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"Heart Strings and Purse Strings" Revisited: A Preregistered Replication and Extension

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The Appraisal-Tendency Framework outlines that discrete emotions of similar valence behave differently, based on each emotion's specific appraisal profile. In the domain of pricing decisions, a seminal paper by Lerner and colleagues report incidental, negative emotions of disgust and sadness to show a divergent effect on spending decisions based on the perceived ownership of a commodity. Specifically, disgust-reduced spending while sadness increased spending on a new product. However, these researchers theorized, but did not statistically test the effects of emotion-induced motivational goals for sadness ("change circumstances") and disgust ("expel and avoid") as the drivers behind their divergent effects on spending. This study ($N = 403$) sought to replicate these primary findings in close adherence to the original protocol with better measurement properties in a different geographical location. It further extended the examination by empirically testing the distinct mediating processes for sadness and disgust by utilizing measures identified from a pilot study ($N = 169$) based on the original protocol. We found support for the effect of sadness (vs. disgust and neutral) in inducing higher choice prices through the motivational goal of changing circumstances, but the expected pattern of results for disgust was not replicated. Additionally, we examined the role of arousal in this context as a factor driving the effect of these emotions on spending. Our research offers new insights regarding the well-known "misery-is not miserly" effect for practitioners while also providing impetus for future research on the endowment effect.

Keywords: emotions, economic decisions, preregistered, replication, open materials, open data

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The robust influence of emotions on decisions and behaviors is well-accepted (Naqvi et al., 2006). Specifically, understanding the effect of discrete emotions is theoretically and practically important due to the pervasiveness of such influences in everyday decisions and behaviors (e.g., Lerner et al., 2003). Findings from this stream of literature provide insights into several domains including risky judgments, ethical decisions, coping strategies, consumption decisions, and purchase behaviors (e.g., Cavanaugh et al., 2015; Cryder et al., 2008; Garg et al., 2005; Garg & Lerner, 2013; Raghunathan et al., 2006). Theorists have demonstrated that discrete, incidental emotions prime unique emotion appraisals (Smith & Ellsworth, 1985). Importantly, research on discrete emotions supports the influence of emotion-specific appraisals on downstream behaviors (e.g., Cavanaugh et al., 2015; Chaudhury et al., 2022; Garg, 2019). Specifically, an influential study in this program of research demonstrated a differential effect of discrete, same-valenced negative emotions of sadness and disgust on spending decisions (Lerner et al., 2004; Google Scholar citations: 1,308, as on October 27, 2022). At the time of its publication, Lerner et al. (2004) facilitated meaningful contribution to the emerging research in emotion which emphasized moving beyond valence and taking a more nuanced, theoretical approach to understanding emotion effects. Further, Lerner et al. (2004) were one of the first studies to examine emotion effects in the domain of behavioral decision-making with real financial stakes. Specifically, they outlined that based on perceived ownership of a commodity, two same-valenced emotions—sadness and disgust—could guide different inclinations to pay for it. Since spending decisions are pervasive, this highly cited work is noted not only for theory development, but also for its general and practical relevance. Sadness is a negative emotion that heightens a sense of loss and helplessness and primes a need to change one's current circumstances (Keltner et al., 1993). Sadness evokes an appraisal of self-focus which often leads to a prioritization of reward-seeking behavior (Raghunathan & Pham, 1999) and trying to replace what has

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been lost by making new purchases (e.g., Cryder et al. 2008). In contrast, disgust is a negative emotion with a core appraisal of repulsion and withdrawal from the elicitor (Rozin et al., 1993). Lerner et al. (2004) posited that since disgust appraisals motivate individuals to move away from or expel the disgust-inducing elicitors and sadness appraisals lead to a general inclination to "change one's circumstances," there will be differential effects of these emotions on spending on an object based on perceived ownership (i.e., an object one already owns or has a chance to spend on and own). Specifically, in the "sell" condition, where participants perceived heightened ownership of an object (highlighter pen set), disgust, and sadness (vs. a neutral state) lowered selling prices. On the other hand, in the "choice" condition, where participants could choose between the highlighter set and money, disgust-reduced choice prices but sadness increased choice prices. The pattern for sadness, also known as the "misery-is-not-miserly effect" (Cryder et al., 2008; Garg et al., 2018), was especially interesting as it reversed a typically robust phenomenon, known as the endowment effect.

While this study is insightful and has been influential in progressing discrete emotions research, it leaves an important question unanswered. Specifically, the attributed causal mechanisms of sadness and disgust in dictating differential choice prices were empirically untested. In the present research, we proposed to not only replicate Lerner et al.'s (2004) findings but also advance the research by testing the mediating pathways of "change circumstances" and "expel and avoid," which were hypothesized in the original paper as driving the divergent effects of sadness and disgust on choice prices, respectively (Figure 1).

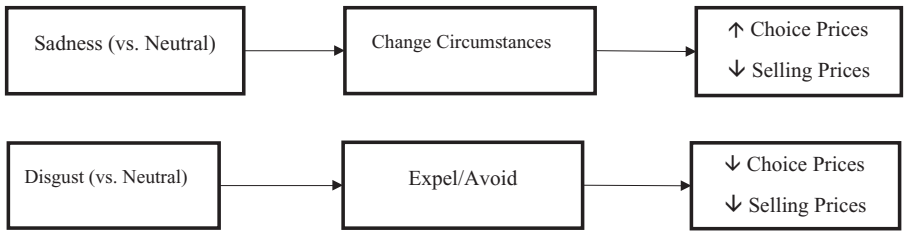
Moderating Influence of Emotions on the Endowment Effect

The endowment effect refers to a perceived increase in valuation of an owned object whereby the minimum selling price exceeds the buying price (Kahneman et al., 1990, Thaler, 1980). Interestingly, several studies have highlighted that incidental emotions moderate the endowment effect. Lin et al. (2006) assigned participants to experience happiness or sadness and evaluated their willingness to purchase a mug or accept money in exchange for a mug they were endowed with. As outlined by their findings, the authors found the endowment effect to occur only under the influence of happiness while it was reversed for sadness. Moreover, as demonstrated by Lerner et al. (2004), induced sadness reversed the endowment effect, even in contrast to another discrete negative emotion, disgust. In a close replication, Shu and Peck (2011) used reading tasks to manipulate sadness and disgust and asked participants to estimate valuation of a pen, based on ownership (referred to as sellers and choosers). Results showed that sadness (vs. neutral) increased choice prices but the expected effect of sadness (vs. neutral) to reduce selling prices was not replicated. Moreover, there was no significant main effect of disgust (vs. neutral) for sellers or choosers. For the sole significant effect of sad participants in the choice condition, Shu and Peck (2011) found that the positive affective reaction is a significant mediator. However, the key mediator of psychological ownership was not statistically significant. One point of note for this study, however, is that participants for the neutral condition participated in a separate study to indicate their valuation of the pen, rather than by random assignment in the same study alongside the emotion conditions of sadness and disgust. Thus, it is not clear whether the null effects of sadness on choice prices and disgust on valuation of the pen for both sellers and choosers might have arisen due to this design anomaly.

Some other studies have conducted replication of the "misery-is-not-miserly" effect with other products such as a water bottle or a coffee mug. For example, Cryder et al. (2008) showed that the effect of sadness (vs. neutral) on increased spending for a water bottle occurs only at high levels of self-focus. In a similar experiment, Garg et al. (2018) demonstrated sadness to increase the choice prices for a bottle, even when an opportunity for compensatory consumption was available. In another study, Martinez et al. (2011) examined two other negative emotions, regret and disappointment, in the willingness to pay for a coffee mug. Results revealed that regret canceled the endowment effect with no differences between spending (sellers) or buying (buyers/choosers) conditions. However, disappointment, like sadness, reversed the endowment effect with increased spending on the mug.

Although more research has examined sadness and has been able to replicate its effects, research on disgust (compared to neutral) has shown that individuals are more likely to dispose of the products they are endowed with, such as trading in a box of office supplies for a new box (Han et al. 2012). In other words, based on the tendency of disgust to dispose of possessions, it encourages expelling or disposing of objects one owns. Importantly, this effect is robust even when participants were warned against carryover effects (Han et al., 2012). A point of note, however, is that in their study, Han et al. (2012) did not measure actual spending on the object of interest. Given the mixed replication of the sadness and disgust effects by Shu and Peck (2011), we seek to conduct a systematic reexamination of the original study (Lerner et al., 2004) while improving on measurement aspects such as sample size. Given the plethora of research triggered in this domain by Lerner et al. (2004), we believe that conducting a close replication of the study and testing whether the results hold is relevant for two important reasons. First, we plan to assess the specific emotion-related appraisal tendencies posited to

Figure 1
Conceptual Framework Proposed by Lerner et al. (2004)



motivate the divergent effects of sadness and disgust, as guided by the emotion-specific model of the Appraisal-Tendency Framework (ATF; Lerner et al., 2015; Lerner & Keltner, 2000, 2001; So et al., 2015). ATF theorizes specific emotions to evoke cognitive appraisals which persist and carryover to influence decision-making (e.g., Lerner & Keltner, 2000, 2001). We will manipulate emotions using the exact manipulations as in the original study and extend the examination by measuring the proposed mediators of change circumstances and expelling/avoid, for sadness and disgust, respectively. Second, we intend to examine the role of arousal as a potential motivator in influencing the downstream effects of sadness and disgust on spending decisions; further adding to our understanding of these effects.

Arousal as a Potential Explanation

Theorists posit that emotions differ not only based on valence, but also on the dimension of activation or physiological arousal (e.g., Revelle & Loftus, 1992; Smith & Ellsworth, 1985). Arousal refers to the intensity of the stimulus event ranging from a relaxed state to an excited state of being (Mehrabian & Russell, 1974; Russell, 1980) and is usually reflected by increased blood flow, higher heart rate, and activation of the sympathetic nervous system (Heilman, 1997). The increased activation also makes high (vs. low) arousal emotions boost information sharing (Berger, 2011). For example, news articles evoking high-arousal emotions such as anger and anxiety are more likely to be shared rather than articles evoking low-arousal emotions such as sadness (Berger & Milkman, 2012). Affective arousal or activation can thus play an important role in emotion regulation and motivating social interactions (Storbeck & Clore, 2008; Thompson, 2011). Notably, the focal emotions of sadness and disgust explored in the Lerner et al. study differ in the dimension of arousal. Specifically, disgust is associated with high arousal (e.g., Gross & Levenson, 1993) while sadness is a relatively low-arousal emotion (e.g., Corson & Verrier, 2007). We wanted to thus explore whether the differences in arousal between disgust and sadness may be contributing to the differential spending behavior across these emotions. Interestingly, although prior research recognizes the role of emotion's valence and arousal in driving behaviors, it is still unclear whether and how the two influence each other. That is, do they work independently, in tandem, or in sequence? Importantly for a deeper understanding of the decision-making process, is arousal experienced prior to or after motivational goals and action tendencies? Dimensional emotion models present theoretical arguments to support contrasting answers to these questions. For instance, the constructionist approach to studying emotion posits that conscious emotional experiences are the result of meaning–making when people perceive their current core affective state as an emotion (Barrett, 2006; Barrett et al., 2007). In other words, conceptual knowledge of emotions (i.e., what is cognitively understood about emotion) complements the bodily perception of core affect in the active construction of an emotional experience (Barrett, 2006; Barrett et al., 2007). For instance, fear is psychologically constructed as a combination of core affect and conceptual knowledge (Lindquist & Barrett, 2008). In an interesting experiment, Lindquist and Barrett (2008) demonstrate that a combined effect of experiencing unpleasantness and high arousal along with salience of the conceptual knowledge of fear makes individuals experience the emotion of fear, as reflected by their risk-aversion. However, general unpleasantness, arousal, or the conceptual knowledge of another negative-valenced discrete emotion, anger does not increase risk aversion. Thus, the experience of arousal prior to the salience of motivational goals is supported by the constructionist account. In contrast, the appraisal theory approach considers that events are appraised at multiple levels of processing which motivates certain cognitive changes and action tendencies (Frijda, 2007; Scherer, 2009). Steered by cognitive appraisals, neurophysiological changes may occur including motor expressions and arousal responses which in turn, lead to conscious labeling of the emotional experience (Scherer, 2009). Thus, the appraisal perspective suggests that arousal effects should statistically merge *after* the experience of motivational goals. To uncover the potential link between emotion arousal and emotion motivations, we examined whether arousal acts as a mediator for emotion effects on spending along with the predicted motivational goals, and if so, how the potential sequence of the two mediating aspects of arousal and motivational goals would occur. In doing so, the current research aimed to contribute to a more precise understanding of the effects of arousal and emotion states in this context.

Overall, we had a three-fold objective in this investigation. One, we sought to replicate the study design implemented by Lerner et al. (2004) and retest the findings. To that end, we conducted a preregistered examination in close adherence to the original protocol with well-defined measurement properties, such as a priori determined sample size and a similar but distinct sample population in a different geographic location for increased generalizability. Second, we extend the original examination by testing for process evidence based on the proposed theorization of Lerner et al. (2004). Third, we empirically test the role of arousal as an alternative explanation for the original findings. Thus, we answer the recent calls for research to replicate important effects and extend it to test for potential mediating processes.

Overview of Studies

Over two studies, we tested the entire conceptual pathway depicted in Figure 1. In a preregistered pilot study reported below, we measured the motivational goals associated with sadness (i.e., to change circumstances) and disgust (i.e., to expel and avoid), as proposed by Lerner et al. (2004). The pilot study thus examined the first stage of the conceptual model. In the main replication study, we then tested the entire theorized conceptual pathway. Specifically, we manipulated sadness, disgust, and neutral, using the same movie clips as those in the original study, and examined how these emotions differentially prime the specific goals of "change circumstances" and "expel and avoid" which, in turn, are predicted to influence the valuation of commodities. Further, the replication study also tested for arousal effects in this context.

Pilot Study

The pilot study was designed to test the distinct motivational goals of "changing circumstances" and "expel and avoid" for sadness and disgust, respectively, so that the associated measures for these goals could be utilized in the main replication study. Further, the pilot study served as a positive control to assess the efficacy of the experimental stimuli (film clips) with a sample from the same population as that for the proposed replication study. The pilot study data were collected after approval by the Ethics Committee of a large public university (Protocol ID#: 190744). The hypotheses, study design, and method of analysis were preregistered at the open science framework

platform (https://osf.io/sd7ya).[1] Time-stamped data is available on the open science framework website (https://osf.io/sxw9k/). All measures collected in the pilot study are reported, and analyses were performed only after the data collection was complete.

We manipulated incidental sadness, disgust, and neutral affective states using the stimuli from the original study and assessed emotional influence on motivation goals to "change circumstances" and "expel and avoid." This study thus used a one-factor, three-level (Emotion: sadness, disgust, neutral) between-subjects design.

Method

Participants

A total of 169 students ($M_{age} = 20.09$ years, $SD = 1.22$, range = 18–24 years; 64.5% female; 1 participant did not report age and gender) at a large, public university were recruited to participate in this study (titled "Imagination Research," as in the original experiment), in exchange for course credit. None of the participants met the three preregistered exclusion criteria: (a) did not write to the prompt in the emotion manipulation task, (b) demonstrated zero variance on the emotion measures (since there were positive and negative emotion measures, consistent responses do not make sense), or (c) experienced technical issues while watching the film clips. Thus, data from all participants were included in the analyses.

Measures and Procedure

We obtained the study materials used in the original experiment by Lerner and colleagues. Specifically, (a) measure of baseline affect (Watson et al., 1988), (b) film clips, and (c) emotion manipulation checks, from the original protocol were used. Distinct from the original study, we additionally measured motivational goals of "change circumstances" and "expel and avoid," following the emotion induction. The study was conducted in a laboratory using an online survey, administered on Qualtrics.

Participants arrived at the laboratory and sat at private computer stations with headsets, with no visual access to other participants, as in the original Lerner et al. (2004) study. Participants began the study by completing a 25-item baseline measure of positive and negative affect. Thereafter, participants were randomly assigned to watch one of the three film clips meant to induce either sadness, disgust, or neutral. As in the original study, participants in the sadness condition watched a clip from *The Champ*, participants in the disgust condition watched one from *Trainspotting*, and participants in the neutral condition watched a National Geographic documentary clip. Following the original instructions, participants in the sadness and disgust conditions were asked to "identify with the main character in the video" and describe how they would feel if they were in a situation like the one depicted in the video clip. Participants in the neutral condition were requested to write about how they typically spent their evenings.

Next, participants indicated their response to items measuring motivational goals of "change circumstances" and "expel and avoid." Specifically, we used five items to measure motivation to "change circumstances" ("The film clip made me want to change my circumstances/move away from current situation/think how to get out of the situation/want to do something/want to change my situation"; 1: *Not at all*; 7: *Very much*) and five items that measured motivation to "expel and avoid" ("The film clip made me want to avoid something/feel like pushing something away/want to get something away from myself/turn away from something or someone/want to keep objects at a distance"; 1: *Not at all*; 7: *Very much*). All items were presented in a random order.

Following this, participants self-reported their emotions in response to the video clips on the 27-item emotion manipulation checks on a 9-point scale (0: *Did not experience the emotion at all*, 8: *Experienced the emotion more strongly than ever before*), as in the original study (Lerner et al., 2004). Finally, participants responded to basic demographic questions that included age, gender, and ethnicity.

Results

Emotion Manipulation Check

Following Lerner et al. (2004), five of the 27 affect items in the manipulation check were used to assess whether emotions of sadness and disgust were effectively induced by the film clips. We averaged the scores of "blue," "downhearted," and "sad" to form a composite measure of sadness ($\alpha = .85$) and "disgust" and "repulsed" to form a composite measure of disgust ($\alpha = .92$).

A univariate analysis of variance (ANOVA) was conducted on the sadness score with emotion condition as the independent factor. As expected, participants in the sad condition ($n = 57$) reported significantly higher sadness score ($M = 6.11$, $SD = 1.74$) than those in the disgust ($M = 4.29$, $SD = 2.24$), $t(103.85) = 4.81$, $p < .001$, $d = 0.91$, and neutral ($M = 2.69$, $SD = 1.86$), $t(111) = 10.07$, $p < .001$, $d = 1.90$, conditions. Similarly, a one-way ANOVA on the disgust score with emotion condition as the independent factor found that participants in the disgust condition ($n = 56$) had a significantly higher score ($M = 7.98$, $SD = 1.42$) than those in the sad ($M = 2.68$, $SD = 1.90$), $t(103.77) = 16.79$, $p < .001$, $d = 3.16$, and neutral ($M = 1.96$, $SD = 1.68$), $t(110) = 20.45$, $p < .001$, $d = 3.87$, conditions. Thus, the film clips were effective in inducing the focal emotions, as intended.

"Change Circumstances" Versus "Expel and Avoid" Goals

We performed a factor analysis on the 10 items using principal components analysis with varimax rotation and only factors with eigenvalues >1 were set to be extracted. Two factors emerged that explained 84.79% of the variance. The five "expel and avoid" items are all loaded onto Factor 1 (eigenvalue = 7.32, all loading values >0.70). These items were averaged to form a composite measure of the "expel and avoid" goal ($\alpha = .96$, $M = 4.03$, $SD = 2.10$). Similarly, the five "change circumstances" items all loaded onto Factor 2 (eigenvalue = 1.16, all loading values > 0.70) and were averaged to form a composite measure of the "change circumstance" goal ($\alpha = .94$, $M = 4.76$, $SD = 1.95$). The correlation between the two scales was significant ($r = .74$, $p < .001$). However, given that distancing and avoidance from an object conceptually represent a form of change in circumstances, the high correlation was less concerning due to two reasons. First, prior research in

[1] The preregistration erroneously used the term "example item" for an item of "change circumstances" (stated as "Want to recover something?") and "expel and avoid" (stated as "Want to get rid of something?"). The items were included as an explanation of the motivational goals and were not part of the measures of the survey. Note that copyright policies do not permit us to share the film clips used in the experiment for public consumption but can be obtained from us or the original authors.

emotions supports that similar valenced emotions prime similar tendencies. For instance, discrete positive emotions such as awe, joy, contentment, love, and pride, all serve to promote motivations relating to broadening thought-action repertoires and building psychosocial resources to sustain and survive (Fredrickson, 1998, 2001). By extension, it thus makes theoretical sense for the negatively valenced emotions of sadness and disgust to prime related motivational effects (indeed to expel and avoid is in some ways the change of circumstances). Second, we planned to utilize both measures simultaneously as parallel mediators in our statistical analyses to efficiently assess the indirect causal effects via each measure. This would minimize the adverse effects of the high correlation while providing insights into the effects of each measure. Thus, the two measures of change circumstances and expel and avoid goals were utilized in subsequent analyses.

Emotion-Goal Congruence

We assessed emotion-goal congruence as predicted by Lerner et al. (2004). As expected, for the "expel and avoid" goal, participants in the disgust condition ($M = 6.00$, $SD = 0.97$) reported significantly higher scores than those in the sadness ($M = 3.86$, $SD = 1.78$), $t(87.16) = 7.95$, $p < .001$, $d = 1.49$, and neutral ($M = 2.24$, $SD = 1.41$), $t(97.78) = 16.43$, $p < .001$, $d = 3.11$, conditions. Participants in the sadness condition reported higher scores than the ones in the neutral condition, $t(106.28) = 5.38$, $p < .001$, $d = 1.01$.

However, for the "change circumstances" goal as well, participants in the disgust condition ($M = 6.32$, $SD = 1.07$) reported higher scores than those in the sadness ($M = 4.83$, $SD = 1.63$), $t(96.82) = 5.75$, $p < .001$, $d = 1.08$, and neutral ($M = 3.12$, $SD = 1.58$), $t(96.54) = 12.53$, $p < .001$, $d = 2.37$, conditions. Participants in the sadness condition reported higher scores than participants in the neutral condition, $t(111) = 5.65$, $p < .001$, $d = 1.07$.

Discussion

The findings of the pilot study highlight that disgust leads to both goals of "expel and avoid" as well as motivated to "change circumstances." However, Lerner et al. (2004) proposed that sadness will be associated with "change circumstances," which would lead to increased spending to acquire an object. It is possible that as negative emotions, both disgust and sadness share motivational commonalities, albeit to different degrees, even though they lead to distinct downstream consequences in this context. It is also potentially possible that the motivational goals act in concert with other emotion-induced differences to drive unique consequences. In this case, disgust is a high-arousal emotion while sadness is a relatively low-arousal one. Overall, the pilot study underscores the need to empirically test the hypothesized effects predicted in the original examination. Additionally, we measured participants' self-reported arousal in the main study. This allowed us to assess whether sadness and disgust's effect on spending is driven by motivational goals and/or arousal. Thus, it helped us to address the role of arousal as a competing mechanism driving the effects of sadness and disgust (cf., Berger, 2011).

Main Study (Replication)

In this study, we sought to replicate the study procedure from Lerner et al. (2004). Specifically, we examined the differential effect of sadness and disgust on financial decisions and importantly, also tested whether the motivational goals associated with sadness and disgust ("change circumstances" vs. "expel and avoid") explain the predicted emotional effects on price valuations.

Method

Participants and Experimental Design

The study used a 3 (Emotion: sadness, disgust, Neutral) × 2 (Ownership: choice, sell) between-subjects design, as per the original design. Following the recruitment methodology in the original study, participants were planned to be recruited from an Online Recruitment Software for Economic Experiments (ORSEE) subject pool at a large university with monetary compensation in exchange for their participation. ORSEE is a convenient and reliable tool to recruit participants (Greiner, 2015) and enabled us to request participants from the same age range as in the original study (i.e., adults between 18 and 49 years). Due to the pandemic, we faced undue delays in data collection and recruited participants from the ORSEE pool as well as by general posting in the business schools at two large, public universities. This study was preregistered (https://osf.io/tnqra) and data is available at https://osf.io/sxw9k/.

Sample

We used G*Power 3.1 (Faul et al., 2007) to estimate the sample size needed for an adequately powered replication. Lerner et al. (2004) do not report effect sizes. However, given that they use the choice prices (vs. sell prices) for sadness versus neutral conditions as the basis of their examination, we used the *t*-statistic and the degrees of freedom (*df*) for these conditions, as reported in the original study, to compute the effect sizes. The original statistic of sadness (vs. neutral) on choice prices was $t(65) = -1.98$, $p = .05$, which leads to an effect size of .49, Cohen's $d = 2t/\sqrt{(df)} = 2(1.98)/\sqrt{(65)} = 0.49$. The value of .49 was thus entered as the parameter for effect size in G*Power under *t*-tests. Type I error was set at 0.05, power was set at 0.80, and allocation ratio was set at 1 (equally sized samples). Based on these parameters, the required sample size for each group was estimated to be 67. Thus, for the 3 × 2 between-subjects design, we aimed to recruit at least 402 participants. As in the pilot study, participants were excluded if they met any of the following criteria:

1. If technical issues arose during watching the film clip (in the "Imagination Research" study) and subjects were unable to complete the study.
2. Subjects did not write to the prompt in the emotion induction writing task or wrote less than a sentence.
3. Zero variance on the emotion scale measures, which included both positive and negative emotions.

Timeline of Data Collection

We planned to complete data collection within 6 months of the approval of the Phase I submission. However, due to the restrictions involved in conducting in-lab studies during the COVID-19 pandemic, data collection for this study took longer than the expected 6 months and was completed within a year of approval. Data were analyzed after data collection exceeded ($n = 404$) the required sample of 402 participants.

Procedure

We obtained the original paper-and-pencil questionnaire used in Lerner et al. (2004) and set up the replication as a computer-based study so that data could be collected digitally via the Qualtrics survey platform (vs. the original paper-based study). The rest of the methodology and procedure remained the same as the original experiment.

Participants were randomly assigned to watch one of the three film clips based on their emotion condition. As per the design of the study, the experimenter (or research assistant) knew the assignment of participants to either "choice" or "sell" conditions, so as to show the highlighter set to those in the "choice" condition (vs. endowing participants with the pen set in the sell condition). The experimenter was, however, unaware of the randomized emotion condition assigned to participants during the experiment.

To prevent arousing suspicion, each session deployed only one of the two ownership manipulations. That is, the experimenter either "showed" the highlighter set to each participant (in the "choice" condition) or placed the highlighter set at each workstation (in the "sell" condition) in a session, as in the original protocol.

The emotion manipulation task was implemented, as in the pilot study. Following the emotion induction, participants completed an ostensibly unrelated study "Asset-pricing research," as in Lerner et al. (2004). Specifically, participants in the "sell" condition indicated their decision of keeping the highlighter set or getting a cash amount while those in the "choice" condition were shown the highlighter set and then indicated their choices between getting the highlighter set or a cash amount, using the Becker et al. (1964) protocol. As in Lerner et al. (2004), participants indicated their selling/choice prices for the highlighter pen set over a price range of \$0.50 to \$14.00 in \$0.50 increments (resulting in 28 choices). After indicating their choices across the 28 options, participants were asked to look over their answers and report the lowest price for which they were willing to sell/choose the highlighter pen set.

Next, participants were asked to think back to the "Imagination Research" study and report on the 10-item measure for "expel and avoid" and "change circumstances" goals (as determined from the pilot study). Additionally, we assessed arousal on a four-item (calm-excited, passive–active, mellow-fired up, and low–high energy; $\alpha = .96$), 9-point semantic differential scale (adapted from Berger, 2011). These items were averaged to create an arousal index.

Following this, participants self-reported felt emotions in response to the emotion task using a 27-item scale (0: *did not experience the emotion at all*; 8: *experienced the emotion more strongly than ever before*). Finally, participants completed demographic questions and responded to the demand awareness questions, as in the original study.

At the end of the session, each participant received cash or the highlighter pen set, based on his/her preference and the randomly set price of the highlighter pen set for that session. The consequential outcomes of choosing between a highlighter pen set and/or the specified cash amounts using the Becker–DeGroot–Marschak protocol were implemented, in line with the original study. Additionally, in the original study, participants were paid \$10 as compensation for their time. Adhering to the current rates of payment, we made a \$10 (AUD 15) payment in the form of a gift card for their participation.

Results

Based on the a priori exclusion criteria in the preregistration, one participant showed zero (0.0) variance on the emotion manipulation checks and was excluded. Thus, all analyses were conducted on the remaining 403 responses. Table 1 provides an overview of the distribution of participants in the experimental conditions.

Emotion Manipulation Check

As in the pilot, we averaged the relevant affect items in the manipulation check to create an index for sadness ("blue," "downhearted," and "sad"; $\alpha = .91$) and disgust ("disgust" and "repulsed"; $\alpha = .95$). An ANOVA analyses of the emotion condition was conducted on the two manipulation check indices. As expected, participants in the sadness condition ($M = 6.46$, $SD = 1.89$) reported higher scores on the sadness index than those in the disgust ($M = 3.13$, $SD = 2.01$), $t(268) = 13.99$, $p < .001$, 95% CI [2.86, 3.79], $d = 1.70$, and neutral ($M = 1.97$, $SD = 1.35$), $t(242.28) = 22.34$, $p < .001$, 95% CI [4.09, 4.89], $d = 2.73$, conditions. Similarly, participants in the disgust condition ($M = 8.14$, $SD = 1.25$) reported higher scores on the disgust index compared to those in the sadness ($M = 2.26$, $SD = 1.65$), $t(250.14) = 33.01$, $p < .001$, 95% CI [5.53, 6.23], $d = 4.02$, and neutral ($M = 1.46$, $SD = 1.20$), $t(266) = 44.52$, $p < .001$, 95% CI [6.39, 6.98], $d = 5.44$, conditions. Thus, the emotion manipulations were deemed successful.

Emotion Effects on Arousal

To examine the effect of emotion conditions on arousal ratings, we conducted a two-way ANOVA with emotion and ownership as independent variables and arousal as the dependent variable. There was no interaction effect of emotion and ownership on arousal, $F(2, 397) = 1.23$, $p = .292$, and no main effect of ownership, $F(1, 397) = 1.81$, $p = .179$. As expected, only a main effect of emotion emerged, $F(2, 397) = 556.68$, $p < .001$, $\eta_p^2 = 0.74$. Specifically, arousal ratings were significantly higher for participants in the disgust condition ($M = 6.95$, $SD = 1.36$) than those in the sadness ($M = 2.57$, $SD = 1.39$), $t(268) = 26.15$, $p < .001$, 95% CI [4.05, 4.71], $d = 3.18$, and neutral ($M = 2.28$, $SD = 1.09$); $t(266) = 30.96$, $p < .001$, 95% CI [4.37, 4.96], $d = 3.78$, conditions. Arousal ratings for sad participants were marginally higher than those in the neutral condition, $t(253.15) = 1.88$, $p = .061$, 95% CI [−0.014, 0.587], $d = 0.23$.

Reexamination of the Original Findings (Lerner et al. 2004)

Following the analyses in the original study, we conducted a 2 × 2 factorial ANOVA to determine the interactive effect of emotion

Table 1
Distribution of Participants (N = 403) in the Experimental Conditions

Ownership condition	Emotion	Participants per cell (*n*)	Average age (in years)	Number of females by condition (percentage)
Sell	Sadness	67	22.31	41 (61.2%)
	Disgust	66	22.12	40 (58.0%)
	Neutral	69	22.39	39 (59.1%)
Choice	Sadness	68	22.85	48 (70.6%)
	Disgust	67	22.30	41 (62.1%)
	Neutral	66	23.11	43 (64.2%)

condition (sadness/disgust vs. neutral) and ownership (choice, sell) on the valuation of the object. Specifically, disgust (relative to neutral) was predicted to decrease selling as well as choice prices. To assess this hypothesis, a 2(emotion: disgust, neutral) × 2(ownership: choice, sell) ANOVA was conducted, as in the original study. There was no interaction effect between emotion and ownership, $F(1, 264) = 0.107$, $p = .744$, and no main effect of emotion, $F(1, 264) = 0.28$, $p = .599$, but a main effect of ownership emerged, $F(1, 264) = 14.04$, $p < .001$, $\eta_p^2 = 0.05$. In general, participants in the sell condition ($N = 202$; $M = 3.59$, $SD = 1.74$) were more likely to price the product higher in the choice condition ($N = 201$; $M = 3.09$, $SD = 1.69$), $t(401) = 2.90$, $p = .002$, $d = 0.29$. Controlling for arousal and pleasantness of emotions (pleasantness/unpleasantness on a 9-point scale) did not change the pattern of results, interaction effect: $F(1, 262) = 0.035$, $p = .851$. Further, since the effects of disgust vs. neutral were not replicated, we conducted additional ancillary analyses to examine if the effect sizes of this study was included in the 95% confidence interval of the original study. Results showed that the 95% confidence interval of the comparison of disgust vs. neutral in the original study did not include the effect sizes found in this study for both the choice and sell conditions (see Supplemental Material). Similarly, analysis of a 2(emotion: sadness, neutral) × 2(ownership: choice, sell) ANOVA was conducted to examine the hypothesis that sadness (vs. neutral) decreases selling prices but increases choice prices. Results demonstrated a marginally significant interaction effect of emotion and ownership, $F(1, 264) = 3.70$, $p = .055$, $\eta_p^2 = 0.014$, although there was no main effect of emotion, $F(1, 264) = 1.51$, $p = .221$, or ownership, $F(1, 264) = 2.10$, $p = .148$. Controlling for arousal and pleasantness of the emotion, the results replicated with a significant interaction, $F(1, 262) = 3.93$, $p = .049$, $\eta_p^2 = 0.015$, and no main effect of emotion, $F(1, 262) = 0.20$, $p = .659$, or ownership, $F(1, 262) = 2.39$, $p = .123$.

Further, we probed each of the interactions to better understand the differences driving the effects. Table 2 reports the means, t statistics, p values, effect sizes, and confidence intervals for comparisons of choice and selling prices by emotion conditions. As in the original study, sadness elicited higher choice prices, relative to disgust and neutral conditions. In contrast to the original study, however, sadness (vs. disgust or neutral) did not decrease selling prices. Further and unlike in the original report, there was no significant effect of disgust on choice prices or selling prices, relative to sadness and neutral conditions.

We also examined the interaction of emotion and ownership on the assigned price of the object using the full 3(emotion: sadness, disgust, neutral) × 2(ownership: choice, sell) model. A two-way ANOVA was conducted with emotion, ownership, and their interaction as independent variables and the assigned price of the object as the dependent variable. The results revealed a significant effect of product, $F(1, 397) = 8.70$, $p = .003$, and a nonsignificant effect of emotion, $F(2, 397) = 1.76$, $p = .173$. As expected, there was a significant interaction effect, $F(2, 397) = 3.23$, $p = .041$, $\eta_p^2 = 0.016$. Specifically, there was a significant difference among the emotion conditions in the choice condition, $F(2, 198) = 5.12$, $p = .007$, $\eta_p^2 = 0.049$, such that participants were willing to pay more if they were experiencing sadness ($M = 3.60$, $SD = 1.82$) than if they were experiencing disgust ($M = 2.73$, $SD = 1.22$, $p = .003$) or neutral emotion ($M = 2.92$, $SD = 1.85$, $p = .017$). There were no differences across the emotion conditions in the sell condition, $F(2, 190) = 0.13$, $p = .876$, see Figure 2.

Extension of the Original Examination

One of the main motivations to replicate the original study involved examining the hypothesized mediating mechanisms proposed, but not tested, in the original study. Specifically, Lerner et al. (2004) suggested that disgust (vs. neutral) induces an "expel and avoid" goal leading to decreased choice prices, while sadness (vs. neutral) induces a "change circumstances" goal leading to increased choice prices. In this replication, we empirically tested these hypotheses (see Figure 1).

Emotion Effects on Motivational Goals

We first conducted a one-way ANOVA with emotion as the independent variable and the expel and avoid index as the dependent variable. A significant main effect of emotion was found, $F(2, 400) = 303.06$, $p < .001$. Results showed that participants in the disgust condition rated significantly higher on the expel and avoid index ($M = 5.88$, $SD = 1.36$) than those in the sad ($M = 3.12$, $SD = 1.57$, $p < .001$) and neutral ($M = 1.77$, $SD = 1.22$, $p < .001$) conditions. Additionally, there was a significant difference between participants in the sad and neutral conditions on this goal ($p < .001$).

Next, we conducted a one-way ANOVA with emotion as the independent variable and the change circumstances index as the dependent variable. A significant main effect of emotion was found, $F(2, 400) = 189.28$, $p < .001$. Results showed that participants in the disgust condition also rated significantly higher on the change circumstances goal ($M = 5.76$, $SD = 1.43$) than those in the sad ($M = 5.11$, $SD = 1.78$, $p < .001$) and neutral ($M = 2.25$, $SD = 1.47$, $p < .001$) conditions. As before, a significant difference also emerged between participants in the sad and neutral conditions on this rating ($p < .001$).

Thus, these results replicated the pattern of findings in the pilot study, whereby the disgust condition induced higher values on both change circumstances and expel and avoid goals.

Mediation by Motivational Goals

To stay true to the propositions in the original study, we compared the emotion effects of sadness or disgust primarily in relation to the neutral condition.[2] To test the hypothesis that disgust and sadness prime different motivations which drive choice prices, we conducted two parallel mediation analyses using PROCESS Model 4 with 5,000 bootstrap samples (Hayes, 2013). In the first mediation analysis, we compared the effect of sadness (vs. neutral) with both motivational goals ("change circumstances" and "expel and avoid") as parallel mediators on choice prices. Emotion condition (sadness = 1, neutral = 0) was the independent variable, the two goals of change circumstances ($\alpha = .95$) and expel and avoid ($\alpha = .96$) were parallel mediators, and choice prices were the dependent variable. Results at a 95% confidence interval revealed an indirect effect of sadness

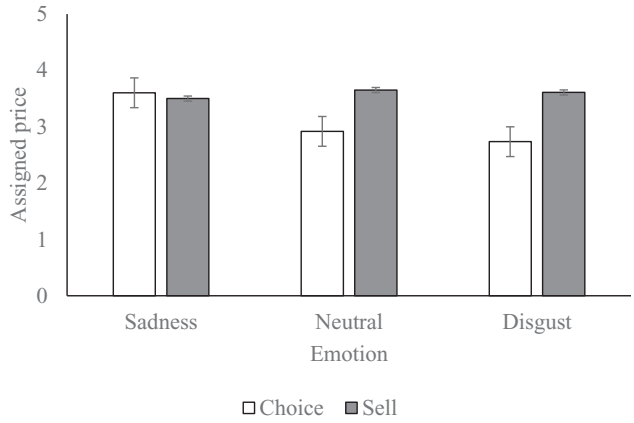
[2] The full 3 × 2 model on choice prices yielded the same pattern of results with the effect of sadness vs. other conditions being mediated by the change circumstances goal, but not the expel and avoid goal. The effect of disgust versus other conditions on choice prices was also found to be mediated by the change circumstances goal rather than the expel and avoid goal.

Table 2
Means and Comparisons of Choice and Selling Prices, by Emotion Condition

				Comparison with sadness				Comparison with disgust			
Ownership condition	Emotion condition	*M (SD)*	95% CI [LL, UL]	*t*	*p*	Effect size (Cohen's *d*)	95% CI [LL, UL]	*t*	*p*	Effect size (Cohen's *d*)	95% CI [LL, UL]
Choice	Sadness	3.60 (1.82)	[3.16, 4.04]	—	—	—	—	—	—	—	—
	Disgust	2.73 (1.22)	[2.43, 3.04]	−3.25	.001	.56	[−1.40, −0.34]	—	—	—	—
	Neutral	2.92 (1.85)	[2.47, 3.37]	−2.17	0.032	0.37	[−1.31, −0.06]	0.67	0.502	0.12	[−0.36, 0.72]
Sell	Sadness	3.50 (1.35)	[3.17, 3.83]	—	—	—	—	—	—	—	—
	Disgust	3.61 (1.81)	[3.17, 4.04]	0.40	0.691	0.07	[−0.43, 0.65]	—	—	—	—
	Neutral	3.65 (2.03)	[3.15, 4.15]	0.51	0.613	0.09	[−0.44, 0.74]	0.13	0.897	0.02	[−0.61, 0.70]

Note. LL = lower limit; UL = upper limit.

Figure 2
Mean Prices as a Function of the Emotion and Ownership Conditions



(vs. neutral) on choice prices via the change circumstances goal ($B = 1.25$, $SE = 0.30$, [0.7066, 1.8714]) but not via the expel and avoid goal ($B = -0.37$, $SE = 0.15$, [−0.6870, −0.0976]). Further, when the mediator measures were included, the direct effect of sadness became nonsignificant ($B = -0.20$, $SE = 0.39$, [−0.9629, 0.5697]).

Similarly, we examined the effect of disgust (vs. neutral) on choice prices, with motivational goals as potential mediators. Emotion condition (disgust = 1, neutral = 0) was the independent variable, with motivational goals as parallel mediators and choice prices as the dependent variable. Results showed that the indirect effect of disgust on choice prices did not operate via the changed circumstances ($B = 0.97$, $SE = 0.51$, [−0.0045, 2.0007]) or the expel and avoid ($B = -0.69$, $SE = 0.52$, [−1.6631, 0.3867]) goals.

Further, Lerner et al. (2004) theorized disgust (vs. neutral) to reduce the selling prices of an object one owns, via the motivation to "expel and avoid" while sadness (vs. neutral) was theorized to reduce selling prices via the motivation to "change circumstances." As predicted, the influence of sadness (vs. neutral) on selling prices was mediated by change circumstances ($B = 0.58$, $SE = 0.25$, [0.1694, 1.1282]), but not expel and avoid ($B = -0.08$, $SE = 0.14$, [−0.3491, 0.2038]). Contrary to prediction, however, the effect of disgust on selling prices was mediated by neither the expel and avoid goal ($B = -0.90$, $SE = 0.63$, [−2.2856, 0.1990]) nor by the change circumstances goal ($B = 0.58$, $SE = 0.58$, [−0.5529, 1.7879]).

Testing Arousal as a Potential Explanation

Arousal presents a possible alternative explanation for the results in the Lerner et al. study given the difference in arousal levels between sadness (low) and disgust (high).[3] Such differences have been found to differentially influence behaviors (e.g., Berger, 2011). Thus, we wanted to explore the role of arousal in driving the effects of sadness and disgust on primarily choice prices, which was the main dependent variable of interest in the original study.

First, we tested arousal as a potential mediator for the comprehensive 3 × 2 model of emotion and ownership on the assigned choice/

[3] We thank an anonymous reviewer for raising this issue.

selling price of the object. A parallel mediation analysis was conducted using PROCESS Model 4 with 5,000 bootstrap samples (Hayes, 2013) with emotion condition (disgust = 1, neutral = 2, sadness = 3) as the independent variable, three parallel mediators—change circumstances, expel and avoid, and arousal, and choice prices as the dependent variable. In-built sequential contrast coding in SPSS Process formed two orthogonal contrasts. The first contrast ("sadness contrast") compared the sadness condition to the disgust and neutral conditions (coded as sadness = 1, disgust = 0, neutral = 0). The second contrast ("control contrast"; coded as neutral = 1, sadness = 1, disgust = 0) compared the residual difference between neutral and disgust conditions on choice prices. As expected, arousal did not mediate the effects of emotion on choice prices for the control contrast ($B = -0.44$, $SE = 0.43$, 95% CI [−1.2319, 0.4621]) or the sadness contrast ($B = 0.05$, $SE = 0.05$, [−0.0581, 0.1575]). However, replicating the results for the motivational goals earlier, the indirect path of the sadness contrast → change circumstances → choice prices was positive and significant ($B = 0.97$, $SE = 0.24$, [0.5259, 1.4497]) while the indirect path of the control contrast → change circumstances → choice prices was negative and significant ($B = -1.26$, $SE = 0.30$, [−1.8850, −0.7006]). In other words, compared to the disgust and neutral conditions, the sadness condition influenced choice prices by increasing the motivation to change circumstances. With respect to the expel goal, the effect of the control contrast → expel and avoid goal → choice prices was significant ($B = 1.07$, $SE = 0.36$, [0.3835, 1.7845]). Importantly, the effect of the sadness contrast → expel and avoid → choice prices was negative and significant ($B = -0.34$, $SE = 0.13$, [−0.6214, −0.0951]), implying that the sadness induction influenced choice prices through the change circumstances goal, rather than the expel and avoid goal.

Similarly, we conducted a parallel mediation analysis with selling prices as the dependent variable, emotion condition (disgust = 1, neutral = 2, sadness = 3) as the independent variable, and three parallel mediators—change circumstances, expel and avoid, and arousal. Results showed that arousal did not mediate the effect of emotion on selling prices for the control contrast ($B = 0.16$, $SE = 0.58$, 95% CI [−1.0389, 1.2320]) or the sadness contrast ($B = -0.0014$, $SE = 0.02$, [−0.0559, 0.0505]). The indirect effects of emotion condition on selling prices via the change circumstances goal were not significant: control contrast → change circumstances → selling prices: $B = -0.40$, $SE = 0.30$, [−1.0253, 0.1829]; sadness contrast → change circumstances → selling prices: $B = 0.35$, $SE = 0.26$, [−0.1697, 0.8833]. Additionally, the indirect effects of emotion condition on selling prices via the expel and avoid goal were not significant: control contrast → expel and avoid goal → selling prices: $B = 0.37$, $SE = 0.37$, [−0.3278, 1.1211]; sadness contrast → change circumstances → selling prices: $B = -0.13$, $SE = 0.13$, [−0.3830, 0.1087].

Arousal as a Parallel Mediator

We included felt arousal as a parallel mediator along with motivational goals ("change circumstances" and "expel and avoid") as the other mediators to reassess the mediating mechanism of emotion (sadness vs. neutral) on choice prices. Specifically, a parallel mediation analysis was conducted using PROCESS Model 4 with 5,000 bootstrap samples (Hayes, 2013) with emotion (sadness = 1, neutral = 0) as the independent variable, three parallel mediators—change circumstances, expel and avoid, and arousal, and choice price as the dependent variable. Results showed that the indirect effects of the emotion variable on choice prices were significantly predicted by motivational goals of change circumstances ($B = 1.24$, $SE = 0.30$, [0.6805, 1.8748]) and expel and avoid ($B = -0.39$, $SE = 0.17$, [−0.7523, −0.0950]), but not arousal ($B = 0.03$, $SE = 0.06$, [−0.1161, 0.1581]). The pattern of results was similar with selling prices as the dependent variable where only the pathway of sadness → change circumstances was positive and significant ($B = 0.62$, $SE = 0.26$, [0.1752, 1.1682]), but there was no effect of arousal ($B = 0.009$, $SE = 0.06$, [−0.1038, 0.1475]) and expel and avoid goal ($B = -0.12$, $SE = 0.15$, [−0.4281, 0.1783]).

Although the direct effect of disgust on choice prices was not significant, we also assessed the role of arousal as a contributing factor in the relationship. A parallel mediation model was analyzed with emotion (disgust = 1, neutral = 0) as the independent variable, three parallel mediators of the arousal index, change circumstances goal, and expel and avoid goal, and choice prices was the dependent variable. Results showed that none of the three mediators were significant in influencing the effect (arousal: $B = 0.98$, $SE = 0.59$, [−0.2660, 2.0978]; change circumstances: $B = 0.96$, $SE = 0.49$, [−0.0092, 1.9207]; expel and avoid: $B = -0.85$, $SE = 0.56$, [−1.9601, 0.2763]). In a similar pattern, the effect of disgust on selling prices was not significantly mediators by arousal or the goal measures (arousal: $B = -0.52$, $SE = 0.76$, [−1.9148, 1.1041]; expel and avoid: $B = -0.74$, $SE = 0.75$, [−2.3982, 0.5462]; change circumstances: $B = 0.57$, $SE = 0.58$, [−0.4783, 1.8329]).

Arousal as a Serial Mediator

Following the primary findings in the original study with the emotional effects of sadness and disgust on choice prices, we next considered the role of arousal as a serial mediator in these effects. That is, we analyzed whether arousal and relevant motivation goals of change circumstances and expel and avoid act as sequential mediators for the effects of sadness (vs. neutral) and disgust (vs. neutral) on choice prices, respectively. First, we analyzed a serial mediation model using PROCESS Model 6 with 5,000 bootstrap samples (Hayes, 2013) where sadness (coded as 1 vs. neutral coded as 0) was included as the independent variable, the dependent variable was choice prices, and sequential mediators were change circumstances → arousal index. Results showed that the change circumstances measure significantly mediated the effect of sadness (vs. neutral) on choice prices ($B = 1.01$, $SE = 0.31$, [0.4690, 1.7032]), while arousal did not ($B = -0.0003$, $SE = 0.04$, [−0.0738, 0.0852]). Moreover, change circumstances and arousal did not sequentially influence the effect of sadness (vs. neutral) on choice prices ($B = -0.03$, $SE = 0.07$, [−0.2029, 0.0755]). We also tested the model by reversing the mediators to examine the influence of sadness on choice prices via an arousal → change circumstances pathway. The indirect path of arousal on choice prices via the change circumstances goal was significant ($B = 0.05$, $SE = 0.03$, [0.0036, 0.1343]) which in turn shows that the role of arousal might be working in conjunction with the unique effect of sadness (relative to the neutral condition) on choice prices.[4] However, in a similar analysis

[4] We also compared the effect of sadness (coded as 1) versus disgust (coded as 0) on choice prices with sequential mediators of change circumstances and arousal. The results were not significant for either order of mediators, that is, change circumstances → arousal ($B = 0.0038$, $SE = 0.0114$, [−0.0107, 0.0343]) or arousal → change circumstances ($B = -0.08$, $SE = 0.1096$, [−0.3295, 0.1103]).

of the potential serial mediation of arousal → change circumstances for the effect of sadness (vs. neutral) on selling prices, the mediating pathway was not significant ($B = -0.0006$, $SE = 0.0064$, [−0.0153, 0.0124]).

Next, we examined the role of arousal as a potential serial mediator to the relevant goal of expelling and avoid for the effect of disgust (vs. neutral) on choice prices. In the model, disgust (vs. neutral) was the independent variable, expel and avoid goal and arousal index were the serial mediators and the choice prices variable was included as the dependent variable. Results did not support arousal as a mediating mechanism driving the effect of disgust (vs. neutral) on choice prices directly ($B = 0.83$, $SE = 0.50$, [−0.2063, 1.7885]) or as a sequential mediator with expel and avoid goal ($B = 0.18$, $SE = 0.15$, [−0.0314, 0.5440]). Reversing the mediators in the model (arousal index → expel and avoid) did not change the pattern of results. That is, there was no significant effect of arousal as a direct ($B = 1.01$, $SE = 0.61$, [−0.2389, 2.2108]) or as a serial mediator along with the expel and avoid goal ($B = -0.09$, $SE = 0.15$, [−0.4373, 0.1517]). Thus, these analyses eliminated arousal as an alternative driver of the emotion effects in this context.

Discussion

The findings of the study highlight that a close implementation of the original Lerner et al. (2004) protocol led to the replication of some effects, but several patterns could not be replicated. Specifically, there was no interactive effect of disgust and ownership on prices, and the null effects persisted even after controlling for arousal and valence ratings. Controlling for arousal and valence, however, a significant interaction effect was revealed for sadness and ownership on choice prices. Specifically, there was a significant difference between sadness (vs. neutral, disgust) on choice prices with participants in the sadness condition willing to spend more to acquire the object (highlighter set). Mediation analyses showed that the effect was mediated by the change circumstances goal, but not the expel/avoid goal. Importantly, arousal did not mediate the effect of sadness on choice prices beyond that accounted by the change circumstances goal. However, arousal was a first-stage mediator motivating the effect of sadness on the change circumstances goal, which in turn, influenced choice prices. Interestingly, arousal did not emerge as a contributor in the causal pathway of sadness to sell prices via motivational goals which suggest that other mediating processes might be at play.

Differences From the Original Study

There are a few notable differences between this replication study and the original study (Lerner et al., 2004). First, the replication was conducted with a similar university sample population in two countries (Australia and the United States) due to the constraints of data collection during the pandemic. The diversity of backgrounds (income, culture, etc.) was important to test the generalizability of emotional effects on spending that emerged in the original work. Second, given that the original study was conducted about 16 years ago, we compensated participants with $10 (AUD 15) payments for their participation rather than the original compensation of $7, to account for economic inflation. Finally, distinct from the original method of data collection (using paper-based surveys), we administered a computer-based Qualtrics survey to collect data. This deviation was beneficial for two reasons. One, manual logging of data was not required, eliminating potential human errors in the process, and second, completed surveys were time-stamped with the intention that documentation and sharing of data (on the open science framework website) will be more efficient.

General Discussion

Traditional emotion theories including the basic emotion theory (e.g., Ekman, 1992; Ekman & Cordaro, 2011; Keltner et al. 2019) and emotion appraisal theories (Lerner & Keltner, 2000, 2001; Smith & Ellsworth, 1985), suggest that specific discrete emotions such as sadness and disgust, stem from an evolutionary need to respond to different situations with specific behaviors and judgments. Further, such emotions are theorized to "prompt us in a direction that, in the course of our evolution, has done better than other solutions in recurring circumstances that are relevant to our goals" (Ekman & Cordaro, 2011, p. 364). Appraisal theories posit that the variability in emotion effects on behavior is derived from differences in the cognitive appraisals that define an emotion experience. However, findings from our pilot study revealed that disgust scored higher than sadness (and neutral) for both motivational goals of "expel and avoid" and "change circumstances." Our results demonstrate that although there is robust support for the "change circumstances" goal driving the effects of sadness, there is considerably less support for the goal of expelling and avoid in driving the effects of disgust. Although disgust might intuitively motivate avoidance of objects, the original results for disgust priming lower willingness to pay to obtain an object were not replicated in this study. This suggests that the effects of these two emotions may not be as distinct in their motivational goals from a functional account of the emotional experiences, as was originally hypothesized. For instance, disgust involves salience of contamination (Rozin & Haidt, 2013), which may trigger an adaptive need to "change circumstances," as much as or more than sadness.

Another possible explanation for the observed discrepancy in the "change circumstances" goal might come from the constructionist perspective of emotions (Barrett, 2006; Lindquist, 2013). Constructionism ideates an alternative account in emotion science by hypothesizing that bodily feelings of affect provide psychological meaning to situations (cf., Barrett, 2009). That is, the core affective physiological state is experienced as having properties of valence and arousal, which may themselves drive behavior (Barrett, 2006; Russell, 2003). These are then transformed into specific emotions based on learnings from cultural priming and psychologically accessible concepts (Barrett, 2013; Lindquist, 2013). In other words, beyond attributes such as valence, emotion concepts highlight global (rather than specific) content and motivate judgment based on the accessibility of a particular concept during an experience (Cameron et al., 2015). For instance, fear is motivated both by negative affect as well as the accessible concept of threat (Lindquist & Barrett, 2008). Thus, it was both relevant and important to retest and extend the original examination of Lerner et al. (2004) to unravel whether the emotion effects on spending operate via the hypothesized pathways or might there be alternative pathways that explain our findings (i.e., the high correlation between the two motivational goals) and test the robustness of the emotion effects.

Implications of Results

Lerner et al. (2004) conducted one of the first studies pioneering the role of discrete emotions on consequential behaviors such as spending. Not only did the results make a crucial contribution to the emotion literature but facilitated important practical implications. Their findings illustrated that the influence of disgust on spending could potentially be used to lower willingness to pay for negative products such as tobacco products, by using disgust-inducing images on cigarette packets, for example. The authors attributed the divergence of these emotional effects to distinct mediating pathways which they theorized but did not test empirically. In this research, we not only tested the original hypothesized mechanism but also, explored arousal as an alternative mechanism in this context.

Recent calls for replication highlight the importance of reassessing well-cited findings (e.g., Pashler & Harris, 2012). The need for replication studies is more pronounced since the relevance of the stimuli used to test theoretical frameworks may change over time. For instance, the psychological value of a highlighter pen set used in the Lerner et al. (2004) study may be different today since people read more online. Consequently, the theoretical framework of the study may be challenged if sadness did not prime higher choice prices. Thus, scientific practices require consistent reconsideration of published, and often well-cited findings for the elimination of false positive effects and to gain assurance in our theoretical understanding as a field. Importantly, practical implications of emotional influences extend from monitoring one's own behavior to policy making. In attending to what, how, and why our emotions prime us to behave the way we do, we can improve our decisions. For instance, extraneous factors such as affective states serve as a foundation for self-regulation (Tice et al., 2007) and may even impact consequential, other-impacting decisions such as judicial sentences (Danziger et al., 2011). The extent of human behavior impacted by emotions thus emphasizes the need to accurately understand the factors shaping our judgment and decisions so that we may better manage the nuanced influences implicated in the cognitive processes.

Limitations and Future Research Directions

Although the replication study advances existing understanding in multiple ways, there are some limitations that future research can address. Guided by prior work on appraisal dimensions of sadness which have successfully used explicit scale measures (Cryder et al., 2008; Dorison et al., 2020; Smith & Ellsworth, 1985), we developed scales to assess the motivational goals which were proposed as mediators by Lerner et al. (2004), in this research. Importantly, scale measures helped us to preserve the original study protocol while extending the examination. Although the reliability of our measures was high and the emotions → motivations link was replicated across two studies with well-powered samples, one way to improve the examination would be to develop more distinct measures for the motivational goals of expelling/avoiding and changing circumstances to lower the correlation, if possible. While research argues that adaptive functions and motivational orientations of emotions are defined by the behaviors they generate (Frijda, 1986; Zeelenberg et al., 2008), we acknowledge that it is equally important to develop measures to provide evidence of the mechanistic pathways of the effects for greater clarity (Lerner et al., 2015). For instance, although the implicit tendency of disgust to expel/avoid is thought to be independent of the object, the effect might be more robust for commodities that are perceived as socially or psychologically threatening, rather than generic commodities such as pens. Notably, this study replicates the null effects of disgust on financial decisions reported in the findings of Shu and Peck's (2011) replication of Lerner et al. (2004). Our significantly stronger sample size combined with similar findings as Shu and Peck's (2011) study emphasizes the importance of understanding implicit goal activation and subsequent behaviors in this context, thus enriching the contributions of the current work. Future research can develop tailored measures for motivational goals so that further examinations can be conducted to provide more granular evidence of discrete emotion effects.

A second limitation can be argued to be around the measure of arousal used in the current study. Arousal or activation can be assessed using a diverse range of methods including heart rate, skin conductance, and pupil diameter (Bradley et al., 2008), electroencephalogram (Stenberg, 1992), as well as self-report measures (Walden et al., 2003). In our study, we used a self-report measure from prior research (e.g., Berger, 2011) to assess arousal activation in order to minimally alter the original study procedure (Lerner et al. 2004). Additionally, the laboratory study was conducted while safety concerns relevant to the COVID-19 pandemic were still salient and social distancing rules were in place. Thus, we refrained from utilizing measures of arousal that would require sharing of equipment or potential physical contact. Importantly, we do find support for arousal's role in mediating the effect of sadness on change circumstances and eventually on choice prices. Future research is needed to further explore the effect of arousal while examining emotion moderators of the endowment effect. Specifically, research can build on the current examination by employing implicit physiological measures of arousal or even explicitly manipulating arousal, to provide further insights.

Finally, we would like to discuss a potential measurement order effect as a situational influence factor. Since all the necessary constructs are usually measured in one attempt, it is common in the literature to assess mediator measures after the dependent variable (Fiedler et al., 2011; Jacoby & Sassenberg, 2011; Kim et al., 2018). Thus, we measured motivational goals as mediators after the dependent variable of spending decisions in the current replication. We chose to include our hypothesized mediators after the dependent variable as part of prioritizing closeness to the original study protocol as a strength of this replication study. An underlying assumption of assessing causal mechanisms by measuring the mediator before the dependent variable is that the causal order of variables is correctly specified. To test the possibility of any confounds in the data collection process, we conducted a reverse mediation analysis (Lemmer & Gollwitzer, 2017) with choice prices as the mediator and each motivational goal as the dependent variable (X → Y → M). General recommendations that we followed focused on, "good practice to measure the dependent variable first (to obtain a measure uncontaminated by possible carry-over effects of other scales), and subsequently pose related attitude and covariate-like questions to the respondent" (Iacobucci et al., 2007, p. 140), thus measured the proposed mediators after the dependent variable. Further, the reverse mediation analysis showed a residual direct effect in the reversed model thus, eliminating concerns of confounds in the order of

measures and data collection process (Kim et al., 2012). However, we acknowledge that measuring the mediator before the dependent variable can retain the causal order of the phenomenon and believe that future research that implements the revised order can provide additional insights.

Finally, although we used multiitem measures to gauge each emotion-specific goal, future research can investigate the robustness of these effects using implicit measures such as with a neurophysiological approach. Such examinations can not only provide insights into the generalizability of discrete emotional influences on the endowment effect, but also potentially advance research by highlighting novel unobserved causal pathways. Given the extensive research in this domain across psychology, economics, and marketing, another worthwhile endeavor will be a meta-analytic examination of the moderators of the endowment effect to facilitate insights for future research.

Overall, beyond replicating an important and influential study, we believe that our research provides greater clarification of the initial conceptualization and provides a clearer understanding of the experiential qualities of the emotions of sadness and disgust.

Context of the Research

The idea for this project originated from the second author's research involving sadness and (food and nonfood) product consumption which demonstrated sad individuals' tendencies to consume more of a hedonic product and spend more on a new product (Garg, 2019; Garg et al., 2007; Garg & Lerner, 2013). Further research by the author has established the resilience of this effect, even in the face of other forms of compensation (Garg et al., 2018). While prior research has established sadness-induced helplessness and self-focus as the underlying drivers of this effect (Cryder et al., 2008; Garg & Lerner, 2013), the motivational goals proposed in the original paper (Lerner et al., 2004) had not been empirically examined. Given the significance of the Lerner et al. (2004) paper and its impact on emotion research, the authors believe that the current replication and extension will contribute to both, a greater understanding of specific negative emotions and their downstream effects, as well as to the broader emotion literature.

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