Article

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Empathy for the Partner Eliminates the Endowment Effect

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Abstract: The endowment effect is a long-standing and powerful phenomenon in behavioral economics whereby people consistently overvalue objects they possess compared to the prices buyers will offer to acquire them. The endowment effect is usually considered irrational and causes disadvantageous choices in realms from online auctions to home sales to domestic clutter. Finding ways to reduce the impact of endowment processes could benefit people and society in myriad ways. Drawing from social psychology, we predicted that people would be more generous toward partners in a common experimental endowment mug task when their partner was portrayed as in pain or need. Combining existing study methods, two pilot studies successfully replicated the endowment effect in control conditions but eliminated or reversed it toward partners in physical (N = 156) or emotional (N = 278) pain (respectively). A pre-registered, in-person study (N = 106) directly contrasted physical pain, emotional pain, and control conditions. We again replicated the endowment effect toward control partners and eliminated it toward partners in physical or emotional pain (buyer prices increased and seller prices decreased; η_p^2 = .13). People's generosity toward those in need can be harnessed to release them from an often troubling and disadvantageous need to hold onto unneeded items that could benefit others.

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People spend significant time working for, buying, organizing, and discarding possessions, which can undermine well-being and the health of the natural environment (Preston & Vickers, 2014; Rogers & Hart, 2021; Roster et al., 2016). Our seemingly irrational motivation to retain excess possessions is akin to the "endowment effect" in behavioral economics (reviewed in Preston & MacMillan-Ladd, 2021). Endowment processes can have wide reaching consequences in the real world. For example, people foment market inefficiencies by trying to sell possessions at prices higher than buyers will pay—from low impact items like used possessions on eBay to high impact items like stocks, cars, and houses (e.g., Bao & Gong, 2016; Kahneman et al., 1991; Thaler, 2000; Tong et al., 2016). People also suffer from domestic clutter as they struggle to discard excess possessions, which in extreme cases can manifest as a debilitating clinical Hoarding Disorder (HD), with threats to public health and safety (e.g., Frost et al., 2000; Tolin et al., 2008, 2010). If we could interfere with such fundamental endowment processes, we could reduce such ills and shift goods from those suffering from excesses to those in need while reducing the negative externalities of overproduction on the natural environment.

It is easier to interfere with powerful psychological processes when we understand the mechanisms that subserve them. People's tendency to become endowed with and attached to material goods is remarkably similar to their tendency to cherish valued social partners (e.g., Preston, 2022; Preston & MacMillan-Ladd, 2021; Smith & Reichman, 1984; Wan & Chen, 2021; Yap & Grisham, 2021). People care about, protect, and try to retain access to both valued goods and other people, even at a current cost to themselves, perhaps owing to our ancestry as social mammals (Preston, 2022). We could potentially interrupt people's attachment to goods by focusing them instead on the needs of

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the other. This is supported by the fact that people will give costly aid to strangers in pain or distress (e.g., Batson, 2011; Preston, 2013) and anticipate that helping will feel good (e.g., Andreoni, 1990; Shiota et al., 2021); moreover, endowment effects can be altered by transient emotion (Lerner et al., 2004) and are smaller when people shift their focus away from the negative associations of the potential loss (Ariely et al., 2005) and toward their social relationships (Maddux et al., 2010). A pathway to relinquishing possessions could alleviate the ills associated with endowment processes and possessiveness, including market inefficiencies, discrepancies between the "haves" and the "have-nots", and the negative impact of material excesses on domestic life and the natural environment.

The Endowment Effect

In the traditional endowment effect from behavioral economics, experimenters gift laboratory participants with an item like a mug or pen; subsequently, endowed sellers set higher prices to sell the item than paired buyers will offer to acquire it from them (also known as "overvaluation", Kahneman et al., 1990, 1991; Thaler, 1980). Endowment effects are often associated with a more general decision bias to weigh losses more heavily than gains ("loss aversion"; Ariely et al., 2005; Kahneman et al., 1991; Tversky & Kahneman, 1991) alongside emotional tendencies to appraise one's own items more positively, feel more attached to them, and feel worse about losing them—similar to the way we cherish bonded social partners (Belk, 1988; Mellers & McGraw, 2001; Norberg et al., 2020; Preston & MacMillan-Ladd, 2021; Shu & Peck, 2011; Sokol-Hessner & Rutledge, 2019). Endowment effects are strong enough that they do not require literal ownership or physical possession and may even reflect the value of ownership per se (Morewedge et al., 2009; Strahilevitz & Loewenstein, 1998), whether legal or psychological (Shu & Peck, 2011). Recent work has further linked the endowment effect to carriers of a single nucleotide polymorphism (SNP) of the dopamine beta-hydroxylase (DBH) gene, adding credence to a role for reward-based motivations in endowment processes in addition to the role for outsized losses (Hou et al., 2019; T. Wang et al., 2024).

Negative Impacts of Endowment Processes

There are myriad real-world consequences associated with people's tendency to overvalue possessions. For example, people have trouble selling possessions like cars, houses, stocks, companies, or even small items in online auctions because they set prices higher than people will pay for them (Bao & Gong, 2016; Kahneman et al., 1991; Tong et al., 2016). People also struggle to part with unneeded items in the home, causing clutter, emotional distress, domestic disputes, and even threats to public safety (Frost et al., 2000; Tolin et al., 2008; Tolin, Meunier, et al., 2010). Even non-clinical individuals with higher individual-difference tendencies on hoarding goods can struggle to part with old or broken items that they do not use or need (e.g., Norberg et al., 2015; Preston et al., 2009; J. M. Wang et al., 2012). At extreme levels, people can suffer from clinical Hoarding Disorder (HD), which was recently added to the DSM-5, defined by "persistent difficulty discarding or parting with possessions, regardless of their actual value" (Tolin et al., 2012). Further validating a shared process between material and social attachments, research finds common behaviors, emotions, and neural circuits that support endowment processes, hoarding tendencies, and social attachments (David et al., 2021; Grisham et al., 2018; Norberg & Rucker, 2021; Preston & MacMillan-Ladd, 2021; Pushkarskaya et al., 2020; Yap & Grisham, 2021).

There are theoretical and practical reasons to try to ameliorate the endowment effect. Theoretically, extensive research on endowment and loss aversion casts people as largely self-oriented and irrational, even if such mental biases permit faster, efficient, or more self-oriented decisions in the long run (Gigerenzer & Gaissmaier, 2011) and improve the outcome of territory disputes and negotiations (Carmichael & Macleod, 2006). The mind is rendered more flexible, context-dependent, and capable of balancing one's own and others' needs if people can avoid such myopic possessiveness when it is adaptive. This more nuanced view of the mind also facilitates connections across fields of inquiry.

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In practical terms, it would also help people to be released from possessiveness. If people could shift their minds and behavior away from their attached goods and toward others' needs, they could make more successful and quicker transactions in the market and goods could be more efficiently transferred from those in abundance or excess to those in need. For example, in the United States, individuals possess such an abundance of belongings that a substantial proportion rely on offsite storage units to supplement their home storage; proving that the goods are unneeded, these units are often never visited; indeed, over 150,000 units are abandoned each year (Jenkinson, 2022). Conversely, 37.9 million people in the United States are living in poverty, which only increased of late through vast inequality and inflation (Creamer et al., 2022). If goods could flow more readily between those burdened by excess to those in need—without it being experienced as a personal loss—both sides benefit. Moreover, if existing goods are utilized by those who most need and want them, fewer new items must enter the market, reducing the externalities of production including deforestation, water and air pollution, carbon emissions, and landfilling (Islam, 2015).

The Current Study

We expect people to more readily transfer goods if they focus on the state and needs of their transaction partner. Altruism, defined as benefiting another at a current cost to the self, should be enhanced if participants feel empathic concern for a partner in distress or need. We operationalize altruism in this study as occurring when a participant offers a partner in pain a higher buying price or lower selling price than they offer a partner who does not express an empathy-eliciting state (i.e., in the control condition).

We already know that people will give altruistically when they feel a genuine, other-oriented concern for a stranger in distress or need (e.g., Batson et al., 1981; Snyder & Lopez, 2002). People also act more altruistically toward people needing immediate aid that they can provide (e.g., see Preston, 2013, 2022). Helping is not merely costly or irrational because it conveys benefits to the giver: it reduces both the target's distress and any distress caught empathically by the observer (Cialdini & Kenrick, 1976), it produces a "warm glow" of giving (Andreoni, 1989, 1990), and it fosters happiness and social connection (e.g., Aknin et al., 2013; Dunn et al., 2008). Because observers of distress often catch and report sadness that can motivate aid (Cialdini & Kenrick, 1976), bad feelings derived from their partner could motivate them to help in order to feel better. Sadness is already known to reverse the endowment effect by focusing participants on their desire to change their state and situation (Lerner et al., 2004). Finally, the endowment effect is expected to be ameliorated by thinking about the other's needs because it shifts their attention away from the potential loss and onto a possible gain (Ariely et al., 2005); it also allows them to better take their partner's perspective (Van Boven et al., 2000). In sum, participants faced with a partner in physical or emotional pain should focus more on their partner and on the benefits of giving than on their own potential loss of the money (buyer) or mug (seller), which would effectively eliminate or even reverse the endowment effect.

We tested our hypothesis by combining previously-replicated laboratory paradigms for both the endowment effect (Kahneman et al., 1990) and empathy-based altruism (Batson et al., 1981; Snyder & Lopez, 2002). Across three pilot studies and one final pre-registered experimental human study, participants were introduced to their ostensive mug task partners online; their partners either expressed physical pain, emotional pain, need, or none of those (control). The endowment effect was expected to be replicated in control conditions but eliminated toward partners in physical or emotional pain, reflected in a 2 (role) by 3 (partner type) interaction, alongside a significant endowment effect (effect of role) only in the control condition. When people can release themselves from the pull of possessions, they can potentially increase market efficiency, reduce distressing clutter, increase well-being, and improve sustainability and the social good.

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Methods

Studies Overview

Three pilot studies tested possible designs and were used to establish an effect size for the final pre-registered study. Two complete pilot studies first compared physical or emotional pain to control conditions (full studies archived online: Physical Pain Online Pilot https://doi.org/10.31234/osf.io/gprh4; Emotional Pain In-Person Pilot https://doi.org/10.31234/osf.io/gezmn). Both pilot studies replicated the endowment effect in control conditions and increased [decreased] prices in buyers [sellers] on the mug task. A third In-Person Pilot collected and validated introductory partner descriptions and determined the sample size for a Final Pre-Registered Study, which combined the prior pilots by directly contrasting partners in physical pain versus emotional pain versus a control partner. We expected to again replicate the endowment effect in control conditions and eliminate or reverse it in either pain condition (without making a prediction about a differential impact of physical or emotional pain).

All studies were delivered electronically via Qualtrics. The role of buyer versus seller was randomly assigned between subjects. Deception was used and mentioned as a possibility in consent forms. Participants were led to believe their partners were real; in reality, we wrote partners' introductory text or modified existing participant text to convey the relevant belief for each condition (matched for length). After learning about their partners and introducing themselves, buyers [sellers] were asked to indicate their price to buy [sell] the mug to their partners. Participants also completed measures of warm glow associated with trading with the partner, trait empathy, and trait hoarding tendencies.

The study received IRB review exemption status, Exemption 3(i)(A). The α for comparisons was set to $p < .05$. We first describe all materials in common across studies before detailing their unique features. We report how we determined our sample size, all data exclusions, all manipulations, and all measures in the study, and the study follows JARS (Appelbaum et al., 2018). Full descriptions of the pilot studies are available at the OSF permalinks above. The pre-registration, data, analysis code, and research materials for the Final Pre-Registered Study are available at OSF: https://osf.io/znmre/?view_only=a3b5aa7ea791496ab4a40140bc4876df. Data were analyzed using IBM SPSS Statistics version 29.0.2.0 with mediation in R ver. 2024.04.2 Build 764.

Materials

Mug Task

All participants were randomly assigned to be buyers or sellers in a mug task (from Kahneman et al., 1991). The task was introduced by saying, "Here is a picture of the mug you and your partners will be making decisions about today [with a photo; the actual mug also shown to in-person participants]. We cannot give this actual mug to everyone, but to add real-world stakes to your decisions, you can enter a lottery at the end of the study, and the winner will receive either the mug or the money that they chose on the winning trial." Next, participants were randomized into buyers and sellers.

Buyers: "There are two types of participants in this task: Sellers and Buyers. **You are a Buyer.** Imagine that other "Seller" participants received the mug you see today, but you can make offers to try to obtain it from them or "buy it off of" them. You should set the price to what you would actually be willing to pay to buy the item from them. Assume that if you set your buying price *lower* than a Seller will accept, then you will keep your money and they will keep their mug. If you set your price at or higher than the price a Seller says they will give it up for, then you will get the mug and they will get your money. So, your buying price should be set where you would actually pay for the mug, in separate dollars and cents." Participants then entered how much they would offer in dollars and cents to buy the mug from each partner.

Sellers: "There are two types of participants in this task: Sellers and Buyers. You are a **Seller.** Imagine that we gave you the mug you see today. The other "Buyer" participants will make offers to

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try to buy the item off of you, at whatever price they are willing to pay. You will set the price to what you would be willing to accept, for them to be able to buy it off of you. Assume that if you set the price *higher* than any Buyer is willing to pay, you keep the mug, and they keep their money. If you set the price at or below what they will pay, then you will get their money, and they will get your mug. So, set your price to where you are actually willing to part with the item, in separate dollars and cents." Participants then entered how much they would accept in dollars and cents to give up their mug to each partner.

Warm Glow

Participants anticipated how much warm glow they would experience from helping the other, measured with four items from a charity involvement questionnaire (items 5, 7, 8, 9 from subscales on helper's high and donation satisfaction; Bennett & Gabriel, 1999) plus one item to measure feeling uplifted from giving (total of five items from strongly disagree to strongly agree; our Cronbach's αs: Physical Pain $\alpha = 0.70$; Emotional Pain $\alpha = 0.67$; Control $\alpha = 0.84$).

Interpersonal Reactivity Index (IRI)

The IRI contains four subscales measuring trait empathy with seven-items each for Personal Distress (PD Cronbach's $\alpha = 0.80$), Empathic Concern (EC Cronbach's $\alpha = 0.76$), and Perspective Taking (PT Cronbach's $\alpha = 0.80$) (we did not use Fantasy; Cronbach's αs from our data). The IRI measures separable features of the broader empathy construct with good internal consistency for subscales and test-retest reliability from 0.62-0.71 (M. H. Davis, 1983).

Hoarding Rating Scale (HRS-SR)

The HRS-SR (Tolin et al., 2010) is a five-item questionnaire that measures trait hoarding tendencies for five hoarding dimensions: clutter, difficulty discarding, excessive acquisition, distress, and impairment on an 8-point Likert scale (0 no problem - 8 extreme difficulty/daily; our Cronbach's $\alpha = 0.75$). The HRS-SR shows high internal consistency and inter-rater reliability and has been validated for clinical diagnosis and for use as a self-report measure (Tolin et al., 2010); it has been successfully used in non-clinical populations and online (e.g., Frost et al., 1996; Liu et al., 2021; Nutley et al., 2020; Preston et al., 2009; Yap et al., 2024).

Three Pilot Studies

Physical Pain Online Pilot. The Physical Pain Online pilot study used a 2 (Partner: physical pain/control) x 2 (Role: buyer/seller) between-subjects design for a 15-minute study ($M = 14.98$m ($SD = 7.27$)) on Cloud Research (Hauser et al., 2022; Litman & Robinson, 2020). The sample size was initially determined by piloting 50 participants per cell, consistent with typical endowment samples ($N = 198$); this number was roughly doubled for the main study to ensure a well-powered control condition that would replicate the endowment effect ($N = 360$). We removed 82 participants using pre-determined filters for not finishing the study ($n = 14$), failing any attention checks ($n = 29$), or not believing their partner was real ($n = 39$), leaving 278 for analysis (174 females). Analyzed adult participants ranged in age (18-78; $M = 45.73$; $SD = 13.88$) and were predominantly white (72.3% white, 6.5% black, 5.0% Latino or Hispanic, 7.9% East Asian; fewer than 10% combined South Asian, Middle Eastern, Native American, or other).

Participants were deceived into thinking they were paired with another participant for a two-part study (there was no second partner, and the studies were related). Participants were randomly assigned to meet a partner in physical pain or a control partner. When the mug task started, they were randomly assigned buyer or seller role. First an ostensive 'memory task' asked participants to remember strings of numbers while occasional distracting beeps occurred. Participants' partner completed the memory task first and sent impressions and advice in a message to the participant. Physical pain partners stated that the beeps were painful because of their tinnitus condition whereas control participants merely referred to the beeps as annoying (after Batson et al., 1981). After this,

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participants completed the IRI, Warm Glow, and Positive and Negative Affect Schedule (i.e., interested, distressed, excited, upset, strong, alert, scared, afraid, enthusiast, proud, determined, jittery; Watson et al., 1988) in random order before the mug task. After the mug task, participants completed the HRS-SR, ending with funneling questions about deception awareness and demographics. As expected, the endowment effect was replicated in the control condition and eliminated in the physical pain condition.

Emotional Pain In-Person Pilot. The Emotional Pain In-Person Pilot study used a 3 (Partner: emotional pain/caring/careless) x 2 (Role: buyer/seller) mixed methods design, administered in-person through the introductory psychology subject pool. We tested 250 participants; 94 were removed (did not finish, identified the partner as a confederate, or failed an attention check item), leaving 156 for analysis (81 females). Sample size was based on a similar Dictator Game where participants could exchange messages, wherein allocations increased toward recipients who asked or made empathic appeals (*N* = 238; Andreoni & Rao, 2011). Participants were randomly assigned to be buyers or sellers, offered to enter a lottery in which one participant's decisions would be made real, and introduced themselves to their partners before reading their partners' introductions (3-5 sentences describing themselves and why they want and deserve the mug). Partners represented three plausible reasons to transfer the mug: The emotional pain partner was down on their luck and said the mug would make them feel better (person-focused caring motivation). The caring partner did not mention wanting or needing the mug but gave the impression they would take good care of it (object-focused caring motivation). The careless partner described needing the mug because they carelessly broke theirs (need-based motivation). After introductions, participants stated their price for each partner (being reminded on the same page of partners' introduction text) before rating all partners on empathy, sympathy, sadness, need, deservingness, warm glow and item care. This was followed by IRI, Warm Glow, and HRS-SR scales. As expected, the endowment effect was replicated toward both caring and careless partners who did not describe any distress but was reversed (not just absent but significantly in the opposite direction) toward the partner in emotional pain.

Final In-Person Pilot. The Final In-Person Pilot pre-tested similar materials for the main study and established the effect and sample size. Aspects of the prior two pilots were combined to contrast the strength of physical and emotional pain (previously tested separately) for eliminating the endowment effect. A 2 (between subjects: buyer, seller) by 3 (within subjects: physical pain, emotional pain, control) mixed-methods design tested 152 participants in a group testing computer room through the introductory psychology subject pool. A trained research assistant welcomed participants to a decision-making study that they would complete with three partners who may be in the room, in a nearby room, or in a recent session; they were shown the physical mug and told they could enter a lottery at the end that would deliver the mug or money after the study completed based on their decisions; they were told to not use their phones or computers for any other task and remain quietly in their seats until the 30 minutes were up. All other task instructions were delivered via Qualtrics.

In the consent form, participants were told that there may be deception (to qualify for exemption) and that they would be completing two tasks: one about their personality and one about how they value goods and services. To disguise the purpose of the task, participants first completed an abbreviated Big-Five Personality Index. After this, participants read the greetings of three online partners (order randomized). Next, participants were asked to introduce themselves to their new partners in 4-5 sentences by writing about something significant or important in their life that day (*n* = 68). Funneling questions revealed that these participants thought it was odd for partners to talk about pain in response to this prompt, so the prompt was modified to request something specific or important in life causing emotional or physical pain (*n* = 30) (in Supplemental Material). Participants continued to be suspicious, so introductions were edited again to focus on issues described by prior participants, using some of their own wording, controlling for word count (~72 words per partner; *n* = 45). Final funneling questions revealed that the final participant group generally believed that their partners were real.

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After reading each partner's introduction, participants completed a 16-item Emotional Response Questionnaire (ERQ, Batson et al., 1997) to describe how they felt about that partner using six adjectives each representing empathic concern (e.g., sympathetic, compassionate) and personal distress (e.g., distressed, upset). Next, participants were randomly assigned as buyers or sellers and completed the mug task. Participants indicated their price per partner (order randomized) on separate pages with a reminder of their partner's introduction. After giving all three prices they selected the single partner they most preferred to trade with and ranked all three (always providing reminder text from the partner's introduction). Lastly, participants completed their feelings of Warm Glow toward each partner (order randomized), deception funneling questions, a memory item to test their attention to partner text content, and demographics (age, gender, racial or ethnic heritage, current and childhood socioeconomic status (MacArthur Ladder Scale; Adler et al., 2000)). They could enter the lottery and provide any feedback before completing the HRS-SR, IRI, and a 5-point Likert scale from "none" to "a great deal" on how much each partner appeared in physical or emotional pain (the manipulation check), distress, and appeared to need help. Participants were provided mental health resources and debriefed.

The Final In-Person Pilot study replicated the endowment effect in the control condition, sellers > buyers, $t(43) = -2.591$, $p = 0.013$, and as predicted, eliminated the role difference in the pain conditions, physical pain: $t(43) = 0.065$, $p = 0.949$; emotional pain: $t(43) = 0.693$, $p = 0.492$.

Final Pre-Registered Study

Pre-Registration and Power Analysis

Based on the third in-person pilot data, we calculated an effect size for the main study (using GPower) and pre-registered our design and hypothesis before data were collected (Open Science Framework; https://osf.io/znmre/?view_only=a3b5aa7ea791496ab4a40140bc4876df). To replicate the endowment effect, the pilot *eta squared* for the endowment effect was .135, suggesting that we needed at least 86 subjects for 95% power, $F(1,43) = 6.711$, $p = .013$ (similar to published endowment studies that often assign ~50 participants/group). For our key 2x3 mixed ANOVA interaction, with three within-subject partner types and two groups, the pilot *eta squared* = .157, indicating that we needed 46 participants for 95% power, Greenhouse-Geisser corrected, $F(1.192, 48.870) = 7.65$, $p = .005$. Thus, to power both the endowment effect and our key partner-by-role interaction, we needed a minimum of 86 participants. We aimed for 100 participants (50 per role), to replicate the endowment effect and observe the key 3 x 2 interaction, while accommodating for expected exclusions.

Participants

Participants for the Final Pre-Registered Study were adult, undergraduate students from the university introductory psychology subject pool who participated for .5h credit. We tested 108 participants (18-23 years old; $M = 18.90$; 64.8% self-identified female, 34.3% male, 0.9% ($n = 1$) other); two were excluded (missed two attention checks; failed to complete study). The mode for race and ethnicity was non-Hispanic white (49.1%), with a fairly even distribution among the remaining half of participants (Latino or Hispanic American (14.2%), East Asian or Asian American (12.3%), Black, Afro-Caribbean, or African American (9.4%), South Asian or Indian American (7.5%), Middle Eastern or Arab American (3.8%), other/multi-ethnic/multi-racial (3.8%)). Subjective SES was normally distributed, current: $M = 4.48$ ($SD = 1.76$); childhood: $M = 5.13$ ($SD = 2.22$), with fewer than 20% occupying the very top and bottom two rungs of the ladder combined.

Methods

Participants completed the study via Qualtrics in a campus computer lab in groups of 10-15, seated at separate computers. The methods were as described for the Final In-Person Pilot. Participants were instructed by a trained research assistant to put away electronics, not open other tabs, or talk to one another. They were informed that they would be partnered through the online program with three other anonymous participants from that room, a nearby testing room, or a recent

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session. They were shown the physical mug and the lottery was explained. The Qualtrics survey began with the 10-item Big-5 Personality Inventory for the "personality study." Next, they introduced themselves to their partners (4-5 sentences about a positive or negative recent event of significant physical or emotional impact). They read each partner's introduction and rated their ERQ empathic concern and personal distress toward them (partner order randomized). Participants were randomly assigned as buyers or sellers and completed the mug task. They indicated their price per partner (order randomized) and selected their preferred partner and ranked them. Lastly, participants completed their Warm Glow toward each partner (order randomized), deception funneling, the memory item, and demographics. They could enter the lottery and provide comments before completing the HRS-SR, IRI, and perceptions of partner physical or emotional pain (the manipulation check), distress, and perceived need before viewing mental health resources and the debrief.

Planned Analyses

Planned analyses were described in the pre-registration (SPSS version 28.0.0.0). Manipulation checks first ensured that participants rated physical pain higher for physical pain partners and emotional pain higher for emotional pain partners compared to control. Two RM-ANOVAs separately compared each pain group to the control group using a repeated measure of physical and emotional pain, expecting significantly lower pain ratings for control partners (effect of partner type within the expected type of pain; unconcerned by cross over pain).

We then replicated the endowment effect in the control condition with a one-way ANOVA, predicting higher selling than buyer prices. The hypothesized key interaction was tested with a 2x3 mixed-effects ANOVA with role (buyer, seller) as our between-subjects effect and partner type as a 3-way repeated-measure (physical pain, emotional pain, control). To clarify that both pain conditions significantly differed from control, follow-up 2x2 ANOVAs compared buyers and sellers for each pain type to control, and ANOVAs tested the effect of role within each pain type. Confidence Intervals (CI) are provided in 95% for key simple comparisons.

Exploratory Analyses

Exploratory analyses are detailed in the Supplemental Material; all exploratory post-hoc tests were Bonferroni corrected for the number of comparisons in that test type. To identify the source of the eliminated endowment effect, RM-ANOVA looked for differences across all three partner types separately within buyers and sellers; corrected one-way post-hoc *t*-tests compared all three pairings per role. We also compared participants' categorical preferences to pick one partner with Chi-square; Friedman's test compared rank-ordered preferences across partners.

To test whether empathic feelings differed across partners, eight corrected one-way *t*-tests compared state ERQ empathic concern and personal distress between each pain partner and the control partner, separately in buyers and sellers. ANCOVAs tested whether trait scores contributed to the key 2x3 interactions, entering each as a covariate in separate models (IRI-EC, IRI-PD, IRI-PT and HRS-SR). Additional tests to explore possible individual differences correlated trait and state empathy and hoarding tendencies with price differences between pain partners and the control partner, separately in buyers and sellers. Mediation used the MLmed macro (www.njrockwood.com; Rockwood, 2017) to test whether partner type effects on prices were mediated by state emotional responses (empathic concern or personal distress) performed in R (Supplemental Material).

Results

Manipulation Check

Demonstrating a successful manipulation, participants rated the physical pain partner as in greater physical pain (M = 4.62, SD = .52) than the control partner (M = 1.19, SD = .42), $F(1,105)$ = 2,622.941, $p < 0.001$, η_p^2 = .96, CI: [3.301, 3.567], and rated the emotional pain partner in greater emotional pain (M = 4.5, SD = .59) than the control partner (M = 1.05, SD = .23), $F(1,105)$ = 2,988.38, $p < 0.001$, η_p^2 = .97, 95% CI: [3.318, 3.568].

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Planned Comparisons

As predicted, we replicated the endowment effect in the control condition when interacting with a partner who did not describe any pain, $F(1,104) = 8.25$, $p = 0.005$, $\eta^2 = .074$. This traditional endowment effect was absent when interacting with partners in physical or emotional pain (Figure 1), 2x3 interaction omnibus, $F(2, 208) = 15.45$, $p < 0.001$, $\eta_p^2 = .13$ (full model Table S1). Separating this effect into comparisons of each pain partner to control, both physical and emotional pain disrupted the endowment effect, physical pain: $F(1,104) = 16.20$, $p < .001$, $\eta_p^2 = .14$; emotional pain: $F(1,104) = 33.74$, $p < .001$, $\eta_p^2 = .25$. Within each partner type, the endowment effect (sellers over buyers) was not significant for either type of pain, physical pain: $F(1,104) = .068$, $p = .794$. $\eta^2 = .001$; emotional pain: $F(1,104) = .160$, $p = .69$, $\eta^2 = .002$.

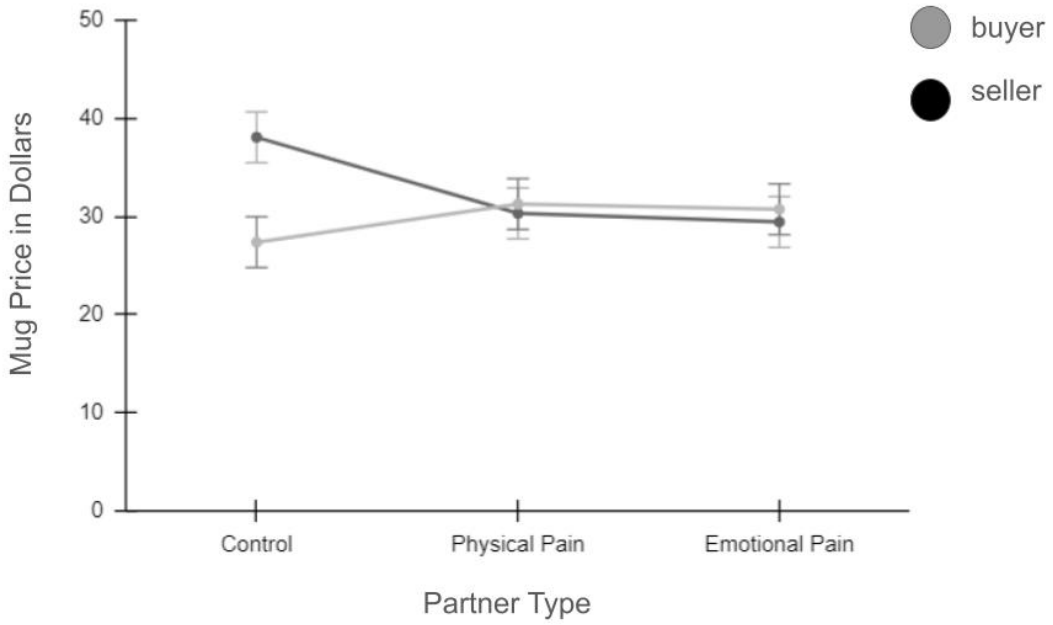

Figure 1. *Endowment Effect Significant only for Control Partners. Note.* Data represent mean within-participant prices (with +/- SE) in dollars for the mug across three transaction partner types; light bar and circle denotes the between-subjects factor of role for buyers; dark bar and circle denotes sellers.

Exploratory Analyses

Exploratory analyses are detailed in Supplemental Material. Changes in the endowment effect appeared to emanate from shifts in pricing by both buyers and sellers. Comparing across all three partner types, separately within buyers and sellers, buyers generally offered more and sellers set prices lower toward each pain partner than control (marginal for buyers and significant for sellers), buyers: $F(2,102) = 2.32$, $p = 0.10$ $\eta_p^2 = .043$; sellers: $F(2,106) = 19.998$, $p < 0.001$ $\eta_p^2 = .27$. Buyer and seller mug prices toward physical and emotional pain partners did not differ, $|t|$s < -.96, ps > .17 (CIs (cents): buyer [-490.95, 385.68], seller [-271.50, 96.16]). In contrast, all pain partner prices differed from control, ts > 3.06, ps < .003 (CIs: buyer emotional versus control [115.81, 555.267], seller emotional versus control [-1,210.25, -516.46], seller physical pain versus control [-1,119.79, -431.58]). A marginal effect of mug price for buyer physical pain versus control did not survive correction, $t(51) = 1.65$, $p = .05$, CI: [-83.12, 859.46].

Exploratory analysis of participants' categorical preferences revealed that both buyers and sellers picked the emotional pain partner more often than physical pain or control; this preference was more pronounced in buyers, $\chi 2$ (2, $N = 52$) = 31.19, $p < .001$ than sellers, $\chi 2$ (2, $N = 54$) = 3.44, $p = .179$. Rankings also differed for buyers and sellers; the modal response was to prefer emotional pain then physical pain then control partners; however, buyers picked the control partner more than the physical pain partner despite ranking physical pain second (Table 1), buyers: Q (2, $N = 47$) = 31.149, $p < .001$; sellers: Q (2, $N = 48$) = 9.042, $p = .011$.

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Table 1. *Frequencies of Selecting Partners by Role for Pick One and Ranking.*

Role	Partner Type	Preferred	Rank 1	Rank 2	Rank 3	Mean Rank
Buyer	Emotional Pain	36	32	5	10	1.39
	Physical Pain	5	11	35	1	2.02
	Control	11	4	7	36	2.59
	Total	52	47	47	47	47
Seller	Emotional Pain	24	23	13	12	1.73
	Physical Pain	17	15	25	8	1.94
	Control	13	10	10	28	2.33
	Total	54	48	48	48	48
Grand Total		106	95	95	95	95

Note: Eleven participants (5 buyers, 6 sellers) only completed pick one, not rankings.

People did feel empathic toward their partners in physical and emotional pain, with higher state ERQ empathic concern and personal distress toward partners in pain compared to control, in buyers and sellers, *t*s > 6.41, *p*s < .001, Cohen's *d*s > 4.06; (CIs EC:
buyers emotional/control [7.82, 11.45], physical pain/control [4.15, 7.70]; sellers emotional/control [6.93, 10.33], physical pain/control [3.72, 7.10]; PD: buyers emotional/control [4.405, 6.83], physical pain/control [6.85, 9.11]; sellers emotional/control [4.32, 6.83], physical pain/control [6.19, 8.41]). However, these feelings and participants' trait empathy and hoarding tendencies did not appear to add to or mediate the impact of partner type on price: Trait empathy and hoarding tendencies were not significant covariates in the key 2 x 3 interaction and did not interact with partner type, *F*s(2,206) < 2.71, *p*s > .06. There were no significant simple correlations after correcting for multiple comparisons between trait or state empathy or hoarding tendencies and price differences between pain partners and control in buyers or sellers, *r*s < .252, *p*s > .03 (Table S2). Mediation did not reveal significant indirect paths between partner type and price through state empathic concern or personal distress (Supplemental Material).

Discussion

Our natural capacity to become attached to the people around us is generally considered a positive and valuable inheritance that infuses life with support and meaning (Mikulincer & Shaver, 2013). In contrast, our related tendency to become attached to material goods is usually considered irrational, self-focused, and damaging (e.g., Dittmar et al., 2014; Kahneman et al., 1991), but it's unclear what, if anything, we can do about it. Our material attachments have been documented by behavioral economists through an "endowment effect", wherein participants set higher prices for their possessions than buyers offer—a fast, simple, high effect size demonstration that nevertheless contributes to serious real-world problems—from market inefficiency to clutter in the home to interpersonal disputes (e.g., Bao & Gong, 2016; Kahneman et al., 1990, 1991; Pushkarskaya et al., 2020; Thaler, 2000; Tong et al., 2016).

Endowment effects reflect people's aversion to losing something (Ariely et al., 2005; Kahneman et al., 1991; Tversky & Kahneman, 1991) as well as their positive associations with possessions, whether owned legally or psychologically (Morewedge et al., 2009; Shu & Peck, 2011). Because we can attach to goods in much the same way that we attach to people—valuing them, thinking highly

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of them, being loathe to see them go—people sometimes use goods to replace or compensate for insufficient social relationships (e.g., Belk, 1988; Mellers & McGraw, 2001; Norberg et al., 2020; Norberg & Rucker, 2021; Preston & MacMillan-Ladd, 2021). In extreme cases, this can contribute to pathological Hoarding Disorder (HD), in which people acquire, hold on to, and fail to discard goods to the point of significant clutter, emotional distress, relationship disputes, and health hazards (Appelbaum et al., 2018; David et al., 2021; Grisham et al., 2018; Liu et al., 2023; Preston & Vickers, 2014; Pushkarskaya et al., 2020; Tolin et al., 2012; Yap & Grisham, 2021).

People's quality of life could be improved if they could experience the joy and fulfillment of a social exchange while also feeling less concerned about giving up an excess item (e.g., Chen et al., 2021; Yap & Grisham, 2021). Empathy and altruism are strong candidates to reframe people's minds in this way (Preston, 2022; Preston & MacMillan-Ladd, 2021; Shiota et al., 2021). We attempted to undermine the endowment effect by focusing people's attention on their partner over the potential loss. People are already known to be more generous when they feel empathic concern toward a person in pain or distress (Batson, 2011; Batson et al., 1981; FeldmanHall et al., 2015, 2015; Snyder & Lopez, 2002) and to altruistically help people needing urgent aid that they can provide (Preston, 2013, 2022). Giving beneficially solves recipients' problems while also bringing joy to givers and fostering social connection (Andreoni, 1989, 1990; Andreoni & Rao, 2011; Dunn et al., 2015; Shiota et al., 2021). Thus, we reasoned that if the classic endowment bias could be eliminated if people could shift their attention away from the potential loss and on to the other's need and the benefits of helping—to the benefit of all.

Across two complete pilot studies, a final pilot study, and a final pre-registered study, we consistently replicated the endowment effect toward control partners, despite using varied methods (e.g., physical versus emotional pain, between versus within-subjects, online versus in-person, crowdsourced versus student populations). Thus, we clearly demonstrated both the robustness of the endowment effect and that our methods were sufficient to elicit it. Within this context, our key hypothesis was also supported, as people were more generous toward partners in physical or emotional pain. This movement occurred in both buyers who offered more and sellers who required less in response to partners in pain than a control partner.

Both physical pain and emotional distress are common ways to elicit empathy-based altruism, but they are rarely compared. We pitted them against one another in the final study and found that participants most often selected to trade with the partner in emotional pain (physical pain intermediate, control last). Perhaps gifts are more appropriate for solving a down mood (e.g., Cryder et al., 2008) than a physical ailment, which likely requires tailored treatment. There are many differences in the expression, affordance, and response to emotional versus physical pain, so it's unlikely that emotional pain is generally superior. For example, people would probably prefer to assist with physical pain if their means of helping were analgesics and they would more quickly approach a crying stranger next to a fallen bike than one reading a letter.

We proposed a possible mechanism that was not fully supported by exploratory analyses. Endowment was expected to decline when people shift attention from the potential loss to the others' needs and their empathy toward them. Participants did indeed feel empathy for their partners in pain, but these states did not correlate with the associated price changes or formally mediate the effect. In addition, individual differences in trait empathy did not significantly correlate or covary with the response (except that trait empathic concern marginally increased buyer offers toward physical pain). There may be a restriction in range in empathy ratings and price changes and a larger sample is likely needed for mediation. Subjective empathy may not be required even if empathic mechanisms are involved since people do help in more immediate ways without feeling empathy and not all empathy is subjective (Preston, 2013, 2022). Further work is needed.

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Constraints on Generality

Multiple limitations to our study require further investigation. The design of the pre-registered study may have primed participants to consider others' struggles, because they introduced themselves by writing about a recent impactful event (e.g., see Gerace et al., 2017). This is an unlikely issue since our effect occurred without these instructions in the initial studies.

Our final pre-registered participants were adult university students who are more wealthy, educated, and white than the US population (*U.S. Census Bureau QuickFacts*, n.d.). Students are also less likely to be financially independent (Barroso et al., 2019) and so may be more generous either because they did not earn their money or because of their lower current SES or dependence on one another (e.g., Piff et al., 2010). We considered this a reasonable study population, however, given that we were replicating endowment and empathy effects that were originally documented and are usually tested with students (e.g., Batson et al., 1981; Kahneman et al., 1990). Both endowment and empathy-based altruism have also already been documented in broader populations and in other cultures (e.g., Bethlehem et al., 2016; Chopik et al., 2017; Hauser et al., 2014; Maddux et al., 2010). Moreover, our results were similar using a crowdsourced sample in the physical pain pilot, suggesting that the effect generalizes to broader ages, levels of education, and SES. That being said, these were US crowdsourced participants only, and this population is more technologically-savvy and liberal than the US population (Behrend et al., 2011; Levay et al., 2016).

Endowment effects are also known to increase in independent and self-enhancing cultures (Maddux et al., 2010) and in more materialistic (Lens et al., 2009), and less pro-environmental individuals (e.g., Bauer et al., 2012; Gu et al., 2020). Thus, the impact of empathy and altruism on endowment should be tested in populations with lower SES, higher conservatism, greater collectivism, and lower materialism. We expect the endowment effect in general to be smaller in people and nations that are less prone to associating goods with happiness and success (Richins & Dawson, 1992; Swinyard et al., 2001); however, these individuals should still be more generous toward people with than without pain (unless expressing distress or need is culturally verboten). Cross cultural differences are expected to be nuanced; for example, East Asian individuals can be interdependent but also associate goods with status and success while individualistic individuals are more self-enhancing but also more willing to help distressed strangers or out-group members (e.g., Cheon et al., 2011; Maddux et al., 2010; Swinyard et al., 2001). Moreover, even within one nation, lower SES individuals who are more dependent should be more generous (Piff et al., 2010). Thus, this research must be extended to improve generalizability and establish boundary conditions. Given that consumerism and its impact on global CO2 emissions is particularly problematic in wealthy, Western nations like the US (S. J. Davis & Caldeira, 2010), it would still help immensely to address American excesses through social benefits.

Applications

Knowing how to disrupt people's attachment to goods has many possible real-world benefits. US consumption contributes to problematic spending and clutter while increasing global pollution and waste. If people are more focused on others' needs, they could experience fewer of consumerist issues while shifting goods from the "haves" to the "have-nots," and reducing the impact of production on the environment. For example, in nationwide "Buy No Things" organizations, members simply give away items for free to anyone in the community who needs it. Responses are usually fast and expressed with enthusiasm and gratitude; the direct exchange is efficient and rewarding because it feels more immediate and concrete than charity donation (charities also do not always find a recipient and increase emissions and pollution by shipping unwanted goods overseas).

Focusing on others' needs could also be used as an intervention in clients with Hoarding Disorder, to help them relinquish items to others in need. This shift in framing could simultaneously improve their clutter, trouble discarding, relationships, and mental health and safety (e.g., Chen, 2023; Preston, 2022). This approach seems reasonable especially because our exploratory tests found greater generosity toward partners in pain with higher trait hoarding tendencies—supported by other HD studies. For example, in HD patients, a group of primarily older female Christian adults

strongly endorsed altruistic values (Pyles et al., 2023) and rural older adults reported higher agreeableness on dimensions of trust, altruism, and sympathy than matched controls (Dozier et al., 2024). People who perceived a greater COVID-19 threat were both more prosocial and engaged in more hoarding-related acts—more so in individualistic cultures (i.e., UK, US, Germany versus Hong Kong; Tse et al., 2022). Hoarding tendencies are also associated with trouble displaying empathy in difficult social situations, but greater empathy for fictional characters, and not an empathy deficit per se (David et al., 2021, but see Chen et al., 2021). But one crowdsourced study did find hoarding tendencies to increase with emotional contagion and decrease with other forms of empathy (cognitive empathy, emotion recognition, theory of mind, controlling for depression; Chen et al., 2021). Given this combination of proclivities—to feel into others' states and objects while struggling with social contact—an ideal intervention perhaps should not attempt to fix their prominent social issues but instead focus attention during discarding away from the loss and on to the appreciation, use, and protection afforded by a future recipient. Of course, this will be less effective for severe HD, which is more persistent and involves items that are unwanted like broken items, junk mail, and literal garbage.

Final Remarks

This is the first study to successfully demonstrate that empathy-based altruism can eliminate the powerful endowment effect. By integrating across behavioral economics and clinical and social psychology, our interdisciplinary approach produced a novel and potentially useful insight into a strong human tendency that seems irrational and self-focused. We found that our possessive nature is not immutable. By appealing to our evolved altruistic urges, we can help people make healthier decisions, for themselves, for others, and for the natural environment.

Supplementary Materials: The following supporting information can be downloaded at the website of this paper posted on Preprints.org.

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References

Adler, N., Epel, S., Castellazzo, G., & Ickovics, J. (2000). Relationship of subjective and objective social status with psychological and physiological functioning: Preliminary data in healthy white women. *Health Psychology*, *19*(6), 586–592. https://doi.org/10.1037/0278-6133.19.6.586

Aisch, G., Buchanan, L., Cox, A., & Quealy, K. (2017). Economic diversity and student outcomes at Michigan. *The New York Times*. https://www.nytimes.com/interactive/projects/college-mobility/university-of-michigan-ann-arbor

Aknin, L. B., Dunn, E. W., Sandstrom, G. M., & Norton, M. I. (2013). Does social connection turn good deeds into good feelings? On the value of putting the "social" in prosocial spending. *International Journal of Happiness and Development*, *1*(2), 155. https://doi.org/10.1504/IJHD.2013.055643

Andreoni, J. (1989). Giving with impure altruism: Applications to charity and Ricardian equivalence. *Journal of Political Economy*, *97*(6), 1447–1458. https://doi.org/10.1086/261662

Andreoni, J. (1990). Impure altruism and donations to public goods: A theory of warm-glow giving. *The Economic Journal*, *100*(401), 464. https://doi.org/10.2307/2234133

Andreoni, J., & Rao, J. M. (2011). The power of asking: How communication affects selfishness, empathy, and altruism. *Journal of Public Economics*, *95*(7–8), 513–520. https://doi.org/10.1016/j.jpubeco.2010.12.008

Appelbaum, M., Cooper, H., Kline, R. B., Mayo-Wilson, E., Nezu, A. M., & Rao, S. M. (2018). Journal article reporting standards for quantitative research in psychology: The APA Publications and Communications Board task force report. *American Psychologist*, *73*(1), 3–25. https://doi.org/10.1037/amp0000191

Ariely, D., Huber, J., & Wertenbroch, K. (2005). When do losses loom larger than gains? *Journal of Marketing Research*, *42*(2), 134–138. https://doi.org/10.1509/jmkr.42.2.134.62283

Bao, H. X. H., & Gong, C. M. (2016). Endowment effect and housing decisions. *International Journal of Strategic Property Management*, *20*(4), 341–353. https://doi.org/10.3846/1648715X.2016.1192069

Barroso, A., Parker, K., & Fry, R. (2019). *Majority of Americans say Parents are doing too much for their young adult children*. Pew Research Center. https://www.pewresearch.org/social-trends/2019/10/23/majority-of-americans-say-parents-are-doing-too-much-for-their-young-adult-children/

Batson, C. D. (2011). *Altruism in Humans*. Oxford University Press.

Batson, C. D., Duncan, B., Ackerman, P., Buckley, T., & Birch, K. (1981). Is empathic emotion a source of altruistic motivation? *Journal of Personality and Social Psychology*, *40*(2), 290–302. https://doi.org/10.1037/0022-3514.40.2.290

Batson, C. D., Sager, K., Garst, E., Kang, M., & Rubchinsky, K. (1997). Is empathy-induced helping due to self-other merging? *Journal of Personality and Social Psychology*, *73*(3), 495–509. https://doi.org/10.1037/0022-3514.73.3.495

Bauer, M. A., Wilkie, J. E. B., Kim, J. K., & Bodenhausen, G. V. (2012). Curing consumerism: Situational materialism undermines personal and social well-being. *Psychological Science*, *23*(5), 517–523. https://doi.org/10.1177/0956797611429579

Behrend, T. S., Sharek, D. J., Meade, A. W., & Wiebe, E. N. (2011). The viability of crowdsourcing for survey research. *Behavior Research Methods*, *43*(3), 800–813. https://doi.org/10.3758/s13428-011-0081-0

Belk, R. W. (1988). Possessions and the extended self. *Journal of Consumer Research*, *15*(2), 139. https://doi.org/10.1086/209154

Bennett, R., & Gabriel, H. (1999). Charity involvement and customer preference for charity brands. *Journal of Brand Management*, *7*(1), 49–66. https://doi.org/10.1057/bm.1999.39

Bethlehem, R. A. I., Allison, C., van Andel, E. M., Coles, A. I., Neil, K., & Baron-Cohen, S. (2016). Does empathy predict altruism in the wild? *Social Neuroscience*, *12*(6), 743–750. https://doi.org/10.1080/17470919.2016.1249944

Carmichael & Macleod. (2006). Welfare Economics with Intransitive Revealed Preferences: A Theory of the Endowment Effect. *Journal of Public Economic Theory*, *8*(2), 193–218.

Chen, W. (2023). *Investigating empathy in hoarding and its potential as a psychosocial treatment target* [UNSW Sydney]. https://doi.org/10.26190/UNSWORKS/25188

Chen, W., McDonald, S., Wearne, T., & Grisham, J. (2021). Investigating associations between hoarding symptoms and affective and cognitive empathy. *British Journal of Clinical Psychology*, *n/a*(n/a). https://doi.org/10.1111/bjc.12280

Cheon, B. K., Im, D., Harada, T., Kim, J.-S., Mathur, V. A., Scimeca, J. M., Parrish, T. B., Park, H. W., & Chiao, J. Y. (2011). Cultural influences on neural basis of intergroup empathy. *NeuroImage*, *57*(2), 642–650. https://doi.org/10.1016/j.neuroimage.2011.04.031

Chopik, W. J., O'Brien, E., & Konrath, S. H. (2017). Differences in Empathic Concern and Perspective Taking Across 63 Countries. *Journal of Cross-Cultural Psychology*, *48*(1), 23–38. https://doi.org/10.1177/0022022116673910

Cialdini, R. B., & Kenrick, D. (1976). Altruism as hedonism: A social development perspective on the relationship of negative mood state and helping. *Journal of Personality and Social Psychology*, *34*(5), 907–914. https://doi.org/10.1037/0022-3514.34.5.907

Creamer, J., Shrider, E. A., Burns, K., & Chen, F. (2022). Poverty in the United States: 2021. *U.S. Census Bureau*.

Cryder, C. E., Lerner, J. S., Gross, J. J., & Dahl, R. E. (2008). Misery Is Not Miserly: Sad and Self-Focused Individuals Spend More. *Psychological Science*, *19*(6), 525–530. https://doi.org/10.1111/j.1467-9280.2008.02118.x

David, J., Aluh, D. O., Blonner, M., & Norberg, M. M. (2021). Excessive object attachment in Hoarding Disorder: Examining the role of interpersonal functioning. *Behavior Therapy*, *52*(5), 1226–1236. https://doi.org/10.1016/j.beth.2021.02.003

Davis, M. H. (1983). Measuring individual differences in empathy: Evidence for a multidimensional approach. *Journal of Personality and Social Psychology*, *44*(1), 113–126. https://doi.org/10.1037/0022-3514.44.1.113

Davis, S. J., & Caldeira, K. (2010). Consumption-based accounting of CO_2 emissions. *Proceedings of the National Academy of Sciences*, *107*(12), 5687–5692. https://doi.org/10.1073/pnas.0906974107

 doi:10.20944/preprints202411.2324.v1

Dittmar, H., Bond, R., Hurst, M., & Kasser, T. (2014). The relationship between materialism and personal well-being: A meta-analysis. *Journal of Personality and Social Psychology*, *107*(5), 879–924. https://doi.org/10.1037/a0037409

Dozier, M. E., Nix, C. A., & DeShong, H. L. (2024). Personality Profile of Rural-Dwelling Older Adults With Hoarding Disorder. *Journal of Public Health in the Deep South*, *4*(1). https://doi.org/10.55533/2996-6833.1086

Dunn, E. W., Aknin, L. B., & Norton, M. I. (2008). Spending money on others promotes happiness. *Science*, *319*(5870), 1687–1688. https://doi.org/10.1126/science.1150952

Dunn, E. W., Aknin, L. B., & Norton, M. I. (2015). Prosocial spending and happiness: Using money to benefit others pays off. *Current Directions in Psychological Science*, *23*(1), 41–47.

FeldmanHall, O., Dalgleish, T., Evans, D., & Mobbs, D. (2015). Empathic concern drives costly altruism. *NeuroImage*, *105*, 347–356. https://doi.org/10.1016/j.neuroimage.2014.10.043

Frost, R. O., Krause, M. S., & Steketee, G. (1996). Hoarding and obsessive-compulsive symptoms. *Behavior Modification*, *20*(1), 116–132.

Frost, R. O., Steketee, G., & Williams, L. (2000). Hoarding: A community health problem. *Health & Social Care in the Community*, *8*(4), 229–234.

Gerace, A., Day, A., Casey, S., & Mohr, P. (2017). 'I think, you think': Understanding the importance of self-reflection to the taking of another person's perspective. *Journal of Relationships Research*, *8*(9).

Gigerenzer, G., & Gaissmaier, W. (2011). Heuristic decision making. *Annual Review of Psychology*, *62*(1), 451–482. https://doi.org/10.1146/annurev-psych-120709-145346

Grisham, J. R., Martyn, C., Kerin, F., Baldwin, P. A., & Norberg, M. M. (2018). Interpersonal functioning in Hoarding Disorder: An examination of attachment styles and emotion regulation in response to interpersonal stress. *Journal of Obsessive-Compulsive and Related Disorders*, *16*, 43–49. https://doi.org/10.1016/j.jocrd.2017.12.001

Gu, D., Gao, S., Wang, R., Jiang, J., & Xu, Y. (2020). The negative associations between materialism and pro-environmental attitudes and behaviors: Individual and regional evidence from China. *Environment and Behavior*, *52*(6), 611–638. https://doi.org/10.1177/0013916518811902

Hauser, D. J., Moss, A. J., Rosenzweig, C., Jaffe, S. N., Robinson, J., & Litman, L. (2022). Evaluating CloudResearch's Approved Group as a solution for problematic data quality on MTurk. *Behavior Research Methods*, *55*(8), 3953–3964. https://doi.org/10.3758/s13428-022-01999-x

Hauser, D. J., Preston, S. D., & Stansfield, R. B. (2014). Altruism in the wild: When affiliative motives to help positive people overtake empathic motives to help the distressed. *Journal of Experimental Psychology: General*, *143*(3), 1295–1305. https://doi.org/10.1037/a0035464

Hou, X., Zeng, J., Chen, H., & Su, L. (2019). The endowment effect in the genes: An exploratory study. *Judgment and Decision Making*, *14*(3), 293–298. https://doi.org/10.1017/S1930297500004332

Islam, S. (2015). Inequality and environmental sustainability. *United Nations Department of Social Affairs*. https://www.un.org/en/desa/inequality-and-environmental-sustainability

Jenkinson, C. (2022, December 18). Too much stuff: Americans and their storage units. *Governing*. https://www.governing.com/context/too-much-stuff-americans-and-their-storage-units

Kahneman, D., Knetsch, J. L., & Thaler, R. H. (1990). Experimental tests of the endowment effect and the coase theorem. *Journal of Political Economy*, *98*(6), 1325–1348. https://doi.org/10.1086/261737

Kahneman, D., Knetsch, J. L., & Thaler, R. H. (1991). Anomalies: The endowment effect, loss aversion, and status quo bias. *Journal of Economic Perspectives*, *5*(1), 193–206. https://doi.org/10.1257/jep.5.1.193

Lens, I., Pandelaere, M., & Warlop, L. (2009). The role of materialism in the endowment effect. *Working Papers of Faculty of Economics and Business Administration, Ghent University, Belgium*, Article 09/578. https://ideas.repec.org//p/rug/rugwps/09-578.html

Lerner, J. S., Small, D. A., & Loewenstein, G. (2004). Heart strings and purse strings carryover effects of emotions on economic decisions. *Psychological Science*, *15*(5), 337–341.

Levay, K., Freese, J., & Druckman, J. (2016). The demographic and political composition of Mechanical Turk samples. *SAGE Open*, *6*(1). https://doi.org/10.1177/2158244016636

Litman, L., & Robinson, J. (2020). *Conducting online research on Amazon mechanical turk and beyond*. SAGE Publications.

Liu, T., Ackerman, J. M., & Preston, S. D. (2021). Dissociating compulsive washing and hoarding tendencies through differences in comorbidities and the content of concern. *Elsevier*, *31*(4), 291–308. https://doi.org/10.1016/j.jbct.2021.05.003

Liu, T., Vickers, B. D., Seidler, R. D., & Preston, S. D. (2023). Neural correlates of overvaluation and the effort to save possessions in a novel decision task: An exploratory fMRI study. *Frontiers in Psychology*, *14*. https://doi.org/10.3389/fpsyg.2023.1059051

Maddux, W. W., Yang, H., Falk, C., Adam, H., Adair, W., Endo, Y., Carmon, Z., & Heine, S. J. (2010). For Whom Is Parting With Possessions More Painful?: Cultural Differences in the Endowment Effect. *Psychological Science*, *21*(12), 1910–1917. https://doi.org/10.1177/0956797610388818

Mellers, B. A., & McGraw, A. P. (2001). Anticipated emotions as guides to choice. *Current Directions in Psychological Science*, *10*(6), 210–214. https://doi.org/10.1111/1467-8721.00151

Mikulincer, M., & Shaver, P. R. (2013). Attachment Orientations and Meaning in Life. In J. A. Hicks & C. Routledge (Eds.), *The Experience of Meaning in Life* (pp. 287–304). Springer Netherlands. https://doi.org/10.1007/978-94-007-6527-6_22

Morewedge, C. K., Shu, L. L., Gilbert, D. T., & Wilson, T. D. (2009). Bad riddance or good rubbish? Ownership and not loss aversion causes the endowment effect. *Journal of Experimental Social Psychology*, *45*(4), 947–951. https://doi.org/10.1016/j.jesp.2009.05.014

Norberg, M. M., David, J., Crone, C., Kakar, V., Kwok, C., Olivier, J., & Grisham, J. R. (2020). Determinants of object choice and object attachment: Compensatory consumption in compulsive buying–shopping disorder and hoarding disorder. *Journal of Behavioral Addictions*, *9*(1), 153–162. https://doi.org/10.1556/2006.8.2019.68

Norberg, M. M., Keyan, D., & Grisham, J. R. (2015). Mood influences the relationship between distress intolerance and discarding. *Journal of Obsessive-Compulsive and Related Disorders*, *6*, 77–82. https://doi.org/10.1016/j.jocrd.2015.06.005

Norberg, M. M., & Rucker, D. D. (2021). The psychology of object attachment: Our bond with teddy bears, coffee mugs, and wedding rings. *Current Opinion in Psychology*, *39*(39). https://doi.org/10.1016/j.copsyc.2021.03.002

Nutley, S. K., Bertolace, L., Vieira, L. S., Nguyen, B., Ordway, A., Simpson, H., Zakrzewski, J., Camacho, M. R., Eichenbaum, J., Nosheny, R., Weiner, M., Mackin, R. S., & Mathews, C. A. (2020). Internet-based hoarding assessment: The reliability and predictive validity of the internet-based Hoarding Rating Scale, Self-Report. *Psychiatry Research*, *294*, 113505. https://doi.org/10.1016/j.psychres.2020.113505

Piff, P. K., Kraus, M. W., Côté, S., Cheng, B. H., & Keltner, D. (2010). Having less, giving more: The influence of social class on prosocial behavior. *Journal of Personality and Social Psychology*, *99*(5), 771–784. https://doi.org/10.1037/a0020092

Preston, S. D. (2013). The origins of altruism in offspring care. *Psychological Bulletin*, *139*(6), 1305–1341. https://doi.org/10.1037/a0031755

Preston, S. D. (2022). *The altruistic urge: Why we're driven to help others*. Columbia University Press. https://www.jstor.org/stable/10.7312/pres20440

Preston, S. D., & MacMillan-Ladd, A. D. (2021). Object attachment and decision-making. *Current Opinion in Psychology*, *39*, 31–37. https://doi.org/10.1016/j.copsyc.2020.07.019

Preston, S. D., Muroff, J. R., & Wengrovitz, S. M. (2009). Investigating the mechanisms of hoarding from an experimental perspective. *Depression and Anxiety*, *26*(5), 425–437. https://doi.org/10.1002/da.20417

Preston, S. D., & Vickers, B. D. (2014). The psychology of acquisitiveness. In S. D. Preston, M. L. Kringelbach, & B. Knutson (Eds.), *The interdisciplinary science of consumption*. MIT Press.

Pushkarskaya, H., Lenkic, P., Stewart, B., Tolin, D., & Woody, S. R. (2020). Hoarding symptoms correlate with the endowment effect. *Journal of Behavioral and Cognitive Therapy*, *30*(3), 201–210. https://doi.org/10.1016/j.jbct.2020.06.002

Pyles, K., Patterson, N., Rios, L. A., & Dozier, M. (2023). An Examination of Altruism and Reported Values in Older Adults with Hoarding Disorder. *The American Journal of Geriatric Psychiatry*, *31*(3), S52–S53. https://doi.org/10.1016/j.jagp.2022.12.210

Richins, M. L., & Dawson, S. (1992). A consumer values orientation for materialism and its measurement: Scale development and validation. *Journal of Consumer Research*, *19*(3), 303–316.

Rockwood, N. J. (2017). *Advancing the formulation and testing of multilevel mediation and moderated mediation models.* [Unpublished master's thesis]. The Ohio State University.

Rogers, C. J., & Hart, D. R. (2021). Home and the extended-self: Exploring associations between clutter and wellbeing. *Journal of Environmental Psychology*, *73*, 101553. https://doi.org/10.1016/j.jenvp.2021.101553

Roster, C. A., Ferrari, J. R., & Jurkat, M. P. (2016). The dark side of home: Assessing possession 'clutter' on subjective well-being. *Journal of Environmental Psychology*, *46*, 32–41. https://doi.org/10.1016/j.jenvp.2016.03.003

Shiota, M., Papies, E., Preston, S. D., & Sauter, D. (2021). Positive affect and behavior change. *Current Opinion in Behavioral Sciences*, *39*, 222–226. https://doi.org/10.1016/j.cobeha.2021.04.022

Shu, S. B., & Peck, J. (2011). Psychological ownership and affective reaction: Emotional attachment process variables and the endowment effect. *Journal of Consumer Psychology*, *21*(4), 439–452. https://doi.org/10.1016/j.jcps.2011.01.002

Smith, C. C., & Reichman, O. J. (1984). The evolution of food caching by birds and mammals. *Annual Review of Ecology and Systematics*, *15*(1), 329–351. https://doi.org/10.1146/annurev.es.15.110184.001553

Snyder, C. R., & Lopez, S. J. (Eds.). (2002). *Handbook of positive psychology*. Oxford University Press.

Sokol-Hessner, P., & Rutledge, R. B. (2019). The psychological and neural basis of loss aversion. *Current Directions in Psychological Science*, *28*(1), 20–27. https://doi.org/10.1177/0963721418806510

Strahilevitz, M. A., & Loewenstein, G. (1998). The Effect of Ownership History on the Valuation of Objects. *Journal of Consumer Research*, *25*(3), 276–289. https://doi.org/10.1086/209539

Swinyard, W. R., Kau, A.-K., & Phua, H.-Y. (2001). Happiness, materialism, and religious experience in the US and Singapore. *Journal of Happiness Studies*, *2*(1), 13–32. https://doi.org/10.1023/A:1011596515474

Thaler, R. H. (1980). Toward a positive theory of consumer choice. *Journal of Economic Behavior & Organization*, *1*(1), 39–60. https://doi.org/10.1016/0167-2681(80)90051-7

Thaler, R. H. (2000). From homo economicus to homo sapiens. *Journal of Economic Perspectives*, *14*(1), 133–141. https://doi.org/10.1257/jep.14.1.133

Tolin, D. F., Frost, R. O., & Steketee, G. (2010). A brief interview for assessing compulsive hoarding: The Hoarding Rating Scale-Interview. *Psychiatry Research*, *178*(1), 147–152. https://doi.org/10.1016/j.psychres.2009.05.001

Tolin, D. F., Frost, R. O., Steketee, G., & Fitch, K. E. (2008). Family burden of compulsive hoarding: Results of an internet survey. *Behaviour Research and Therapy*, *46*(3), 334–344. https://doi.org/10.1016/j.brat.2007.12.008

Tolin, D. F., Meunier, S. A., Frost, R. O., & Steketee, G. (2010). Course of compulsive hoarding and its relationship to life events. *Depression and Anxiety*, *27*(9), 829–838.

Tolin, D. F., Stevens, M. C., Villavicencio, A. L., Norberg, M. M., Calhoun, V. D., Frost, R. O., Steketee, G., Rauch, S. L., & Pearlson, G. D. (2012). Neural mechanisms of decision making in hoarding disorder. *Archives of General Psychiatry*, *69*(8), 832–841. https://doi.org/10.1001/archgenpsychiatry.2011.1980

Tong, L. C. P., Ye, K. J., Asai, K., Ertac, S., List, J. A., Nusbaum, H. C., & Hortaçsu, A. (2016). Trading experience modulates anterior insula to reduce the endowment effect. *Proceedings of the National Academy of Sciences*, *113*(33), 9238–9243. https://doi.org/10.1073/pnas.1519853113

Tse, D. C. K., Lau, V. W., Hong, Y., Bligh, M. C., & Kakarika, M. (2022). Prosociality and hoarding amid the COVID -19 pandemic: A tale of four countries. *Journal of Community & Applied Social Psychology*, *32*(3), 507–520. https://doi.org/10.1002/casp.2516

Tversky, A., & Kahneman, D. (1991). Loss aversion in riskless choice: A reference-dependent model. *The Quarterly Journal of Economics*, *106*(4), 1039–1061. https://doi.org/10.2307/2937956

University of Michigan-Ann Arbor. (n.d.). Data USA. Retrieved April 8, 2024, from https://datausa.io/profile/university/university-of-michigan-ann-arbor#incomeawards

U.S. Census Bureau QuickFacts: United States. (n.d.). Retrieved February 20, 2024, from https://www.census.gov/quickfacts/fact/table/US/PST045223

Van Boven, L., Dunning, D., & Loewenstein, G. (2000). Egocentric empathy gaps between owners and buyers: Misperceptions of the endowment effect. *Journal of Personality and Social Psychology*, *79*(1), 66–76. https://doi.org/10.1037/0022-3514.79.1.66

Wan, E. W., & Chen, R. P. (2021). Anthropomorphism and object attachment. *Current Opinion in Psychology*, *39*, 88–93. https://doi.org/10.1016/j.copsyc.2020.08.009

Wang, J. M., Seidler, R. D., Hall, J. L., & Preston, S. D. (2012). The neural bases of acquisitiveness: Decisions to acquire and discard everyday goods differ across frames, items, and individuals. *Neuropsychologia*, *50*(5), 939–948. https://doi.org/10.1016/j.neuropsychologia.2012.01.033

Wang, T., Zeng, J., Huang, W., Xiong, X., & Su, L. (2024). Thalamic volume links DBH gene on the endowment effect. *Behavioral Brain Research*. https://doi.org/10.1016/j.bbr.2024.115050

Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology*, *54*, 1063–1070. https://doi.org/10.1037/0022-3514.54.6.1063

Yap, K., & Grisham, J. R. (2021). Object attachment in hoarding disorder and its role in a compensatory process. *Current Opinion in Psychology*, *39*, 76–81. https://doi.org/10.1016/j.copsyc.2020.07.022

Yap, K., Timpano, K. R., Schmidt, N. B., & Grisham, J. R. (2024). An online experimental test of the compensatory process in hoarding disorder: Reducing loneliness and its effects on object attachment. *Current Psychology*, *43*(23), 20626–20639. https://doi.org/10.1007/s12144-024-05895-9