How interpersonal closeness and social image concerns shape Pay-What-You-Want decisions independently: evidence from two large-scale online experiments

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Introduction: This study explores the interplay between two key drivers of prosocial behavior: social image concerns and interpersonal closeness. By disentangling their independent and combined effects in a Pay-What-You-Want setting, we provide new insights into their roles in shaping prosocial behavior.

Methods: Using a 4 x 2 between-subjects design, we disentangled the effect of interpersonal closeness between the buyers on four levels (closeness effect) and the effect of social image concerns on two levels of payment observability (audience effect). We conducted two large-scale online experiments involving voluntary payments for a hypothetical purchase of an entrance ticket to the American Museum of Natural History in New York. Study 1 included 1,034 participants, and Study 2 (a replication study) included 995 participants.

Results: We found that both channels, interpersonal closeness and social image concerns, independently increase voluntary payments significantly. Hence, their effects on prosocial behavior are additive.

Discussion: Our findings validate prior research through high external validity, the use of innovative methodological approaches, and large non-student samples. The findings offer practical insights for structuring payment environments when implementing Pay-What-You-Want pricing strategies in market-based settings. Specifically, Pay-What-You-Want settings can be designed either to enable the observability of payments or to allow buyers to consume alongside interpersonally close others. Both approaches could independently enhance revenue.

KEYWORDS

Pay-What-You-Want, prosocial behavior, interpersonal closeness, social image concerns, payment observability, experiment

1 Introduction

People behave in many prosocial ways: they donate, they help others, they cooperate, and they pay positive amounts in voluntary payment settings. Pay-What-You-Want (PWYW) is a popular voluntary payment setting which represents one practical application of prosocial behavior in economics. In PWYW settings, the whole price determination power is delegated to the buyers (Kim et al., 2009). Hence, as the price setting decision for a service or a product is made solely by the buyers it can be assumed that the voluntary payments reflect prosocial behavior in buyers toward sellers.

PWYW as a pricing mechanism has been studied theoretically and empirically (see, for reviews, Gerpott (2017); Greiff and Egbert (2018); Vizuete-Luciano et al. (2022)). Previous research in the field of PWYW has revolved around such a pricing mechanism's success factors. More recently, interpersonal closeness between the buyers and social image concerns as drivers of prosocial behavior have moved to the center of attention (Dorn and Suessmair, 2016, 2017; Gneezy et al., 2012; Hilbert and Suessmair, 2015; Hofmann et al., 2021; Regner and Riener, 2017; Schlüter and Vollan, 2015) because, in many PWYW settings, buyers do consume in the presence of others and sometimes are also observed by them. It is deemed crucial for the successful implementation of PWYW schemes to better understand how these effects are related to each other and to voluntary payments. Furthermore, these phenomena are of interest for a more fine-grained development of theoretical frameworks on social image concerns and interpersonal closeness as well as their effects on prosocial behavior in general.

However, previous empirical studies have not yet fully answered the question whether increased prosocial behavior is driven by various degrees of interpersonal closeness between the buyers, by social image concerns, or by a combination of both. Hofmann et al. (2021) investigated this in a Pay-What-You-Want context through a laboratory experiment, demonstrating that both factors independently and additively enhance prosocial behavior. Nonetheless, their study is limited by its abstract laboratory setting, the binary manipulation of interpersonal closeness, and reliance on a student sample.

Expanding upon prior research, this study addresses these limitations and offers three key contributions to extend our understanding of these dynamics in real-world contexts.

First: Utilizing a PWYW setting with high external validity embedded in a real-world application of PWYW. We elicited buyers voluntary willingness to pay for the hypothetical purchase of an entrance ticket for the American Museum of Natural History (AMNH) in New York as a measure of prosocial behavior. The AMNH was the tenth most visited museum worldwide in 2018 (Themed Entertainment Association, 2018) and it uses Pay-What-You-Want at the admission desk in the museum as pricing mechanism. We employ the typical payment situation in museums for the manipulation of payment observability and interpersonal closeness between buyers in this experiment, namely standing in line with other visitors in close proximity during the payment situation.

Second: Implementing a novel experimental method that allows us to induce interpersonal closeness on four levels in an online experiment. Previously applied methods to induce interpersonal closeness in mainly laboratory experimental settings include: sharing personal information with each other (Aron et al., 1997; Sedikides et al., 1999); maintaining eye-contact (Cui et al., 2019; Zhou et al., 2018); and acting in synchrony (Paladino et al., 2010; Rabinowitch and Knafo-Noam, 2015; Tunçgenç and Cohen, 2016). Similarly, natural social relationships can be used, such as inviting friends into the laboratory, conducting experiments in the field, or by using borrowed identities from real social relationships (Aron et al., 1997; Berscheid et al., 1989a; Cialdini et al., 1997; Gächter et al., 2015). Less explored is whether such methods can be successfully applied in an online experimental environment.

This paper closes this research gap by using borrowed identities from real social relationships as a method to operationalize four levels of subjectively different degrees of interpersonal closeness in an online experiment. By this, we transfer the complex phenomenon of the various degrees of social relationship into a controlled online experimental setting to gain insights into the processes at play. This paper utilizes a 4 x 2 experimental design. Interpersonal closeness was manipulated on four levels (very low interpersonal closeness *IOS1*; low interpersonal closeness *IOS2*; high interpersonal closeness *IOS3*; and very high interpersonal closeness *IOS4*), while social image concerns were varied as payment observability on two levels (*No Audience* and *Audience*).

Third: Using a large, non-student U.S. American sample and implement a replication study to test the results on empirical robustness. In Study 1, the sample consisted of N = 1,034 American participants. We conducted a further replication study with N = 995 American participants in Study 2.

Our findings complement the results of Hofmann et al. (2021) and are well in-line with the findings of Dorn and Suessmair (2016, 2017), Hilbert and Suessmair (2015) and Schlüter and Vollan (2015). In both studies of this paper (with overall N = 2029), voluntary payments increase when buyers are nearby close others. That is, the presence of close others increases voluntary payments regardless of payment observability. Further, we find that the amounts paid are higher when observed by another buyer. The relationship between social image concerns and interpersonal closeness is additive in total: increasing interpersonal closeness and social image concerns via observability of payments increase voluntary payments separately. These findings of two separate main effects tie in well with literatures about the effect of interpersonal closeness and the impact of social image concerns on voluntary payments. To summarize, our results lend robust empirical support to the hypothesis that both drivers (i.e., closeness between buyers and social image concerns via observation of payments), separately, are causally linked in increasing prosocial behavior. The large non-student sample size, the replication approach with two studies used, and the use of a setting with higher external validity allow us to interpret the findings in a more generalizable way than previous studies. These insights can be utilized to further develop theoretical frameworks on the interpersonal closeness and social image concerns affecting prosocial behavior. Finally, taking the additive effect of interpersonal closeness and social image concerns into account, the results of this paper might help to shape successful designs of PWYW mechanisms in future.

The remainder of this paper proceeds as follows: Section 2 reviews the related literature while Section 3 sets out the materials and methods of both studies. Section 4 introduces the behavioral predictions. Section 5 presents the results of Study 1 and Section 6 reports the results of Study 2. The results of both studies are discussed in Section 7 while Section 8 concludes.

2 Related literature

Real world applications of PWYW lay out the possibility that the individual decision-making of how much to pay voluntarily can be influenced by social image concerns and interpersonal closeness

separately or in combination. Imagine a scenario where buyers in a coffee store stand in line to pay voluntarily for their beverages. In one setup, they stand close to each other such that the other visitors can observe the payment decision. In another setup, they stand far enough away from each other that they are accordingly unable to observe the payments. Additionally, the people in the line may vary in their social connections to the buyer. In some cases, interpersonally close other visitors - such as friends or family members - might be present, while in others, the other buyers are distant acquaintances or strangers. Both the visibility of contributions and the type of social relationships could influence how much each person decides to pay voluntarily.

First, it could be the case that the presence of close others already increases prosocial behavior toward the seller even when the buyer goes unobserved. This phenomenon builds on the broad literature on interpersonal closeness and prosocial behavior. As human beings do not live in social vacuums but in social relationships, psychological and sociological research advances the idea that human behavior is especially shaped by social relationships to interpersonally close others (Cooley, 1909; Forgas and Williams, 2016; Gächter et al., 2023; Mashek and Aron, 2004). One key characteristic between the decision-maker and the other individuals is the social relationship between them. The concept of interpersonal closeness was first conceptualized as such in social psychology and can be defined as a parameter to distinguish between social relationship categories (Aron et al., 1992; Berscheid et al., 1989a) respective individuals, including categories such as strangers, acquaintances, friends, very close friends, partners or family members.

In the literature, it is emphasized that interpersonal closeness typically emerges via repeated interactions. This occurs through seeing each other, spending time together, knowing each other, and sharing information about each other (Berscheid et al., 1989b; Gaines, 2016; Kelley and Thibaut, 1978). Psychological research, especially in the field of synchronous movement and mimicry, suggests a correlative relationship between interpersonal closeness and prosocial behavior. Previous studies have put forward the idea that higher levels of interpersonal closeness let people enter a prosocial mindset and thus might potentially increase prosocial behavior (Andersson et al., 2020; Ashton-James et al., 2007; Bell et al., 1995; Brewer and Kramer, 1986; Cialdini et al., 1997; Cross et al., 2019; Kramer and Brewer, 1984; Maner et al., 2002; Neuberg et al., 1997; Reddish et al., 2013, 2016; Rennung and Göritz, 2016; Stel et al., 2008; Valdesolo and DeSteno, 2011; van Baaren et al., 2004; Vicaria and Dickens, 2016; Wiltermuth and Heath, 2009). Furthermore, Korchmaros and Kenny (2001) have shown that emotional closeness and helping behaviors correlate positively with each other. Findings from neuropsychology underline the influence of close others even in the absence of observability (van Hoorn et al., 2016). In addition, processes that involve thinking about oneself and others is activated especially with regard to familiarity with others (Jung et al., 2018).

Following this line of research, it hence seems to matter whether others are present during decision-making and who these others are. Especially the degree of social relationship seems to be a relevant aspect for decision-making, potentially driving increased prosocial behavior. Adapted to PWYW settings, this effect might be transferred as such that buyers increase their voluntary payments when being together with interpersonally close others. In-line with this literature, such behavioral changes (i.e. voluntary payments) resulting from the presence of interpersonally close others will be referred to as *closeness* effect in this paper.

Second, it could be that being observed during the payment decision increases prosocial behavior toward the seller irrespective of who is observing the buyer's own behavior. This phenomenon builds on broad literatures concerning observability of behavior and prosocial behavior. A large number of studies in psychology has shown that observation affects performance (see, e.g., Triplett, 1898; Wolf et al., 2015; Zajonc, 1965). Similarly, research in economics provides empirical evidence that observing the payments (via reducing anonymity) increases prosocial behavior in the form of contributions in dictator games (see, e.g., Engel, 2011; Hoffman et al., 1996), in donations (see, e.g., Alpízar et al., 2008; Alpízar and Martinsson, 2013; Lacetera and Macis, 2010; List et al., 2004; Martin and Randal, 2008; Soetevent, 2005), as cooperation in the prisoner's dilemma (see, e.g., Grimalda et al., 2016), and in public goods games (see, e.g., Andreoni and Petrie, 2004; Christens et al., 2019; Rege and Telle, 2004).

As one possible underlying psychological mechanism, social image concerns have been introduced into the literature (Andreoni and Bernheim, 2009; Ariely et al., 2009; Bénabou and Tirole, 2006; Ellingsen and Johannesson, 2008). Social image concerns assume that people derive a positive social image from signaling generous behavior to others. Individuals can use their behavior as a mechanism to maintain a positive social image, for instance, via high payments in a voluntary payment setting. To activate social image concerns it is necessary that the behavior of an individual be observed. An audience can thus be operationalized by introducing observability of behavior. The concept of social image concerns implicitly assumes that people strive to appear in a favorable way toward themselves and others. This implies that individuals might change their behavior if they are observed by others. In the same vein, psychologists propose the expectation of being evaluated by others as underlying mechanism of the audience effect (Cottrell, 1968; Guerin and Innes, 1982).

Taken together, these literatures outline observability of behavior as being important aspects in individual decision-making, possibly motivated by social image concerns, and resulting in increased prosocial behavior. Adapted to PWYW settings, this effect might be transferred as such that buyers increase their voluntary payments when being observed by other buyers during their payment. In-line with this literature, such a change in behavior (i.e. voluntary payments) due to observability by other buyers will be referred to as *audience* effect in this paper.

Existing research on PWYW settings already emphasize the importance of both aspects as relevant for the success of a PWYW pricing schemes. However, the literature on social relationships, social image concerns via payment observability, and their interplay in the field of PWYW is not conclusive. Payment observability toward the seller does not significantly affect payments in an online music store (Regner and Riener, 2017) and a restaurant setting (Gneezy et al., 2012). Four studies focusing on observability by other buyers have indeed shown that the prices paid increase if the payment is observed by other buyers (Dorn and Suessmair,

FIGURE 1
Adapted IOS Scale with four levels.
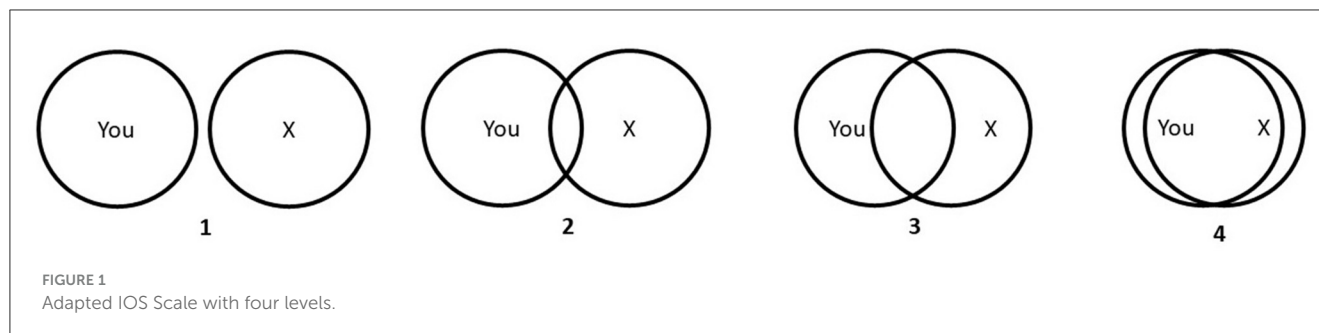
2016, 2017; Hilbert and Suessmair, 2015; Schlüter and Vollan, 2015). In summary, these four studies have shown that, on average, voluntary payments were higher in settings where buyers were observed by other buyers compared to settings where buyers could pay anonymously. This was found to hold true for different products, namely, the hypothetical purchase of a Big Mac (Dorn and Suessmair, 2016, 2017), the purchase of flowers via an honor box (Schlüter and Vollan, 2015), and the purchase of mugs in a laboratory experiment (Hilbert and Suessmair, 2015). These studies investigated the behavioral effects of interpersonal closeness and payment observability on voluntary payments empirically for the first time. However, they intertwined the concepts of observability and interpersonal closeness, making it difficult to discern whether the observed increase in payments is primarily driven by the visibility of payments or the presence of close others. The studies simultaneously manipulated both factors: whether payments were observable and the variation of the social context. As a result, the interpretative value of the results is limited: increased payments in these public settings could be attributable to either the presence of an audience, which activates social image concerns, or to the presence of close other buyers during the payment decision.

A previous study by Hofmann et al. (2021) has examined this in a Pay-What-You-Want context and disentangled both phenomena in a laboratory experiment. Their results provide the first empirical evidence that both effects are at play separately and that the combined effect is additive in total: increasing interpersonal closeness and social image concerns via observability of payments increase prosocial behavior, i.e. voluntary payments, independently. However, the results of Hofmann et al. (2021) are limited due to the abstract character of the laboratory experiment setting, due to the manipulation of interpersonal closeness on only two levels, and due to its being a student sample. Although internal validity can be assumed to be high, external validity might be an issue. It thus remains an open empirical question whether the results can be validated in real-world settings with higher external validity for more than two levels of interpersonal closeness with a non-student sample. This paper closes these gaps.

3 Materials and methods

Experimental design and procedures were identical in Study 1 and Study 2. With voluntary payment decisions used as dependent variable, the subjects were asked to indicate how much they would

be willing to pay for a ticket at the American Museum of Natural History (AMNH) in New York.

The experiment applies a 4 x 2 between-subjects design, resulting in eight treatments. We varied the degree of interpersonal closeness between the buyers on four levels (*IOS1, IOS2, IOS3, and IOS4*) and social image concerns via payment observability on two levels (*No Audience* and *Audience*). The very low interpersonal closeness condition *IOS1* serves as the baseline. Herein the other visitor present during the ticket purchase is described as a stranger. The three interpersonal closeness conditions *IOS2, IOS3,* and *IOS4* represent interpersonally close conditions and use borrowed identities from the participants real-world social relationships. A low interpersonal closeness is manipulated in the *IOS2* condition, while a high interpersonal closeness is manipulated in the *IOS3* condition. Finally, in the *IOS4* condition, a very high interpersonal closeness is induced. The payment observability condition *No Audience* (NA) represents a setting in which payments are not observed by a specific other visitor (standing in line far away from the participant), whereas in the *Audience* (A) condition, own payments are observed by a specific other visitor (standing in line directly behind the participant). The experimental instructions are provided in the Supplementary materials.

The experiment consisted of six steps which are described below.

In **Step 1**, three real social relationships, each representing three different degrees of interpersonal closeness, were elicited for further procedural use in the experiment. The participants were shown the picture of a four-level-adapted version of the original seven-level IOS Scale (Aron et al., 1992), familiarizing them with the concept of interpersonal closeness (see Figure 1).

The approach that interpersonal closeness can be conceptualized and measured as cognitive overlap between the Self and the Other was introduced by Aron et al. (1991, 1992, 1997). They assumed that the closer a social relationship is, the more the boundaries between self and other blur, resulting in their merging. Following this line of thought, the authors proposed eliciting the strength of interpersonal closeness using the 'Inclusion of Other in the Self' (IOS) Scale (Aron et al., 1992). The IOS Scale measures the perceived "interconnectedness of self and other" (Aron et al., 1992, 1997), using a pictorial scale of increasingly overlapping circles: the more the circles overlap, the higher the perceived interpersonal closeness. Accordingly, it is assumed that the cognitive overlap is able to differentiate among varying degrees of interpersonal closeness in social relationships (Aron and Fraley, 1999). As compared to the 'Relationship Closeness Inventory'

(Berscheid et al., 1989b), the IOS Scale is a more flexible measure of interpersonal closeness that is simple and fast to use at the same time. As shown by Gächter et al. (2023), the IOS Scale is a reliable measure of interpersonal closeness. It is not only used in psychology but has also recently gained attention in economics (see, e.g., Beranek and Castillo, 2024; Gächter et al., 2015). The IOS Scale is used in this study as it can be seen as a valid instrument to induce and measure interpersonal closeness.

The subjects were asked to think about three same-sex people representing different levels of perceived interpersonal closeness to them, namely, pictures 2-4 of Figure 1. Subjects provided the first name, age, how long they had known the person, and type of relationship for each of the three persons. Participants were asked not to name persons with whom they have a shared income or livelihood. The same-sex criteria had been checked before participants were able to continue with the experiment. To illustrate this procedure, participants were told that a social relationship toward a stranger, about whom they do not know anything, would represent picture 1 of Figure 1. Following this analogy, picture 2 of Figure 1 would then represent a social relationship being closer than toward a stranger but still not very close, such as with acquaintances or neighbors. Picture 3 of Figure 1 would represent a relationship with close friends or nearby relatives. Finally, picture 4 of Figure 1 would represent a very close relationship, such as those between best friends or very close family members. This method of using borrowed identities from real-world social relationships induces various degrees of closeness relying on the subjects self-assessment. It captures possible inter-individual variations regarding the meaning of closeness while at the same time structuring the assessment by means of the IOS Scale. It thus allows the subjects to define for themselves how to classify their social relationships regarding different degrees of closeness, an advantageous approach compared to external classifications by the experimenter to define what manifests a close relationship (Berscheid et al., 1989b).

In **Step 2**, the level of interpersonal closeness was manipulated. One out of the four levels (i.e., *IOS1, IOS2, IOS3,* or *IOS4*) of interpersonal closeness was randomly chosen. Each subject was assigned to one interpersonal closeness condition only. Subjects were then asked to write a short text about their daily routine on a weekday (baseline condition *IOS1*) or to write a short text about their relationship with the assigned person (conditions *IOS2, IOS3,* and *IOS4*), including, for instance, how they met each other and which activities they usually do together. The aim of this procedure was to strengthen the randomly assigned level of interpersonal closeness.

In **Step 3**, subjects read the scenario description. Participants were asked to imagine they were visiting the American Museum of Natural History (AMNH) in New York and standing in line at the ticket counter. A picture of the AMNH and information about the museum were provided to activate possible knowledge about the museum and to make the scenario more tangible. The subjects were told that the AMNH allowed visitors to pay what they want for the entrance ticket. They further read that they could expect the visit to fulfill their expectations to keep expected satisfaction homogeneous in all treatments. Activation of social image concerns have been embedded in the scenario description by making payments not observable or observable. Subjects were told that they recognized

the randomly assigned person from Step 2 also standing in the line. In the *No Audience* condition they read that the person was standing *far away behind* them with unknown others standing between them. Thus, while paying at the ticket counter, this person would still be far away behind them and could not observe how much they paid for their visit. In the *Audience* condition they read that the person was standing *right behind* them. Thus, while paying at the ticket counter, this person was in a position to observe how much they paid for their visit. That the staff person at the ticket counter would learn about the price the subjects were willing to pay was kept constant across treatments. Additionally, the subjects were given the information that the museum suggests a price of $23 per visitor, providing an external reference price to keep potential knowledge about this price anchor constant across the treatments.[1]

Step 4 contained the measure of voluntary willingness to pay operationalized as the price the subjects would be willing to pay in $ for a ticket to visit the AMNH. This measure is called "voluntary payment" in the following.

In **Step 5**, a manipulation check was conducted in which participants were asked to rate their perceived level of closeness toward the person randomly chosen in Step 2 on the same adapted IOS Scale from one to four (Figure 1).

In **Step 6**, a couple of control variables were measured. First order and second order beliefs of the participants were measured as well as their general interest in and usage of various cultural activities. Additionally, their affiliation to the AMNH in general was collected. Further, subjects were asked to indicate their preferences for a fixed price or a Pay-What-You-Want pricing mechanism. At the very end of the experiment, demographics were measured.

The data collection for Study 1 took place in December 2018. To test the robustness of the results from Study 1, we ran a replication study (Study 2) in December 2019. We used the identical experimental design in both studies and added various control questions after the replication measures in Study 2 to gain deeper insights into the potential underlying mechanisms influencing the willingness to pay. Firstly, to rule out possible confounds between the treatments due to different arousal levels, we collected data on pleasure, arousal, and dominance via the Self-Assessment Manikin (SAM) scales (Bradley and Lang, 1994). We further added a manipulation check for payment observability by the other visitor, asking "How much did you feel observed by the other visitor while making your payment decision?" (7-point Likert scale from 1 (*Not at all*) to 7 (*Very much*)). To gain more insights into the potential mechanisms behind the closeness effect, social cohesion with the other visitor was elicited, using adopted items from Carless and de Paola (2000) and Delfgaauw et al. (2022).

Besides that, we collected data on feelings of guilt (adopted from Cohen et al. (2011)) when participants paid less than they believed the other visitor would pay, less than expected by the other visitor, and less than expected by the AMNH. We also measured the perception to feel uncomfortable when paying more than the other visitor, more than the other visitor expected the subjects to pay, and more than the AMNH expected. Finally, we elicited the participants social preferences using the six-item version of the social value orientation (SVO) slider measure (Murphy et al., 2011). In the replication study (Study 2), we further added an additional baseline treatment in which the museum visitor was alone at the ticket counter with no other visitor being present during the payment decision.

4 Behavioral predictions

This paper aims to investigate how four levels of interpersonal closeness (closeness effect) and social image concerns via two levels of payment observability (audience effect) affect prosocial behavior, being elicited as voluntary payments in a Pay-What-You-Want context with high external validity. The behavioral predictions are derived in accordance with the related literature outlined earlier.

Previous literature indicates that proximity to interpersonally close others when making payment decisions might lead to the buyer entering a prosocial mindset which in turn results in increased prosocial behavior. Hence, the literature suggests a *closeness* effect, i.e. being together with close others increases prosocial behavior. As in this study four levels of interpersonal closeness are induced, we expect that, on average, payments increase with increasing levels of interpersonal closeness. *Ceteris paribus*, we predict an average closeness effect on voluntary payments:

HYPOTHESIS 1. *Voluntary payments increase with increasing levels of interpersonal closeness.*

If behavior is observed, social image concerns are activated. In the *Audience* condition, these social image concerns are activated via payment observability whereas payment observability is not present in the *No Audience* condition. Related literature on payment observability showed increased contributions if payments were observed (*audience* effect). Accordingly, we expected that, on average, payments would be higher if observed by other buyers. We predict an average *audience* effect on voluntary payments, thus:

HYPOTHESIS 2. *Voluntary payments are, on average, higher in the* Audience *condition than in the* No Audience *condition.*

Regarding the relationship between an audience and interpersonal closeness, recent empirical findings suggest that the effects are additive, not interactive. Both constructs seem to increase payments separately without amplifying each other. Thus, additive effects assume that the independent variables affect the dependent variable separately and do not reinforce each other in the regression analysis. In our study, this would result in two separate main effects rather than a significant interaction effect. Consistent with such an additive relationship, we predict:

HYPOTHESIS 3. *The relationship between social image concerns via payment observability and interpersonal closeness is additive in total. Therefore, both constructs independently contribute to higher voluntary payments without intensifying each other's effects.*

TABLE 1 Treatments and observations Study 1.

Interpersonal closeness	No audience (NA)	Audience (A)	Total
Very low interpersonal closeness (IOS1)	129	131	260
Low interpersonal closeness (IOS2)	130	130	260
High interpersonal closeness (IOS3)	126	123	249
Very high interpersonal closeness (IOS4)	135	130	265
Total	520	514	1,034

5 Results Study 1

The subjects in Study 1 were recruited via Amazon Mechanical Turk (MTurk) and the experiment was programmed using Qualtrics. 1,034 subjects participated in Study 1, randomly assigned to one of the eight treatments (see Table 1). Participants took on average 11.6 minutes (SD =7.12) to complete the survey and participation was incentivized with \$1.20. The participants were on average 38.4 (SD =11.87) years old with 55.1% of the subjects being female. On average, subjects had 0.84 children (SD =1.14). The sample is balanced between liberals and conservatives (M = 3.53, SD = 1.82, 7-point Likert scale ranging from 1 *(Strongly liberal)* to 7 *(Strongly conservative)*). Table 1 summarizes the number of participants showing almost equally distribution among the eight treatments. We ran a manipulation check to ensure that the manipulation of interpersonal closeness was successful. Using a four-level IOS Scale at the end of the experiment, subjects were asked which of the four presented IOS pictures best described their relationship to the person mentioned in experimental Steps 2, 3, and 4. The mean IOS score in condition *IOS1* was M =1.30 (SD =0.59), while it was M =2.10 (SD =0.52) in condition *IOS2*. In condition *IOS3*, the mean IOS score was M =2.92 (SD =0.34) and in condition *IOS4* it was M =3.85 (SD =0.48). The results indicate significant differences: The higher the interpersonal closeness level of the condition, the closer the subjects felt to the named person. A nonparametric comparison of the four conditions (Kruskal-Wallis test, $H(3) = 815.52$, $p < 0.001$) and a one-way analysis of variance ($F(3, 1030) = 1,296$, $p < 0.001$) support this result. Also, *post hoc* tests indicate that the manipulation of interpersonal closeness was successful between all four levels. Thus, we conclude that the manipulation of interpersonal closeness via borrowed identities from real-world social relationships successfully induced different levels of interpersonal closeness.

On average, participants in Study 1 were willing to pay \$19.66 (SD =6.90) for a ticket at the AMNH. The average voluntary payment is significantly different from zero (one-sample t-test against zero, $p < 0.001$). The amount participants were willing to pay varied in a broad range between \$0 and \$50 which is illustrated in Figure 2.
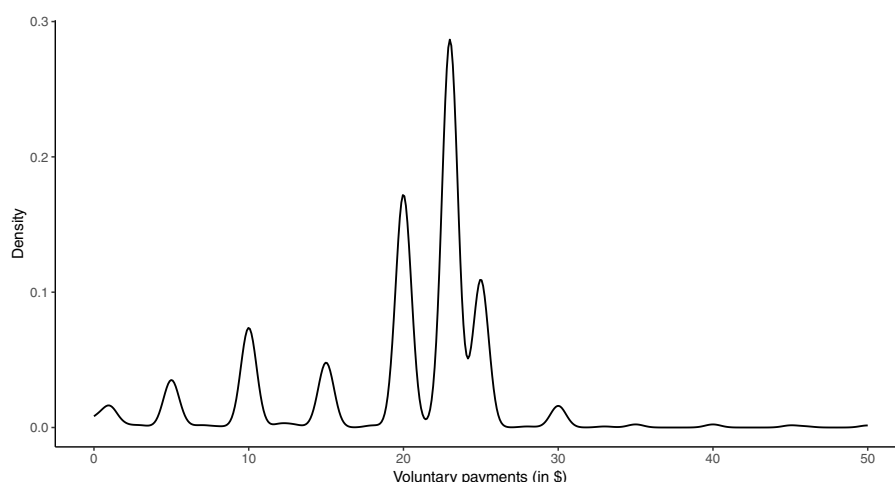
FIGURE 2
Distribution of voluntary payments Study 1.

TABLE 2 Mean voluntary payments in \$ for all eight treatments averaged across conditions Study 1.

Interpersonal closeness	No audience (NA)	Audience (A)	Mean (SD)
Very low interpersonal closeness (IOS1)	17.74 (7.18)	18.48 (8.04)	18.12 (7.62)
Low interpersonal closeness (IOS2)	19.47 (6.79)	20.23 (6.24)	19.85 (6.52)
High interpersonal closeness (IOS3)	20.12 (6.24)	20.33 (7.02)	20.22 (6.62)
Very high interpersonal closeness (IOS4)	19.39 (7.08)	21.55 (5.77)	20.45 (6.55)
Mean (SD)	19.18 (6.88)	20.14 (6.89)	19.66 (6.90)

Standard deviations (SD) are provided in parentheses.

Table 2 provides summary statistics of the voluntary payments for all eight treatments and their mean averaged across the conditions.

We first looked at the closeness effect on voluntary payments. The higher the level of interpersonal closeness, the more subjects do tend to pay. On average, subjects paid \$18.12 (SD =7.62) in closeness condition *IOS1*, \$19.85 (SD =6.52) in closeness condition *IOS2*, \$20.22 (SD =6.62) in closeness condition *IOS3*, and \$20.45 (SD =6.55) in closeness condition *IOS4*. This result is visualized in Figure 3.

A Kruskal-Wallis test indicates that the differences between the four interpersonal closeness conditions is statistically significant ($H(3) = 17.46$, $p < 0.001$). This result is also supported by a one-way analysis of variance examining the effect of interpersonal closeness (factor variable with four levels) on payments. Subjects pay significantly more if interpersonal closeness increases ($F(3, 1,030) = 6.21$, $p < 0.001$). Hence, the results provide empirical

evidence for - what we call - a strong closeness effect on prosocial behavior.

RESULT 1. *Voluntary payments increase significantly with increasing levels of interpersonal closeness.*

Turning to the results regarding the audience effect, the data analysis shows that in the *Audience* condition (M =\$20.14, SD =6.89), the voluntary payments are significantly higher than in the *No Audience* condition (M = \$19.18, SD = 6.88, one-sided two-sample t-test, $t(1032) = -2.24$, $p = 0.013$)). Observed participants thus paid, on average, 5% more than unobserved subjects. This result is further confirmed by a one-way analysis of variance ($F(1, 1032) = 5.03$, $p = 0.025$) and is illustrated in Figure 4.

RESULT 2. *Voluntary payments are, on average, significantly higher in the* Audience *condition than in the* No Audience *condition.*

Results 1 and 2 are further supported by a linear regression (Table 3). In each of the four model specifications, voluntary payments is dependent variable. We included an audience dummy (Audience = 1, zero otherwise) in Model 1 as explanatory variable. In Model 2, we entered interpersonal closeness as independent variable (continuous variable). In Model 3, we added both audience and interpersonal closeness into the regression model. Finally, in Model 4 we added an interaction term between audience and closeness. In all four Models, we included various control variables in the regressions, such as: first order and second order beliefs; preference for fixed price; sociodemographic variables; and control variables regarding the American Museum of Natural History as well as control variables for rated importance of cultural activities in general and frequency of visits to cultural activities.

We find a significant main effect of having an audience on voluntary payments across interpersonal closeness conditions (Model 1, coefficient = 0.85, $p = 0.02$). Subjects pay significantly more if payments are observed by other buyers. The regression results (Model 2) further show a significant main effect of interpersonal closeness on the voluntary payments (coefficient = 0.64, $p < 0.001$). The main effects of audience and interpersonal
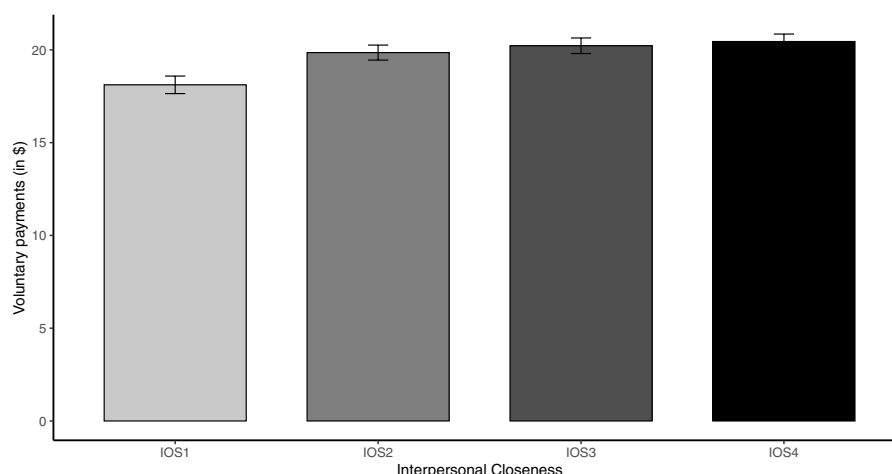
FIGURE 3
Mean voluntary payments by interpersonal closeness condition Study 1.
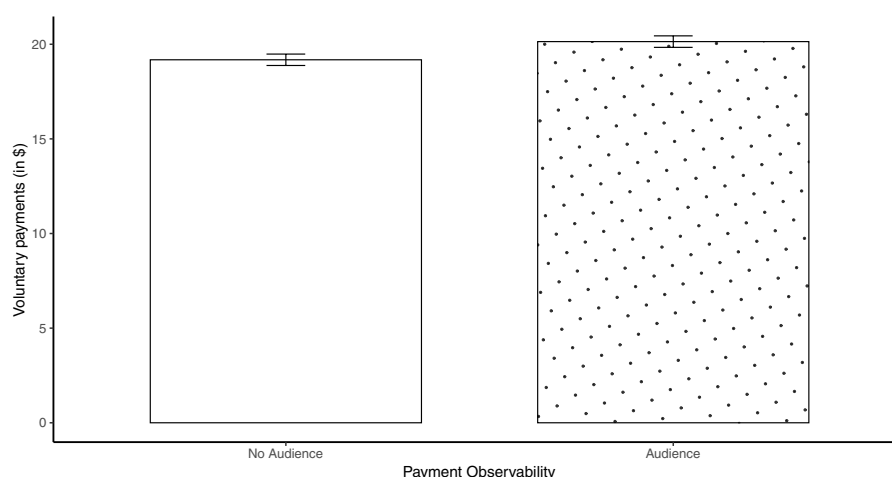

FIGURE 4
Mean voluntary payments by payment observability condition Study 1.

closeness remain to a similar extent if added simultaneously in the regression (Model 3). Summarized, these results lend support for Hypothesis 1 and Hypothesis 2.

Regarding the relationship between social image concerns via payment observability and interpersonal closeness, the results indicate an additive relationship: the effect of one factor does not depend on the presence or level of the other. We do not find a significant interaction effect between audience and interpersonal closeness (Model 4, coefficient = 0.19, $p = 0.524$), hence the audience effect does not seem to be more pronounced if the audience consists of very close others. The data analysis thus lends support for Hypothesis 3. To test this result on robustness, we ran an analysis of variance including an interaction between payment observability and interpersonal closeness. The result is similar to the linear regression summarized in Table 3. While the main effects of an audience ($F(1, 1,026) = 5.11$, $p = 0.024$) and

of interpersonal closeness ($F(3, 1,026) = 6.30$, $p < 0.001$) are significant, the interaction is not significant ($F(3, 1,026) = 0.97$, $p = 0.407$).

RESULT 3. *Social image concerns via payment observability and interpersonal closeness contribute to voluntary payments separately. Hence, the results support an additive relationship between social image concerns via payment observability and interpersonal closeness.*

Looking at the influence of the control variables on the voluntary payments, the regression results indicate a positive and significant effect of first order and second order beliefs on voluntary payments in all four Models. If visitors expect the other person to pay more for the ticket (first order beliefs), they seem to adapt their behavior and also increase their payment. Similarly, if visitors expect the other person to expect higher payments from themselves (second order beliefs), they pay more.

TABLE 3 Determinants of voluntary payments Study 1.

	Model (1)	Model (2)	Model (3)	Model (4)
Audience	0.85* (0.34)		0.86* (0.34)	0.38 (0.83)
Closeness		0.64*** (0.15)	0.64*** (0.15)	0.54* (0.21)
Audience x closeness				0.19 (0.30)
First order beliefs	0.31*** (0.03)	0.29*** (0.03)	0.29*** (0.03)	0.29*** (0.03)
Second order beliefs	0.34*** (0.04)	0.35*** (0.04)	0.35*** (0.04)	0.35*** (0.04)
Preference for fixed price	2.16*** (0.35)	2.14*** (0.35)	2.12*** (0.35)	2.12*** (0.35)
Age	0.04* (0.02)	0.04* (0.02)	0.04* (0.02)	0.04* (0.02)
Gender	0.33 (0.36)	0.16 (0.36)	0.21 (0.36)	0.21 (0.36)
Political orientation	0.19† (0.10)	0.14 (0.10)	0.15 (0.10)	0.15 (0.10)
Children	−0.03 (0.16)	−0.03 (0.16)	−0.01 (0.16)	−0.01 (0.16)
Degree	−0.31* (0.13)	−0.35** (0.13)	−0.34** (0.13)	−0.34** (0.13)
Marital status	0.03 (0.21)	0.07 (0.21)	0.06 (0.21)	0.06 (0.21)
Religion	−0.01 (0.05)	−0.02 (0.05)	−0.02 (0.05)	−0.02 (0.05)
AMNH known	−0.19 (0.30)	−0.22 (0.30)	−0.23 (0.30)	−0.22 (0.30)
AMNH already visited	0.53 (0.43)	0.53 (0.43)	0.47 (0.43)	0.47 (0.43)
AMNH intention to visit	0.30 (0.37)	0.33 (0.37)	0.35 (0.37)	0.35 (0.37)
Importance: cultural activities	0.26† (0.15)	0.25† (0.14)	0.25† (0.14)	0.25† (0.14)
Visits: cultural activities	0.76* (0.31)	0.66* (0.31)	0.68* (0.30)	0.69* (0.30)
Constant	0.15 (1.79)	−0.24 (1.79)	−0.78 (1.79)	−0.56 (1.83)
Observations	1,020	1,020	1,020	1,020
R^2	0.38	0.39	0.39	0.39
Adjusted R^2	0.37	0.38	0.38	0.38

Results from linear regressions. Voluntary payments is the dependent variable in all four Models. Standard errors are provided in parentheses. $^{\dagger}p < 0.1$; $^{*}p < 0.05$; $^{**}p < 0.01$; $^{***}p < 0.001$.

Additionally, those participants who prefer fixed prices (FP) over Pay-What-You-Want (PWYW) pay significantly more than subjects preferring PWYW over FP. This result holds true for all four Models. Regarding the sociodemographic variables, age and degree have a significant influence on voluntary payments in all four Models. Older participants pay significantly more. Further, the higher the education of the participants, the less they pay for their ticket voluntarily. Finally, subjects who visit cultural activities such as museums or concerts more often pay significantly higher prices than those who visit less frequently. This influence is similar in all four tested regression Models.

Summarized, the results of Study 1 show that payments are higher in the *Audience* treatments than in the *No Audience* treatments. Further, the results suggest payments increased with increasing levels of interpersonal closeness. These effects are at play independently, indicating an additive relationship.

6 Results Study 2

Identical to Study 1, subjects in Study 2 were also recruited via Amazon Mechanical Turk (MTurk) and the experiment was programmed using Qualtrics. 995 subjects participated in Study 2

which took on average 16.2 minutes to be completed. Participation was incentivized and subjects earned $1.50 as a participation fee. As shown in Table 4, participants in Study 2 differed only regarding age from the subjects in Study 1. Participants in Study 2 were on average 39.9 years old ($SD = 12.53$) and 53.7% were female. Similar to Study 2, political orientation was balanced with $M = 3.41$ ($SD = 1.76$). Also, the number of children in Study 2 ($M = 0.75$, $SD = 1.10$) was similar to Study 1. The similarities between Study 1 and Study 2 regarding participants allow for the conclusion that the two samples were not different from each other.

The manipulation check of Study 2 reveals that participants show similar IOS scores as in Study 1. The mean IOS score in condition *IOS1* is $M = 1.21$, while it is $M = 2.13$ in condition *IOS2*, $M = 2.99$ in condition *IOS3*, and $M = 3.94$ in condition *IOS4*. These values differ statistically significantly from each other (nonparametric Kruskal-Wallis test, $H(3) = 877.71$, $p < 0.001$) as was the case in Study 1. Thus, the manipulation of interpersonal closeness was successful. An additional manipulation check regarding payment observability shows that subjects in the *Audience* condition felt significantly more observed ($M = 4.57$, $SD = 1.89$) than participants in the *No Audience* condition ($M = 2.24$, $SD = 1.68$, one-sided two-sample t-test, $t(986) = -20.62$, $p < 0.001$).

TABLE 4 Characteristics of participants in Study 1 and Study 2.

Variable	Mean Study 1	Freq. Study 1	Mean Study 2	Freq. Study 2	p value
Age	38.37		39.87		0.006
Female		0.551		0.537	0.510
Political Orientation	3.53		3.41		0.135
Children	0.84		0.75		0.082
Degree					0.619
Less than high school graduate		0.3		0.5	
High school graduate		9.7		9.3	
Some college / associate's degree		34.6		36.1	
Bachelor's degree		39.9		36.7	
Advanced degree		15.6		17.4	
Marital Status					0.562
Married / Partnership		52.1		49.0	
Widowed		1.5		1.1	
Divorced		8.4		8.7	
Separated		1.1		1.4	
Single / Never married		36.9		39.7	
Employment Status					0.657
Employed		82.6		84.2	
Unemployed		17.4		15.8	
Net Income					0.195
Less than $ 20.000		11.4		11.1	
$ 20.000 to $ 34.999		15.8		17.8	
$ 35.000 to $ 49.999		19.9		19.2	
$ 50.000 to $ 74.999		27.3		23.3	
$ 75.000 to $ 99.999		13.4		14.5	
Over $ 100.000		12.3		14.5	
Religion					0.127
Protestant		24.4		26.3	
Catholic		21.1		18.9	
Other Christian		8.2		5.2	
Jewish		1.9		1.5	
Muslim		1.4		1.1	
Buddhist		1.6		1.6	
Hindu		0.5		0.6	
Other		3.7		5.0	
None		37.3		39.7	

p values for variables age, political orientation, and children stem from two-sided two-sample t-tests and from χ^2 tests for variables gender, degree, marital status, employment status, net income, and religion.

The descriptive data analysis of the voluntary payments in Study 2 reveals a successful replication of the main results of Study 1 (see Table 5).

Similar to Study 1, participants in Study 2 were willing to pay on average $19.58 ($SD$ =6.90) for a ticket at the AMNH. The average voluntary payment is significantly different from zero (one-sample t-test against zero, $p < 0.001$). Once more, the amount participants were willing to pay varied in a broad range between $0 and $50 which is illustrated in Figure 5.

The results suggest a main effect of interpersonal closeness being visualized in Figure 6. The shape of the bar plot for Study 2 looks slightly different to the bar plot of Study 1 regarding the four closeness conditions. However, statistical analyses reveal that none of the mean voluntary payments in Study 2 differ significantly from the mean voluntary payments in Study 1 as indicated by two-sided two-sample t-tests.

Moreover, we again find a main effect of payment observability which is illustrated in Figure 7. Subjects paid significantly more when being observed.

The replication of Study 1 is further supported by a regression analysis. We ran a linear regression with the Study 2 data, identical to the regression ran with the Study 1 data (see Table 6). The data analysis leads to similar results as the regression of Study 1 (see Table 3).

In Model 1, audience positively and marginally significantly predicts payment behavior (coefficient = 0.59, $p = 0.076$). A similar result occurs in Model 3 (coefficient = 0.60, $p = 0.071$), when audience and interpersonal closeness were both added to the regression. The marginal significance potentially can be explained by the lower sample size compared to Study 1. In addition, the high variance in voluntary payments could influence the significance of the results. The smaller effect sizes of the audience effect in Study 2 might also be taken into account when explaining the marginal significance.

Furthermore, interpersonal closeness positively and significantly predicts payment in Model 2 (coefficient = 0.50, $p < 0.001$) and Model 3 (coefficient = 0.50, $p < 0.001$). This result is also in-line with the regression analysis of Study 1. Finally, we do not find a significant interaction effect between audience and interpersonal closeness in Model 4 (coefficient = 0.38, $p = 0.228$), which is similarly the case to Study 1. Regarding controls included in the regression, we find first order beliefs and second order beliefs, preference for fixed price, degree, and importance of cultural activities as significant determinants of the voluntary payments, are also in-line with the regression analysis conducted in Study 1. Age is no longer a significant predictor, which might be due do the significant difference between Study 1 and Study 2 data regarding age. Summarizing the results from the Study 2 analysis, we conclude that the effects found in Study 1 are robustly confirmed in the Study 2 replication.

RESULT 4. *The results of Study 1 (N = 1,034) are robustly confirmed in a replication Study 2 (N = 995).*

We further ran an *additional baseline* treatment, in which the subjects were alone during the payment situation; 105 subjects participated in this treatment. The average payment in this additional *baseline treatment* is \$17.64 ($SD = 7.51$), being at a similar level as the average payment in the baseline treatment of Study 1, *IOS1 No Audience* ($M = 17.74$, $SD = 7.18$). The difference between the *additional baseline* in Study 2 and the *IOS1 No Audience* treatment in Study 1 is not significant (two-sample t-test, $t(232) = -0.11$, $p = 0.912$). This result suggests that a payment

TABLE 5 Mean voluntary payments in $ for all eight treatments averaged across conditions as well as for the additional baseline (being alone) Study 2.

Interpersonal closeness	No audience (NA)	Audience (A)	Mean (SD)
Very low interpersonal closeness (IOS1)	17.91 (8.03)	18.48 (6.59)	18.20 (7.32)
Low interpersonal closeness (IOS2)	19.96 (6.27)	21.28 (5.26)	20.63 (5.81)
High interpersonal closeness (IOS3)	18.90 (7.44)	19.57 (7.02)	19.25 (7.22)
Very high interpersonal closeness (IOS4)	19.83 (6.90)	20.91 (6.68)	20.37 (6.80)
Mean (SD)	19.13 (7.24)	20.02 (6.53)	19.58 (6.90)
Additional baseline (being alone)	17.64 (7.51)	-	-

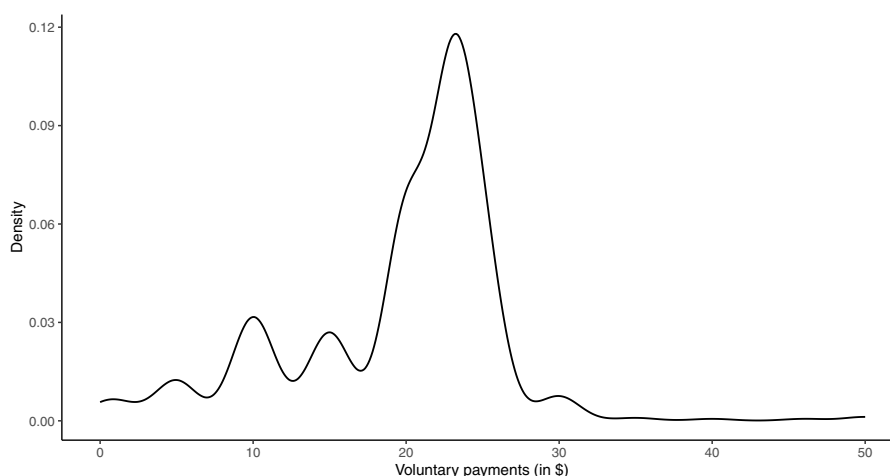Standard deviations (SD) are provided in parentheses.

FIGURE 5
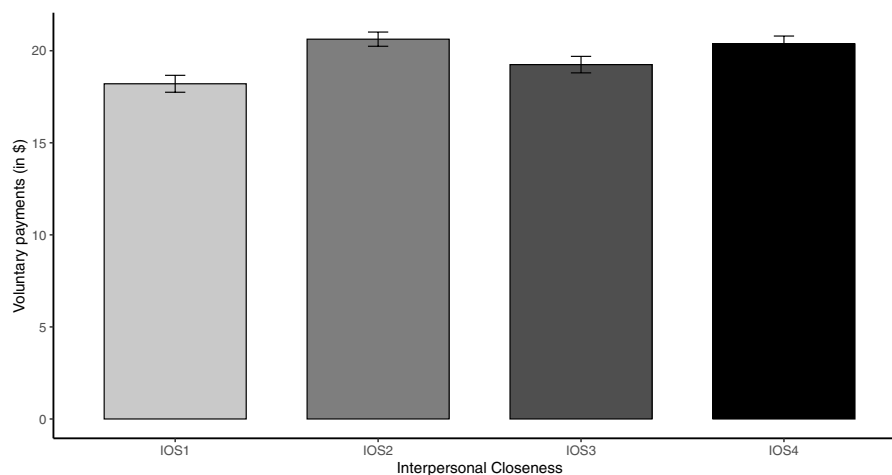Distribution of voluntary payments Study 2.

FIGURE 6
Mean voluntary payments by interpersonal closeness condition Study 2.
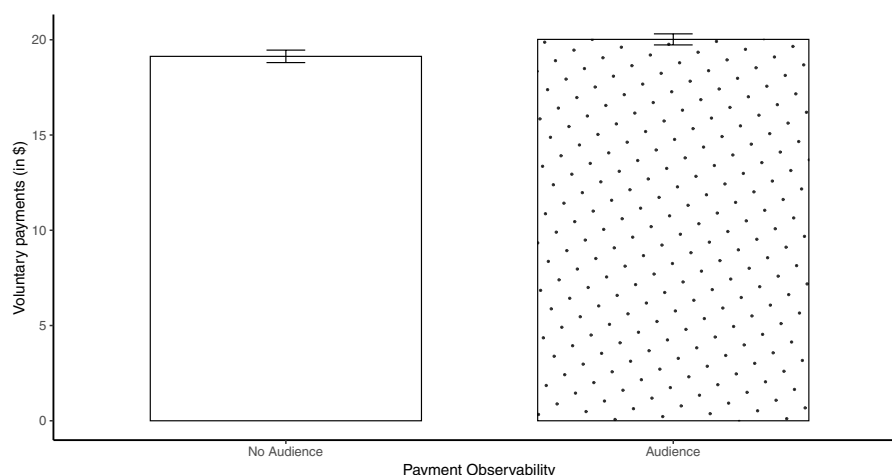

FIGURE 7
Mean voluntary payments by payment observability condition Study 2.

situation in which a not known visitor is present is identical to scenarios in which a visitor is alone.

Beyond the replication of the Study 1 results, we retrieved additional variables in Study 2 to gain further insights, especially about the closeness effect. These additional variables are explored in the following. There are no significant differences between the eight treatments regarding pleasure (Kruskal-Wallis test, $H(7) = 10.04$, $p = 0.186$), arousal (Kruskal-Wallis test, $H(7) = 6.60$, $p = 0.472$) or dominance (Kruskal-Wallis test, $H(7) = 7.75$, $p = 0.355$). Furthermore, the eight treatments do not differ regarding SVO types (χ^2 test, $\chi^2(21, N = 995) = 19.52$, $p = 0.552$). Thus, neither differences in arousal levels nor differences in social preferences might explain the underlying mechanism of the closeness effect.

However, social cohesion values significantly differ between the four interpersonal closeness conditions (Kruskal-Wallis test, $H(3) = 636.48$, $p < 0.001$). The higher the interpersonal closeness, the more subjects care about their connectedness with the other visitor. This result suggests that, with increasing interpersonal closeness, individuals tend to align own behavior to the expectations of others in order to maintain the social relationship. Feelings of guilt do not significantly differ between the four closeness conditions when a subject paid less than the AMNH expected (Kruskal-Wallis test, $H(3) = 4.42$, $p = 0.220$). However, these do significantly differ when they paid less than the other visitor (Kruskal-Wallis test, $H(3) = 8.49$, $p = 0.037$), and especially when the subject paid less than the other visitor expected them to pay (Kruskal-Wallis test, $H(3) = 35.02$, $p < 0.001$). Hence, feelings of guilt increase with increasing levels of closeness. This holds true not only for feelings of guilt when less was paid, but in the inverse, is also valid in those cases where subjects would pay more than the other visitor expected (Kruskal-Wallis test, $H(3) = 13.82$, $p = 0.003$). These results suggest that social cohesion, beliefs, and consistency with

TABLE 6 Determinants of voluntary payments Study 2.

	Model (1)	Model (2)	Model (3)	Model (4)
Audience	0.59† (0.34)		0.60† (0.34)	−0.35 (0.83)
Closeness		0.50*** (0.15)	0.50*** (0.15)	0.31 (0.21)
Audience x closeness				0.38 (0.30)
First order beliefs	0.31*** (0.03)	0.30*** (0.03)	0.30*** (0.03)	0.30*** (0.03)
Second order beliefs	0.37*** (0.03)	0.37*** (0.03)	0.37*** (0.03)	0.38*** (0.03)
Preference for fixed price	2.00*** (0.35)	2.00*** (0.35)	1.98*** (0.35)	1.99*** (0.35)
Age	0.02 (0.02)	0.02 (0.02)	0.02 (0.02)	0.02 (0.02)
Gender	−0.18 (0.36)	−0.09 (0.35)	−0.11 (0.35)	−0.11 (0.35)
Political orientation	0.15 (0.11)	0.17 (0.11)	0.17 (0.11)	0.16 (0.11)
Children	0.18 (0.16)	0.20 (0.16)	0.19 (0.16)	0.19 (0.16)
Degree	−0.37** (0.13)	−0.38** (0.13)	−0.38** (0.13)	−0.38** (0.13)
Marital status	−0.30 (0.21)	−0.30 (0.21)	−0.29 (0.21)	−0.27 (0.21)
Religion	−0.04 (0.05)	−0.03 (0.05)	−0.03 (0.05)	−0.03 (0.05)
AMNH known	−0.07 (0.29)	−0.01 (0.29)	−0.01 (0.29)	−0.02 (0.29)
AMNH already visited	0.18 (0.42)	0.08 (0.42)	0.08 (0.42)	0.05 (0.42)
AMNH intention to visit	−0.13 (0.36)	−0.12 (0.36)	−0.11 (0.36)	−0.08 (0.36)
Importance: cultural activities	0.39** (0.15)	0.35* (0.15)	0.35* (0.15)	0.34* (0.15)
Visits: cultural activities	0.45 (0.35)	0.54 (0.35)	0.54 (0.35)	0.55 (0.35)
Constant	3.26† (1.74)	2.33 (1.76)	2.01 (1.77)	2.45 (1.80)
Observations	995	995	995	995
R^2	0.41	0.42	0.42	0.42
Adjusted R^2	0.40	0.41	0.41	0.41

Results from linear regressions. Voluntary payments is the dependent variable in all four Models. Standard errors are provided in parentheses. $†p < 0.1$; $*p < 0.05$; $**p < 0.01$; $***p < 0.001$.

the expectations of close others might play an important role in explaining the underlying mechanisms of the closeness effect.

7 General discussion

Do buyers in a Pay-What-You-Want setting with high external validity show increased prosocial behavior toward the seller (i.e. higher voluntary payments) driven by increasing levels of interpersonal closeness between the buyers? And how does such a closeness effect relate to social image concerns activated by the observability of behavior? It remains unclear yet how social image concerns via payment observability and more than two degrees of interpersonal closeness relate to each other regarding prosocial behavior in a real-world setting. The purpose of this study is to close this gap. It explores both phenomena in two online experiments, applying a setting with high external validity, namely, a ticket purchase at the American Museum of Natural History (AMNH) in New York. Two large-scale studies were conducted in order to test the behavioral effects at hand regarding empirical robustness. The findings of both studies indicate that interpersonal closeness between buyers itself indeed leads to increasing prosocial behavior, i.e., higher voluntary payments. This result provides evidence for the presence of a strong closeness effect on prosocial behavior.

Furthermore, social image concerns via payment observability significantly increase the voluntay payments. These results suggest an additive relationship between interpersonal closeness and social image concerns, lending strong support to the assumption that closeness effects and audience effects are at work separately and do not reinforce each other. This aspect might be taken into account when further developing models of social image concerns and interpersonal closeness.

Result 1 confirms the presence of a closeness effect on prosocial behavior, that is, voluntary payments significantly increase if individuals are in near proximity to interpersonally close other buyers. Thus, the social relationship between buyers in a voluntary payment setting seems to be an important aspect in explaining the individual payment decision. This result is consistent with previous studies suggesting a link between increased interpersonal closeness and increased prosocial behavior (see, e.g., Cialdini et al., 1997; Korchmaros and Kenny, 2001; Kramer and Brewer, 1984; Maner et al., 2002; Reddish et al., 2013; Rennung and Göritz, 2016; Stel et al., 2008; Valdesolo and DeSteno, 2011; van Baaren et al., 2004). It is also in-line with the finding of Hofmann et al. (2021), namely that in a Pay-What-You-Want context, the interpersonal closeness between buyers itself affects the payment decision irrespective of payment observability. These results contribute robust empirical evidence to the existing literature on how close social relationships

lead to increasing prosocial behavior in a voluntary payment setting. This is particularly interesting as, for the first time, it provides empirical evidence for the existence of such a strong closeness effect in voluntary payment settings for varying degrees of interpersonal closeness between buyers using a large, non-student sample in a PWYW setting with high external validity.

The data analysis revealed first and second order beliefs as relevant predictors of voluntary payments. These results tie-in well with the literature on beliefs and the adaptation of individuals to these beliefs as one possible explanation for the phenomenon of the closeness effect. The idea that individual behavior is influenced by beliefs entered the economic literature with the advent of psychological game theory (see, e.g., Battigalli and Dufwenberg, 2007; Geanakoplos et al., 1989). Geanakoplos et al. (1989) introduced the terms first order beliefs and second order beliefs. While first order beliefs describe an individual's beliefs about what another individual will do, second order beliefs refer to the beliefs of an individual about the beliefs and expectations of another individual. Thus, the behavior of others serves as either an informational source to arrive at a decision or as normative guidance for what kind of behavior is expected to be the right thing to do. In the literature, it is emphasized that the social relationship between individuals matter, especially regarding the desire of one to behave similar to the behavior and the expected behavior of others (Ajzen, 1991; Etcheverry and Agnew, 2016; Walker, 2015). A positive relationship between interpersonal closeness and adaption to behavior and beliefs is proposed such that own behavior is more aligned with the behavior and beliefs of close others as compared to distant others. The rationale behind this line of argumentation is that an individual aims to invest more effort to maintain a close social relationship with another person as compared to socially distanced relationships. Mapping this onto PWYW settings, it can thus be expected that the closer an individual feels to another buyer the greater the increase in their desire to behave similar to them in order to maintain the social relationship. The results of Study 2 lend support to this assumption. Social cohesion as one potential underlying mechanism of the closeness effect might explain why the mere presence of interpersonally close others increases voluntary payments, including when unobserved. Accordingly, it can be assumed that with higher levels of interpersonal closeness people adjust their own behavior more toward the behavior and expectations of others as the maintenance of these relationships is increasingly important to an individual. More specifically, this implies that voluntary payments for PWYW settings may increase up to the amount individuals expect close others to pay. Overall, one may conclude that the strong closeness effect found in both studies might be driven by the aim to be consistent with the first and second order beliefs of interpersonally close others, potentially motivated by a desire for social cohesion. However, this paper by no means claims to fully explain the underlying mechanisms informing these observed behavioral effects, which lie beyond the scope of this paper. Future research is therefore needed to better understand the psychological mechanisms at play.

Result 2 confirms the presence of an audience effect, indicating that voluntary payments significantly increase if the payer is observed by others. This result is in-line with the literature concerning increased prosocial behavior due to observability (see, e.g., Alpízar et al., 2008; Andreoni and Petrie, 2004; Engel, 2011)

and about social image concerns being activated if behavior is observed (Andreoni and Bernheim, 2009; Bénabou and Tirole, 2006; Ellingsen and Johannesson, 2008; Grimalda et al., 2016). Moreover, it is in-line with findings from Pay-What-You-Want settings, which suggest that observation by other buyers increases voluntary payments (Dorn and Suessmair, 2016, 2017; Hilbert and Suessmair, 2015; Hofmann et al., 2021; Schlüter and Vollan, 2015).

Furthermore, Result 3 suggests an additive relationship between social image concerns via payment observability and interpersonal closeness. Each factor makes a distinct and independent contribution to the voluntary payments, without being influenced by or altering the effect of the other factor. Additive effects typically manifest in distinct main effects instead of an interaction effect in the regression analysis. This paper thus adds empirical evidence supporting the proposition that high interpersonal closeness does not intensify social image concerns. The data analysis is in-line with the findings of Hofmann et al. (2021) regarding more than two levels of interpersonal closeness and settings with higher external validity. The results on audience and interpersonal closeness were robustly confirmed in a replication study (Study 2), as indicated by Result 4. Future theories modeling the relationship between social image concerns and interpersonal closeness might therefore take these findings into account by placing more emphasis on an additive instead of interactive relationship. One potential explanation for the additive effects might be that the closeness and the audience effect potentially have different underlying (cognitive) mechanisms. Natter and Kaufmann (2015) for instance identified various consumer- and product-specific mechanisms that affect voluntary payments. In a similar vein, Rathore et al. (2022) categorized consumer-related and external factors that have been examined previously in PWYW studies. Consumer-related factors include individual traits, perceptions, and attitudes, while external factors refer to characteristics of the special buying situation. In this study, two potential mechanisms might be at play separately. While norm-compliance, beliefs, and a feeling of cohesion might drive prosocial behavior when being together with interpersonally close others, social image concerns might foster higher payments when payments are observed. Since these mechanisms are separate, their effects are likely to be additive rather than interactive.

Taking a closer look at the additive relationship between social image concerns via payment observability and interpersonal closeness, the results suggest that a high level of consistency between own behavior and beliefs might drive the closeness effect. However, the data analysis also indicates that voluntary payments are lower if they are not observed; this holds true for all levels of interpersonal closeness. Dreber et al. (2013) and Jung et al. (2018) outline a conflict between conformity and own economic utility maximization in unobserved prosocial consumer settings, focusing on decision-making in groups, as a possible explanation for this result. This literature suggests social norms and norm-compliance as driver of economic behavior. Their results show that in unobserved decisions, brain regions which are related to internalized prosocial behavior are activated (e.g. conformity due to social pressure) and that prosocial behavior is shown, especially for appropriate price levels. Further, the results indicate that in observed decisions, brain regions which

are related to strategic behavior (e.g. social image concerns) are likewise activated. Applying this to the experiment, in unobserved settings, social pressure might be at work only up to an assessed appropriate price point, which is a similar concept to first and second order beliefs as well as norms. It thus might be the case that the closeness of others only facilitates higher payments up to this point, but not beyond it, as no further rewards are expected from paying more than is appropriate in such settings. That is, economic utility maximization kicks in as a stronger influence beyond the expected appropriate price and becomes more relevant than social pressure and social norms. In a similar vein, personal norms could be a potential explanation for why voluntary payments converge at $20 with increasing levels of interpersonal closeness when being unobserved. In a recent study, Bašić and Verrina (2024) showed that personal norms are a key driver of many economic decisions and that they can predict many behavioral choices. It thus might be the case that buyers in this study hold personal norms about what represents an appropriate payment behavior and that these personal norms interrelate with the social proximity of the other buyers such that the personal norms depend on the interpersonal closeness between buyers. However, this study is not able to investigate this relationship but leaves it as fruitful avenue for future research.

Since individuals expect additional social reward from their behavior, social image concerns might explain why individuals pay prices beyond the appropriate price level in observed settings. This line of argumentation is partly supported by the data. Although all eight treatments reveal an expected appropriate price range of around $20, payments only go beyond this level in the *IOS4 Audience* treatment in Study 1 (which represents a scenario in which the buyers are observed by a very close other visitor) as well as in the *IOS2 Audience* and *IOS4 Audience* treatment in Study 2. Payments in the other treatments increase with increasing levels of interpersonal closeness only up to this expectation without going beyond this point. Such a result lends support to the assumption that amplified social image concerns are at play only for social relationships with relatively high interpersonal closeness. Thus, the data suggests that payments increase only beyond appropriate price levels if the social pressure is high enough. Further research is necessary to better understand the relationship between beliefs, belief fulfillment, norms, observability, and interpersonal closeness. As suggested by Dreber et al. (2013) it might be of interest, for instance, whether or not individuals differ regarding their "norm-compliance parameter" (p. 353), leading to heterogeneous levels of compliance.

Further, the findings regarding beliefs and own behavior are limited by the correlational structure of the data. Thus, it is not possible to causally elicit whether the expected behavior of the other buyer influences own payment or vice versa. For instance, the literature on the false-consensus effect (see, e.g., Ross et al., 1977) raises the possibility that individuals tend to think others behave similar to themselves. That is, individuals overestimate the extent to which their own behavior is not only the right thing to do, but also the behavior others would accordingly show as well. Thus, the desire of consistency between own behavior and beliefs with increasing levels of interpersonal closeness might be due to other influences and this paper does not claim exhaustiveness

in this respect. Future studies on the relation between beliefs and own voluntary payments should follow an experimental approach to better examine the causal direction of the effect. Another possible approach of future research would be to elicit beliefs in a randomized order before and after the own payment decision.

In addition, the current paper cannot rule out that the relationship between interpersonal closeness, beliefs, and own behavior is not necessarily linear. The own payment behavior of an individual for instance might be positively affected if she believes that a very close other buyer would pay a high amount, while it would be negatively affected if she believes that a very close other buyer would pay a very low amount. Such a possible net closeness effect of zero is suggested by Bicchieri et al. (2022) and Dimant (2019). They show that with close others being present in a decision-making setting, compliance to pay less and compliance to pay more increases depending on the beliefs. It is therefore relevant for future studies to explore whether low or high levels of expectations might change the amplitude of the audience and closeness effects. To summarize, a complete motivational explanation and a test for a non-linearity of the behavioral effects lie beyond the scope of this paper, and thus remains an open task for future studies.

What are the practical implications of the results? This study provides empirical evidence that it is not only the observability of behavior, but also the buyer structure, that matters for prosocial behavior in general and in a Pay-What-You-Want setting in special. It has been shown that both social image concerns via payment observability and the presence of interpersonally close others in the buying setting are sufficient to increase voluntary payments and not necessarily a combination of both. It is thus crucial for the practical implementation of PWYW settings that both effects are taken into account. Making payments observable can be one successful strategy to increasing their amounts. Further, designing settings in which buyers are nearby interpersonally close other buyers seems to be another successful strategy to increase voluntary payments. Accordingly, voluntary payment mechanisms might also work successfully under anonymity (e.g. online products, anonymous cashboxes) when buyers know that close others are also consuming. The results of this study provide additional empirical evidence toward the assumption that it might be sufficient for buyers to be aware that close others are consuming the product as well. This is particularly relevant for PWYW applications of e-commerce businesses or the cultural sector. A key strategy to enhance voluntary payments might be to increase buyers awareness that interpersonally close others are also consuming the product. Online retailers could for instance display information indicating that socially close individuals have also puchased a particular product. Additionally, interactive virtual buying experiences could be designed, allowing close buyers to consume together. Similarly, cultural organizations that implement anonymous cashboxes for voluntary payments may benefit from utilizing purchasing environments where socially close individuals consume simultaneously. Revenue may increase in bars, restaurants, cinemas, museums, theaters, or concert venues, as these settings naturally facilitate shared consumption experiences.

8 Conclusion

In the past decades, most economic research on prosocial behavior has focused on certain features that may affect prosocial behavior in various settings. This paper contributes to this literature by empirically examining two important phenomena affecting prosocial behavior in general, and more specifically, a buyers voluntary willingness to pay: 1. the effect of varying degrees of interpersonal closeness (closeness effect); and, 2. its relationship to the effect of social image concerns via payment observability (audience effect). It thus sheds light on the relationship between social image concerns and interpersonal closeness between buyers. We explored both factors in the context of voluntary payments for a visit at the American Museum of Natural History (AMNH) in New York. This paper applied the method of borrowed identities of real social relationships in order to manipulate interpersonal closeness in two online experiments with high external validity. Furthermore, it investigated the impact of interpersonal closeness on prosocial behavior across more than two levels. By means of a 4 x 2 online experiment, we explored four levels of interpersonal closeness (very low interpersonal closeness *IOS1*, low interpersonal closeness *IOS2*, high interpersonal closeness *IOS3*, and very high interpersonal closeness *IOS4*) and two levels of payment observability (*No Audience* and *Audience*). This controlled setting allowed us to separately investigate the effect of social image concerns via payment observability (audience effect) and the effect of interpersonal closeness (closeness effect), including their relation to each other (if any), on the buyers voluntary payments.

We found having an audience had a significant effect on voluntary payments: When subjects were observed by other visitors, the average payment was significantly higher than when the visitors were unobserved. Thus, we summarize that social image concerns are a strong driver of prosocial behavior. We further found a significant effect of interpersonal closeness on those payments: the higher the interpersonal closeness to other buyers, the higher were the voluntary payments. Data analysis further reveals an additive relationship between social image concerns and interpersonal closeness. One possible explanation for the additive relationship is that the strong closeness effect is potentially driven by the desire for increasing similarity between own payment behavior and beliefs in the case of increasing degrees of interpersonal closeness.

On the basis of these results, we therefore conclude that interpersonal closeness and social image concerns can be seen as two separate drivers of prosocial behavior. Hence, this paper shows that the context in which an individual decision is taking place matters in a PWYW setting. This study thus advances our understanding of how social image concerns and interpersonal closeness are connected regarding prosocial behavior. The results imply that social image concerns are a strong driver of prosocial behavior, but that the interpersonal closeness of others in payment settings also play a crucial role. Clearly, further research will be required to validate the impact of both drivers in other domains of prosocial behavior (such as donating and helping) or other types of economic games (such as dictator games or public goods games). It is of further relevance for future research whether the results of this study hold true for different products offered under PWYW conditions and whether beliefs and personal norms moderate the closeness effect on own behavior in a negative or positive direction. This information can be used to develop a better understanding of the effects that social image concerns via observability of behavior and the social relationships between the buyers have on voluntary payment decisions in PWYW settings specifically and on prosocial behavior in general.

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 humans were approved by the International Max Planck Research School "Adapting Behavior in a Fundamentally Uncertain World" (IMPRS Uncertainty). The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

EH: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Validation, Visualization, Writing – original draft, Writing – review & 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.

Generative AI statement

The author(s) declare that no Gen AI was used in the creation of this manuscript.

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Supplementary material

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/frbhe.2025.1536983/full#supplementary-material

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