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Trait Self-esteem Moderates Decreases in Self-control Following Rejection: An Information-processing Account

Michelle Vandellen^{1,*}, Megan L. Knowles², Elizabeth Krusemark³, Raha F. Sabet¹, W. Keith Campbell⁴, Jennifer E. McDowell^{4,5}, and Brett A. Clementz^{4,5}

¹Social Science Research Institute, Duke University, Durham, NC, USA

²Department of Psychology, Franklin and Marshall College, Lancaster, PA, USA

³Department of Psychology, University of Wisconsin, Madison, WI, USA

⁴Department of Psychology, University of Georgia, Athens, GA, USA

⁵Department of Neuroscience, Bioluminescence Research Center, University of Georgia, Athens, GA, USA

Abstract

In the current paper, the authors posit that trait self-esteem moderates the relationship between social rejection and decrements in self-control, propose an information-processing account of trait self-esteem's moderating influence and discuss three tests of this theory. The authors measured trait self-esteem, experimentally manipulated social rejection and assessed subsequent self-control in Studies 1 and 2. Additionally, Study 3 framed a self-control task as diagnostic of social skills to examine motivational influences. Together, the results reveal that rejection impairs self-control, but only among low self-esteem individuals. Moreover, this decrement in self-control only emerged when the task had no social implications—suggesting that low self-esteem individuals exert effort on tasks of social value and are otherwise preoccupied with belonging needs when completing nonsocial tasks.

Keywords

self-concept and self-esteem; social and personal relationships; attention

Social scientists have long argued that relationships and social interactions play an important role in how people think about themselves (Cooley, 1902; Leary, Tambor, Terdal, & Downs, 1995; Mead, 1934). A core motive that reflects the centrality of social relationships in daily life is the need to belong, a drive that motivates individuals to engage in behaviours thought to secure acceptance and protect against exclusion (Baumeister & Leary, 1995; Maslow, 1958). To regain a sense of belonging after rejection, individuals engage in a variety of affiliative behaviours such as social compensation in group contexts (Williams & Sommer, 1997), conformity (Williams, Cheung, & Choi, 2000) and allocation of rewards to future interaction partners (Maner, DeWall, Baumeister, & Schaller, 2007). Other recent research reveals that individuals spontaneously exhibit affiliative behaviours after experiencing a threat to their belonging needs. For instance, excluded participants automatically mimicked the behaviour of interaction partners and ingroup members (Lakin, Chartrand, & Arkin,

2008). Cumulatively, these efforts aimed at restoration of social bonds indicate a system that is sensitive to an individual's current level of social acceptance. We view this system as rooted in sociometer theory (Leary et al., 1995) and propose that trait self-esteem captures chronic differences in information processing related to interpersonal relationships. In the current paper, we explore how trait self-esteem moderates responses to threatened belonging via decrements in state self-control with a focus on how this moderation is consistent with an information-processing account.

To date, dozens of studies have examined a link between threatened belonging needs and social motivation. Most of that work was informed by sociometer theory (Leary et al., 1995), suggesting that state self-esteem essentially functions as a monitor of one's inclusionary status so that instances of social rejection and acceptance produce decreases and increases in self-esteem, respectively. In recent work focusing on the neural underpinnings of the sociometer, brain regions associated with rejection distress (i.e. bilateral anterior insula and dorsal anterior cingulate cortex or dACC) showed enhanced activity after receiving negative social feedback to the extent that individuals reported lower state self-esteem (Eisenberger, Inagaki, Muscatell, Halton, & Leary, 2011). Because acceptance increases state self-esteem and rejection often decreases state self-esteem (Blackhart, Knowles, Nelson, & Baumeister, 2009) and belonging contributes to general well-being, people often engage in behaviours aimed at restoring social status and belonging following rejection or other instances of relational devaluation (DeWall, 2010; DeWall, Maner, & Rouby, 2009; Leary et al., 1995).

Arguably, the first step in restoring a sense of belonging is to tune into one's social environment. In line with this idea, Pickett and Gardner (2005) posited that threats to belonging needs activate a social monitoring system whereby individuals attend to, decode and recall relevant social information. A number of studies have provided evidence of heightened attention to social cues after rejection. For instance, Pickett, Gardner and Knowles (2004) found that individuals who relived a rejection were more likely to spontaneously attend to vocal tone in a Vocal Stroop Task than individuals who relived a failure or neutral experience. Similarly, following social threat, early-stage processing of social information increases such that people focus more attention on smiling faces (DeWall et al., 2009). Moreover, rejection enhances the gaze-oriented triggering effect (Wilkowski, Robinson, & Friesen, 2009). In comparison with individuals who relived a past acceptance, those who relived a rejection were more responsive to the gaze direction of a face. Arguably, heightened attention to social information such as vocal tone, smiling faces and eye gaze should facilitate subsequent social interactions and improve chances for social reconnection.

Selective attention to stimuli often begets selective memory for those stimuli. As a result, one would expect social threats to produce not just heightened attention to social cues but also enhanced memory for social information. Indeed, excluded individuals demonstrate better memory for social events than included individuals (Gardner, Pickett, & Brewer, 2000). More recently, research has revealed that rejection bolsters memory of other-focused information in particular (Hess & Pickett, 2010). Presumably, enhanced social memory facilitates the fortification of social bonds following rejection, but no research has tested this assumption directly.

For an interaction to go smoothly, one must not only merely attend to social cues and remember relevant social information but one must also be able to decode those social cues accurately. Indeed, Pickett and Gardner (2005) posited that enhanced accuracy is another component of the social monitoring system. According to their model, individuals with heightened belonging needs should be more accurate in decoding verbal and nonverbal cues. Consistent with this prediction, excluded individuals are more accurate in discriminating

Duchenne smiles from non-Duchenne smiles (Bernstein, Young, Brown, Sacco, & Claypool, 2008). Being able to recognise emotional facial expressions, vocal tones and genuine smiles should provide socially threatened individuals with important advantages in forming new or repairing existing social bonds.

TRAIT SELF-ESTEEM AND THE SOCIAL MONITORING SYSTEM

This research highlights how situational experiences of social rejection lead to increased efforts to maintain social belongingness. State self-esteem has been implicated in this process as the cue that relational devaluation has occurred. Building on this research, one could also construe trait self-esteem in accordance with sociometer theory. In line with this idea, individuals who are successful at attaining satisfying relationships have higher state and trait self-esteem (Denissen, Penke, Schmitt, & van Aken, 2008). In our view, low trait self-esteem can be construed as a proxy for people with chronically challenged belongingness needs.

Given the sociometric properties of state self-esteem, one would thus expect chronically enhanced social monitoring among those low in trait self-esteem. Research has primarily tested this hypothesis with regards to traits carrying similarities to the social belonging deficits we expect among low self-esteem individuals. For example, lonely individuals and those with dispositionally high belonging needs are more accurate in identifying vocal tones and emotional facial expressions than the nonlonely and those low in belonging needs (Gardner, Pickett, Jefferis, & Knowles, 2005; Pickett et al., 2004). Importantly, the enhanced performance found among individuals with chronically high belonging needs is specific to social tasks—suggesting that heightened belonging needs do not increase motivation in general (Pickett et al., 2004, Study 3). In a similar vein, the lonely—that is, those who are not satisfied with their current social bonds—also demonstrates better memory for social information than the nonlonely (Gardner et al., 2005).

Fortunately, some research has shown an association between low trait self-esteem and self-reported interpersonal sensitivity. For example, individuals with lower self-esteem report particularly high interpersonal awareness (McCabe, Blankstein, & Miller, 1999). Studies using performance-based measures of interpersonal sensitivity provide convergent evidence of enhanced social monitoring among individuals with low self-esteem. For instance, in a sample of 30 undergraduates, trait self-esteem predicted performance on the Revised 'Reading the Mind in the Eyes' Test (Baron-Cohen, Wheelwright, Hill, Raste, & Plumb, 2001) such that low self-esteem individuals were significantly more accurate than high self-esteem individuals in recognising the emotional or cognitive state conveyed by sets of eyes (Knowles, 2006). Similarly, low self-esteem individuals are more likely to follow another's gaze than high self-esteem individuals—an effect that has been shown with rejection-primed individuals as well (Wilkowski et al., 2009). Furthermore, research reveals that trait self-esteem deficits among the excluded motivate them to discriminate Duchenne and non-Duchenne smiles and to prefer to work with those with genuine smiles (Bernstein, Sacco, Brown, Young, & Claypool, 2010).

These patterns of information processing likely represent a complicated interplay between motivation and cognition. Although the cognitive patterns associated with increased social attention could magnify belonging motivations, we suspect the reverse is more likely. That is, these patterns of information processing are more likely the result of heightened motivation to form social relationships among low self-esteem individuals. Importantly, this heightened motivation may manifest itself in various ways. One possibility is that individuals with low self-esteem have chronic activation of the social monitoring system. An additional possibility—one that may work independently of or in addition to potential

chronic activation of the social monitoring system—is that individuals with low self-esteem may be particularly vulnerable to experience of social rejection. First, they may perceive experiences of rejection to be stronger because of the increased attention they give their social interactions. Second, because the pool of social interactions on which they base their self-esteem is more negative than that of individuals with high self-esteem, experiences of social rejection may be more likely to move individuals with low self-esteem beyond a critical tipping point—a point at which social motivation becomes not only important but also a primary focus.

Although one might expect individuals with low self-esteem to develop positive social relationships as a result of their enhanced social sensitivity, there are multiple reasons why increased social monitoring does not necessarily result in relationship success for those with low self-esteem. First, low self-esteem individuals might fail under the social pressure of real-world interpersonal interactions, as do the lonely. Even though lonely individuals demonstrate greater attention to and accuracy in decoding social cues in the lab than their nonlonely counterparts (Gardner et al., 2005), this sensitivity does not translate into positive social interactions and eradicate their loneliness. Recent research reveals that lonely individuals choke on social monitoring tasks that are framed in social ways (e.g. as indicative of social success), and anxiety appears to mediate this choking effect among the lonely (Knowles, Lucas, Gardner, & Baumeister, 2011). Like the lonely, low self-esteem individuals may have difficulty translating enhanced social sensitivity into actual social behaviour that might lead to social integration.

Second, low self-esteem individuals may have difficulty fortifying their social bonds because of their particular attunement to social risks in their social environments (Anthony, Wood, & Holmes, 2007). One downstream consequence of low self-esteem individuals' heightened attention to social risk is that they experience more negative affect after being exposed to subliminal rejection cues (i.e. faces displaying anger and disgust; Richter & Ridout, 2011). As a result of this heightened sensitivity to rejection cues, individuals with low self-esteem are more likely to perceive events as suggesting that their belongingness is being challenged than individuals with higher self-esteem. Moreover, perceptions of interpersonal risk activate self-protective goals among low self-esteem individuals—leading them to push away partners rather than trust and connect with them (Murray, Derrick, Leder, & Holmes, 2008).

Additionally, this heightened sensitivity of individuals with low self-esteem is evident when they respond to threats to the self (e.g. negative feedback, social rejection; vanDellen, Campbell, Hoyle, & Bradfield, 2011). As evidence of this heightened sensitivity, individuals with low self-esteem tend to respond to self-threats with increased negative affect, reduced positive affect and reduced state self-esteem to a much greater degree than do individuals with high self-esteem. Similarly, in response to direct social rejection (e.g. social exclusion from a group), individuals with low self-esteem appear to be particularly vulnerable compared with individuals with high self-esteem (vanDellen, Allen, & Campbell, in press). Convergent evidence across a number of studies suggests that individuals with low self-esteem—such as those with a heightened need to belong—display enhanced social sensitivity. Yet, this enhanced social sensitivity does not necessarily translate into stronger social bonds.

In sum, then, although threat increases attention to social reconnection for all people, individuals with low self-esteem are in a particularly vulnerable situation. Because individuals with low self-esteem appear to have chronically threatened belongingness needs and are increasingly sensitive to negative social experiences, rejection should increase activity in the social monitoring system among individuals with low self-esteem. In contrast,

because individuals with high self-esteem are less sensitive to social threats, rejection may not increase activity in the social monitoring system for them.

THE IMPLICATIONS OF SOCIAL MONITORING FOR SELF-REGULATION FOLLOWING REJECTION

Given that threatened relational value focuses attention on social reconnection, and as we expect, particularly for individuals with low self-esteem, one downstream consequence of rejection may be reduced in pursuit of nonsocial goals. Indeed, past research indicates that experiences of rejection decrease state self-control (Baumeister, DeWall, Ciarocco, & Twenge, 2005; Baumeister, Twenge, & Nuss, 2002; DeWall, Baumeister, & Vohs, 2008; Twenge, Catanese, & Baumeister, 2002). Social rejection similarly leads to decrements in complex reasoning and decision making, constructs associated with executive functioning and self-control (Baumeister et al., 2005; Campbell et al., 2006; Krusemark, Campbell, McDowell, & Clementz, 2011). To date, this decrease in self-control following social rejection has been explained in terms of a broken social contract (Baumeister et al., 2005). In essence, when people are rejected from society, they become less motivated to behave in a socially appropriate manner. In this paper, we suggest an alternative account of why social rejection leads to decrements in self-control. Specifically, we offer an information-processing account by which decrements in self-control following social rejection occur because rejection elicits a shift in both attention and motivation towards restoring social connections. Therefore, because low trait self-esteem is associated with chronically threatened belonging needs, in the present studies, we focus specifically on the role that trait self-esteem plays in moderating reactions to rejection.

In light of recent empirical evidence suggesting that high self-esteem acts as a resource, buffering individuals from the need to respond to threats to self-worth (e.g. Brown, 2010; vanDellen et al., 2011), we expected that an attentional shift toward social information would be most evident among individuals with low trait self-esteem. Therefore, because they lack the buffer of their counterparts with high self-esteem, we expected participants with low self-esteem to be especially preoccupied with social needs following rejection and therefore to fail to exert self-control on tasks presented in the laboratory. However, we also suspected that if opportunities for self-control were presented as being related to social needs, because their attention to belongingness is heightened following rejection, participants with low self-esteem would actually exert more self-control than their counterparts with high self-esteem.

STUDY 1

The purpose of this study was to test the possibility that trait self-esteem might moderate the effect of social rejection on state self-control. Specifically, we expected that individuals low in trait self-esteem would be particularly sensitive to social rejection.

Method

Participants: We recruited 98 participants (68 women, 30 men) from an undergraduate research pool at a public university in the southeastern USA. All participants were between the ages of 18 and 25 years and completed the study in exchange for partial completion of a research requirement for an introductory psychology course.

Procedure: Participants completed the 10-item Rosenberg Self-Esteem Scale (RSE; Rosenberg, 1965; $\alpha = .91$, $M = 4.25$, $SD = 0.71$) by using a five-point Likert scale with endpoints ranging from 1 (*not at all like me*) to 5 (*very much like me*) to indicate their level of self-esteem. Following completion of the RSE and other filler scales, participants were

randomly assigned to reflect on and answer questions about either an experience of social rejection or an experience of physical pain. Writing about physical pain served as a control condition involving a negative, but nonsocial, event. Specifically, participants in the *rejection condition* were asked to ‘think back to a time in your life when you felt really left out of a group’, whereas participants in the *pain condition* were asked to ‘think back to a time in your life when you felt physical pain’. All participants were asked to report what the experience was like and how it made them feel. Additionally, participants answered a series of questions about the event including the physical location where the event occurred and when the event occurred. Finally, participants wrote a few sentences describing the experience.

After the recall manipulation, participants completed a computerised point-earning waiting game that served as our measure of self-control (based on Schmeichel & Vohs, 2009, Experiment 4). Participants were told they would be playing a computer game in which they could earn points. The task was framed simply as a task to be completed with no mention of social skills or self-control. Each participant completed a trial in which they chose between earning three points in exchange for a three-second delay or 15 points in exchange for a 15-second delay before the next item appeared. The purpose of the practice trials was to accustom the participants to the game. Specifically, the practice trials allowed participants to learn which item was associated with a longer delay and which was associated with a shorter delay. The longer delay is unpleasant because it involves a longer period of boredom and the perception of making slower progress, but it offers a greater point reward. Because the tendency is to move on quickly, choosing this longer delay requires self-control (Schmeichel & Vohs, 2009). After five practice trials, the purpose of which was to establish which icon was associated with which delay and point value, we recorded the participants’ choice on the first trial as an indicator of their motivation to delay gratification. Given that effort and persistence on subsequent trials may be motivated by processes less immediately accessible to the recall manipulation and on the basis of feedback during the task from points received, we chose to record only the first trial of the point-earning waiting game (Bushman & Baumeister, 1998; $M = 10.22$, $SD = 5.90$).

Results and discussion—We used moderated multiple regression to examine the effects of dummy coded condition (control = 0; rejection = 1) and trait self-esteem (standardised) on the participants’ ability to delay gratification. First, we ran a regression analysis examining the main effects of condition and trait self-esteem. There were no main effects of condition, $B = -0.67$, $t(95) = -0.55$, $p = .58$, or of trait self-esteem, $B = 0.71$, $t(95) = 1.16$, $p = .24$. Next, we added a product term representing the interaction between trait self-esteem and condition to the model. When this interaction term was added to the model, both the main effect of condition, $B = -1.07$, $t(94) = -0.99$, $p = .32$, and the main effect of self-esteem, $B = -0.91$, $t(94) = -0.75$, $p = .45$, remained nonsignificant. As expected, we found a significant interaction between trait self-esteem and condition, $B = 2.60$, $t(94) = 1.99$, $p = .05$, $\Delta R^2 = .04$. To parse this interaction, which is depicted in Figure 1, we ran tests of simple effects following the procedures of Cohen, Cohen, West and Aiken (2003). This analysis revealed a marginally significant effect of the rejection manipulation among participants with low self-esteem, $B = -3.51$, $t(94) = -3.86$, $p = .06$, but no effect among participants with high self-esteem, $B = 1.69$, $t(94) = 1.00$, $p = .32$. In other words, this interaction was driven by a loss of self-control among low self-esteem participants following rejection.

STUDY 2

Study 1 provided initial evidence that trait self-esteem moderates the effect of social rejection on self-control. To determine whether this effect would extend to other measures of self-control and experiences of social exclusion, we ran a second study utilising a similar

between-subjects design. As in the first study, we expected that only low self-esteem participants would demonstrate self-control decrements in response to rejection in Study 2.

Method

Participants: We recruited 28 female participants from an undergraduate research pool at a large university in the southeastern USA. All participants were between the ages of 18 and 25 years and completed the study in exchange for partial completion of a research requirement for an introductory psychology course.

Procedure: Individual participants completed the study with two confederates who posed as participants. All three were seated at computers in separate cubicles in the same laboratory room. Participants first completed a questionnaire packet that included the 10-item RSE scale by using a five-point Likert scale with endpoints ranging from 1 (*not at all like me*) to 5 (*very much like me*; Rosenberg, 1965; $\alpha = .85$, $M = 4.50$, $SD = 0.44$). Participants then typed a short *About Me* essay in which they introduced themselves to the other ostensible participants and read two essays that they believed belonged to the other participants. Participants were then instructed to indicate which of the two confederates they would like to work with on a second task. After a short delay in which the computer appeared to be processing all the participants' responses, participants received feedback that they would be working alone on the subsequent task. Participants were randomly assigned to work alone on the basis of a random draw after a tie (i.e. all participants had received the same number of votes) or because of social exclusion (i.e. no other participants had elected to work with them).

Following this rejection manipulation, participants were escorted to a second room in which they completed a self-control task by using the game of Operation (adapted from DeWall et al., 2008). Specifically, participants were given a list of 10 items and instructed to remove them from the game board by using a pair of tweezers as quickly as possible without making any mistakes. The task was framed simply as a task to be completed with no mention of social skills or self-control. A mistake in the game of Operation involves touching the tweezers to the side of the game board which then produces an unpleasant buzzing sound. This task requires self-control because accuracy (i.e. not making mistakes) and speed are at a trade-off. The primary dependent variable we used for this study was time (in seconds) taken to complete the Operation task with shorter durations indicating greater self-control ($M = 131.43$, $SD = 51.86$). Higher numbers on the task reflect poorer performance.

Results and discussion—As in Study 1, we used moderated multiple regression to examine the effects of condition (dummy coded; control = 0 and rejection = 1) and trait self-esteem (standardised) on time taken to complete the Operation task. Because number of errors made on the Operation task was not related to how much time it took participants to complete the task, we did not include errors in our analyses. First, we examined whether there were main effects of trait self-esteem or condition on seconds taken to complete the Operation task. There was neither a main effect of experimental condition, $B = 27.89$, $t(25) = 1.43$, $p = .16$, nor trait self-esteem, $B = -8.77$, $t(25) = -0.89$, $p = .38$. Next, we added the interaction between standardised self-esteem scores and dummy coded regression into the model. In this analysis, both the main effect of condition, $B = 30.28$, $t(24) = 1.74$, $p = .09$, and the main effect of self-esteem, $B = 35.92$, $t(24) = 1.94$, $p = .06$, became marginally significant. As predicted, these main effects were qualified by an expected interaction between trait self-esteem and experimental condition, $B = -57.54$, $t(24) = -2.74$, $p = .01$, $\Delta R^2 = .21$, which is depicted in Figure 2. Tests of simple effects revealed that rejection impaired self-control of participants with low self-esteem, $B = 87.82$, $t(24) = 3.15$, $p < .01$

such that they took more seconds to complete the task, but not those with high self-esteem, $B = -27.26$, $t(24) = -1.03$, $p = .32$.

As in the first study, we found evidence in Study 2 that decreases in self-control following social rejection were moderated by trait self-esteem. Specifically, rejection led to decreases in self-control among participants with low trait self-esteem but did not affect participants with high self-esteem. In essence, across both Studies 1 and 2, rejection only impaired participants' self-control if they had low trait self-esteem. In contrast, having high trait self-esteem—or feeling as if one is generally socially embedded—buffered participants against the self-control decrements typically found after social rejection. Indeed, individuals with low trait self-esteem demonstrated significantly less self-control following rejection experiences than other nonthreatening experiences.

One interesting, but unexpected finding, from both Studies 1 and 2 was that in the control condition, there was a tendency for individuals with low self-esteem to outperform individuals with high self-esteem. This finding points to the complex role that self-esteem plays in maintaining social relationships. One possible explanation is that individuals with low self-esteem are attempting to follow-through on their responsibilities for the implicit social contract (Baumeister et al., 2005). However, this pattern was reversed in the rejection condition. The implicit social contract explanation would hold if one adopted the view that threats to individuals with low self-esteem interrupt their self-regulatory efforts. Another possibility for these effects is that individuals with low self-esteem may be higher on individual difference and personality variables that are not examined in these studies such as conscientiousness, self-monitoring and trait self-control.

STUDY 3

Studies 1 and 2 demonstrated the moderating role of trait self-esteem in rejection-induced self-control impairment, but the question remains: why are individuals with low trait self-esteem particularly susceptible to self-control deficits following rejection? We addressed this question in the final study. Specifically, we examined whether the decrease in self-control found among those with low trait self-esteem after rejection occurs because of a shift in social attention. We suspect that, given a heightened need to belong is associated with increased social attention, the decreases in state self-control among low self-esteem participants occurred because rather than attending to and exerting effort on the task at hand, they were otherwise preoccupied with belongingness needs.

To test this hypothesis, we conducted an experiment in which all participants experienced rejection and were subsequently asked to complete a measurement of self-control (i.e. an executive functioning task). Because Studies 1 and 2 demonstrated that individuals with low self-esteem demonstrate less self-control after rejection, we focused in this experiment on reactions to rejection. Additionally, we changed the way that the self-control task was presented. Rather than presenting the task as neutral (i.e. seemingly irrelevant to social relationships), we told participants that the task measured social skills. On the basis of our hypothesis that self-control impairments occur among individuals with low self-esteem because they shift their energies toward social reconnection, we expected that individuals with low self-esteem would be more motivated to perform well on this task than individuals with high self-esteem.

Method

Participants: We recruited 32 participants (28 women, 4 men) from an undergraduate research pool at a large university in the southeastern USA. All participants were between

the ages of 18 and 21 years and completed the study in exchange for partial completion of a research requirement for an introductory psychology course.

Procedure: When participants arrived one at a time, they completed a personality inventory that was supposedly scored by the experimenter. This inventory included the 10-item RSE scale by using a four-point Likert scale with endpoints ranging from 1 (*not at all like me*) to 4 (*very much like me*; Rosenberg, 1965; $\alpha = .77$, $M = 3.41$, $SD = 0.54$) as well as measures of extraversion. On the basis of the procedures of DeWall, et al. (2009), participants received accurate information about their level of extraversion as well as feedback that they would live alone and have few social relationships. The experimenter scored the participants' extraversion responses and delivered accurate feedback about their level of extraversion (e.g. moderately introverted, very extraverted). Next, the experimenter told the participants:

Some of the other items suggest that you are the type of person who will end up alone later in life. You may have friends and relationships now, but by your mid-20s most of these will have drifted away. You may even marry or have several marriages but most of these will be short-lived and not continue into your 30s. Relationships do not last, and when you are past the age where people are constantly forming new relationships, the odds are you'll end up being alone more and more.

Next, participants completed the *n*-back task (Gevins & Cutillo, 1993) on a computer. The task requires self-control because participants need to monitor and update continually presented information under different levels of cognitive load (Gevins et al., 1990; Smith & Jonides, 1997; Owen, McMillan, Laird, & Bullmore, 2005).

Participants were told the following:

The next task you'll complete is an *n*-back task. In the task, you'll be asked to respond to a target letter presented on the screen in two different levels of difficulty. You should respond as quickly and accurately as you can on every trial. We are using this task because we think it is an indirect way of measuring people's social skills.

During the *n*-back task, participants were instructed to monitor a series of letters and respond whether a current stimulus was the same as the one presented *n* trials previously. Participants practised a short version of the task (made up of two levels of the task in increasing order of difficulty: base and one-back) to become familiar with the speed of presentation. As the easiest level of the task, the base block consisted of 45 trials with a series of letters one at a time, requiring participants to respond to all trials with a button press on the keyboard. This part of the task simply requires individuals to respond when any letter is presented, rather than making a same/different judgement for every trial. For the one-back block, participants responded to indicate whether the presented letter matched the letter in the previous position. At this more difficult level of the task, participants had to respond at every trial (indicating with a different button whether the letter matched or did not match the previous letter), repeatedly updating the information held in working memory (45 trials, 14 matches per block). Participants were presented these blocks of trials in a randomised order. Because we were interested in motivation to perform well on this task, we treated reaction time in milliseconds (ms) to the trials as our dependent measure. Shorter reaction times demonstrate increased motivation to perform well on the task.

Results and discussion—In this study, all participants received a threat to their belonging needs. Therefore, we did not include a factor in the statistical model that pertained to social rejection (as in Studies 1 and 2). Instead, in this study, the experimental

manipulation was a within person factor. Specifically, we measured performance at two varying levels of task difficulty. To account for the repeated nature of this variable, we ran a mixed model with trait self-esteem treated as a continuous between-subjects variable and task difficulty (control, difficult) treated as within-subjects variable. This analysis produced a main effect of task difficulty, $F(1, 30) = 103.23$, $p < .0001$, partial $\eta^2 = 0.77$, such that participants responded slower to the difficult trials ($M = 491.17$ ms, $SD = 140.47$) than to the baseline measurement trials ($M = 323.97$ ms, $SD = 103.96$). There was a marginally significant main effect of trait self-esteem on overall response time, $F(1, 30) = 3.49$, $p = .07$, partial $\eta^2 = .10$, suggesting that individuals with low self-esteem responded faster to both baseline and difficult trials. Additionally, there was an interaction between trait self-esteem and level of task difficulty, $F(1, 30) = 4.12$, $p = .05$, partial $\eta^2 = .12$. As Figure 3 shows, trait self-esteem did not predict reaction time on the baseline trials, $F(1,30) = 1.13$, $p = .30$, $r = .19$. However, on the difficult trials, self-esteem did predict reaction times, $F(1,30) = 5.11$, $p = .03$, $r = .38$, such that individuals with lower trait self-esteem responded *quicker* to the difficult trials than did individuals with higher trait self-esteem.

This pattern of results suggests that individuals with low self-esteem were increasingly motivated to follow the instructions of this task and to respond quickly. This increased motivation was apparent overall, but particularly on the difficult trials of the task. Recall that this task was presented as a task that indirectly measured social skills. The results of this study contrast the results from Studies 1 and 2 in which rejection decreased the extent to which individuals with low self-esteem demonstrated self-control. We propose that these differences emerged because in Study 3, participants believed the task they were completing was relevant to social reconnection, whereas in Studies 1 and 2, no such information was provided.

These results support our information-processing explanation by suggesting that decrements in self-control occur after rejection because individuals with low self-esteem shift their attention toward social relationships and away from the goals associated with exerting self-control. When individuals with low self-esteem are given the opportunity to exert self-control on a task that is ostensibly socially relevant, their heightened attention to social information produces effort that is better than that of individuals with high self-esteem.

GENERAL DISCUSSION

Studies 1 and 2 provide convergent evidence that trait self-esteem moderates the effect of social rejection on state self-control. In both studies, we increased the salience of social rejection either through a recall task (i.e. prompting participants to recall an instance of social rejection) or a laboratory experience (i.e. excluding participants from a group). Subsequently, we asked participants to complete a task requiring self-control (i.e. a delay of gratification point-earning task and a speed-accuracy task). Despite the fact that in each study we measured state self-control by using a different operationalisation, we found that trait self-esteem moderated the impact of rejection on self-control. Our findings suggest that rejection has little negative impact on the self-control of individuals with high self-esteem, but it is likely to impair the self-control of those with low self-esteem.

Having established the moderating role of trait self-esteem in rejection-induced self-control impairment, we turned to the question: why are low self-esteem individuals particularly susceptible to self-control deficits following rejection? If low self-esteem indicates that an individual's belonging needs are unfulfilled, then one would expect low self-esteem individuals to chronically engage in behaviours that might improve their inclusionary status. Past research showing that low self-esteem individuals outperform their high self-esteem counterparts on a variety of social monitoring tasks (e.g. Bernstein et al., 2010; Knowles,

2006; Wilkowski et al., 2009) suggests that individuals with low self-esteem tune into their social environments to fortify their sense of belonging. However, the results of our study indicate that these social monitoring tendencies are particularly likely to occur if individuals with low self-esteem experience a social threat such as rejection. If low self-esteem individuals attend to social information after threat, they have fewer resources to devote to other nonsocial tasks—a burden that is not shared by high self-esteem individuals. Thus, the diverted attention of those with low self-esteem could account for the disparate effects of rejection on self-control among those high and low in self-esteem.

To fully test this information-processing account of the moderating influence of self-esteem, we ran a final study. In Study 3, we presented a self-control task to participants as one that measured social skills. In this study, lower self-esteem was actually associated with improved effort on the task. The results of this study, combined with those of Studies 1 and 2, suggest that the reason self-control is impaired following rejection has to do with a shift in motivation toward social reconnection. When the self-control task offered a chance at demonstrating skills necessary for social reconnection, individuals with low self-esteem performed particularly well on it. These results are consistent with research suggesting that following rejection, social motivation increases (Gardner et al., 2000; Pickett et al., 2004) and with work suggesting that low trait self-esteem serves as a vulnerability factor increasing the chances that one will be negatively influenced by social rejection (vanDellen et al., 2011).

Alternative explanation and limitations

Despite the appeal of the information-processing account described previously, we should consider plausible alternative explanations for the moderating influence of trait self-esteem. Our information-processing account focuses on the characteristics of individuals with low self-esteem; however, it is possible that the differential impact of rejection on self-control is driven by characteristics of individuals with high self-esteem. If trait self-esteem is indicative of inclusionary status, individuals with high self-esteem may have a strong sense of social connection and belonging that could serve as a buffer or resource against acute rejection experiences. In other words, high self-esteem individuals might have enough strong, stable social bonds to protect them against the self-control decrements associated with rejection. Similarly, past research reveals that after rejection, individuals will draw upon their social resources, and the accessibility of one's group memberships, in particular, is associated with self-esteem (Knowles & Gardner, 2008). Moreover, a recent meta-analysis reveals that high self-esteem acts as a resource, buffering individuals from the need to respond to threats to self-worth (vanDellen et al., 2011). In short, individuals with high self-esteem might be immune to the consequences of rejection for self-control because of the social resources that can be marshalled in response to rejection.

Although individuals with high self-esteem may have greater resources to draw upon when under social threat than individuals with low self-esteem, this social resources explanation does not account for the findings of Study 3. If this explanation had credence, then framing the self-control task as either socially relevant or irrelevant would have had no impact on participants' performance, but instead, we found that low self-esteem individuals performed better on the self-control task when its social implications were made salient. As stated earlier, individuals with low self-esteem are likely to be more efficient monitors of their social environment and largely more sensitive to contextually relevant means to restore belonging. Thus, the information-processing account may be more valid and parsimonious than the social resources explanation. Still, further research should test this alternative explanation directly.

Although not central to our examination, we note the divergent outcomes in the control condition between high and low self-esteem individuals (Studies 1 and 2) when the tasks were nondiagnostic of social skills. One explanation for this outcome that accords with our theory is that the nature of low self-esteem may actually lead individuals to typically try to exert more self-control. Previous research suggests that people positively construe self-control in others (Baumeister & Alquist, 2009; DeWall et al., 2008). Given that individuals with low self-esteem may be chronically striving to increase their social acceptance, without a social threat, they may be more likely to exert effort on tasks requiring self-control as a means of trying to gain social approval. A question remaining to be answered regarding this possibility is why rejection undermines efforts to exert self-control when it is not perceived as socially relevant. One possibility for this is that rejection increases attention to more readily apparent means of social reconnection. Another possibility that must be considered is that individuals with low self-esteem are not always efficient at managing threats to their self-worth. In fact, often, they want to restore social connection following rejection but experience anxiety that interferes with their ability to do so (Knowles et al., 2011).

We have introduced an information-processing account of self-esteem that is highly interconnected with social motivation. Specifically, we suggest that patterns of information processing arise from heightened motivation to form social relationships. However, future research should address the potential for other sources of motivation (e.g. success in a domain not related to social relationships) to restore the self-control of individuals with low self-esteem. Given that social motivation is a primary concern for individuals and that past research suggests that belongingness needs cannot be met by other substitutes (Knowles, Lucas, Molden, Gardner, & Dean, 2010), we expect that although motivation to succeed should increase the self-control of both individuals with low and high trait self-esteem (Muraven & Slessareva, 2003), it should not reduce the gap between individuals with low and high trait self-esteem. Future studies might benefit from directly addressing the specific sources of motivation (whether a social resource is drawn upon) and content of threatened individuals' thoughts when threatened (a rumination explanation) to clarify and fully delineate potential alternate explanations for divergent self-regulatory outcomes and compensatory mechanisms.

Finally, we note that we examined the effects of rejection in the context of an experiment. Although this has the benefit of isolating rejection as a causal factor in self-control decrements, the study design choices we made make it difficult to additionally examine other factors that may contribute to lack of self-control. Our measurements of state self-control, although consistent with current standards in the field (e.g. Baumeister et al., 1998), were single-item measures of self-control that preclude reliability assessments. These measures are not likely substitutes for each other, as they each capture different aspects of self-control. However, using these different measures as outcomes across a series of studies allows us to conclude that social experiences do seem to affect the source of variance that these measures share—state self-control. Additionally, although we assume that factors such as agreeableness, conscientiousness, need for cognition and working memory capacity, were evenly distributed among our conditions, future research may additionally consider how these individual differences are involved in social information processing and shifts in self-regulatory behaviours following belongingness threats. Furthermore, it would be interesting to identify whether individual differences in implicit, rather than explicit, self-esteem lead to similar shifts in information processing. Given that reacting to a threat is a relatively automatic process (Pickett et al., 2004), we expect that assessing trait self-esteem through implicit measurements should parallel the findings presented here. Finally, particularly interesting research might address real-world implications such as impulse spending and overeating following rejection for individuals with low self-esteem.

Conclusions

Taken together, these studies begin to elucidate important implications for how self-regulation impairment following rejection is understood. Because trait self-esteem appears to moderate the effect of social rejection, it may not make sense to assume that rejection itself drains a volitional resource (e.g. Baumeister, Bratslavsky, Muraven, & Tice, 1998) nor that impairments of self-control are because of a broken social contract (e.g. Baumeister et al., 2005). Rather, an information-processing account may be the best explanation for why self-regulation is impaired following rejection. Our studies suggest specifically that the degree to which one's attention shifts toward social reconnection following rejection, one's performance on traditional self-control tasks becomes impaired. Thus, our information-processing account highlights the role that the social monitoring system plays in directing attention and motivation following rejection.

More generally, our findings point to the general role that personality and individual differences play in the process of self-regulation. In our studies, trait self-esteem was linked to different downstream reactions to self-threats largely because self-threat led to increased social information processing among individuals with low self-esteem. Identifying the ways that trait variables (including related traits such as extraversion, narcissism and more domain-specific aspects of self-esteem) are associated with differing chronic patterns of information processing and how these patterns of information processing influence reactions to events, either positive or negative, will be an important next step in connecting the fields of personality and social psychology.

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Study 1

Effects of Rejection and Trait SE on Delay of Gratification (Nondiagnostic Computer Task)

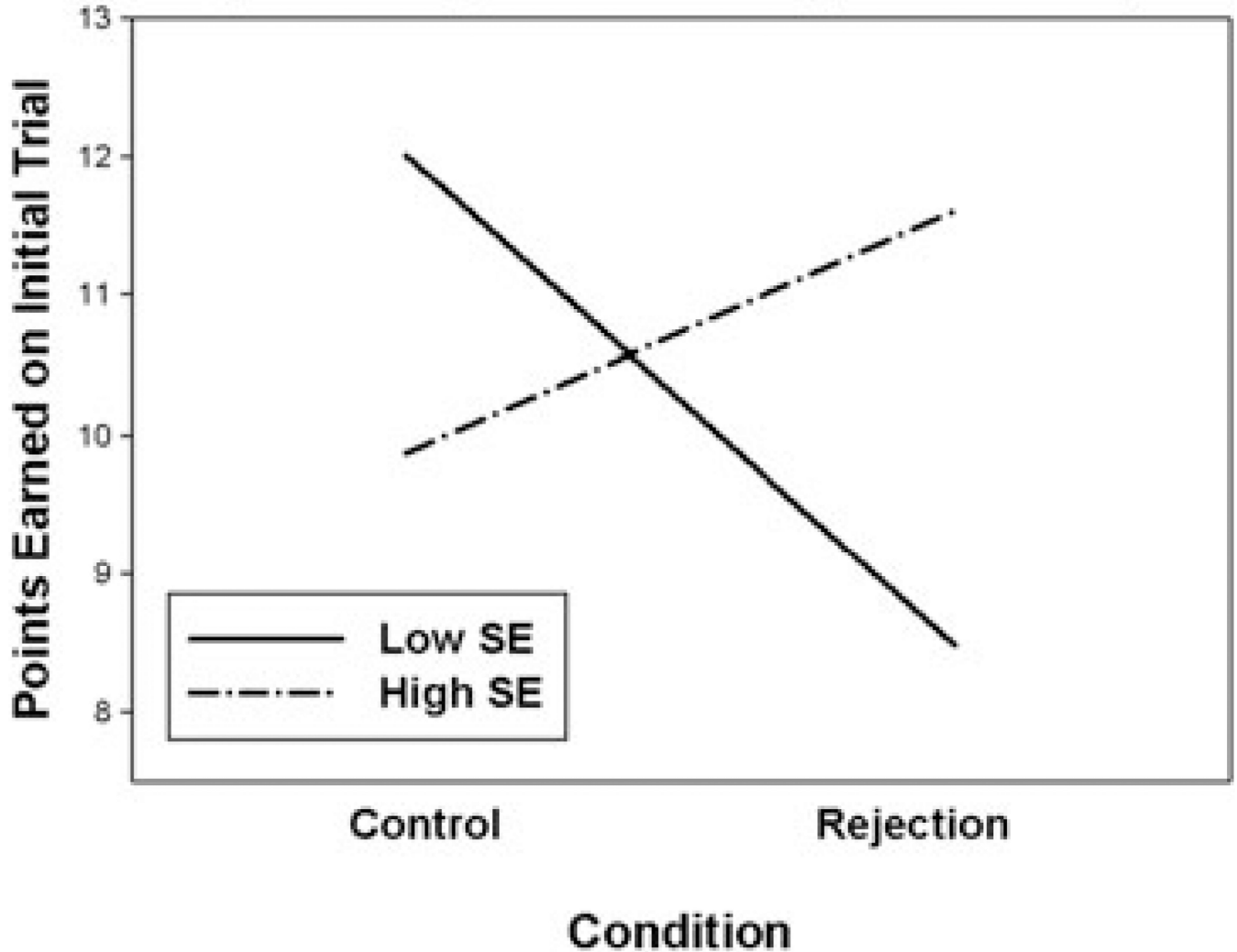


Figure 1. Interactive effects of experimental condition (rejection or control) and trait self-esteem in predicting willingness to engage in delay of gratification (Study 1).

Study 2

Effects of Trait SE and Rejection on Self Control (Nondiagnostic Task)

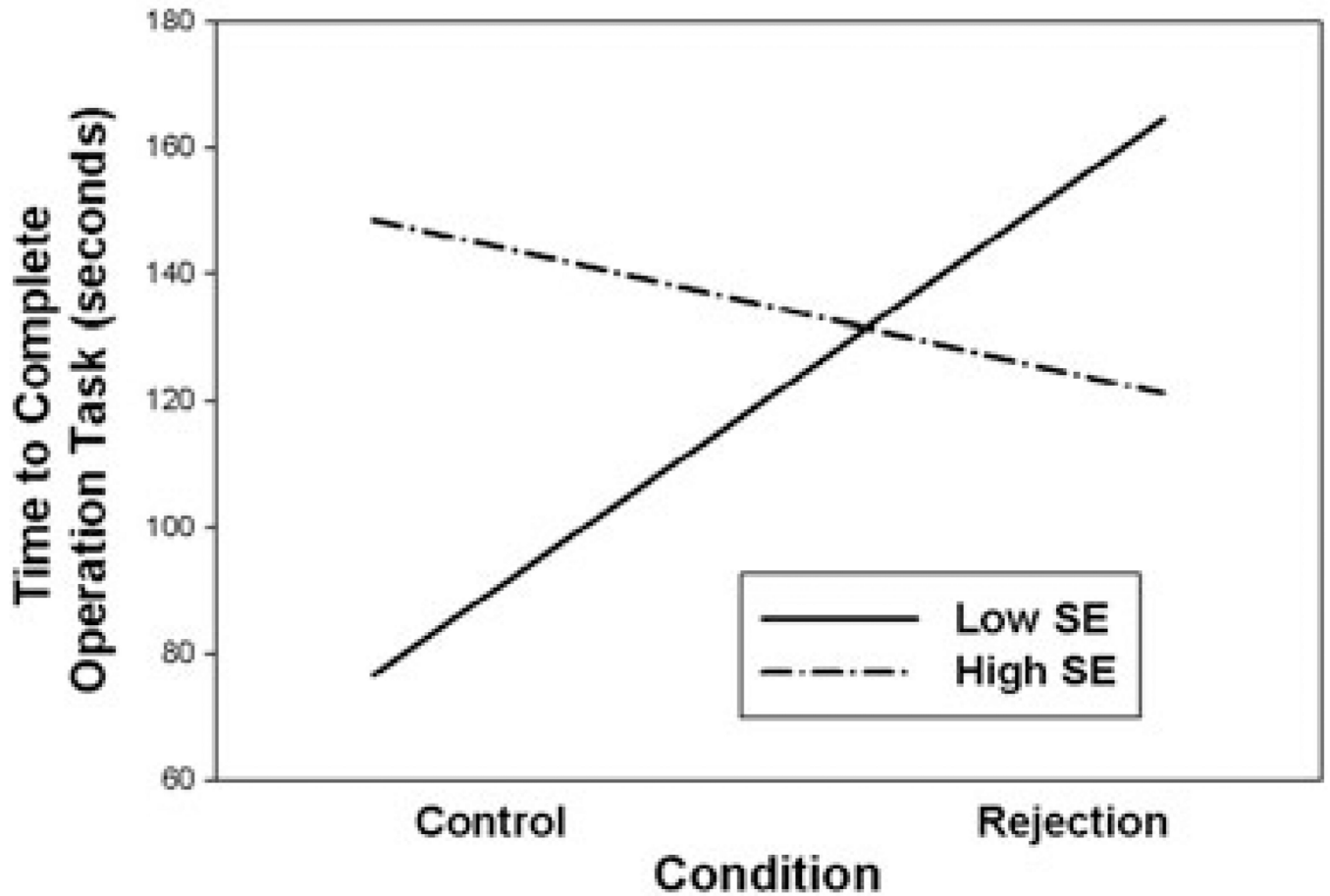


Figure 2. Interactive effects of experimental condition (rejection or control) and trait self-esteem in predicting time (in seconds) to successfully complete a series of tasks on the game of Operation (Study 2).

Study 3

Effects of Trait SE on Self Control (Diagnostic Task)

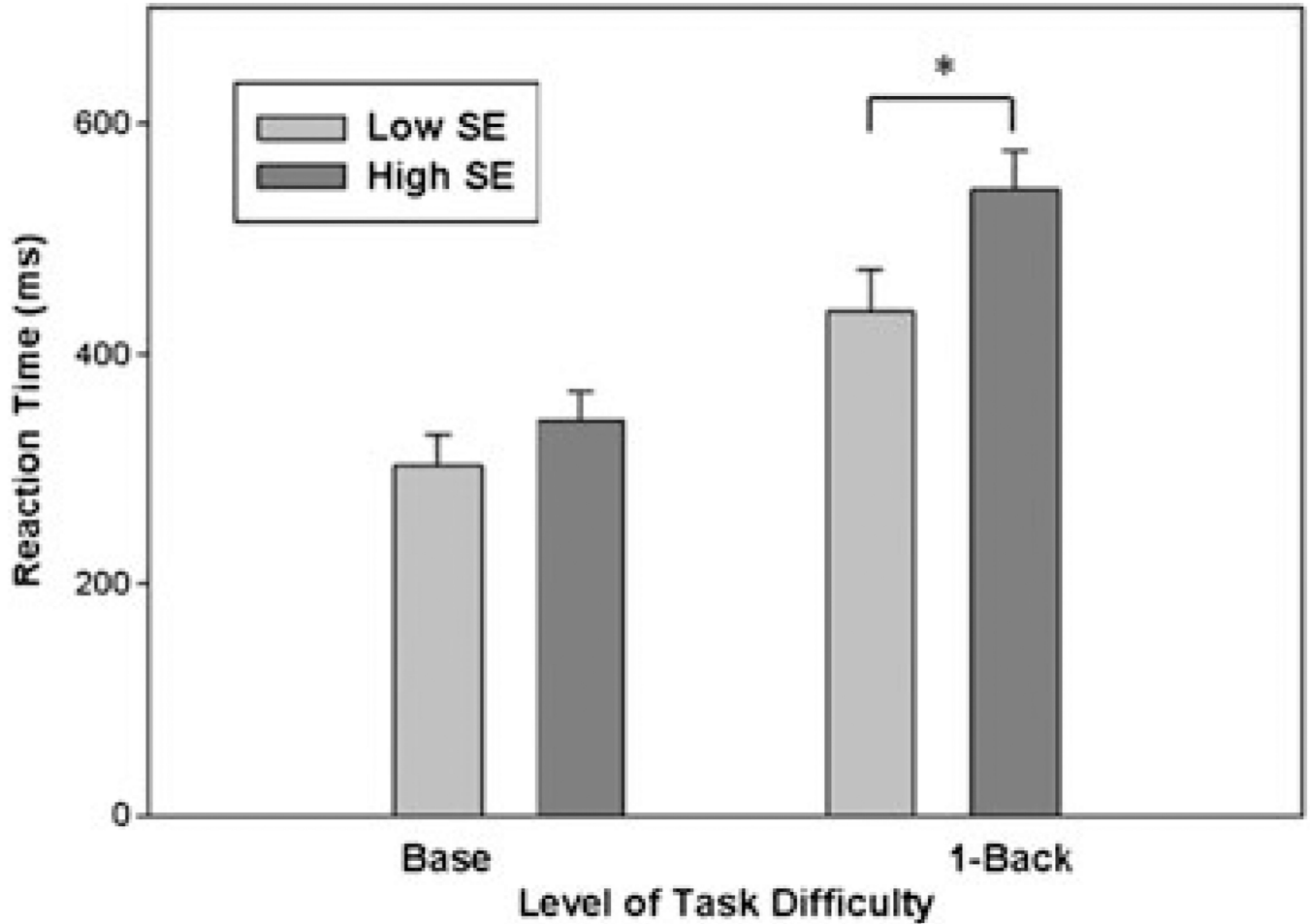


Figure 3. Interactive effects of task difficulty and trait self-esteem in predicting effort on the *N*-back task (Study 3).