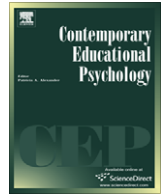




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The buffering effects of rejection-inhibiting attentional training on social and performance threat among adult students [☆]

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ABSTRACT

Concerns about social rejection can be disruptive in an academic context. We set out to train a positive cognitive habit that would buffer against social and performance threat thereby making students less vulnerable and more resilient to rejection. Participants from adult education centers ($n = 150$) were first trained to inhibit rejection using a specially designed computer task, and were then taken through a rejection and failure manipulation. Results showed that of the most vulnerable participants with low explicit and low implicit self-esteem, those in the experimental condition exhibited significantly less vigilance for rejection compared to their counterparts in the control condition. The attentional training also made participants with low explicit self-esteem feel less rejected after a rejection manipulation and less willing to persevere on a virtually impossible anagrams task. Finally, participants in the experimental condition reported less interfering thoughts of being rejected while completing the anagrams task, and overall higher state self-esteem after having been rejected and experiencing failure. The results show that training positive social cognitions can have beneficial self-regulatory outcomes in response to social and performance threat in a school context.

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1. Introduction

Academic learning typically takes place in a social context, and the school environment can be an important source of social stress. As such, academic achievement has recently been described as not only reflecting a purely cognitive learning process but a combination of cognitive and *social* learning processes (Patrick, 1997; Welsh, Parke, Widaman, & O'Neil, 2001). In particular, social rejection and the stress it often causes can interfere with normal learning activities. For example, it is suggested that rejected students are more likely to experience a limited amount of positive peer interaction opportunities thereby depriving them of learning normal, adaptive social conduct and social cognitions (Parker & Asher, 1987). Concerns about rejection can contribute to self-regulation difficulties that undermine academic performance and later school adjustment (Buhs, Ladd, & Herald, 2006).

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The detrimental impact of social rejection concerns is evident in peer rejected students, who have been shown to exhibit increased absenteeism (DeRosier, Kupersmidt, & Patterson, 1994), higher rates of school dropout (Parker & Asher, 1987), and lower achievement (Austin & Draper, 1984; Buhs et al., 2006; DeRosier et al., 1994; French & Waas, 1985; O'Neil, Welsh, Parke, Wang, & Strand, 1997; Welsh et al., 2001). It is also evident in first-year college students for whom emotional factors are considered major causes of attrition (Szulecka, Springett, & de Pauw, 1987) and for whom good emotional and social health increases the chances of succeeding in college (Leafgran, 1989). Academic work habits are influenced by peer rejection as early as when students start kindergarten: peer rejection in kindergarten has been linked to deficits in work habits and academic achievements assessed in later grades, while stable social acceptance has been shown to buffer early academic difficulty (O'Neil et al., 1997). As we review shortly, the impact of social experiences, including rejection and acceptance, is profoundly shaped by the individual's cognitive orientation to the experience, including any tendency to be highly vigilant for and attentive to signs of rejection in their interactions. Therefore, the social cognitions one develops to confront the complex social environment at school are not only important for healthy peer interactions and social functioning but also for developing work habits conducive to academic success, from kindergarten right through to university. Our primary research objective for the current study was to see whether re-training

adult students' negative social cognitions, in particular their hypervigilance for rejection, would positively influence their emotional and behavioral self-regulatory strategies when faced with social and performance threats.

1.1. Self-regulatory processes in the academic context

Some authors have identified individual differences in several cognitive processes that influence academic performance, most of them relating to low self-esteem in one way or another. One cognitive process that is correlated with low self-esteem is rejection sensitivity, which is people's tendency to defensively expect, readily perceive, and overreact to social rejection (Downey & Feldman, 1996). Students high in this hypersensitivity for rejection have been shown to experience increased difficulties in school with peers and teachers, to disengage from school, and to show declines in grades as well as increases in absenteeism and suspensions (Downey, Lebolt, Rincon, & Freitas, 1998).

Another cognitive process contributing to poor academic functioning is cognitive interference, which is a phenomenon whereby the cognitive processing of one task impedes or *interferes* with the processing of a second and simultaneously occurring task. Test anxiety that arises under performance and achievement-oriented conditions, is one type of cognitive interference which is associated with poor academic functioning. Test anxiety is defined as "intrusive thoughts that keep the individual from directing full attention to the task at hand" (Sarason, 1984, p. 932). People high in test anxiety experience greater cognitive interference which causes poor performance (Sarason, 1984; Sarason & Stroops, 1978). The cognitive interference in test anxiety, often involving thoughts of failure or fear of rejection, can perpetuate a cycle of self-preoccupying worry. These negative self-preoccupations in turn interfere with the demands of the task at hand and negatively impact performance. Whereas students high in anxiety are presumed to divide their attention between task demands and personal concerns that take the form of self-preoccupations, those lower in anxiety devote a greater proportion of their resources to the task at hand. Therefore the ability to limit social worries and distractions is a beneficial self-regulatory strategy for task completion and performance.

Specific individual differences in strategies for the self-regulation of behavior have also emerged in the literature, often correlating with people's overall self-evaluation of their own worth, that is, their self-esteem. Whereas individuals with high self-esteem are primarily motivated to achieve success, individuals with low self-esteem are motivated to avoid failure, making for different patterns of behavioral persistence (Baumeister & Tice, 1985; Di Paula & Campbell, 2002; Tice, 1993). Specifically, individuals with high self-esteem have been shown to persist longer than individuals with low self-esteem but only when in a situation where the possibility of eventual success remains (McFarlin, Baumeister, & Blascovich, 1984; Sommer & Baumeister, 2002). When faced with repeated failures, individuals with high self-esteem actually persist less than individuals with low self-esteem, reflecting an effective self-regulatory strategy that enables them to disengage from the task and stop their unproductive persistence (Di Paula & Campbell, 2002). Therefore, tenacious persistence per se is not a sign of effective self-regulation. In fact, effective self-regulation involves a constellation of strategies that monitor the available situational information that inform the individual when it is efficient to either persist on a task or detach from an unattainable goal. Individuals with low self-esteem oftentimes show maladaptive patterns of persistence which can engender negative affect and low self-regard (Di Paula & Campbell, 2002).

1.2. Self-esteem, academic achievement, and vigilance for rejection

Given the evidence linking healthy self-esteem with adaptive self-regulation in the school context, it is not surprising that educators have often sought to "boost" students' overall self-esteem with praise and positive reinforcement in the hopes of improving academic performance. However, this strategy has not withstood rigorous experimental test. By and large, interventions aimed at boosting self-esteem in this way have not shown related increases in academic performance (Baumeister, Campbell, Krueger, & Vohs, 2003; Scheirer & Kraut, 1979).

We propose that the links between self-esteem, self-regulation, and performance might be clarified through further examination of the construct of self-esteem. In recent influential contributions to the literature, self-esteem has been characterized as primarily a *sociometer* system that monitors individuals' social inclusionary status (Leary, Tambor, Terdal, & Downs, 1995). As such, when evaluating one's general sense of self-worth, feelings of self-esteem are suggested to derive from social cognitive processes that perceive, interpret, and regulate one's construal of social feedback, to produce a sense of being accepted and respected versus rejected and criticized. In this light, well-regulated social cognitive processes can buffer the impact of rejection and lead to effective regulation of emotions, effective goal pursuit, and in turn, feelings of self-esteem.

Following the reasoning of the sociometer model, recent research has documented that low self-esteem is associated with a pattern of biased attention toward social rejection. Dandeneau and Baldwin (2004) used an Emotional Stroop task to investigate the association between vigilance for rejection information and low self-esteem. Whereas the original Stroop task asked participants to quickly name the 'ink' color of color words, the Emotional Stroop task asks participants to name the ink color of emotional words (see Williams, Mathews, & MacLeod, 1996, for a review of the Emotional Stroop Task). Emotional words that resonate with participants' emotional vulnerability (e.g. 'slither' for snake phobics) create greater cognitive interference than neutral words (e.g. 'table' or 'spoon') and therefore produce longer color-naming reaction times. Dandeneau and Baldwin (2004) used interpersonal rejection (e.g. rejected, excluded, unwanted), acceptance (e.g. accepted, liked, wanted) and non-interpersonal neutral words (e.g. table, spoon, kitchen) in an Emotional Stroop task and found that people with low self-esteem showed greater Stroop interference on rejection words than acceptance words relative to their high self-esteem counterparts. These results provided initial support for the idea that low self-esteem involves cognitive habits, presumably stemming from repeated exposures to rejection and past exclusions that increase vigilance for rejection cues. This in turn increases the likelihood of perceiving or interpreting social cues as signs of rejection thereby perpetuating a vicious cycle of low self-esteem (Dandeneau & Baldwin, 2004; Dandeneau, Baldwin, Baccus, Sakellaropoulou, & Pruessner, 2007).

1.3. Rejection-inhibiting training and its effects

Our current study built on recent research indicating that it may be possible to break the vicious cycle of low self-esteem by retraining the detrimental attentional bias pattern. A computer task designed to teach participants to ignore rejection by having them identify a smiling/approving face as quickly as possible in a 4 × 4 grid of distracting frowning faces has shown positive cognitive, psychological, behavioral, and physiological effects (Dandeneau et al., 2007). By repeatedly doing the task for over 100 trials, participants learn to focus their attention on acceptance and ignore rejection, gradually retraining their attentional system to be less vigilant for rejection.

The rejection-inhibiting training task has been shown to modify the attentional bias for rejection that people with low self-esteem exhibit (Dandeneau & Baldwin, 2004; Dandeneau et al., 2007). Participants with low self-esteem in the experimental rejection-inhibiting training task experienced significantly less Stroop interference on rejection words, and a significantly lower bias for rejection than their counterparts in the control condition who were trained to identify the 5-petaled flower in a 4×4 grid of 7-petaled flowers (Dandeneau & Baldwin, 2004). Dandeneau et al. (2007) also showed similar results with a different measure of attentional bias, the Visual Probe Test (described shortly). As well, when the trainer task was administered for a week to students studying for their final exam, students showed significantly lower self-reported levels of stress for their final exam, less anxiety during their exam, and greater academic self-esteem than their counterparts in the control condition (Dandeneau et al., 2007, Study 3a). Administered for a week to telemarketing representatives working in a highly stressful and social evaluative context, the experimental training task showed beneficial psychological, physiological, and behavioral effects: Those in the experimental condition reported an increase in self-esteem and a decrease in perceived stress by the end of the week, significantly lower level of the stress hormone cortisol, and a 68% increase in sales during training week (Dandeneau et al., 2007, Study 3b). Overall, the rejection-inhibiting training task appears to influence the early stages of social perception, re-tuning the attentional filter to be less vigilant for rejection thereby circumventing the effects of social stress.

1.4. Current study

In an attempt to recruit participants who had experienced difficulty in their academic life, we asked students at remedial schools, namely adult education centers, to participate in our current study. Participants were recruited from 3 adult education centers whose purpose is to offer adults of all ages who have dropped out of junior or high school a flexible learning program to obtain their diploma. Our primary purpose was to see if modifying the students' negative social cognitions, in particular the hypervigilance for rejection, would influence their emotional and behavioral self-regulatory strategies in reaction to an overt rejection and a performance threat. Specifically, we wondered whether students trained to inhibit rejection would show the effective self-regulatory responses of inhibiting feelings of rejection after overt rejection, less cognitive interference while working on a school-like task, less persistence after repeated failure, and higher state self-esteem after undergoing social and performance threats.

In addition, we wished to explore whether implicit self-esteem, one's unconscious feelings of self-worth, plays a supplementary role to that of explicit self-esteem in the processing of rejection information. Whereas explicit self-esteem, usually measured with a self-report questionnaire (e.g. Rosenberg Self-Esteem Scale, Fleming-Courtney Feelings of Inadequacy Scale), reflects people's conscious evaluations of self-worth, implicit self-esteem, usually measured with a speeded categorization task of self, other, good, and bad words (e.g. Self-esteem Implicit Association Task) or the Name Letter preference measure, taps into people's unconscious feelings of self-worth that are often unobstructed by self-presentational processes. A growing number of studies are showing the unique contributions individual differences in implicit self-esteem have above and beyond those of explicit self-esteem (e.g. Baccus, Baldwin, & Packer, 2004; Jordan, Spencer, & Zanna, 2003), therefore, we examined this possibility in the current study.

In the present study, participants were asked to complete either the experimental (find-the-smile) attentional training condition or the control (find-the-flower) condition. After the training, participants underwent a rejection manipulation where they were

overtly rejected by a peer "Carole", then completed a set of 3 difficult anagrams meant to induce failure and test self-regulation responses. We hypothesized that participants with low self-esteem who received the find-the-smile training would exhibit reduced vigilance for rejection compared to those in the control condition. We expected that those in the experimental condition would report lower feelings of rejection after having been rejected by Carole, and less persistence on the extremely difficult anagrams. We also anticipated that participants with low self-esteem in the experimental conditions would report less cognitive interference during the anagrams task showing that they were better able to concentrate on the task, and higher levels of state self-esteem after having experienced rejection and failure than those in the control condition. To address these hypotheses, we submitted the criterion variables (vigilance for rejection, feelings of rejection, persistence on anagrams, and state self-esteem) to multiple regression analyses with condition, explicit self-esteem, implicit self-esteem, and all 2-way and 3-way interaction terms used as predictors.

2. Method

2.1. Participants

Participants were students at 3 adult education centers in Montréal, Canada. Participants with a greater than 18% error rate on either the experimental training task or the visual probe task (9 participants), with a rejection or acceptance bias score greater than 3 standard deviations from the mean (1 participant), and with missing data on the Name Letter Measure (21 participants) were excluded from the analyses. The final sample consisted of 150 participants (83 women) with a mean age of 22.0, $SD = 6.41$. Participants were recruited with posters and through the schools' councilors and were compensated \$10 CDN for their time. All participants spoke French as their first language therefore all questionnaires and instructions were translated into French.

2.2. Attentional training tasks

Smiling/accepting and frowning poses of people were used as stimuli for the find-the-smile experimental training task.¹ The smiling pictures for this and the visual probe task (see below) were judged as significantly more accepting, and frowning pictures as sig-

¹ There were actually two, slightly different, versions of the experimental task used. For exploratory purposes, we wondered if increasing the emotional salience of the facial stimuli could increase the effect of the attentional training. In the original training task (which was used in one of the current experimental conditions and identical to that used in prior studies), the pictorial stimuli are presented without contextualizing them, that is, participants are not explicitly led to perceive the faces as people who accept and/or reject them. We wondered if, by increasing the emotional salience of the stimuli, in a sense making the stimuli more personally relevant and important, this would make the attentional training even more effective. For this we asked half of the participants in the experimental training condition to complete a slightly modified version of the experimental task. Before beginning the training task, participants were shown a set of 16 frowning faces and were asked to imagine that these were pictures of people who rejected them. They were also shown a set of 16 smiling faces and asked to imagine that these people accepted them. The presentations of the sets of frowning and smiling pictures were counterbalanced across participants. These photos were then used in the training task. Analyses of the effects of the experimental training conditions on rejection bias scores showed, however, that the find-the-smile conditions did not differ in the cognitive outcomes they produced. That is, comparing the original find-the-smile condition to the control condition produced a significant 3-way interaction term (explicit self-esteem by implicit self-esteem by condition), $\beta = -.521$, $t(137) = -4.417$, $p = .001$, and comparing the modified version of the find-the-smile to the control also produced a significant 3-way interaction term (explicit self-esteem by implicit self-esteem by condition), $\beta = -.284$, $t(137) = -2.275$, $p = .024$. In addition, there were no differences between both find-the-smile conditions when predicting self-report results. For these reasons, the analyses in the text were conducted by combining the two conditions into a single experimental condition.

nificantly more rejecting, than a neutral point on a 7-point scale by independent raters. The grayscale stimuli were presented on a computer screen in the following manner: a 4 square \times 4 square matrix, measuring 17 cm by 17 cm on the computer screen, appeared in the middle of the screen wherein there was 1 smiling face and 15 frowning faces (Fig. 1). Using the computer mouse, participants were instructed to click on the accepting face as quickly as possible. There were 112 experimental trials that were divided into 4 blocks of 28 trials with breaks between blocks, and the experimental trials were preceded by 6 practice trials.

In the control find-the-flower task, which was identical to the one used in the Dandeneau et al. (2007) and Dandeneau and Baldwin (2004) studies, the stimuli consisted of black and white drawings of 5- and 7-petaled flowers. The procedure was identical to that in the experimental condition except the instructions asked participants to identify the 5-petaled flower as quickly as possible in the matrix of 7-petaled flowers. As such, it controlled for the activity of engaging in a visual search task while not including the component of repeatedly disengaging from frowning faces.

2.3. Visual probe task

The visual probe task assesses the degree to which the participant's attention is drawn to and held by specific types of stimuli, in this case, frowning/rejecting faces. On each trial the participant is shown a pair of faces, sampled from frowning, smiling, and neutral expressions. Next, a probe is displayed and the participant's reaction times to identify probes replacing frowns versus neutral expressions are used to calculate an index of their attentional vigilance toward rejection. The procedure was based on the method

well established in anxiety and social anxiety research (Bradley, Mogg, Falla, & Hamilton, 1998). The stimuli consisted of 64 grayscale pictures of faces with a resolution of 72 dpi, measuring 45 \times 70 mm on the computer screen with a distance of 115 mm between their centers. The pictures were shown on a white background. The 64 stimulus faces consisted of 32 different people, with half providing neutral and rejecting poses and the other half providing neutral and accepting poses thereby making 16 rejecting-neutral pairs and 16 accepting-neutral pairs for the critical trials. A separate set of 16 pairs, 8 rejecting-neutral and 8 accepting-neutral, was used for the practice trials.

The visual probe task consisted of 16 practice and 64 experimental trials that were presented in a random order for each participant. Each of the 32 pairs of experimental stimuli faces was presented twice, once with the emotional face on the right and once on the left, making for 32 rejecting-neutral trials and 32 accepting-neutral trials. Each trial started with the fixation symbol "+" in the center of the screen for 500 ms. Following the fixation, a picture pair was shown for 500 ms, followed by a probe (either ':' or ':.') replacing either the picture on the left or the right of the screen. The probe remained on the screen until the participant made a response by pressing the appropriate labeled key on the keyboard (q for ':' and z for ':.'). Each probe type replaced an equal number of emotional and non-emotional pictures on each side of the screen. Participants were instructed to indicate, as quickly and as accurately as possible, which probe appeared on the screen. The inter-trial interval varied randomly between 500 and 1250 ms. The visual probe task was programmed using Psychology Software Tools' E-Prime software (Psychology Software Tools Inc., 2002a).



Fig. 1. Screen shot of the experimental attentional training condition.

2.4. Rejection threat: Meeting Carole

The rejection threat procedure was administered on the computer and made to look like an automated personality compatibility test. Participants were told that they were going to meet a new person (Carole), but before doing so would need to answer a few questions to see how compatible they would be with this person. The computer program asked them 4 bogus questions: Would you like to have children? Do you think listening to Heavy Metal music causes violence in young people? Do you think violence on television makes people more violent? Do you give money to beggars on the street? These questions were meant to elicit opinion-based answers rather than fact-based answers so as to give credence to the compatibility cover story. Following the 4 bogus questions, state levels of happiness/sadness, calmness/anxiety, and feelings of acceptance/rejection were assessed with 9-point likert scales. The computer program then informed the participant that it was going to compare their responses to Carole's responses. Once the bogus comparison time elapsed, a large frowning pose of Carole appeared on the screen accompanied by a short text indicating that based on the information the participant provided, Carole would act in a cold manner, would ignore and reject them, and would probably not like to be their friend. Participants were then asked to take the time to form an impression of Carole, imagine what she might tell them and the emotions she would elicit in them. After forming their impression of Carole, participants again rated how happy/sad, calm/anxious, and accepted/rejected they felt.

2.5. Performance threat: Anagrams

The anagrams task was presented as a word ability task where the object was to unscramble the string of letters presented on the screen to make a word. A series of instruction screens described the procedure and gave them an example. Participants were told that they could work on the anagram for as long as they wished and that they had two choices for each anagram: they could either write in their answer, making sure not to guess, or press the mouse button to quit and continue on to the next anagram. The same three French anagrams were given in the same order to every participant. Pre-testing showed that the words chosen for the anagrams were extremely difficult although not impossible. At the end of the anagram task participants were asked to indicate on a 7-point likert scale how willing they would be to continue with more anagrams. The computer program recorded the time spent on each anagram as well as participants' responses.

2.6. Procedure

Participants were run in groups in the computer laboratory of their respective schools. All computers were tested for millisecond accuracy with E-Prime's RefreshClockTest millisecond accuracy test (Psychology Software Tools Inc., 2002b). Only computers that passed the test were used in order to guarantee accurate millisecond timing of stimuli presentation and reaction time recording.

After reading and signing the consent form, participants completed the Rosenberg Self-Esteem Scale with items such as *I feel that I'm a person of worth, at least on an equal basis with others* (Rosenberg, 1965, 10 items, $\alpha = .74$) and the Name Letter measure, a measure of implicit self-esteem (Nuttin, 1985, 26 items, test-retest reliability $r = .713$ with no experimental effects on the Name Letter measure). The Name Letter measure asks participants to rate, on a scale ranging from 1 to 9, the extent to which they like each letter of the alphabet in order to help the experimenters with stimuli for a future experiment. In reality, the measure captures to what degree participants prefer the letters of their initials over the other letters of the alphabet. A relatively higher liking of one's ini-

tial letters, representing one's name and 'self', is indicative of high implicit self-esteem. Pre-measures of explicit and implicit self-esteem were used as predictor variables in regressions analyses. Participants were then randomly assigned to one of the attentional training conditions, which they completed at their computer stations individually. They then completed the visual probe task followed by the rejection threat procedure and then the anagrams. Following the anagram task, participants completed the State Self-Esteem Scale (Heatherton & Polivy, 1991, 20 items, $\alpha = .86$), a widely used measure that assesses people's state or momentary levels of self-esteem (e.g. *I feel confident about my abilities, I am worried about whether I am regarded as a success or a failure*). Participants also completed the Cognitive Interference Questionnaire (Sarason & Stroops, 1978, 21 items, $\alpha = .86$) which assesses the occurrence of task-relevant and task-irrelevant thoughts while completing the experiments. We also added questions related to interfering thoughts of rejection and of Carole in order to assess the specific effects of the attentional training (e.g. *I thought about having been rejected, I was distracted by thoughts of Carole*). Participants were then debriefed about the true purpose of the rejection threat and on the difficult anagram task. Specifically, participants were told that Carole rejected everyone, that it was simply an experimental manipulation, and that it had nothing to do with their personality or their opinions. They were also told that the anagrams were meant to be very difficult and that they should not be discouraged if they did not get the answers.

3. Results

3.1. Visual probe task

3.1.1. Data preparation

Data for the VPT were prepared as follows: trials with errors were discarded (3.6% of data) and based on Ratcliffe's (1993) recommendations for dealing with outliers, reaction times (RT) less than 200 ms and greater than 2 standard deviations above each participant's overall mean reaction time were discarded (4.6% of data). Long reaction times to trials where the rejection faces and probe are in different locations (invalid trials) indicate that participants were paying attention to the rejecting face but needed to respond to the probe which was shown on the opposite side. Fast response times to trials where the rejection faces and probes are in the same location (valid trials) indicate that participants were again paying attention to the rejection face and responded quickly because the probe replaced the picture where their attention was guided. Rejection bias scores were calculated by subtracting the mean RT of valid trials from the mean RT of invalid trials (MacLeod, Mathews, & Tata, 1986). An acceptance bias score was calculated by subtracting the mean of valid acceptance trials from the mean of invalid acceptance trials. A high positive rejection bias score (e.g. +25) indicates an attentional bias toward rejecting faces whereas a negative rejection bias score (e.g. -25) demonstrates inhibition or disengagement from rejecting faces. The two bias scores were then used as outcome variables in subsequent multiple regression analyses.

3.1.2. Analyses

Reaction time data on the VPT were submitted to multiple regression analyses after centering both continuous variables (explicit and implicit self-esteem), and creating a dummy-coded condition variable with the control condition as a reference (0 for control, 1 for experimental). The cross products of the continuous variables and the dummy-coded condition variable were used to compute the 2- and 3-way interaction terms. All of the following multiple regression analyses included the following predictors: three "main" effects (explicit self-esteem, implicit self-esteem,

dummy-coded condition), three 2-way interaction terms (explicit by condition, implicit by condition, explicit by implicit), and the 3-way interaction term (explicit by implicit by condition). The correlation between our two continuous independent variables, explicit and implicit self-esteem, was not significant, $r = -.014$, ns , thereby indicating that there are no issues of multicollinearity.

When using rejection bias scores as our outcome variable, the overall regression was significant, $F(7, 142) = 2.55$, $R^2 = .112$, $p = .017$. Explicit and implicit self-esteem in combination, played a role in determining people's response to the experimental manipulation: The criterion variable of rejection bias was significantly predicted by the 3-way explicit self-esteem by implicit self-esteem by condition interaction term, $\beta = -.504$, $t(142) = -3.24$, $p = .001$. No other main or interaction effects were significant. Simple slope analyses (Aiken & West, 1991) of the 3-way interaction showed that the effect of training was most pronounced on participants with both low explicit self-esteem and low implicit self-esteem (at one standard deviation below the mean for explicit self-esteem and at one standard deviation below the mean for implicit self-esteem). Those with low explicit and low implicit self-esteem in the experimental condition experienced significantly less rejection bias than their counterparts in the control condition, $\beta = -.443$, $t(142) = -2.425$, $p = .017$. Simple slope analyses for low explicit and high implicit as well as for high explicit and low implicit trended in the opposite direction but were not significant, $\beta = .133$, $t(142) = .843$, ns , and $\beta = .250$, $t(142) = 1.356$, ns , respectively. The simple slope analysis for high explicit and high implicit self-esteem was marginally significant, mirroring the results of low-lows, $\beta = .265$, $t(142) = -1.812$, $p = .072$ (Fig. 2). Analyses conducted on participants' acceptance bias scores did not reveal any significant interactions.

These results partially replicate Dandeneau and Baldwin (2004) and Dandeneau et al. (2007) previous findings, however this time with the added moderating effect of implicit self-esteem. Whereas previous research has shown that participants with low explicit self-esteem benefit from the attentional training, the present research shows that a subgroup of participants with low explicit self-esteem, that is, those with low explicit and low implicit self-esteem, benefited most from the training. As well, a marginal finding also suggests that a subgroup of those with high self-esteem,

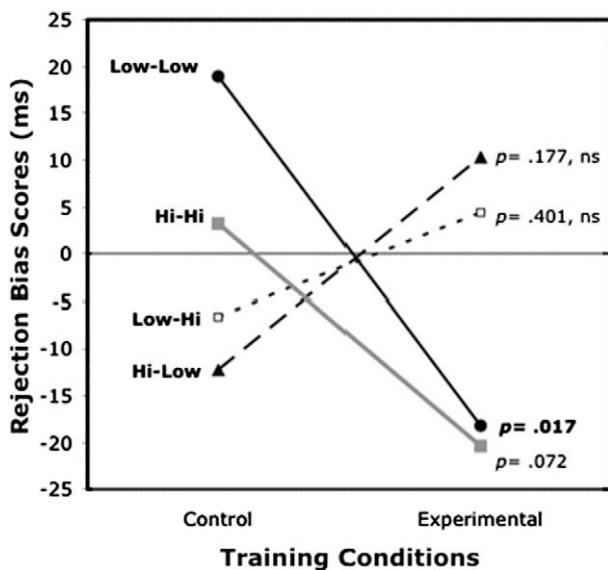


Fig. 2. Graph of simple slopes of rejection bias scores for the explicit self-esteem by implicit self-esteem by condition interaction term. Low-Low = low explicit and low implicit, Low-Hi = low explicit and high implicit, etc.

that is those with high explicit and high implicit self-esteem, might also benefit from the training. Although novel, the added effect of implicit self-esteem (including this effect for those with high self-esteem) must be interpreted with caution considering a randomization irregularity that occurred on pre-measured implicit self-esteem: Participants in the control condition had significantly higher pre-measured implicit self-esteem than those in the experimental conditions, $F(1, 148) = 11.939$, $p = .001$. Although this unforeseen randomization abnormality is statistically controlled by including implicit self-esteem as a predictor in the analysis, it leaves somewhat ambiguous the role of implicit self-esteem in the interaction effect. Regardless of the cause of the explicit-implicit self-esteem effect, these results mirror past results and show that the most vulnerable participants, that is, those with low explicit and low implicit self-esteem, benefited most from the social cognitive training.

3.2. Self-report results

3.2.1. Feelings of rejection after being rejected by Carole

To assess the buffering effect of the attentional training on feelings of rejection after a rejection threat, a multiple regression analysis was conducted on the self-reported feelings of rejection after meeting Carole.² Ratings of rejection (high scores indicate greater feelings of rejection) were used as the criterion variable in the same multiple regression analysis used to analyze rejection bias scores with the addition of pre-measured feelings of rejection entered as a control variable. The overall regression was significant, $F(8, 141) = 4.346$, $R^2 = .198$, $p < .001$. Explicit self-esteem significantly predicted feelings of rejection, $\beta = -.306$, $t(141) = -2.120$, $p = .036$, indicating that the higher one's explicit self-esteem, the less rejected one felt after being rejected by Carole. More importantly, feelings of rejection were also significantly predicted by the explicit self-esteem by condition interaction, $\beta = .313$, $t(141) = 2.209$, $p = .029$. Simple slope analyses revealed that those with low explicit self-esteem in the experimental condition felt significantly less rejected after being rejected by Carole than those in the control condition, $\beta = -.238$, $t(141) = -2.086$, $p = .039$. As Fig. 3 demonstrates, whereas participants with low self-esteem in the control condition exhibited much higher feelings of rejection compared to their high self-esteem counterparts, those in the experimental condition were much more similar to levels exhibited by those with high self-esteem. Those with high explicit self-esteem did not differ between conditions, $\beta = .126$, $t(141) = 1.083$, ns . Neither the main effect of implicit self-esteem, $\beta = -.095$, $t(141) = -.660$, ns , nor the interaction between implicit self-esteem and condition, $\beta = .202$, $t(141) = 1.455$, ns , was significant in this analysis. No analyses conducted on participants' self-reported feelings of sadness and anxiety after meeting Carole was significant. Thus, it appears that the experimental training condition targeted participants' thoughts specifically relating to the rejection threat, helping them disengage from Carole's negative social evaluation thereby making them feel less rejected than usual.

3.2.2. Performance threat: Persistence and willingness to continue failing

Analysis of the performance on the anagrams revealed that they were virtually unsolvable: Participants correctly solved only .19 out of 3 ($SD = .47$) on average, with 83% of participants solving

² Correlational analyses provided convergent validity support for our novel self-report measures. The three assessments of self-rated feelings of rejection were significantly correlated, $r = .378$ to $r = .642$, p 's $< .001$. Feelings of rejection after meeting Carole significantly correlated with interfering thoughts of rejection ($r = .227$, $p = .005$) as well as overall explicit self-esteem ($r = -.182$, $p = .026$). The interfering thoughts of rejection measure was marginally correlated with explicit self-esteem, ($r = -.140$, $p = .088$) and significantly correlated with state self-esteem ($r = -.401$, $p < .001$).

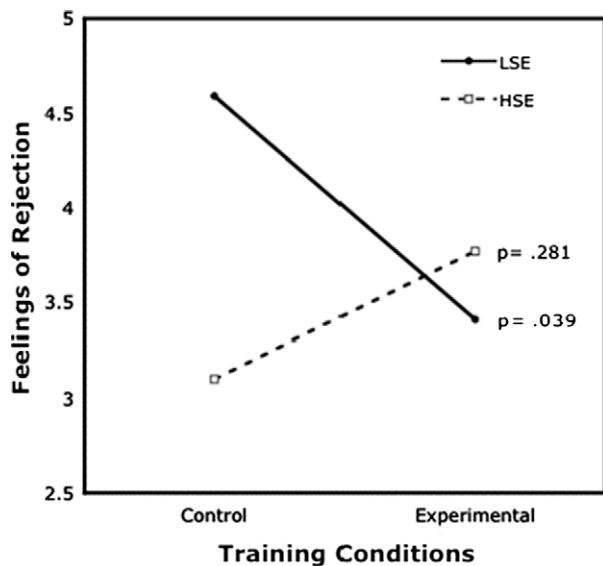


Fig. 3. Graph of simple slopes of feelings of rejection. LSE = low explicit self-esteem, HSE = high explicit self-esteem.

none correctly. Also, analysis of the time spent working on anagrams did not show differences in persistence. Importantly, explicit self-esteem did not predict success rate, indicating that the anagrams were very difficult for individuals with low self-esteem and for those with high self-esteem, $\beta = .125$, $t(141) = .804$, *ns*. In addition, analyses conducted on the average time spent on all three anagrams, controlling for success rate, revealed that participants in both conditions, regardless of level of explicit self-esteem, spent approximately the same amount of time, $\beta = .005$, $t(141) = .056$, *ns*, ($M = 2$ min 49 s, $SD = 2.24$ for experimental; $M = 2$ min 37 s, $SD = 1.94$ for controls). The anagrams task therefore represented a performance threat during which a large proportion of participants experienced repeated failure, that is, failing three anagrams.

There was, however, a significant explicit self-esteem by condition interaction when predicting participants' willingness to continue, $\beta = .316$, $t(141) = 2.131$, $p = .035$, with number of correct anagrams entered as a control variable (overall regression $F(8, 141) = 2.512$, $R^2 = .125$, $p = .014$). Tests of simple slopes revealed that participants with low explicit self-esteem in the experimental condition were significantly less willing to continue with difficult anagrams than their counterparts in the control condition, $\beta = -.298$, $t(141) = -2.502$, $p = .013$ (Fig. 4). Given that these same participants also felt less rejected after having been rejected by Carole, these results suggest that participants adopted a self-preservation strategy that enabled them to regulate their emotions more effectively. That is, rather than persisting on a task on which they experienced repeated failure, participants with low explicit self-esteem in the experimental condition mirrored a strategy exhibited by those with high self-esteem and opted to disengage from the discouraging task. No other effects were significant in this analysis, including the simple slope for those with high self-esteem.

3.2.3. Interfering thoughts of rejection

To assess the impact of the attentional training on interfering thoughts, we assessed the cognitive interference that thoughts of rejection, thoughts of Carole, and distracting thoughts more generally caused while participants worked on the anagrams. Multiple regression analyses, with thoughts about being rejected as the criterion variable (overall regression $F(7, 142) = 1.488$, $R^2 = .068$, $p = .176$), revealed that participants in the experimental condition

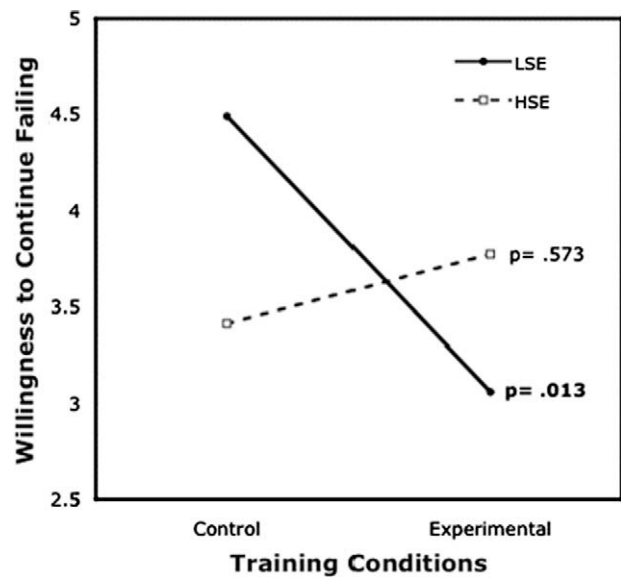


Fig. 4. Graph of simple slopes of reported willingness to continue with difficult anagrams.

($M = 1.27$, $SD = .70$) reported a significantly lower occurrence of thoughts of rejection than those in the control condition ($M = 1.53$, $SD = .88$), $\beta = -.204$, $t(142) = -2.358$, $p = .020$. The main effects of explicit self-esteem, and implicit self-esteem, as well as their interactions with condition were not significant. This suggests that the attentional training reduced interference caused by social rejection while working on a difficult task, thereby limiting distractions caused by social feedback.

Analyses on the overall task-relevant and task-irrelevant cognitive interference scores and the specific interfering thoughts about Carole did not yield any significant results. This suggests that the training task does not promote person-related inhibition but rather the inhibition of the social feedback that this person represents. It also supports our proposal that the training task does not merely train a visual habit of disengaging from specific frowning faces but rather a more general conceptual habit of inhibiting rejection-related information, regardless of the form it may take in the social environment.

3.2.4. State self-esteem

In order to assess participants' momentary feelings of self-worth after having been rejected and failing at anagrams, multiple regression analyses were conducted on state self-esteem, which was measured post-training and post-threat manipulations (overall regression $F(7, 142) = 11.600$, $R^2 = .364$, $p < .001$). Participants in the experimental condition reported significantly higher state self-esteem ($M = 4.03$, $SD = .52$) than their counterparts in the control condition ($M = 3.85$, $SD = .57$), $\beta = .185$, $t(142) = 2.593$, $p = .010$. This outlines the buffering effect the attentional training has against social and performance threats. It suggests that developing cognitive skills to confront the harsh social environment has positive psychological outcomes on student's feelings of self-worth. Given that this effect was not moderated by level of self-esteem, even people with high self-esteem seem to benefit from the rejection-inhibiting training. No other effects were significant in this analysis.

4. Discussion

Modifying people's cognitive orientation toward social rejection contributed to effective self-regulation of emotion and behavior, in response to social and performance threats in this remedial school

context. The experimental training task, which modified student's negative attentional patterns by training them to focus on acceptance while ignoring rejection, showed beneficial buffering effects against social rejection from a peer and failure at a school-like task. A range of beneficial self-regulatory responses were found: participants in the experimental condition with low explicit and low implicit self-esteem were less vigilant for rejection than their counterparts in the control condition indicating the cognitive modification of their attentional patterns; participants with low explicit self-esteem in the experimental condition reported feeling less rejected after being disliked, and reported greater readiness to disengage from failing at anagrams; finally, regardless of students' level of self-esteem, participants in the experimental conditions reported less interfering thoughts about being rejected and greater state self-esteem after having been rejected and having failed at anagrams than their counterparts in the control condition. Taken together these results suggest that modifying students' social cognitions can help promote positive self-regulation of emotions and behaviors, which in the long run, may help build social and academic competence (Patrick, 1997).

The cognitive and self-report results suggest that reducing people's hypervigilance for social rejection may contribute to four beneficial self-regulatory responses that are important in the academic context. First, the attentional training reduces attentional bias toward rejection, by making it easier for people to ignore or disengage from negative cues. Accurate observations and perceptions of one's and others' social behaviors is a vital process involved in building positive social interactions and social competence (Putallaz & Sheppard, 1992). Therefore, by modifying student's attentional perspectives to focus on the support and social acceptance that is in their environment, they may be more inclined to develop positive social relations and social competence. Related to perceiving one's environment in a more positive light is research showing the importance of engaging students in positive emotional experiences in the classroom in order to maximize learning potential (Meyer & Turner, 2002, 2006; Turner, Thorpe, & Meyer, 1998). By reducing student's propensity to look for and focus on negative social cues, the classroom environment could be perceived as a source of support and security, thereby promoting positive teacher–student and student–student relationships and interactions. This supportive climate would elicit positive emotional reactions and contribute to effective learning (Meyer & Turner, 2006).

Second, these results indicate that people trained to inhibit rejection report less interfering thoughts about rejection while they were completing a difficult school-like task. Downey et al. (1998) have shown that students high in rejection sensitivity are more distressed after being rejected than students low in rejection sensitivity, and report engaging in more antisocial and aggressive behaviors which contributes to school disengagement and grade declines. Sarason (1984) has shown the detrimental effects that self-preoccupying thoughts have on task performance, where high anxious students who divide their attention between task and personal demands have less available resources to devote to the task at hand. Our results demonstrate that participants in the experimental training condition had less self-preoccupying thoughts caused by rejection while working on anagrams. Although there were no performance differences, presumably because of the high difficulty of the anagrams, it follows that being able to reduce cognitive interference may help focus students' attention on the task at hand and increase the possibility of succeeding in future evaluation-oriented contexts.

Third, the attentional training task may promote disengagement from failure by eliciting a more realistic appraisal of goal pursuit as well as more effective self-regulatory strategies. Past research has shown that participants with high self-esteem demonstrated an effective self-regulatory process that contributes to

their “approach success” motivation whereby they persist less after repeated failure (Di Paula & Campbell, 2002). Individuals with low self-esteem, on the other hand, showed the lack of effective strategies in that they tended to persist more in the face of repeated failure in an effort to remedy their personal deficiencies and avoid future negative outcomes. The present results show that participants with low self-esteem in the experimental training task expressed less willingness to continue with repeated failure compared to their control counterparts, suggesting that they realized the futility of persisting on the task and would be better suited to devote their resources elsewhere. In fact, Wrosch and colleagues (Wrosch, Miller, Scheier, & de Pontet, 2007; Wrosch, Scheier, Miller, Schulz, & Carver, 2003) have shown that those able to disengage from unattainable goals and reengage in alternative ones experience higher subjective well-being and better physical health. Disengaging from the cause of one's current distress is therefore a self-preservation strategy associated with psychological and physical well-being. Therefore, the fact that individuals with low self-esteem in the experimental condition expressed less willingness to continue reflects an effective self-regulatory process similar to that exhibited by individuals with high self-esteem which could help them better regulate their emotions in the face of performance threats.

Finally, the three previous self-regulation responses, that is, inhibiting peer rejection, reducing cognitive interference, and disengaging from repeated failure, likely contributed to an overall higher feeling of self-worth, as demonstrated by the state self-esteem result. This is especially valuable considering “self-esteem boosting interventions” typically have not been terribly successful (Baumeister et al., 2003; Scheier & Kraut, 1979). Rather than increasing self-esteem with praise and positive reinforcement, developing beneficial social cognitive habits that promote efficient self-regulation of emotions is suggested to be a more enduring and successful strategy (Baumeister et al., 2003). Not only would modifying underlying social cognitions help students deal with current threats and challenges but it could also give them the confidence to continue forward with future challenges thereby promoting a self-amplifying cycle of self-worth rather than of distress (e.g. Dandeneau et al., 2007; Mikulincer, Shaver, & Pereg, 2003).

Many authors have suggested looking at social, in addition to academic competencies, in order to paint a more complete picture of students' academic difficulties and school adjustment (e.g. French & Conrad, 2001; O'Neil et al., 1997; Patrick, 1997; Welsh et al., 2001). This has given rise to new ways of tackling student academic adjustment, namely through modifying students' negative social cognitions that stem from early or repeated peer rejection. Through modifying the social cognitions that contributed to the dysfunctional socialization with peers, it may be possible to develop beneficial habits that contribute to academic success. More importantly, it may be possible to provide students with an engaging attentional training tool that would improve their social self-regulation skills, a key component to developing academic competence (Dodge, Pettit, McClaskey, & Brown, 1986; Parker & Asher, 1987; Patrick, 1997; Putallaz & Sheppard, 1992).

4.1. Limitations and future directions

There are certain limitations to this study that are noteworthy and merit discussion in an effort to advise future research. First, the randomization irregularity with pre-measured implicit self-esteem, which was uncontrollable, leaves the interpretation of the explicit–implicit interaction effects open to question. Additional research will be required to resolve this issue, but these findings do suggest that future studies should consider the effects of implicit as well as explicit self-esteem. Future research could also investigate how students with varying levels of implicit and explicit

self-esteem perceive “unattainable” goals and how this impacts their persistence. It would also be beneficial to see at what point adaptive persistence becomes maladaptive in the school context.

The results of the current study must also be considered cautiously before drawing conclusions about long-term effects. Although the current study tested only short-term effects of the attentional training in the school context, our previous studies have provided support for at least some longer-term impact of repeated training sessions in real-life contexts (Dandeneau et al., 2007). For example, telemarketing representatives who completed the attentional training task in the morning showed positive effects later in the evening and more importantly, at the end of the workweek (Dandeneau et al., 2007, Study 3b).

Finally, with the burgeoning Serious Games movement wherein computer game technology is being used to develop educational and training tools, scientifically based casual games that target academic and social competence skills might be an effective way for educators and administrators to support their students' education. For example, a version of the attentional training task has been licensed to MindHabits Inc., for implementation and commercialization purposes (the game can be played online at www.mindhabs.com). Based on the current research, the MindHabits Trainer is an effort to engage students in an amusing game that unobtrusively trains beneficial habits of thoughts related to social and academic competencies.

Overall, our results indicate that adopting beneficial social cognitions that reduce people's hypervigilance to social rejection contributes to effective self-regulation responses, buffering against the effects of social and performance threats and leading to increases in state self-esteem. Given the importance of emotional and behavioral self-regulation in the school context, additional research is called for to examine the usefulness of this and other techniques for modifying social cognitive responses to social rejection.

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