  $p < 0.01$ ). Moreover, Proactive aggressive behavior score was negatively correlated with cognitive flexibility ( $r = -0.114$ ,  $p < 0.01$ ).

### Moderation effect of cognitive flexibility on the relationship between boredom and aggressive behavior

The results of the moderation analysis with selected aggressive behavior (and its components) as the dependent variable, boredom as an independent variable, and cognitive flexibility as a moderator are presented in Table 2.

The results show that cognitive flexibility moderated the relationship between boredom and aggressive behavior ( $\beta = -0.085$ ,  $p < 0.05$ ). Results of a simple slope test further revealed that, for individuals with low cognitive flexibility, state boredom could positively predict aggressive behavior ( $\beta_{\text{simple}} = 0.234$ ,  $p < 0.001$ ). For individuals with high cognitive flexibility, the relationship between state boredom and aggressive behavior was not significant ( $\beta_{\text{simple}} = 0.064$ ,  $p = 0.228$ ; see Figure 1).

Further, the various components of aggressive behavior were used as dependent variables. Cognitive flexibility and its two subcomponents were used as moderators, respectively. The results are as follows: cognitive flexibility moderated the relationship between boredom and proactive aggression ( $\beta = -0.101$ ,  $p < 0.05$ ). Results of a simple slope test further revealed that, for individuals with low cognitive flexibility, state boredom could positively predict proactive aggression ( $\beta_{\text{simple}} = 0.264$ ,  $p < 0.001$ ). For individuals with high cognitive flexibility, the relationship between state boredom and proactive aggression was not significant ( $\beta_{\text{simple}} = 0.063$ ,  $p = 0.232$ ; see Figure 2). Moreover, alternatives moderated the relationship between boredom and proactive aggression ( $\beta = -0.101$ ,  $p < 0.01$ ). Simple slope test revealed that, for individuals with low alternatives, state boredom could positively predict proactive aggression ( $\beta_{\text{simple}} = 0.266$ ,  $p < 0.001$ ). For individuals with high alternatives, the relationship between state boredom and proactive aggression was not significant ( $\beta_{\text{simple}} = 0.063$ ,  $p = 0.224$ ; see Figure 3). Control has no significant

TABLE 1 Descriptive statistics and results of correlational analysis.

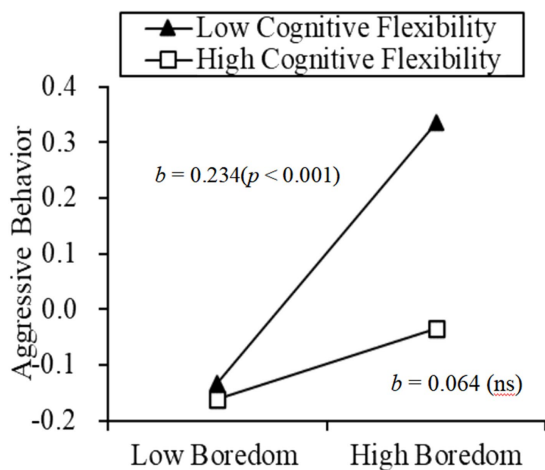
Variables	Mean	SD	Median	Mode	1	2	3	4	5	6
1 Boredom	89.22	33.03	91	96	1					
2 Cognitive flexibility	73.28	31.23	71	65	0.019	1				
3 Alternatives	50.58	21.79	49	46	0.016	0.866**	1			
4 Control	22.7	11.63	21	19	0.022	0.875**	0.721**	1		
5 Aggressive behavior	54.99	20.58	55	50	0.145**	−0.085*	−0.116**	−0.009	1	
6 Proactive aggression	24.92	13.44	21	12	0.158	−0.114**	−0.167**	0.007	0.614**	1
7 Reactive aggression	30.06	16.25	27	10	0.052	−0.013	−0.009	−0.017	0.758**	−0.049

\* $p < 0.05$ , \*\* $p < 0.01$ .

TABLE 2 Results of moderation analysis with the aggressive behavior, proactive aggression, and reactive aggression as dependent variables, boredom as the independent variable, and cognitive flexibility as the moderator.

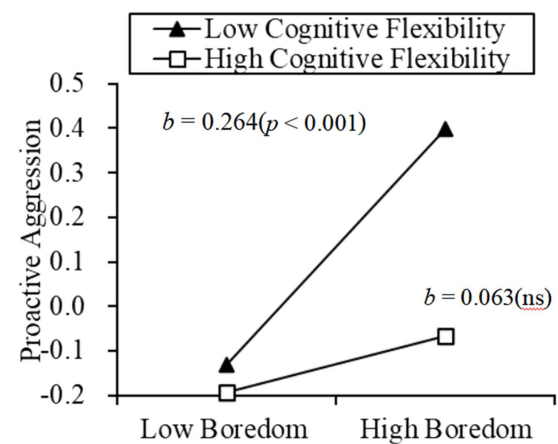
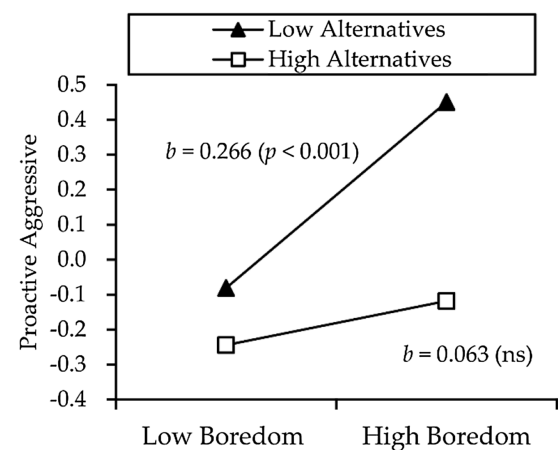
Interaction effect	Coefficient	SE	<i>t</i>	<i>P</i>
<b>Aggressive behavior as dependent variable</b>				
Boredom $\times$ CF	−0.085	0.039	−2.176	0.03
<b>Proactive aggression as dependent variable</b>				
Boredom $\times$ CF	−0.101	0.039	−2.588	0.01
Boredom $\times$ A	−0.101	0.038	−2.646	0.008
Boredom $\times$ C	−0.072	0.039	−1.853	0.064
<b>Reactive aggression as dependent variable</b>				
Boredom $\times$ CF	−0.025	0.04	−0.619	0.536
Boredom $\times$ A	−0.024	0.04	−0.595	0.552
Boredom $\times$ C	−0.019	0.039	−0.473	0.636

CF, Cognitive Flexibility; A, Alternatives; C, Control.

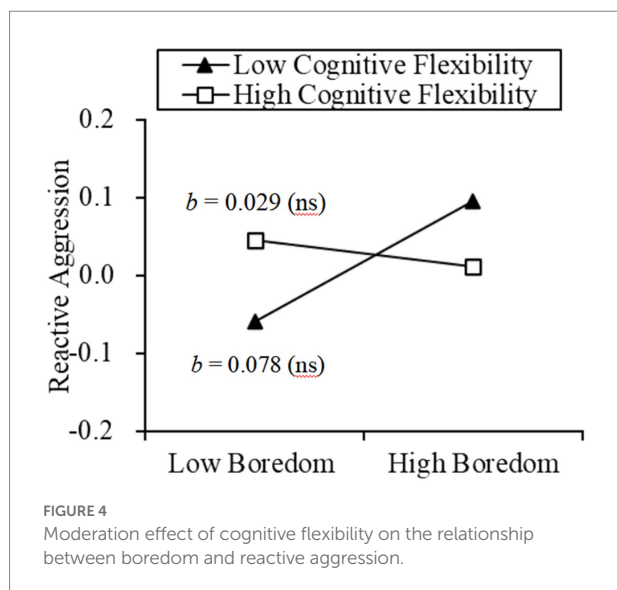
FIGURE 1  
Moderation effect of cognitive flexibility on the relationship between boredom and aggressive behavior.

effect on the relationship between state boredom and proactive aggression ( $\beta = -0.072$ ,  $p = 0.064$ ).

For reactive aggression, cognitive flexibility has no significant effect on the relationship between state boredom and reactive aggression ( $\beta = -0.025$ ,  $p = 0.536$ ; see Figure 4). Alternatives and

FIGURE 2  
Moderation effect of cognitive flexibility on the relationship between boredom and proactive aggression.FIGURE 3  
Moderation effect of alternatives on the relationship between boredom and proactive aggression.

control also have no significant effect on the relationship between state boredom and reactive aggression ( $\beta = -0.024$ ,  $p = 0.552$ ;  $\beta = -0.019$ ,  $p = 0.636$ ).



## Discussion

### The relationship between boredom and aggression

When the environment is monotonous, repetitive, boring, etc., or the environment does not match the internal standards, it is easy to induce the individual's state boredom. Due to the new coronavirus epidemic caused by the "Omicron" variant, college students are facing more inconvenience and restrictions in their lives, which significantly increased the boredom level (Chao et al., 2020). Individuals will adopt coping strategies when their environments cannot be exited or changed. The purpose of this study was to examine the relationship between boredom and aggressive behaviors (proactive aggression and reactive aggression) during close-off management.

As a coping strategy for boredom, there was no significant positive association between the two forms of aggressive behaviors and boredom. The results of this study are in line with previous research on coping strategies and boredom (Droit-Volet et al., 2020; Gazmer et al., 2020; Liang et al., 2020; Donati et al., 2022). In light of this, aggression may not be a meaningful and satisfying alternative target activity for everyone as a means to alleviate boredom.

### Moderating role of cognitive flexibility

The results of the moderation analysis revealing that cognitive flexibility is a moderator that affects the strength of the relationship between boredom and proactive aggression. Previous research has found that individuals with lower psychological flexibility were more likely to experience depression, anxiety, or worry, while those with higher psychological flexibility had better mental wellbeing since they could choose the right coping mechanisms

to adapt to novel situations better (Dawson and Golijani-Moghaddam, 2020). It has been shown that people with a high level of cognitive flexibility are more likely to be able to cope with the COVID-19 epidemic environment than individuals with a low level of cognitive flexibility. Through cognitive restructuring and effective coping, cognitive flexibility might compensate for intolerance of uncertainty's negative impact on psychological well-being. Thus, people with high cognitive flexibility are able to resist behaviors that are harmful to their physical and mental health during the COVID-19 epidemic (Demirtaş, 2021; Sadler et al., 2021).

The results of our study indicate that there was significant negative association between the cognitive flexibility and aggressive behavior. Being high in cognitive flexibility dampens the effect of boredom on aggression. For individuals with high cognitive flexibility, increased boredom did not increase the likelihood of the emergence of individuals' aggressive behavior. Although aggressive behavior can increase positive emotions, its modulating effect on emotion may only be temporary (Chester et al., 2019). The antisocial nature of aggression dictates that aggression for self-interest and pleasure is inherently contrary to social norms such as morality and law. Individuals may fear poor social evaluation or legal punishment after their aggressive behavior. The duration of pleasure from aggression is relatively short compared to the negative effects of aggression (Miller and Lynam, 2006). In general, aggression is more of a "double-edged sword." This implies that for individuals with high cognitive flexibility, the use of antisocial behavior such as aggression to regulate emotions is distinctly non-adaptive.

During the COVID-19, closed-off management of the university may contribute to an increased risk of psychological and behavioral problems among college students (Chang and Hou, 2022). Adapting to the restrictive and isolating conditions requires a reappraisal and restructuring of cognitive processes. Since cognitive flexibility provides adaptive solutions to changing conditions and demands, adjustment to this changed context can be particularly difficult for individuals with lower cognitive flexibility. The results of this study indicate that individuals with low cognitive flexibility are more susceptible to boredom levels during closed-off management. The relationship between boredom and aggression varied among individuals who exhibited certain aspects of cognitive flexibility. As boredom increased, proactive aggressive behavior increased for those with low CFI-Alternatives.

As a result of closed-off management, many of the original methods of regulating emotions are limited. In the past, people with low cognitive flexibility might have been able to regulate boredom through activities such as exercise, concerts, and excursions (Tu et al., 2022). It is, however, not possible to obtain these at this time. For people with low CFI-Alternatives, coming up with more solutions is difficult. Proactive aggression that is proactive increases the individual's level of arousal and draws the attention of others. When compared to people with high

CFI-Alternatives, they are more likely end up choosing to commit proactive aggression due to a greater focus on short-term positive emotional experiences (Garivani et al., 2021; Kerekes, 2021; Scheinost et al., 2021). Furthermore, although positive emotions do not trigger aggressive behavior (Burgdorf and Panksepp, 2006), the pleasurable experience and the rapid high arousal of aggression may also be an important factor in triggering aggression (Ramírez et al., 2005; Robertson et al., 2012). Individuals may release stress and psychological discomfort by aggressive behavior (Larsen, 2000; Raine et al., 2006). Despite this, for participants with low CFI-Control, two forms of aggressive behavior did not increase with boredom. This may be because people with low CFI-Control engage in less constructive cognition (e.g., wishful thinking or ruminative self-blame) in difficult situations rather than more constructive cognition (e.g., problem solving) (Dennis and Vander Wal, 2010; Lambert et al., 2014; Eadeh et al., 2017).

## Limitations and further work

This study has several limitations, which also provide avenues for future research. Since our study is non-experimental and cross-sectional, we cannot draw causal conclusions from our moderation model. It does not fully account for the causal relationship between aggressive behavior and state boredom in nature, and similar problems exist in studies of aggression with other variables. In light of this, it is necessary to exercise caution when interpreting and extending the conclusions. To address this limitation, future research can use empirical sampling. For example, researchers can ask participants to keep diaries or report their boredom levels at random points over time (Nett et al., 2011).

Although the aggression could regulate emotions, providing pleasure (Raine, 2018). Over time, the individual may become dependent on the aggressive behavior, aggression may be reinforced. Our study further highlights the critical value of enhanced cognitive flexibility in combating the experience of boredom during the COVID-19 epidemic. Psychological interventions that target the improvement of cognitive flexibility could be utilized to reduce psychological symptoms. For example. Interventions such as positive meditation can help individuals develop the belief that aggression is not a reasonable means of regulating emotions, and help them acquire reasonable methods of emotion regulation.

## Conclusion

Our findings indicate that cognitive flexibility is an important factor affecting the relationship between boredom and the two forms of aggression. The results can increase our understanding of the factors that influence aggressive behavior

in closed-off management environments. For individuals with high cognitive flexibility, the relationship between state boredom and proactive aggression was not significant. The relationship between state boredom and proactive aggression was significantly positively correlated for individuals with low cognitive flexibility, especially low substitutability. In addition, cognitive flexibility has no significant moderating effect on the relationship between state boredom and reactive aggression. Due to differences in consideration of alternatives and sense of control, boredom may affect decisions about aggressive behavior differently for individuals with different levels of cognitive flexibility. This suggests that cognitive flexibility should be valued as a protective factor that can reduce aggression during closed-off management period of COVID-19 pandemic management (Denson, 2015).

## 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 Ethics Institutional Review Board of Shandong Drug and Food Vocational College. The patients/participants provided their written informed consent to participate in this study.

## Author contributions

YL: conceptualization, formal analysis, and writing—original draft. XC: investigation, methodology, and writing—review and editing. All authors contributed to the article and approved the submitted version.

## 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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# How do childhood abuse and neglect affect prosocial behavior? The mediating roles of different empathic components

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**Background:** Childhood abuse and neglect are typically considered as two different forms of maltreatment. Previous international studies have found differential effects of abuse and neglect on prosocial behavior, but this and the mediating pathway underlying these associations have not been examined in a Chinese sample. Our study aims to examine the effects of childhood abuse and neglect on prosocial behavior in Chinese participants and test the unique mediating roles of different empathic components in these associations.

**Methods:** A total of 1,569 young adults (average age=18.17years) were recruited from a college that enrolls students from all provinces of China. Participants completed a series of questionnaires, including the Childhood Trauma Questionnaire, Interpersonal Reactivity Index, and Prosocial Tendencies Measure. Path analysis was conducted to determine the mediational relationships.

**Results:** Emotional neglect had significant direct effect on prosocial behavior ( $\beta=-0.108$ ,  $p<0.001$ ), and could also impact prosocial behavior through the mediating roles of perspective-taking and empathic concern (effect size=-0.091 and -0.097 respectively,  $p<0.001$ ). Emotional abuse affected prosocial behavior only through personal distress (effect size=-0.072,  $p<0.001$ ). Physical abuse, sexual abuse and physical neglect have little effect on prosocial behavior and empathy.

**Conclusion:** Childhood abuse and neglect have distinct influences on prosocial behavior. Emotional abuse and emotional neglect affect prosocial behavior through distinct pathways. This conclusion could help to establish precise interventions for improving prosocial behavior in maltreated individuals.

## KEYWORDS

abuse, neglect, prosocial behavior, perspective-taking, empathic concern, personal distress

## Introduction

Prosocial behavior refers to a broad range of actions that are intended to benefit other people or an ongoing political system, including helping, donating, comforting, sharing and volunteering (Dovidio, 2001; Penner et al., 2005). Living in a complex social environment, it is almost impossible for humans to avoid social contact and social reciprocity. Previous studies have demonstrated that positive social interaction, such as prosocial behavior, can effectively improve people's emotional distress, enhance well-being (Lin et al., 2019), decrease internalizing and externalizing problems (Memmott-Elison et al., 2020), and decrease morbidity of mental diseases (Schacter and Margolin, 2019). In particular, young adults' prosocial behavior can help them develop social skills, establish solid social relationships, and engage in society (Hu et al., 2019; Memmott-Elison et al., 2020). Considering the positive effects of prosocial behavior on individuals' lives, it is necessary to investigate the related factors of and psychological mechanisms underlying prosocial behavior.

## Childhood abuse/neglect and prosocial behavior

According to learning theories, individuals develop prosocial belief, internalize moral standard and acquire helping skills through interactions with their parents or other caregivers (Schuhmacher et al., 2019). Therefore, abnormal parent-child relationships or unhealthy growth environments, such as childhood maltreatment, might hinder the development of prosocial behavior in later life (Music, 2011; Carvalho et al., 2020; Wu et al., 2020; Prior et al., 2021).

Childhood maltreatment, including abuse (emotional, physical, and sexual abuse) and neglect (emotional and physical neglect), are relatively common around the world, with prevalence rates ranging from 41% to 97% (Carlson et al., 2020). It is widely acknowledged that childhood abuse and neglect should be considered as two different forms of maltreatment. According to the conceptual framework of McLaughlin et al. (2014a), abuse should be categorized as experiences of threat, and neglect as experiences of deprivation. Similarly, Humphreys and Zeanah (2015) argued that both childhood abuse and neglect are deviations from the expectable environment, but in different directions (abuse as the presence of harmful input, while neglect as a lack of necessary input), and suggested that different risks for psychopathology and later-life outcomes emerge from these two types of abnormal environmental input. Several studies have examined the distinctions between abuse and neglect in the context of psychiatric disorders (Vonderlin et al., 2018; Cohen and Thakur, 2021; Villodas et al., 2021), substance abuse disorder (Kobulsky et al., 2018), accelerated aging (Colich et al., 2020) and brain structure and cognitive function (Teicher and Samson, 2013, 2016; McLaughlin et al., 2014b; Kim-Spoon et al., 2021). Based on the above theoretical frameworks and empirical studies, some

scholars have suggested that it is no longer suitable to use a cumulative risk approach (that only considers the number and severity of traumatic exposures, and/or which simplifies or ignores the distinct effects of different forms of maltreatment) to assess the unique mechanisms linking particular maltreatments with developmental outcomes (Teicher and Samson, 2016). Therefore, we independently examined the effects of abuse and neglect on prosocial behavior in the current study.

To date, only three studies have investigated the different associations of abuse and neglect with altruistic attitudes (a type of prosocial behavior) among young adults (Carvalho et al., 2020; Gomis-Pomares and Villanueva, 2020; Prior et al., 2021). Two studies in European found that, after controlling for other types of maltreatment, only emotional neglect and physical abuse significantly predicted a low level global altruistic attitudes and behavioral expressions of altruism (Carvalho et al., 2020; Gomis-Pomares and Villanueva, 2020). Another study conducted in Australia found that only physical neglect was negatively associated with affective altruism, after controlling for demographic variables (Prior et al., 2021). These studies suggest that childhood maltreatment, especially neglect, hinders prosocial behavior. Additionally, they also showed that differences in emotional and physical maltreatment on prosocial behavior exist, which suggests that further distinction between abused or neglected experiences is necessary (for example, divide abuse into emotional, physical and sexual abuse, and divide neglect into emotional and physical neglect).

## The mediating role of empathy

Abuse and neglect that occurs in childhood or early adolescence are considered as a distal influencing factor of adulthood prosocial behavior. Thus, we predicted that childhood abuse and neglect affect prosocial behavior through more proximal traits or tendencies. In the present study, we considered the potential mediating role of empathy.

Empathy broadly refers to the multidimensional ability to understand others' cognitive states and share others' emotions (Eisenberg and Miller, 1987). Empathy is crucial for developing prosocial behavior (Eisenberg et al., 2006; Carrizales et al., 2021). Many scholars have suggested that empathy should be divided into cognitive and emotional components (Davis, 1983). The Interpersonal Reactivity Index (IRI) is a well-established assessment tool for different empathic components, in which cognitive empathy includes perspective-taking (PT) and fantasy (FS) components. PT, also called theory of mind (ToM), is defined as the ability to adopt others' psychological perspective and reason their views, thoughts and emotions (Davis, 1983; Decety, 2011). In behavioral studies, the competence and accuracy of emotion recognition are the important embodiments of PT. FS refers to the tendency to imagine oneself as fictitious characters. Emotional empathy refers to the capacity to sense and share others' feelings, including empathic concern (EC) and personal distress (PD;

Davis, 1983; Shamay-Tsoory, 2011; Guhn et al., 2020). EC is defined as the other-oriented empathic tendency, and is characterized by the feelings of warmth, compassion, and concern for needy people. PD has been described as the self-oriented discomfort in response to other people's situations or conditions, such as anxiety, distress, and unease.

The empathy-altruism hypothesis argues that empathy can evoke altruistic motivation which elicits more prosocial behavior in the future (Batson, 1987), but that not all the components of empathy benefit prosocial behavior. Previous theories and studies have suggested that there are differential impacts of different empathic components on prosocial behavior. For example, EC and PT have been reported to be positively associated with prosocial behavior (Carlo et al., 2015; Bowman-Smith et al., 2021), while PD has been reported to be unrelated to or negatively associated with prosocial behavior (Eisenberg et al., 1989; Batson and Shaw, 1991). Moreover, there has been mixed evidence on how FS impacts prosocial behavior. For example, FS has been found to elicit prosocial behavior in young adults (Tahiroglu and Taylor, 2019), but another study found that FS had little influence on prosocial behavior after controlling for confounders (Pang et al., 2022). Further examining the relationships between different components of empathy and prosocial behavior in a broader population may help to clarify the inconsistencies of prior studies.

Empathy can be damaged by childhood maltreatment (Prino and Peyrot, 1994; Levy et al., 2019). Previous research has indicated that empathy emerges in early life and develops for a long period after that through abundant interactions with caregivers (De Haan and Gunnar, 2009). The parent-child attachment bond provides a template for children to understand and resonate with the pain, feelings, and thoughts of others (Feldman, 2017). However, being abused or neglected by caregivers in early life, could disrupt the normal development of empathy. Empirical studies have demonstrated that more severe childhood maltreatment predicted lower emotional and cognitive empathy (Locher et al., 2014; Mielke et al., 2016). As mentioned, the different features of abuse and neglect may mean that they have differential impacts on empathy and its components. Neglected children, who lack emotional cue input in early life, might have more damage in empathic development than abused children, who have sufficient but harmful cue input. One study found that both emotional and physical neglect, but not abuse, predicted lower empathy, as partially suggested by the above hypothesis (Ometto et al., 2016). However, to our knowledge, few studies have investigated the effects of separate forms of maltreatment on empathic components, and the majority of these studies only focused on childhood abuse (Perez-Albeniz and de Paul, 2004; Mielke et al., 2016; Meidan and Uzefovsky, 2020). Considering that abuse and neglect usually occur together, it is difficult to accurately assess the effect of one maltreatment form on empathy without controlling for the other. Based on these previous findings and limitations, it seems necessary to investigate the associations between the different forms of maltreatment and empathic components more extensively. More importantly, it is

still not well understood how these associations are linked with prosocial behavior. One well-established study found that lower general empathy mediated the association between childhood maltreatment and reduced prosocial behavior (Yu et al., 2020), which suggests that empathy is a promising mediator, and more research is needed to explore the mediating effects of different forms of empathy. Based on above studies, we further proposed hypotheses: Firstly, neglect have more profound effects on both empathy and prosocial behavior than abuse. At the same time, emotional maltreatment have more significant influences on empathy and prosocial behavior than other forms of maltreatment. Secondly, abuse and neglect could impact prosocial behavior differently *via* distinct empathic responses.

## The current study

Reviewing the existing literature, little research has investigated the mediating pathway underlying the relationships among abuse, neglect, and prosocial behavior and scarce studies focused on the differential effects of abuse and neglect on different empathic components and prosocial behavior. Therefore, the current study conducted a cross-sectional investigation by using a sample of Chinese young adults to separately explore the unique influence of abuse or neglect on prosocial behavior, and examine the special roles played by different empathic components.

## Materials and methods

### Participants

The questionnaire survey was conducted among 1,652 college students (aged between 16 and 22 years) with cluster sampling method from Southern Medical University in Guangdong Province, which enrolls students from all provinces in China. All participants volunteered to complete an online questionnaire survey in the classroom. Questionnaires with more than 10% missing values were considered as invalid. Besides, we excluded the participants who reported that they have had been diagnosed as severe mental illnesses, such as schizophrenia, bipolar disorder and so on. After excluding these, the sample included a total of 1,569 participants (639 males and 930 females, average age of 18.17 years). Among the participants, 54.0% came from urban areas, and 22.1% were from a town, and 23.9% were from rural areas. A total of 473 participants (30.1%) were only children.

### Procedure

Before conducting the investigation, ethical approval was granted by the Ethics Committee of the first author's college. All the survey data were collected after informed consent had been obtained from the participants. Participants were told that their



personal information would be protected, and they were free to quit the survey at any time without any punishment. To enhance the validity of the responses, participants filled in the questionnaires anonymously.

## Measurement tools

### Childhood abuse and childhood neglect

Childhood abuse and neglect were measured using the Chinese version of the Childhood Trauma Questionnaire-Short Form (Bernstein et al., 2003; Zhao et al., 2005), which is a widely used tool to assess the type and severity of childhood maltreatment. This 28-item self-reported scale contains the five following subscales: emotional abuse (EA), physical abuse (PA), sexual abuse (SA), emotional neglect (EN), and physical neglect (PN). Each subscale has five items that are scored on a five-point Likert scale that ranges from 1 (never) to 5 (always). In the present study, childhood abuse was divided into emotional abuse, physical abuse and sexual abuse, and childhood neglect was divided into emotional neglect and physical neglect. The total abuse score and total neglect score were calculated by summarizing the scores of related subscales. Higher scores indicated higher levels of maltreatment. Participants with scores for emotional abuse  $\geq 13$ , physical abuse  $\geq 10$ , or sexual abuse  $\geq 8$  were considered as having had “significant abuse experiences,” and those with scores for emotional neglect  $\geq 14$  or physical neglect  $\geq 10$  were considered as having had “significant neglect experiences” (Cheng et al., 2021). In this study, the Cronbach's  $\alpha$  coefficient of the Childhood Trauma Questionnaire-Short Form was 0.824, and the Cronbach's  $\alpha$  for the abuse subscales and neglect subscales were 0.704 and 0.816, respectively.

### Empathy

Empathy was measured using the Chinese Version of the IRI (C-IRI), which is a 28-item self-report questionnaire. The C-IRI is a multidimensional measure to assess empathy (Davis, 1980, 1983), and comprises four subscales including EC, PT, PD, and FS. In the current study, we used these four subscales to assess different empathic component. The Cronbach's  $\alpha$  coefficients for the four subscales in this study ranged from 0.621 to 0.873.

### Prosocial behavior

The Chinese version of Prosocial Tendencies Measure was used to assess prosocial behavior (Carlo and Randall, 2002; Kou et al., 2007). The Prosocial Tendencies Measure consists of 26 items that are rated on a five-point Likert scale ranging from 1 (does not describe me at all) to 5 (describes me greatly). The measure assesses six domains of prosocial behavior (emotional, public, anonymous, direct, altruism, and compliant). In this study, the Cronbach's  $\alpha$  coefficient of the Prosocial Tendencies Measure was 0.782, and the Cronbach's  $\alpha$  coefficients for the six subscales ranged from 0.576 to 0.805.

## Data analysis

First, IBM® SPSS 22.0 was used to obtain the descriptive statistics and examine correlations. A descriptive analysis was performed to summarize the sociodemographic, using the mean and standard deviations or the number and percentage distribution. Distribution of the main variables (including all forms of childhood maltreatment, prosocial behavior, four forms of empathy) are slightly skewed with the Skewness ranged from  $-0.17$  to  $1.53$ , and the Kurtosis ranged from  $-0.28$  to  $2.37$ . West et al. (1995) and Kim (2013) proposed that the data with an absolute skew value lower than 2 and an absolute kurtosis value lower than 7 could be considered as basically normal distribution. Besides, parametric test including Pearson's correlation test, Structure Equation Modeling and *t*-test are robust even for skewness and nonnormality (Norman, 2010; Fagerland, 2012). Thus, we conducted Pearson's correlation analysis to examine the correlations between main variables. We used Bonferroni correction to correct the statistical values of multiple testing (Armstrong, 2014). Second, based on the results of Pearson's correlation, we performed path analysis to examine the mediating roles of different empathic components in the associations between childhood abuse or neglect and prosocial behavior using the Process macro software 4.1 (Preacher and Hayes, 2004) in SPSS. Firstly, we examined the effects of abuse or neglect on different empathic components. And then we examined the effects of abuse or neglect on prosocial behavior which included different empathic components. We used  $R^2$  and *F* value to present the explanatory powers and the significance level. Bootstrapping with 5,000 iterations was used to test the significance of direct and indirect effects. Age, sex and other sociodemographic variables were controlled for as covariates in the mediating analyses. What's more, *t*-test was conducted to examine gender differences in childhood trauma, empathic components and prosocial behavior.

## Results

### Preliminary analyses

Descriptive statistics for the full sample are presented in Table 1. Abuse alone was experienced by 11.3% of participants ( $n = 177$ ), 16.6% ( $n = 260$ ) were exposed to neglect alone, and 8.2% ( $n = 129$ ) were exposed to mixed childhood maltreatment. About 36.1% ( $n = 566$ ) individuals reported at least one form of maltreatment in the current study. Correlations between the main variables are summarized in Table 2.

Only emotional abuse, emotional neglect and physical neglect were significantly negatively correlated with prosocial behavior ( $r = -0.100, p < 0.05$ ;  $r = -0.185, p < 0.001$ ;  $r = -0.117, p < 0.001$ ), while physical abuse and sexual abuse were not ( $r = 0.015, r = -0.013, p > 0.05$ ). Emotional abuse was significantly correlated with PD, and FS ( $r = -0.196, 0.168$ , respectively;  $p < 0.001$ ), but uncorrelated with EC and PT ( $r = -0.014, r = -0.071$ , respectively;  $p > 0.05$ ). Physical abuse and sexual abuse were uncorrelated with



any form of empathy. Emotional neglect was correlated with EC, PT, and PD ( $r = -0.106, p = 0.004$ ;  $r = -0.125, p < 0.001$ ;  $r = -0.113, p = 0.001$ ), but uncorrelated with FS ( $r = 0.028, p > 0.05$ ). Physical neglect was only correlated with EC ( $r = -0.095, p < 0.05$ ). Detailed information were presented in Table 2. The scatterplots of significant correlations were present in Figure 1.

Besides, we found that males have more FS than females ( $t = 3.85, p < 0.001$ ), while females have higher EC and PD than males ( $t = -3.25, p < 0.001$ ;  $t = -8.23, p < 0.001$ ). But there were no significant difference in abuse, neglect and prosocial behavior between males and females ( $t = -1.67, p = 0.094$ ;  $t = -1.628, p = 0.104$ ;  $t = -0.809, p = 0.419$ ).

## Empathic concern and perspective-taking mediated the association between emotional neglect and prosocial behavior

Based on the results of Pearson's correlation, we found both emotional and physical neglect were significantly associated with prosocial behavior and some empathic components. Therefore, we conducted mediating analysis to investigate the special roles of empathic components in the relationship between emotional or physical neglect and prosocial behavior.

After controlling for age, sex, siblings, and hometown, we found that higher emotional neglect significantly predicted worse EC and PT ( $\beta = -0.109, p = 0.001$ ;  $\beta = -0.126, p < 0.001$ ), which then led to lower prosocial behavior ( $\beta = 0.284, p < 0.001$ ;  $\beta = 0.260, p < 0.001$ ; see Table 3). The analysis also revealed a significant direct effect of emotional neglect on prosocial behavior

( $\beta = -0.108, p < 0.001$ ; see Table 3), which indicated EC and PT were partial mediators (Figure 2). But we did not find the same mediating pathway between physical neglect and prosocial behavior. Additionally, we also did not find significant indirect effects of emotional or physical neglect on prosocial behavior through PD or FS (see Tables 3, 4).

## Personal distress mediated the association between emotional abuse and prosocial behavior

Based on the results of Pearson's correlation, we found only emotional abuse was significantly associated with prosocial behavior and some empathic components. Thus, we only performed mediating analysis to examine the special roles of empathic components in the relationship between emotional abuse and prosocial behavior.

After controlling for age, sex, siblings, and hometown, the mediating analysis showed that a higher level of emotional abuse significantly predicted higher PD ( $\beta = 0.167, p < 0.001$ ), and PD negatively predicted prosocial behavior ( $\beta = -0.102, p < 0.001$ ). However, the direct path from emotional abuse to prosocial behavior was not statistically significant ( $\beta = -0.018, p = 0.483$ ; see Table 3). Therefore, PD completely mediated the relationship between emotional abuse and prosocial behavior (Figure 3). Moreover, EC, PT and FS did not mediate the relationship between emotional abuse and prosocial behavior (see Tables 3, 4).

## Discussion

The purpose of the current study was to investigate the distinct mediating effects of different empathic components in the relationships between different forms of childhood maltreatment and prosocial behavior. We found that emotional abuse dampened prosocial behavior by increasing PD. Emotional neglect not only reduced prosocial behavior directly, but also through the mediating pathway of lowering EC and PT. Physical abuse, sexual abuse and physical neglect have little effect on prosocial behavior. The current findings support our hypothesis that abuse and neglect impact prosocial behavior *via* distinct pathways, and prove that emotional maltreatment have more significant effect on prosocial behavior and empathic components than physical or sexual maltreatment. The present study helps us to better understand the influential mechanisms underlying the effect of abuse/neglect on prosocial behavior.

According to previous research, relative to males, females showed higher emotional responsivity and mirroring responses to others' pain which present stronger overall emotional empathy (Christov-Moore et al., 2014). The present study found that females showed higher EC and PD than males, which was consistent with the existing results (Schulte-Rüther et al., 2008; Birkett, 2014). In contrast, few studies have explored gender

TABLE 1 Socio-demographic characteristics of the full sample ( $N=1,569$ ).

Variables	Categories	N (%)
Age (Mean $\pm$ SD)		18.17 (0.64)
Sex	Male	639 (40.7)
	Female	930 (59.3)
Hometown	Urban	848 (54.0)
	Town	346 (22.1)
	Rural	375 (23.9)
Siblings	None	473 (30.1)
	1	617 (39.3)
	2	285 (18.2)
	More than 2	194 (12.4)
Childhood maltreatment	Abuse	177 (11.3)
	Neglect	260 (16.6)
	Mixed	129 (8.2)
	At least one form of maltreatment	566 (36.1)

SD, standard deviation.

TABLE 2 Pearson's correlations, means, and SDs of the main variables ( $N=1,569$ ).

	Abuse	EA	PA	SA	Neglect	EN	PN	EC	PT	PD	FS	PB
Abuse	1											
EA	0.859***	1										
PA	0.698***	0.333***	1									
SA	0.427***	0.164***	0.105**	1								
Neglect	0.419***	0.458***	0.217***	0.062	1							
EN	0.431***	0.473***	0.219***	0.066	0.946***	1						
PN	0.281***	0.303***	0.153***	0.039	0.816***	0.584***	1					
EC	-0.010	-0.014	-0.039	0.062*	-0.114***	-0.106**	-0.095*	1				
PT	-0.078	-0.071	-0.061	-0.012	-0.119***	-0.125***	-0.075	0.215***	1			
PD	0.164***	0.196***	0.076	-0.002	0.108**	0.113**	0.070	0.134***	-0.048	1		
FS	0.152***	0.168***	0.075	0.025	0.022	0.028	0.005	0.199***	0.082	0.200***	1	
PB	-0.063	-0.100*	0.015	-0.013	-0.179***	-0.185***	-0.117***	0.347***	0.344**	-0.079	0.092*	1
Mean $\pm$ SD	18.29 $\pm$ 3.48	7.15 $\pm$ 2.32	5.85 $\pm$ 1.56	5.29 $\pm$ 0.94	15.56 $\pm$ 5.23	8.98 $\pm$ 3.72	6.58 $\pm$ 2.10	23.89 $\pm$ 2.74	23.80 $\pm$ 2.72	23.00 $\pm$ 3.72	21.80 $\pm$ 2.72	94.23 $\pm$ 11.00

Corrected by Bonferroni Correction. \* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$ ; Abuse, childhood abuse; Neglect, childhood neglect; EA, emotional abuse; PA, physical abuse; SA, sexual abuse; EN, emotional neglect; PN, physical neglect; EC, empathic concern according to the Interpersonal Reactivity Index (IRI); PT, perspective-taking according to the IRI; FS, fantasy according to the IRI; PD, personal distress according to the IRI; PB, prosocial behavior according to the Prosocial Tendencies Measure; SD, standard deviation.

difference in cognitive empathy (including FS and PT) and its underlying mechanism. In the current study, males showed higher FS than females, but no significant gender difference in PT was found. The current results indicate that gender difference in different empathic components exists and is needed to be confirmed in the future studies. Stereotypically, females are portrayed as more prosocial than males. However, we did not find gender difference in prosocial behavior in college students. The present study did not find significant difference in abuse or neglect experience either.

## The mediating role of empathic concern and perspective taking in the emotional neglect model

The present findings are basically in line with Miano's et al. (2018) research which found that neglect predicted decreased empathic accuracy (one of the manifestations of weak PT). We further found that only emotional neglect impaired PT and EC abilities, and in turn contributed to decreased prosocial behavior, while physical neglect did not. Unlike physical neglect, which refers to the failure to provide children with adequate food, clothing and medical care, and largely relies on the economic status of the family, emotional neglect manifested by parents' refusal to interact with their children and to meet children's emotional needs seems to have more profound effect on children's social development.

There are two possible explanations for the deleterious effect of emotional neglect on PT. Firstly, parents or other caregivers are the main environmental resource for children to acquire social-cognitive ability in early life. Chronic emotional neglect deprives children of the adequate chance to develop social functioning. Second, the parents who emotionally neglect their children usually present with a deficit in processing social information (such as a failure to recognize a child's emotional state or correctly interpret the signal of need; Crittenden, 1993), which means they are less able to provide a good template for children to learn social skills. Children reared in these environments are more likely to acquire poor social information processing skills, including low PT skills. Consistent with previous findings (Blankenstein et al., 2020), weak PT predicted lower prosocial behavior. Some scholars have suggested that the perception of others' mental states is the basic prerequisite for arousal of an altruistic attitude and prosocial decision-making (Carlo et al., 1999; Kanske et al., 2015). Due to the inability to recognize other's situation and emotional state, individuals who encountered emotional neglect during childhood might not possess the capacity necessary to generate prosocial tendency, let alone prosocial behavior. Our findings indicated that training of PT or the theory of mind would help to promote prosocial behavior in emotionally neglected individuals.

According to the attachment theory (Bowlby, 2008), children are unlikely to develop secure attachment styles when their attachment figures are unresponsive and unavailable (especially in parents who tends to fail to meet their children's emotional need),

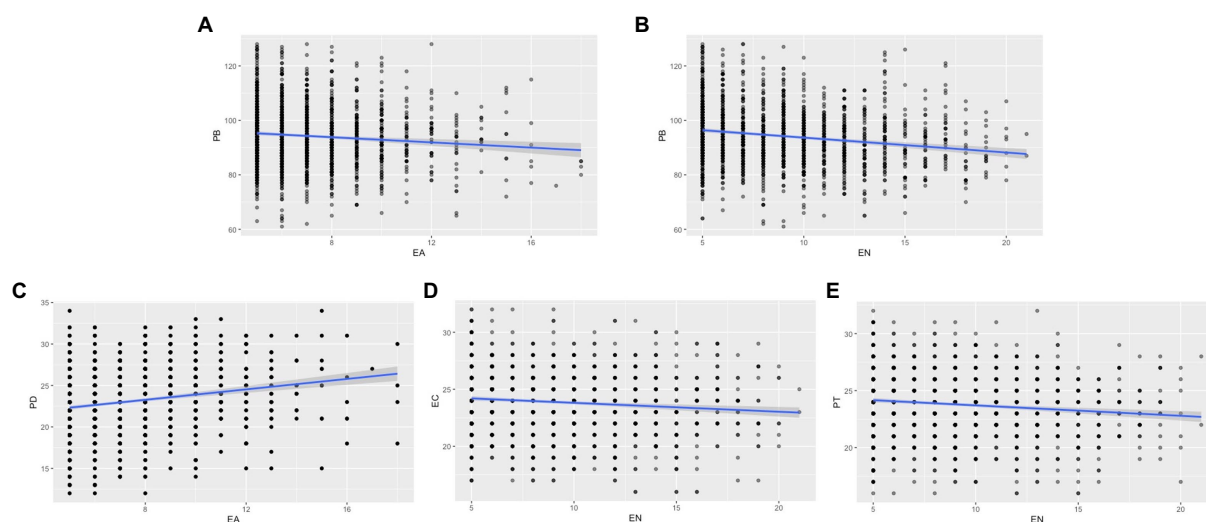


FIGURE 1

Scatterplots of the main correlations. EA, emotional abuse; EN, emotional neglect; PB, prosocial behavior; PD, personal distress; EC, empathic concern; PT, perspective-taking. 1Scatterplots of the main correlations. EA, emotional abuse; EN, emotional neglect; PB, prosocial behavior; PD, personal distress; EC, empathic concern; PT, perspective-taking. (A) correlation between EA and PB; (B) correlation between EN and PB; (C) correlation between EA and PD; (D) correlation between EN and EC; (E), correlation between EN and PT.

and these styles extend to later personal interactions. Empirical research has demonstrated that emotional neglect causes insecure attachment in adulthood, which mainly presents as attachment avoidance or attachment anxiety (Huh et al., 2020; Struck et al., 2020). Additionally, weak attachment has been found to strongly decrease the magnitude of EC (Batson and Shaw, 1991). According to the prosocial motivation theory, EC is the core empathic component that drives altruistic motivation and promotes prosocial behavior (Batson and Shaw, 1991). Our findings that low EC predicted fewer prosocial behavior is in lined with the prosocial motivation theory, as well as previous empirical studies (Carlo et al., 2015; Kamas and Preston, 2021). Emotionally neglected individuals who are unable to establish solid relationships with others and cannot understand the feelings of those in need, are unlikely to engage in prosocial behavior, even if they can correctly adopt the perspective of others. Therefore, training social interaction and compassion could help to promote prosocial behavior in neglected individuals.

What's more, FS and PD did not mediate the relationship between emotional or physical neglect and prosocial behavior. Previous findings have found that FS and PD showed large differences in different populations. For example, the American population has been found to have higher FS than people in other countries (Birkett, 2014), and depressive people showed more PD than the general population (Zhang et al., 2021). To our knowledge, ours is the first study to examine the relationships between neglect and FS and PD. Therefore, the results based on Chinese young adults should be interpreted with caution; more investigations with other populations are needed to verify these results and explore the potential mechanisms underlying these relationships in more depth.

## The mediating role of personal distress in the emotional abuse model

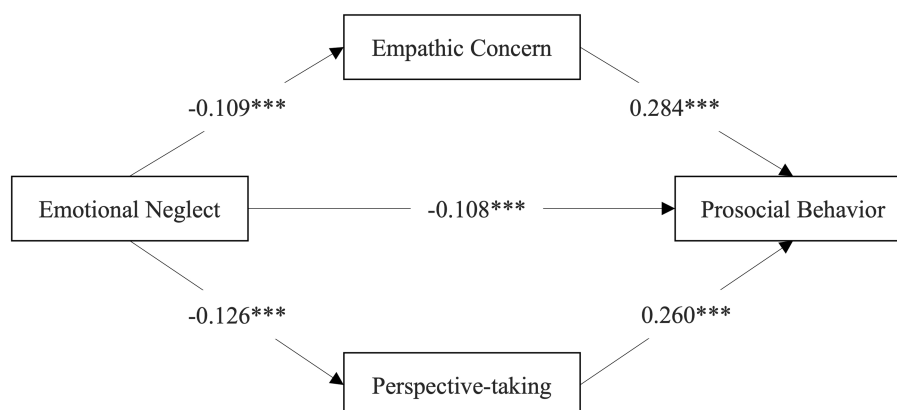
We found that emotional abuse increased PD, which in turn inhibited prosocial behavior, while physical abuse and sexual abuse showed little effect on prosocial behavior and empathy, which might suggest that emotional abuse causes more significant disruption on social emotions and behaviors than other forms of abuse. EC and PD are two different kinds of oriented emotional empathy. Decety (2011) argued that emotional regulation plays an important role in determining the orientation of emotional empathy (i.e., whether it develops into PD or EC). Individuals who suffer from abuse have been found to have poor emotional regulation ability, as indicated by reduced activity in control-related brain regions (Blair et al., 2019). Ineffective emotional regulation makes individuals who have been emotionally abused prone to high levels of PD in the face of others' bad situations, and this unease and disturbance might not benefit helping behavior, but even inhibit it (Davis, 1983; Eisenberg and Eggum, 2009). The current study revealed that a high level of PD predicted less prosocial behavior. It is believed that a high level of PD evokes egoistic motivation that acts to reduce aversive arousal, rather than altruistic motivation to help needy individuals (Batson, 1987). To summarize, the over-arousal of negative emotions caused by emotional abuse reduces the willingness to engage in prosocial behavior.

Unlike emotional neglect, we found no significant effects of emotional abuse on PT or EC. Compared to individuals who have suffered from emotional neglect, those who have been emotionally abused appear to preserve a relatively normal empathic function. These findings were in line with some existing studies. For example, Miano et al. (2018) suggested that overall abuse did not decrease

**TABLE 3** Standardized coefficient estimates predicting empathic concern, perspective-taking, personal distress, fantasy, and prosocial behavior ( $N=1,569$ ).

Variables	EC		PT		PD		FS		PB	
	$\beta$ (SE)	Value of $p$	$\beta$ (SE)	Value of $p$	$\beta$ (SE)	Value of $p$	$\beta$ (SE)	Value of $p$	$\beta$ (SE)	Value of $p$
Age	0.019 (0.108)	0.450	0.011 (0.108)	0.667	-0.009 (0.143)	0.726	-0.019 (0.149)	0.439	-0.008 (0.390)	0.726
Sex	<b>0.077</b> <b>(0.141)</b>	<b>0.003</b>	<b>0.051</b> <b>(0.141)</b>	<b>0.044</b>	<b>0.180</b> <b>(0.188)</b>	<b>&lt;0.001</b>	<b>-0.111</b> <b>(0.195)</b>	<b>&lt;0.001</b>	0.020 (0.527)	0.387
Hometown	0.043 (0.090)	0.120	-0.007 (0.090)	0.781	<b>0.059</b> <b>(0.120)</b>	<b>0.028</b>	<b>-0.068</b> <b>(0.196)</b>	<b>0.009</b>	0.004 (0.328)	0.884
Siblings	0.027 (0.069)	0.333	0.043 (0.068)	0.123	-0.003 (0.091)	0.904	-0.021 (0.095)	0.439	-0.001 (0.248)	0.971
EA	0.044 (0.034)	0.091	-0.019 (0.034)	0.507	<b>0.167</b> <b>(0.045)</b>	<b>&lt;0.001</b>	<b>0.212</b> <b>(0.046)</b>	<b>&lt;0.001</b>	-0.018 (0.124)	0.483
EN	<b>-0.109</b> <b>(0.025)</b>	<b>0.001</b>	<b>-0.126</b> <b>(0.025)</b>	<b>&lt;0.001</b>	0.010 (0.033)	0.758	-0.039 (0.020)	0.236	<b>-0.108</b> <b>(0.089)</b>	<b>&lt;0.001</b>
PN	-0.049 (0.040)	0.119	0.003 (0.040)	0.930	0.015 (0.054)	0.629	-0.031 (0.056)	0.319	0.005 (0.146)	0.854
EC									<b>0.284</b> <b>(0.096)</b>	<b>&lt;0.001</b>
PT									<b>0.260</b> <b>(0.094)</b>	<b>&lt;0.001</b>
PD									<b>-0.102</b> <b>(0.071)</b>	<b>&lt;0.001</b>
FS									0.043 (0.069)	0.071
$R^2$	<b>0.025</b>	<b>&lt;0.001</b>	<b>0.021</b>	<b>&lt;0.001</b>	<b>0.077</b>	<b>&lt;0.001</b>	<b>0.054</b>	<b>&lt;0.001</b>	<b>0.221</b>	<b>&lt;0.001</b>
$F$	5.82		4.67		18.45		12.69		40.23	

Abuse, childhood abuse; Neglect, childhood neglect; EA, emotional abuse; EN, emotional neglect; PN, physical neglect; EC, empathic concern according to the Interpersonal Reactivity Index (IRI); PT, perspective-taking according to the IRI; PD, personal distress according to the IRI; FS, fantasy according to the IRI; PB, prosocial behavior according to the Prosocial Tendencies Measure; SE, standard error. The bold format is meant to highlight the significant values.

**FIGURE 2**

Empathic concern and perspective-taking mediate the association between emotional neglect and prosocial behavior. \*\*\* $p < 0.001$ .

cognitive empathy and Ometto et al. (2016) showed that physical abuse did not affect compassion, but this study did not examine the effect of emotional abuse. However, a study whose participants

aged from 4 to 10 years old found that abuse decreased children's cognitive empathy but did not decrease their emotional empathy (Meidan and Uzefovsky, 2020), which was not exactly consistent

TABLE 4 The paths and effect analysis between childhood abuse, neglect, and prosocial behavior ( $N=1,569$ ).

	Effect	Path	Effect size		
			Effect	SE	95% CI
Emotional abuse model	Direct effect	Emotional abuse → prosocial behavior	−0.087	0.124	(−0.331, 0.157)
	Indirect effect	Emotional abuse → empathic concern → prosocial behavior	0.012	0.008	(−0.003, 0.028)
		Emotional abuse → perspective-taking → prosocial behavior	−0.005	0.008	(−0.020, 0.010)
		<b>Emotional abuse → personal distress → prosocial behavior</b>	<b>−0.017</b>	<b>0.005</b>	<b>(−0.029, −0.008)</b>
		Emotional abuse → fantasy → prosocial behavior	0.009	0.015	(−0.002, 0.021)
	Total effect		−0.089	0.135	(−0.353, 0.175)
Emotional neglect model	Direct effect	<b>Emotional neglect → prosocial behavior</b>	<b>−0.319</b>	<b>0.089</b>	<b>(−0.494, −0.144)</b>
	Indirect effect	<b>Emotional neglect → empathic concern → prosocial behavior</b>	<b>−0.091</b>	<b>0.031</b>	<b>(−0.155, −0.033)</b>
		<b>Emotional neglect → perspective-taking → prosocial behavior</b>	<b>−0.097</b>	<b>0.027</b>	<b>(−0.151, −0.048)</b>
		Emotional neglect → personal distress → prosocial behavior	−0.003	0.010	(−0.024, 0.017)
		Emotional neglect → fantasy → prosocial behavior	−0.005	0.006	(−0.019, 0.004)
	Total effect		−0.515	0.098	(−0.708, −0.322)
Physical neglect model	Direct effect	Physical neglect → prosocial behavior	0.027	0.146	(−0.260, −0.313)
	Indirect effect	Physical neglect → empathic concern → prosocial behavior	<b>−0.072</b>	<b>0.050</b>	<b>(−0.170, −0.027)</b>
		Physical neglect → perspective-taking → prosocial behavior	0.004	0.042	(−0.078, 0.088)
		Physical neglect → personal distress → prosocial behavior	−0.008	0.016	(−0.041, 0.025)
		Physical neglect → fantasy → prosocial behavior	−0.007	0.010	(−0.030, 0.008)
	Total effect		−0.056	0.162	(−0.374, 0.261)

95% CI, 95% bias-corrected confidence interval. The bold format is meant to highlight the significant values.

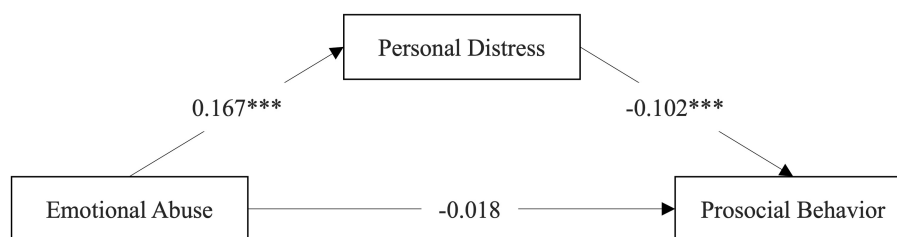


FIGURE 3

Personal distress mediates the association between emotional abuse and prosocial behavior. \*\*\* $p < 0.001$ .

with the current finding. We suggest that it is necessary to further examine the relationships between different forms of abuse and PT and EC in more larger populations of different age groups.

Moreover, we found that emotional abuse could significantly increase FS, but FS was unrelated to prosocial behavior. Daydreaming

or FS has been found to benefit the regulation of mental distress caused by childhood abuse and neglect (Somer et al., 2021). The current study found that only emotional abuse predicted high level of general FS, and other forms of maltreatment did not. Moreover, previous results on the effect of FS on prosocial behavior have been



mixed (Tahiroglu and Taylor, 2019; Pang et al., 2022). We proposed that distinguishing different elements of FS would help to provide a deeper insight into the special role of FS in the association between childhood maltreatment and prosocial behavior.

## Emotional abuse/neglect and prosocial behavior

The current study showed that only emotional neglect had a direct impact on prosocial behavior, in Chinese young adults, which was consistent with Gomis-Pomares and Villanueva (2020) based on Spanish population. This suggests that the unique effect of emotional neglect on prosocial behavior is consistent across populations. In addition to the deficits of PT and EC, there exist some other factors in individuals who have been neglected in emotional need that could affect prosocial behavior, such as caring capacity, subjective willingness to help, and the social reward circuit (Fehr and Rockenbach, 2003; Grueneisen and Warneken, 2022). Individuals who have never felt loved or important might be unable to acquire the ability to care or love others. Furthermore, these deficits may cause more social withdrawal and limited interpersonal relationships, which further decrease interest in caring for others (Music, 2011). Additionally, some studies have found that neglect predicts the hyposensitivity of reward and blunted reward processing (Bounoua et al., 2021; Yang et al., 2021). In this case, children who have experienced neglect would be less likely to associate prosocial behavior with positive social consequences (such as obtaining social reward or a good reputation or avoiding social punishment), which would in turn reduce the willingness to engage in prosocial behavior.

We found no significant direct path from emotional abuse to prosocial behavior, which indicates that PD completely mediated the relationship between emotional abuse and prosocial behavior. This indicates that emotional abuse only reduced the prosocial behavior *via* over-arousal of distress.

Abuse has received an increasing amount of attention in recent decades, largely because it can cause obvious damage in a short period of time and has a stronger impact on psychiatric disorders and externalizing behavior than neglect does (Liu et al., 2018; Strathearn et al., 2020). Unfortunately, the effects of childhood neglect are often neglected, despite the fact that far more children are neglected than abused, especially in China. According to national statistics, there were around 6.97 million left-behind children (neglected children) in 2018 (Ge et al., 2022). What's more, emotional neglect is more common now, because some parents believe that adequate food and safe environment are enough for children's development. Considering the chronic and profound effect of emotional neglect on social functioning, future studies should focus on this. The current study provides a comprehensive understanding on how abuse/neglect affect prosocial behavior through different empathic components and might help to establish targeted psychological interventions to improve prosocial behavior in individuals who have been

maltreated. Specifically, we suggest that trainings of empathy (that are targeted to promote EC and PT) and social interaction would be suitable for individuals who have been emotionally neglected, and training of emotional regulation could be useful for individuals who have been emotionally abused.

## Limitations

Our study has several limitations that should be noted. First, due to the nature of cross-sectional studies, it is not possible for us to infer causality in the relationships between childhood abuse/neglect, different empathic components, and prosocial behavior. Further longitudinal studies or randomized controlled intervention experiments are needed to examine the causal relationships between these variables. Second, the present study totally depended on self-report measures. Although we adopted the well-established questionnaires, like the Childhood Trauma Questionnaire-Short Form, which has been confirmed to have a low false-positive rate and (Teicher et al., 2016), it could be useful to combine with data obtained from interviews with both children and their parents. This would help us to better understand the outcomes of childhood maltreatment. Third, we only explored several separate forms of early-life maltreatment in the current study. Other aspects of maltreatment that were excluded in our research, such as low socioeconomic status or school bullying, might exert different effects on prosocial behavior. Fourth, most of the effect sizes in the present results were small according to the criterion proposed by Sullivan and Feinn (2012). We speculated that the main reason for the relatively small effects could be attributed to the characteristics of college students in the current study. Compared to the orphans in welfare institution and the abused children reported by the government (Teicher et al., 2016), college students have relatively mild abused or neglected experience. The effect sizes between maltreatment experiences and prosocial behavior might be stronger in the sample such as rescue stations, shelters, and foster care who suffered from more serious abuse and neglect. Future research could compare and supplement the current results by collecting multicenter data.

## Conclusion

This study revealed that childhood abuse and neglect have differential effects on prosocial behavior. To be specific, PT and EC played partially mediating roles in the association between emotional neglect and prosocial behavior. PD completely mediated the relationship between emotional abuse and prosocial behavior. Physical abuse, sexual abuse and physical neglect have little effect on prosocial behavior. The present findings offer a better understanding of how abuse and neglect differently affect prosocial behavior through different empathic components, and provide a platform for future directions, such as the development of targeted psychological interventions for different types of maltreatment.

## 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 Southern Medical University. The participants provided their written informed consent to participate in this study. Written informed consent was obtained from a legal guardian/next of kin of participants under the age of 18.

## Author contributions

YW and XuY designed the research. PC, QZ, XS, and XiY performed the research and analyzed data. PC and QZ wrote the manuscript. YW and XuY critically reviewed the manuscript. All authors contributed to the article and approved the submitted version.

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# Why people hesitate to help: Neural correlates of the counter-dynamics of altruistic helping and individual differences in daily helping tendencies

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Recent psychological and neuroimaging studies on altruism–egoism dilemmas have promoted our understanding of the processes underlying altruistic motivation; however, little attention has been paid to the egoistic counter-dynamics that prompt hesitancy to help. These counter-dynamics may involve the construction of reasons not to help based on contextual elaboration and explain individual differences in the tendency to help others in daily life. In this functional magnetic resonance imaging (fMRI) study, we explored the neural correlates of altruism–egoism dilemmas during empathy-driven helping decisions, with particular attention to the counter-dynamics related to individual helping tendency traits. We used two context-rich helping decision scenarios. In the empathy dilemma (Emp) scenario, empathy-driven motivation to help a poor person was associated with a cost, whereas in the economic-dilemma (Eco) scenario, self-beneficial motivation to help a non-poor person was associated with a cost. Our results showed activation of the right anterior prefrontal cortices, supramarginal gyrus, and posterior cingulate cortex (PCC) for the altruism–egoism dilemma (i.e., Emp>Eco). A significant negative effect of the helping tendency trait score was observed on PCC activation; interestingly, this effect was observed for both Emp and Eco dilemmas. The identified neural correlates of altruism–egoism dilemmas appear to be related to the construction of decision reasons based on contextual elaboration in naturalistic situations. In contrast to the classical view, our results suggest a two-stage model that includes an altruistic helping decision followed by counter-dynamics to determine the individual helping tendency.

## KEYWORDS

altruism, empathy, decision-making, moral-dilemma, fMRI, personality, posterior cingulate cortex

## 1. Introduction

Although most people are happy to help others who are in adverse situations, we often hesitate to act after contemplating the consequences to ourselves. For example, we might easily decide to offer a bottle of water to a thirsty person, but then defer because we would have less to spend for lunch. We might offer organ donation to save a life, but then decline after



considering our own medical risks and the concerns of close friends and family. Such non-helping decisions are typically accompanied by moral pain, which we must then overcome. Interestingly, some people often choose to help while others rarely experience such altruism–egoism dilemmas.

Recent studies on altruism–egoism dilemmas have focused primarily on altruistic motivation. Early studies cast doubt on the notion that helping behavior has a purely altruistic motivation (Harris, 1977; Schroeder et al., 1988; Cialdini, 1991). However, more recent research has been based mainly on the empathy–altruism hypothesis (Batson et al., 1991), in which altruistic helping of disadvantaged others is assumed to be driven purely by empathic feelings (Harbaugh et al., 2007; Rodrigue et al., 2011). Individual differences in the tendency to help others have also been attributed to differences in the tendency to show empathic concern (Batson et al., 1983; Decety et al., 2016).

Neuroimaging studies on altruism–egoism dilemmas have also focused on altruistic motivation; these studies have used an experimental paradigm in which participants can choose to help a person by “taking on” some of the pain that they are experiencing from electric shock (Singer et al., 2004). The anterior insula (AI) and temporoparietal junction (TPJ) are activated when a person observes another in pain; in this empathic response, the medial prefrontal cortex (mPFC) is activated at the point where the decision to help is made (Lamm et al., 2011; Feldman Hall et al., 2015). Activity in the AI and TPJ is greater in people who experience stronger empathic feelings when observing another person’s pain (Decety and Jackson, 2006; Decety and Lamm, 2007; Timmers et al., 2018). These findings have been replicated in individuals who tend to make altruistic decisions in economic games that do not involve pain (Sanfey, 2007; Cornelissen et al., 2011; Eimontaite et al., 2019).

In the past, psychologists were interested in the egoistic counter-dynamics that prompt hesitancy to help; early analyzes suggested that these dynamics may involve the construction of reasons not to help, based on contextual elaboration of the situation. A half century ago, psychologists discussed egoistic counter-dynamics in the context of the Kitty Genovese case, in which a woman was reportedly killed while being observed by 38 people. Although it is now known that witnesses did report the attack, many potential reasons were raised for witnesses not helping despite feeling empathy, including the awareness of other witnesses reducing the individual’s sense of responsibility, and the fear of being evaluated by others while asking for help (reviewed in, Latane and Darley, 1968). Such reasons would appear to be constructed based on contextual elaboration of the situation, allowing future simulation of potential cost and risk.

## 2. Literature review and hypotheses

### 2.1. The counter-dynamics of helping decision

Few experimental studies have addressed the counter-dynamics of helping decisions, possibly in part due to a preference for well-controlled experimental designs that prioritize real self-sacrifice in terms of monetary or physical cost while minimizing the context of the decision (Cutler and Campbell-Meiklejohn, 2019; Schaefer et al., 2021). Contextual elaboration in constructing reasons not to help is

unlikely to occur in a minimal experimental design because a rich context is required to allow an individual to spontaneously explore reasons for not helping. In daily life, people may think that there are several “good” reasons for not helping. For example, they may think that help will be provided by other, more suitable people, or that helping might be misconstrued and viewed negatively by others (c.f. the case of Kitty Genovese). Moreover, it may be believed that there is a potential net negative effect of helping for society as a whole (where the time or money associated with helping could be used for other important purposes), or that there is a potential benefit for people in need of help, of solving their problems by themselves. Finally, it may be believed that the problems of people in need of help have arisen from their own behavior, such that it might be beneficial in the long run for them to take responsibility. Such egoistic counter-dynamics may share neural substrates with the resolution of moral dilemmas (Greene et al., 2004; Garrigan et al., 2016), which appear similar in terms of the contextual elaboration necessary to overcome the moral pain associated with deciding not to help. Several studies have investigated these neural substrates by devising various moral dilemmas, and have demonstrated involvement of the anterior prefrontal and lateral temporoparietal cortices, as well as the posterior cingulate cortex (PCC) (Moll et al., 2002, 2006; Greene et al., 2004; Reniers et al., 2012), which are the candidate neural substrates for egoistic counter-dynamics.

### 2.2. Individual differences in helping tendency

The scarcity of research on counter-dynamics is partly due to the lack of measures of individual differences in the tendency to help others in daily life (Moll et al., 2006; Volz et al., 2017; Piccinini and Schulz, 2019). Although some researchers have examined individual traits in altruistic motivation, most such studies have used the empathic concern subscale of the Interpersonal Reactive Index (IRI) (Davis, 1980) to evaluate empathy in association with particular types of decisions (Banissy et al., 2012; Paciello et al., 2013; Schaefer et al., 2021). Recently, an altruism subscale was developed for the Power to Live questionnaire, which measures eight personal characteristics associated with survival in disasters, identified through exploratory analyzes of interviews and questionnaire surveys of survivors of the 2011 Great East Japan Earthquake (Sugiura et al., 2015). The altruism subscale has been demonstrated to measure helping behavior during disaster evacuation at the expense of one’s own safety (Sugiura et al., 2020), and scores thereon may be inversely related to the tendency to recruit counter-dynamics when deciding whether to help.

### 2.3. Hypotheses development

In the current functional magnetic resonance imaging (fMRI) study, we aimed to identify the neural correlates of altruism–egoism dilemmas during empathy-driven helping decisions, with a particular focus on the counter-dynamics of helping decisions and individual tendencies to avoid helping. We used a context-rich scenario to allow contextual elaboration for constructing reasons to overcome moral pain associated with not helping. We used two helping decision scenarios, an empathy dilemma (Emp) scenario, in which

empathy-driven motivation to help a disadvantaged other was associated with a cost, and an economic-dilemma (Eco) scenario, in which self-beneficial motivation to help a non-disadvantaged other was associated with a cost. Our hypothesis was that the decision as to whether to help would activate the moral dilemma network (i.e., anterior prefrontal and lateral temporoparietal cortices and the PCC) to a greater extent under the empathy dilemma than under the economic dilemma, predominantly in people who tend to help less in daily life. We used the altruism subscale of the Power to Live questionnaire as an index of the helping tendency.

### 3. Methods

#### 3.1. Ethics statement

The protocol for this was reviewed and approved by the Tohoku University School of Medicine Ethics Committee (2018–1-785). All participants signed an informed consent form and were compensated for their participation. All participants were screened for fMRI contraindications and were given an orientation to the fMRI procedure prior to entering the scanner.

#### 3.2. Participants

Forty healthy right-handed students in between July and August 2019 participated in the present study. All participants were undergraduate or graduate students of Tohoku University, Japan (26 males and 14 females; mean age = 21.2). All participants had no history of psychiatric condition, medical issue, or any of the standard contraindications to MRI scanning. Four participants were excluded from the analysis due to technical errors during data collection and three were excluded due to excessive head movement (> 6 mm).

#### 3.3. Personal characteristics measurements

To measure individual tendencies of empathic concern and helping others in adverse situations, we used the empathic concern subscale of the Japanese version of the IRI (Himichi et al., 2017) and the altruism subscale of the Power to Live questionnaire (Sugiura et al., 2015), respectively, in association with stimulus and fMRI data analyzes. The empathic concern scale is composed of seven items, such as “I often have tender, concerned feelings for people less fortunate than me;” respondents rated the self-applicability of these statements on a 5-point scale (1: does not describe me at all, 5: describes me very well). The helping tendency (i.e., altruism) is indexed by five items: I like it when other people rely on me and are grateful to me; (2) When I see someone having trouble, I have to help them; (3) When someone asks me to do something for them, I cannot refuse; (4) Other people's good fortune makes me happy so I like to help others; and (5) I am meddlesome and I like to do things for others; respondents rated the self-applicability of these statements on a 6-point scale (0: does not describe me at all, 5: describes me very well). We used the total score of all items for each scale (responses to the three reverse items for empathic concern were reverse-coded). The reliability (Cronbach's  $\alpha$ ) and construct validity of the Japanese version

of IRI (Himichi et al., 2017) and the Power to Live questionnaire have been established in disaster survivors (Sugiura et al., 2015) and in normal populations (Ishibashi et al., 2019; Matsuzaki et al., 2022). Using the current dataset, both of these instruments had a Cronbach's  $\alpha$  of 0.67.

#### 3.4. Experimental tasks

For both the Emp and Eco scenarios, each trial was composed of two phases: context presentation (Con) and helping decision (Dec) (Figure 1A). Each phase started with a presentation period (10 s) during which the scenario was described in detail in text format, followed by a rating period (4 s). In the Con phase, the scenario text described a situation introducing another person whom the participant would later decide whether to help or not; the person was in a disadvantaged situation in the Emp scenario but not in the Eco scenario. During the subsequent rating period, the participant was required to rate the degree of empathic concern they felt (“Do you feel empathy?”) toward the person using a 4-grade scale (1: not at all; 4: very much). In the subsequent Dec phase, the scenario text described a situation that would be relevant to a later helping decision. In the Emp scenario, possible reasons for deciding not to help include the presence of other people, being engaged in another important matter, and the belief that the person in need is responsible for their situation. In the Eco scenario, there were some potential benefits to the participant (e.g., monetary or social evaluation) that could mitigate the cost of helping a non-disadvantaged other. During the subsequent rating period, the participant was required to rate the likelihood of helping the person (“Are you likely to help?”) using a 4-grade scale (1: not at all; 4: very much). A total of 80 trials (40 per scenario type) were conducted; the order of the scenario types was pseudo-randomized. The interval between trials or phases varied between 3 and 10 s, while an eye-fixation cross was presented. The entire trial period was divided into four sessions, each of which lasted 769 s including 16- and 20 s rest periods at the beginning and end, respectively. Thus, the total length of the sessions was 51 min 16 s.

#### 3.5. Stimuli

We prepared the Emp and Eco scenarios in pairs, such that each pair described an identical situation except for the key features manipulating empathic concern and the dilemma (Figure 1A). We collected the sample scenario pairs using an online cloud sourcing service (Lancers; Tokyo, Japan) and survey software (Qualtrics; Provo, UT, United States). We asked 100 applicants (without demographic specification or data) to create three pairs each after an explanation of the scenario specifications, and obtained 243 effective pairs. We created 82 candidate pairs using the situations and expressions in these 243 sample pairs, considering their appropriateness to the students, situational variability, and individual rating variability. Then, we selected 40 pairs for the fMRI experiment from these 82 candidates through an online experiment using the same cloud sourcing service and survey software. We asked 349 applicants (130 males and 219 females; mean age = 30.82 years) to perform the same tasks as the fMRI experiment (i.e., rating empathic concern and helping likelihood) for all 82 candidate pairs (i.e., 164 trials; presented in

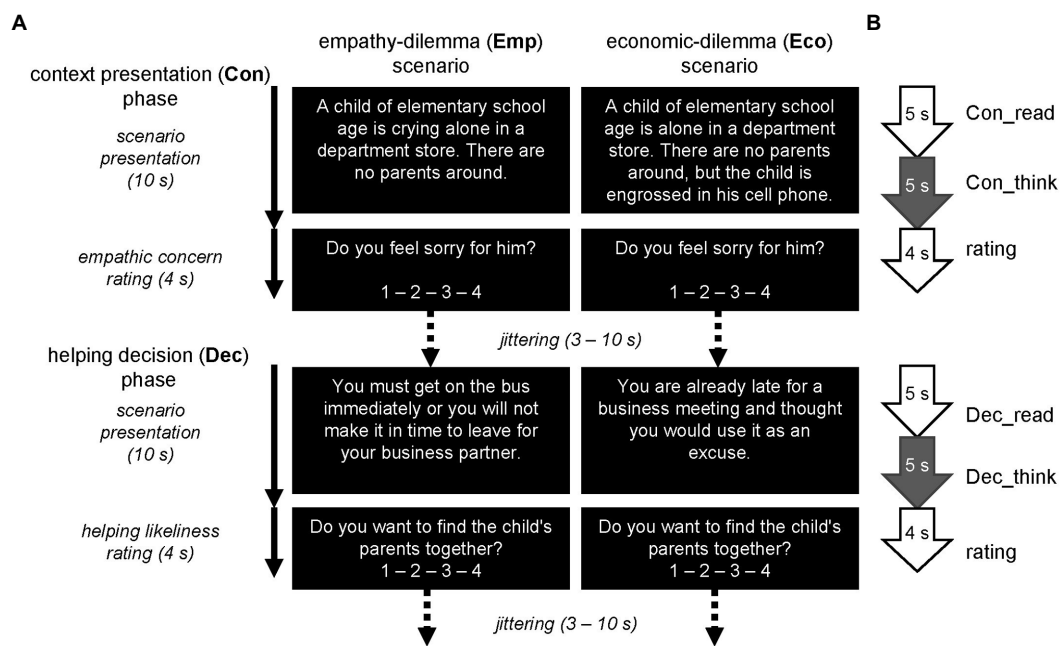


FIGURE 1

(A): Experimental design. A pair of empathy-dilemma (Emp) and economic-dilemma (Eco) scenarios is shown as an example. (B): Process model for fMRI analysis. Scenario presentation period was split in the middle and neural process in its latter half (thinking period) was compared between scenario types (i.e., Emp vs. Eco) separately for Con and Dec phases.

random order) and two personality trait measures. The 40 pairs were arbitrarily selected through discussion among the authors, with preference for situational variability across pairs, high correlation between empathic concern and trait empathic concern scores for EmpCon trials, and high correlation between helping likelihood and trait helping tendency scores for EmpDec trials.

### 3.6. Perspective instructions

Before entering the scanner, participants completed the empathy and helping likelihood personality trait questionnaires and practiced the fMRI task (20 trials, 10 scenario pairs not selected for the fMRI experiment) using a computer. They asked to consider themselves as a person who witness the situation that is written in texts and rated accordingly. In addition, all participants are asked to keep all of their belonging outside of the scanner room and participants who wear glasses are visually corrected using prepared glasses.

### 3.7. Experimental procedure

The participants asked to lay supine on the bed of the MRI scanner and stimuli were presented through a liquid-crystal display (LCD) monitor *via* a mirror attached to a head coil. Each participant performed the rating task by pushing the four buttons of an MRI-compatible response device (Current Designs, Philadelphia, PA, United States) with the first, second, third, and fourth fingers of their right hand. The assignment of the fingers to the buttons was counterbalanced across participants. The participant's head was supported bilaterally by a cushion to reduce head motion, and they

were instructed not to move their body throughout the experiment, except for the assigned finger. All trials were created, controlled, and recorded using the E-prime 2.0 software (Psychology Software Tools, Inc., Pittsburgh, PA, United States).

### 3.8. fMRI measurements

All MRI data were collected using a 3-T MRI scanner (Achieva Quasar Dual, Philips Medical Systems, Best, Netherlands). To obtain functional images of blood oxygenation level-dependent T2\*-weighted MR signals, 40 transaxial images covering the entire brain were obtained using a gradient echo-planar imaging (EPI) sequence [repetition time (TR)=2,500 ms; echo time (TE)=30 ms; slide thickness=3 mm; gap=0 mm; flip angle (FA)=85°; field of view (FOV)=192 mm<sup>2</sup>; and scan matrix=64×64]. High-resolution T1-weighted structural MR images were also obtained from each participant.

### 3.9. fMRI analysis

All functional images were analyzed using the Statistical Parametric Mapping software (SPM 12; Wellcome Department of Cognitive Neurology, London, UK) implemented in the MATLAB R2016a environment (MathWorks Inc., Natick, MA, United States). All analyzes were performed using the Montréal Neurological Institute (MNI) space. For pre-processing, head motion along the time-series EPI images was estimated and all images were realigned. Scanning time lags across the slices were corrected using a time series interpolation. The EPI images were spatially normalized to the MNI

space using parameters estimated using the MNI-T1 template and structural T1 image of each participant, which were co-registered to the EPI image beforehand; a segmentation procedure was adopted to normalize the T1 image. Finally, all normalized EPI images were smoothed using a Gaussian kernel with a full width at half maximum of 8 mm.

A conventional two-level approach was applied to the multi-subject fMRI dataset for statistical analysis. At the first level, condition-specific hemodynamic responses were estimated at each voxel for each participant in a general linear model (GLM) framework. Each 10-s scenario presentation period of the two phases (Con and Dec) for the two scenario types (Emp and Eco) was split, with the first and second halves modeled separately as reading and thinking periods, with the latter being of interest in this study (Figure 1B). The rating periods of both phases in both scenario types were modeled together, coupled with a regressor in which the response magnitude was modulated parametrically with the rating score; these were intended to tease out sensorimotor effects across fingers. Thus, 10 condition-specific regressors (EmpCon\_read, EmpCon\_think, EmpDec\_read, EmpDec\_think, EcoCon\_read, EcoCon\_think, EcoDec\_read, EcoDec\_think, rating, and rating\_parametric) were included in the model for each session. The six estimated head motion parameters were included to remove any artifacts caused by head motion. A high-pass filter (128 s cut-off) was adopted to remove low-frequency noise.

At the second level, between-subject statistical inferences were made for the contrasts of estimated condition-specific hemodynamic responses. To confirm the successful experimental manipulation of emotional concern in the Emp scenario, the contrast EmpCon\_think > EcoCon\_think was tested using a voxel-wise one-sample *t*-test; we expected higher activation of empathic concern-related regions during context presentation under the Emp than Eco scenario. Second, to identify the neural response characterizing the altruism–egoism dilemma during empathy-driven helping decisions, the contrast EmpDec\_think > EcoDec\_think was tested using a voxel-wise single-sample *t*-test.

Finally, to identify the neural correlates of individual differences in the helping tendency, we performed regression analysis using the helping tendency trait score (i.e., the altruism subscale of the Power to Live questionnaire). We conducted a voxel-wise search of the trait effect on two contrasts: EmpDec\_think – EcoDec\_think and EmpDec\_think + EcoDec\_think (i.e., against baseline). The former addressed neural responses specific to the empathic dilemma and the latter was common to both dilemma types. We also performed a *post-hoc* region-of-interest (ROI) regression analysis to address the trait effects for all identified activation peaks in these voxel-wise regression analyses, as well as to those in the single-sample *t*-test of the contrast EmpDec\_think > EcoDec\_think. The ROI analysis addressed the trait effects separately for the EmpDec\_think and EcoDec\_think (i.e., against baseline) and the EmpDec\_think – EcoDec\_think contrasts.

The statistical threshold for the voxel-wise analysis was  $p < 0.001$  (uncorrected) for the cluster formation, and corrected to family-wise error ( $p < 0.05$ ) using cluster size, and assuming the entire brain as the search volume. For the one-sample *t*-test of the EmpCon\_think > EcoCon\_think contrast, small-volume correction was applied to empathic concern-related regions, i.e., the bilateral AI and right TPJ (Feldman Hall et al., 2015). Volume images for bilateral AIs were obtained from the Automated Anatomical Labeling (AAL) brain atlas

(Tzourio-Mazoyer et al., 2002), while those for the right TPJ used a sphere with a 20-mm radius centered at [54, –54, 24] (Morishima et al., 2012). For *post-hoc* ROI analyses, a 20-mm-radius spherical ROI from the Marsbar toolbox v0.44 was used (Brett et al., 2002), with a statistical threshold of  $p < 0.05$  (uncorrected).

## 4. Results

### 4.1. Behavioral data

We compared the average rating scores and their correlations with two personality scores, between two scenario types. For the Con phase, we aimed to confirm a high empathic concern rating under the Emp scenario (i.e., close to the maximum of 4), and a low rating under the Eco scenario (i.e., close to the minimum of 1), to ensure that empathy manipulation was successful; positive correlation between the former and the empathic concern trait was also expected. For the Dec phase, we expected the average helping likelihood rating to be close to the midpoint of the range (2.5), reflecting a balance between helping and non-helping decisions among participants for both scenario types. However, we expected positive correlation between the rating and trait helping tendency only for the Emp scenario.

The results are summarized in Table 1. As expected, the average empathy concern rating was  $>3$  for the Emp scenario and  $<2$  for the Eco scenario, with a mean difference close to 1.5 ( $p < 0.001$ , two-tailed, single-sample *t*-test). Correlation (Pearson's *r*) with the empathy concern trait was significant for the Emp scenario, but not for the Eco scenario; a similar correlation pattern was observed for helping tendency. As expected, average helping likelihood ratings were close to the midpoint of 2.5 for both the Emp and Eco scenarios, with their difference of less than 0.5. Significant correlations with both helping tendency and empathic concern were observed for the Emp scenario, but not for the Eco scenario.

There was a moderate degree of positive correlation between the two personality traits, empathic concern and helping tendency ( $r = 0.50$ ,  $p = 0.003$ ).

### 4.2. fMRI results

#### 4.2.1. Confirmation of experimental manipulation

Differential neural activation between two scenarios (Emp > Eco) during the Con phase was identified using a voxel-wise single-sample *t*-test of the contrast EmpCon\_think > EcoCon\_think (Table 2, Figure 2). As expected, higher activation during EmpCon was observed in the right insula and TPJ, which are implicated in empathic concern (Feldman Hall et al., 2015), suggesting our successful induction of empathic concern in the Emp scenario. Activation was also observed in the left anterior prefrontal region, including the middle frontal gyrus and inferior frontal gyrus. We performed an ROI regression analysis with the empathy concern score for each peak differential activation. We expected to find a positive correlation, which would support an association of trait empathic concern with increased activation during EmpCon trials; however, no significant effect was identified for any of the peaks ( $p > 0.05$ , uncorrected).



TABLE 1 Behavioral data.

Rating (phase)	Scenario	Average rating (mean±SD)			Trait correlation (r)			
			Emp -Eco	<i>p</i>	Empathic concern	<i>p</i>	Helping tendency	<i>p</i>
Empathic concern	Emp	3.19 ± 0.45	1.45 ± 0.39	<0.001*	0.48	0.004*	0.44	0.01*
(Con phase)	Eco	1.72 ± 0.27			0.30	0.09	0.31	0.07
Helping likeliness	Emp	2.22 ± 0.44	−0.41 ± 0.50	<0.001*	0.46	0.006*	0.40	0.02*
(Dec phase)	Eco	2.63 ± 0.38			0.08	0.67	0.24	0.17

Average rating score (range: 1–4) for the empathy dilemma (Emp) and economic-dilemma (Eco) scenarios and their difference, and their correlation coefficients (Pearson's *r*) with trait scores for empathic concern (Interpersonal Reactive Index (IRI) subscale) and helping tendency (Power to Live altruism subscale), for the empathic concern rating in the empathic concern (Con) phase, and the helping likelihood rating in the helping likelihood (Dec) phase. \**p* < 0.05 (uncorrected).

TABLE 2 Differential activation during context presentation (EmpCon>EcoCon).

Structure		Coordinate				Cluster size			
		<i>x</i>	<i>y</i>	<i>z</i>	<i>t</i>	<i>k</i>		<i>p</i>	
Insula	R	48	2	10	6.16	306		0.003	†
Temporoparietal junction	R	60	−22	22	4.63	318		0.008	†
Middle frontal gyrus	L	−30	38	36	5.50	902	a	<0.001	
Inferior frontal gyrus	L	−30	40	14	4.59		a		

For each peak voxel, laterality (L: left, R: right), Montréal Neurological Institute (MNI) coordinate, *t*-value for differential activation (EmpCon\_think −EcoCon\_think), and associated cluster information are provided. For each cluster, the number of voxels (*k*; 2×2×2 mm/voxel) and *p* are provided for the highest peak voxel. Identical letters indicate the same cluster. † *p* corrected according to an a priori-determined small volume.

#### 4.2.2. Neural response characterizing the altruism–egoism dilemma

Differential neural activation between the two scenarios (Emp>Eco) during the Dec phase was identified using a voxel-wise single-sample *t*-test of the contrast EmpDec\_think>EcoDec\_think (Table 3, Figure 3). Higher activation during EmpDec was observed in the right anterior prefrontal cortices, including the superior frontal sulcus and middle frontal gyrus, as well as the supramarginal gyrus and PCC, suggesting their involvement in the empathic dilemma.

#### 4.2.3. Neural correlates of the individual differences in helping tendency

Our voxel-wise test of helping tendency effects on the contrast EmpDec\_think −EcoDec\_think, which addressed the neural response specific to empathic dilemma, showed no significant activation, whereas that of the contrast EmpDec\_think + EcoDec\_think (i.e., against baseline), which addressed the neural response common to both dilemma types, found a significant negative effect in the left PCC (Table 4, Figure 4). In other words, there was a negative effect of trait helping tendency in both EmpDec and EcoDec trials.

*Post-hoc* ROI analyzes for the activation peaks identified in this analysis (Table 4) detected a significant negative trait effect for both scenarios (i.e., EmpDec\_think and EcoDec\_think against baseline); these effects were not significant for the EmpDec\_think −EcoDec\_think contrast, suggesting a negative effect of trait helping tendency in both scenarios. Among the activation peaks identified in the voxel-wise single-sample *t*-test of differential activation during the helping decision contrast (i.e., EmpDec\_think>EcoDec\_think), a negative effect was detected at the right PCC under the Emp scenario, whereas those under the Eco scenario and difference (Emp −Eco) were not significant (Table 3).

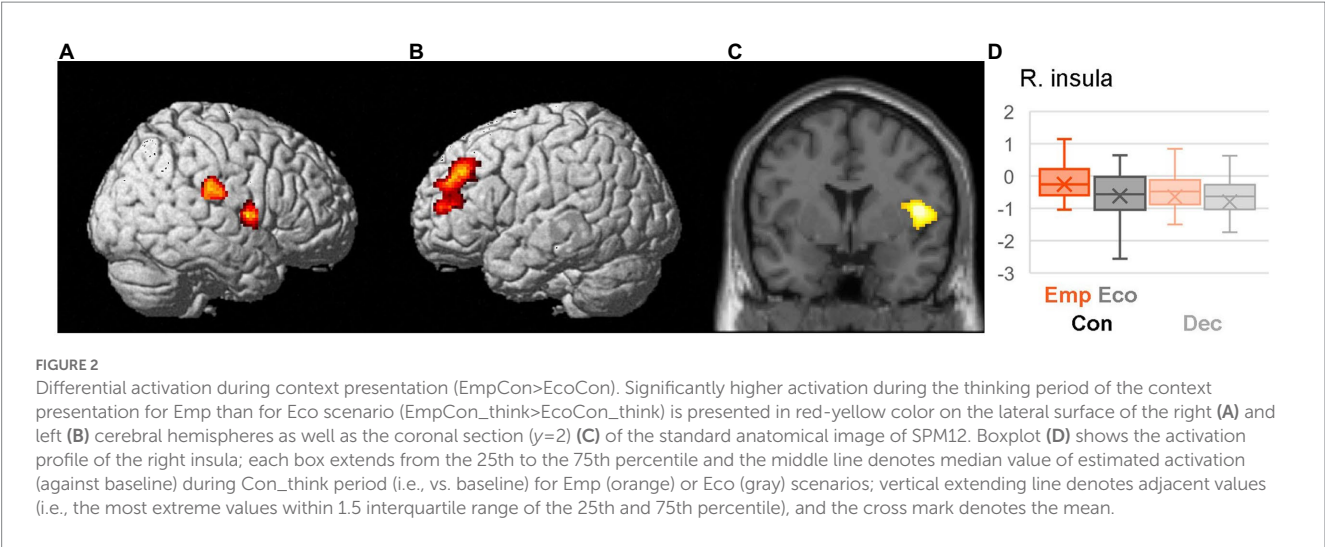
Therefore, there was no clear evidence of scenario-specific versus general effects.

### 5. Discussion

Using context-rich scenarios to allow contextual elaboration for constructing reasons to overcome the moral pain associated with not helping a disadvantaged person, we explored the neural responses characterizing naturalistic altruism–egoism dilemmas. We detected activation of the right anterior prefrontal cortices, supramarginal gyrus, and PCC during the decision as to whether to help under an empathy dilemma (i.e., EmpDec>EcoDec). Consistent with our expectation, these identified regions largely overlapped with the cortical areas implicated in moral dilemmas (Moll et al., 2002, 2006; Greene et al., 2004; Reniers et al., 2012), supporting commonality between altruism–egoism and moral dilemmas. Among these regions, the PCC showed a significant negative effect of helping tendency and neural response during EmpDec, suggesting greater involvement of this region in people who tend to help less in daily life. A more robust negative effect of this trait was detected in the left PCC by its close proximity in the voxel-wise search; interestingly, this negative effect was observed during both the EmpDec and EcoDec periods.

The identified neural correlates of altruism–egoism dilemmas appear to be related to the egoistic counter-dynamics of helping decisions in naturalistic context-rich situations. Anatomical overlap was also prominent in context-rich studies of decision-making in the context of moral dilemmas (Greene et al., 2004; Reniers et al., 2012), as well as in studies that analyzed responses to morality-related emotional images (Moll et al., 2002) and asked participants to make donations to organizations without providing any context (Moll et al., 2006). These





**TABLE 3** Differential activation during helping decision (EmpDec>EcoDec).

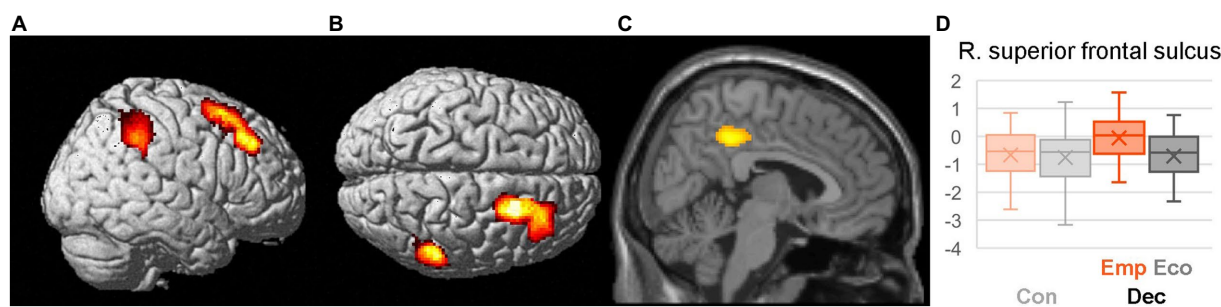
Structure		Coordinate				Cluster size			Helping-tendency trait effect			
		x	y	z	t	k		p	Emp	p	Eco	p
Superior frontal sulcus	R	26	12	54	6.89	1,617	a	<0.001	−1.46	0.14	−1.20	0.19
Middle frontal gyrus	R	32	34	38	5.17		a		−1.01	0.24	−1.11	0.21
Supramarginal gyrus	R	56	−46	48	6.21	554		0.012	−0.30	0.38	0.03	0.40
Posterior cingulate cortex	R	6	−40	40	4.91	370		0.046	−2.12	0.04*	−1.82	0.08

Differential activation (EmpDec\_think − EcoDec\_think) is summarized as described in Table 2. The t values for the helping tendency effect are provided for the Emp and Eco scenarios (vs. baseline) for each identified peak (20-mm spherical region of interest centered at the peak voxel). \**p* < 0.05 (uncorrected).

studies reported involvement of the mesolimbic and orbitofrontal cortices in decision-making, which was not detected in the current study. Studies in which a moral dilemma was embedded in the context of decision-making (Greene et al., 2004; Reniers et al., 2012) reported activation of the supramarginal gyrus and PCC, consistent with our results. These regions are activated during the evaluation of realistic situations for which there is no obviously correct choice, such as between two roads (to reach one’s place of employment; familiar congested road vs. newly constructed shortcut) (Pearson et al., 2011), as well as during self-evaluation of emotions after being offered help with luggage by a stranger (Olivo et al., 2021). Therefore, these areas may be involved in contextual elaboration as it pertains to justifying decisions, regardless of the decision type. The supramarginal gyrus, which plays a role in processing action goals (Van Overwalle and Baetens, 2009), and the PCC, which is involved in autobiographical information processing (Leech and Sharp, 2014; Busler et al., 2019), may be important for contextual elaboration in realistic situations; these areas are also known to play a role in episodic simulation of future events (Schacter et al., 2007, 2008). The anterior prefrontal cortices, which have been implicated in moral dilemmas irrespective of contextual richness (Moll et al., 2006; Schaich Borg et al., 2006; Reniers et al., 2012), play a general role in cognitive control and may also be involved in dilemma resolution (de la Vega et al., 2016).

The role of PCC activation in the egoistic counter-dynamics of helping decisions may be conceptualized around the comparison

and integration of different types of values, considering its anatomical location and relationship with behavioral data. Anatomically, the PCC and adjacent precuneus are considered to have dorsal and ventral functional subdivisions (Leech et al., 2011; Stawarczyk and D’Argembeau, 2015); in both of these studies, PCC activation occurred at the dorsal subdivision. In the context of decision-making, activation of the dorsal subdivision was observed during choices between fixed amounts of money and the probability of winning incommensurable goods such as food (Fitz Gerald et al., 2009), and higher activation was associated with better evaluation performance in people or consumer products based on 12 attributes (Kageyama et al., 2019). There appears to be a gap between the behavioral and neural data, as the effect of helping tendency on helping likelihood was specific to the Emp scenario in this study, whereas its effect on neural activation during decision-making was common to both scenario types. Thus, in people who tend to help less in daily life, PCC activation was high during the decision as to whether to help under both empathic and economic dilemmas, and was behaviorally reflected in reduced helping likelihood only under the former condition. This gap may occur because the participant must compare and integrate altruistic (i.e., socioemotional) and egoistic (i.e., materialistic) values under the empathic dilemma (Volz et al., 2017; Lee et al., 2019), whereas competing values are largely egoistic under the economic dilemma.



**FIGURE 3**  
Differential activation during helping decision (EmpDec>EcoDec). Significantly higher activation during the thinking period of the context presentation for Emp than for Eco scenario (EmpDec\_think>EcoDec\_think) is presented on the cerebral surfaces from the right (A) and top (B) as well as on the parasagittal section (x=6) (C). Boxplot (D) shows the activation profile of the right superior frontal sulcus during Dec\_think period. Other details are the same as for Figure 2.

**TABLE 4** Effect of helping-tendency trait during helping decision (EmpDec + EcoDec).

Structure		Coordinate				Cluster size		Helping-tendency trait effect			
		x	y	z	t	k	p	Emp	p	Eco	p
Posterior cingulate cortex	L	-22	-16	40	-4.44	454	0.008	-3.00	0.006*	-3.60	0.001*
Posterior cingulate cortex	L	-10	-14	40	-4.32			-2.68	0.01*	-5.39	<0.001*

Significant negative effect of helping tendency on activation during the thinking period during a helping decision, irrespective of the scenario type (EmpDec\_think + EcoDec\_think). The results are summarized as described in Table 3.

The negative effect of helping tendency on PCC activation observed in this study appears consistent with the typically inverse relationship between adaptive personality traits and the degree of neural activity. Helping tendency is considered to be an adaptive personality trait; on the Power to Live questionnaire, as one of the eight psychobehavioral characteristics associated with surviving disasters, this trait is scored using the altruism subscale (Sugiura et al., 2015), and showed associations with both the tendency to help others (Sugiura et al., 2020) and be helped by others in the aftermath of a disaster (Sugiura et al., 2021). These findings are consistent with the notion that altruism is an adaptive trait in social processes, although the evolutionary process remains controversial (Trivers, 1971; Glassman, 2000; Boyd and Richerson, 2009). Intuitively, the adaptive capacities or abilities are generally achieved through increased brain activity. However, adaptive personality traits are rarely associated with higher brain activation in situations where the adaptive nature of the trait is exerted. For example, among other Power to Live subscales, the adaptive trait of problem solving is associated with lower brain activation in motor-related areas (Miura et al., 2020a), stubbornness (i.e., resistance to social conformity pressure) in a cognitive control area (Miura et al., 2020b), and emotion regulation in extensive cortical regions including the prefrontal control system (Sugiura et al., 2023). The concept of mindfulness (Bishop et al., 2004) may be relevant to adaptive reductions of PCC activity. Trait mindfulness was correlated with prosocial behavior (Donald et al., 2019) and reduced PCC activation was observed during mindful acceptance of emotions (Messina et al., 2021). However, the relationship between PCC activation and adaptability may be nonlinear; fear of death and PCC activation

exhibited a quadratic relationship during the contemplation of one's own death (Hirano et al., 2021).

## 6. Conclusion and implications

### 6.1. Conclusion

Based on these considerations, we propose a two-stage model of altruistic helping decision-making. The first stage is an altruism-egoism dilemma process, in which empathy-driven helping motivation conflicts with egoistic cost and may be subject to little individual difference. This stage may feature a contextual elaboration process for constructing reasons for the decision in naturalistic context-rich situations. Our data suggest involvement of the right supramarginal gyrus and anterior prefrontal cortices in this stage, and we suggest that they have roles in sensorimotor aspects of contextual elaboration and cognitive control for dilemma resolution, respectively. The second stage concerns the key counter-dynamics of the helping decision, and is responsible for individual differences in the helping tendency in daily life. This stage may be related to the comparison and integration of different types of values relevant to episodic simulation of future events based on autobiographical information.

### 6.2. Theoretical implications

There are two important implications of this proposed model. First, the important determinant of individual differences in the helping

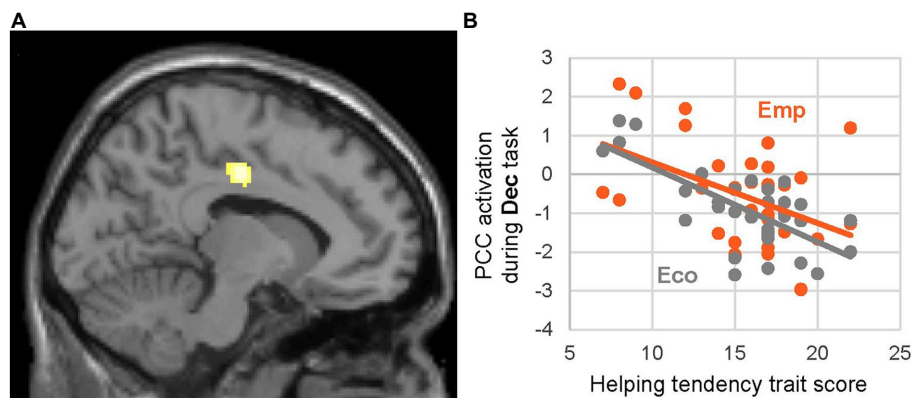


FIGURE 4

Effect of helping-tendency trait during helping decision (EmpDec + EcoDec). Significant negative effect of helping-tendency trait on activation during the thinking period on helping-decision context irrespective of the scenario type (EmpDec\_think + EcoDec\_think) is presented on the parasagittal section ( $x=-10$ ) (A). The scatter plot for estimated PCC  $[-10, -14, 40]$  activation during Dec\_think period (i.e., vs. baseline) against the helping-tendency trait score and regression line are given separately for Emp (orange) and Eco (gray) scenarios (B). Other details are the same as for Figure 2.

tendency appears to exist outside of the empathic process, in contrast to the classic view (Batson et al., 1991; Feldman Hall et al., 2015). Second, the latter stage appears to be non-specific to altruistic helping decisions; although the effect was expressed behaviorally only in altruistic helping in this study, the effect of this trait on the neural process was also present in the egoistic helping decision and may be expressed behaviorally in other decision contexts in daily life. Support for this notion is provided by the finding of PCC involvement in maladaptive decision-making in the context of attention-deficit/hyperactivity disorder (Sonuga-Barke and Fairchild, 2012) and HIV infection (Hall et al., 2021).

### 6.3. Social implications

Our study highlights the altruism–egoism dilemma and counter-dynamic processes in social helping decisions, a process that previous studies have described as complex (Sanfey, 2007; Ramsøy et al., 2014). In conclusion, the results of this study provide a social understanding of how helping decisions are made by balancing the costs and benefits according to oneself, and why some people do help while others do not.

## 7. Study limitations

There were several limitations to this study. First, the helping decisions were “virtual;” thus, our findings may not extend to helping decisions with real-world consequences. However, we believe that the psychological and neural processes stimulated by the tasks in this study accurately reflect those stimulated by real-world helping decisions; the helping likelihood rating was correlated with helping tendency, which was previously shown to be associated with real-world helping behaviors (Sugiura et al., 2020). Second, with respect to our conceptualization and experimental manipulation of the empathic process, we did not explicitly take into account a multidimensional model that includes perceptual and cognitive components of empathy (Gallese, 2003; Innamorati et al., 2019). However, the empathy-related brain regions identified in the current study (i.e., the insula and TPJ, as well as prefrontal areas) partly overlap with the putative neural

correlates of perceptual and cognitive components of empathy (Ebisch et al., 2022).

## 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 Tohoku University School of Medicine Ethics Committee (2018-1-785). The patients/participants provided their written informed consent to participate in this study.

## Author contributions

VW, KO, RI, and MS contributed to the conception and design of the study and analyzed the data. KO, RI, and VW prepared the experimental stimuli and carried out the experiment. VW and MS wrote the manuscript. All authors contributed to the manuscript and approved the submitted version.

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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.2023.1080376/full#supplementary-material>

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