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Stereotype Threat and Executive Resource Depletion: Examining the Influence of Emotion Regulation

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Abstract

Research shows that stereotype threat reduces performance by diminishing executive resources, but less is known about the psychological processes responsible for these impairments. The authors tested the idea that targets of stereotype threat try to regulate their emotions and that this regulation depletes executive resources, resulting in underperformance. Across 4 experiments, they provide converging evidence that targets of stereotype threat spontaneously attempt to control their expression of anxiety and that such emotion regulation depletes executive resources needed to perform well on tests of cognitive ability. They also demonstrate that providing threatened individuals with a means to effectively cope with negative emotions—by reappraising the situation or the meaning of their anxiety—can restore executive resources and improve test performance. They discuss these results within the framework of an integrated process model of stereotype threat, in which affective and cognitive processes interact to undermine performance.

Keywords

stereotype threat; emotion regulation; executive function

In discussing the challenges faced by African American college students, Shelby Steele (1989) offered the following observation about the experience of racial identity in academic settings:

> To admit that one is made anxious in integrated situations about the myth of racial inferiority is difficult for young Blacks. It seems like admitting that one *is* racially inferior. And so, most often, the students will deny harboring those feelings. (p. 51)

When confronted with negative stereotypes, do individuals deny feeling worried that such stereotypes apply to them, as Shelby Steele suggested? If so, what are the negative consequences of this type of emotion regulation? For more than a decade, research on *stereotype threat* (C. M. Steele & Aronson, 1995) has shown that members of various groups perform more poorly on cognitively demanding tasks when they fear their behavior will be interpreted through the lens of negative social stereotypes. For example, research has repeatedly shown that describing a test as a measure of intellectual ability can hurt the performance of members of groups stereotyped to lack that ability (e.g., Brown & Day,

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2006; Croizet & Claire, 1998; Hess, Auman, & Colcombe, 2003; Spencer, Steele, & Quinn, 1999). Although advances have been made in delineating the processes by which this threat operates, the field still lacks clear empirical tests of how different affective and cognitive processes work together to impair task performance (Schmader, Johns, & Forbes, 2008).

The current research was designed to fill this void. We examined whether targets of negative stereotypes underperform in threatening intellectual environments because they dedicate limited cognitive resources to controlling their emotional reactions to such situations. Specifically, we propose that being the target of a negative stereotype can hurt performance because regulating one's anxious response to the situation hijacks the executive resources necessary for performing well in such domains.

Stereotype Threat and Performance

C. M. Steele and his colleagues (C. M. Steele, 1997;C. M. Steele & Aronson, 1995) proposed that members of stereotyped groups may experience additional pressure when placed in situations where their behavior could be interpreted as evidence for the validity of that stereotype. African Americans, for example, may feel especially bothered in intellectual testing situations because they fear that their performance will be judged in terms of the stereotype that associates their racial identity with poor academic and intellectual ability. The apprehension about confirming this stereotype can disrupt their performance and produce a stereotype-consistent outcome, in this case, low test performance. C. M Steele termed the experience of this self-evaluative threat embedded in the context of a salient group identity *stereotype threat*.

There is now considerable evidence that individuals perform more poorly on complex cognitive tasks when negative stereotypes about their group are made salient (see C. M. Steele, Spencer, & Aronson, 2002, for a review). In addition to establishing the ubiquity of this phenomenon, research has also begun to explicate the processes that translate stereotype salience into poor performance, providing evidence for the role of both affective and cognitive processes (see Schmader et al., 2008, for a review).

On the affective side, research has sometimes documented that individuals report feeling more apprehensive and anxious in stereotype threat situations (Marx & Stapel, 2006; Spencer et al. 1999) or, if they do not explicitly report feeling anxious, that they show nonverbal signs of discomfort and nervousness (Bosson, Haymovitz, & Pinel, 2004). In fact, although self-report measures of anxiety have yielded mixed results (J. L. Smith, 2004), more consistent evidence has been found for the physiological components of stress and anxiety, like increased blood pressure (Blascovich, Spencer, Quinn, & Steele, 2001), skin conductance (Murphy, Steele, & Gross, 2007), general arousal (O'Brien & Crandall, 2003), and physiological response patterns associated with threat appraisals (Vick, Seery, Blascovich, & Weisbuch, 2008). Importantly, the manner in which heightened autonomic arousal is interpreted appears to be important for lowering performance (Ben-Zeev, Fein, & Inzlicht, 2005). When targets of negative stereotypes are given an opportunity to misattribute their arousal to an external source, they fail to show the typical pattern of underperformance (Ben-Zeev et al., 2005; Johns, Schmader, & Martens, 2005). Although arousal alone could have a direct negative effect on performance (Schmader et al., 2008), these results suggest that the cognitions accompanying anxious arousal also play a significant role in undermining performance.

On the cognitive side, stereotype threat appears to make stereotypic thoughts accessible (Davies, Spencer, Quinn, & Gerhard stein, 2002; Inzlicht, Aronson, Good, & McKay, 2006;C. M Steele & Aronson, 1995) and increases the prevalence of negative thoughts (Cadinu, Maas, Rosabianca, & Kiesner, 2005). But in addition to these effects on thought content, stereotype threat also appears to undermine the cognitive processes needed to perform well on

intellectual tasks (Quinn & Spencer, 2001). Specifically, research by Schmader and Johns (2003) suggests that performance decrements occur because individuals under threat experience a reduction in their *working memory capacity* —a limited cognitive resource akin to executive attention (Engle, 2002; Feldman Barrett, Tugade, & Engle, 2004). Additional studies have provided conceptual replications of this result (Beilock, Rydell, & McConnell, 2007) and have documented complementary findings that negative stereotypes hurt performance by increasing mental work-load (Croizet, Despres, Gauzins, Hugeut, & Leyens, 2004) and exhausting executive control capacity (Inzlicht, McKay, & Aronson, 2006).

The Interplay of Cognitive and Emotional Processes

Research indicates that something about performing stereotype-relevant task diminishes executive resources needed to do well. However, there is still an open question as to what accounts for this effect. Schmader et al. (2008) have recently proposed that threat-induced performance impairments could stem from targets' active efforts to regulate their negative emotions during a challenging cognitive task. Thus, in the present research, we consider the possibility that performance is impaired by the interplay of cognitive and emotional processes. We suggest that targets' attempts to suppress the experience or expression of anxiety can deplete the executive resources they need for successful performance on cognitively demanding tasks.

According to appraisal-based models of stress and coping (e.g., Lazarus, 1991), situations that create uncertainty and present a potential threat to self-integrity motivate people to suppress or regulate the negative thoughts and feelings they experience as a result of these situations (Avero, Corace, Endler, & Calvo, 2003; Skinner & Brewer, 2002). Given that the fear of stereotype confirmation is, by definition, an ego-threatening experience that can increase doubt (C. M. Steele & Aronson, 1995), stress and coping research would suggest that it could also elicit spontaneous attempts to suppress negative feelings like anxiety that arise. People under threat may therefore attempt to suppress their emotions, whether that be inhibiting the emotions that arise or preventing their expression.[1] There are several pieces of evidence consistent with this idea. For example, Matheson and Cole (2004) have shown an association between experiencing stress due to social identity threat and a tendency to down-regulate negative emotions. Considering that stereotype threat can induce a general focus on avoiding negative outcomes (Seibt & Förster, 2004;J. L. Smith, 2004), the inclination to adopt a suppression strategy might be further encouraged by the intuition that anxiety hurts performance on difficult intellectual tasks (e.g., T. W. Smith, Snyder, & Handeslman, 1982). Indeed, there is evidence that the measure of heart rate variability used by Croizet et al. (2004) as an indicator of mental workload could specifically capture the effort expended to regulate anxiety (Appelhans & Luecken, 2006). Together, these findings suggest that emotion regulation might be a natural reaction to the threat of confirming a self-relevant negative stereotype.

The difficulty documenting the affective consequences of stereotype threat using self-report measures (see J. L. Smith, 2004, for a review) might also suggest that targets attempt to suppress negative emotions. Past research has yielded more consistent evidence for the affective consequences of stereotype threat when relying on indirect indicators of arousal or discomfort. A study by Bosson et al. (2004) highlights this dissociation between self-reports and indirect measures. They found that participants under stereotype threat did not report increased anxiety on a questionnaire even though analysis of their nonverbal behavior suggested that they were in fact feeling anxious and uncomfortable in the performance situation. Importantly, the nonverbal index of anxiety mediated poor performance on the critical task. Thus, stereotype

[1]We use the term *suppression* to include the act of suppressing either the emotion itself or the outward expression of that emotion because it seems likely that both strategies would be adopted during spontaneous suppression episodes.

threat appears to increase anxiety despite the fact that targets might be reluctant to report it explicitly. This dissociation between direct and indirect measures of anxiety could be the byproduct of people consciously trying to regulate and suppress their emotions, something they can do on controllable self-report measures but are unable to do on indirect measures.

If targets of stereotype threat do attempt to suppress their emotional reactions, what might be the consequence? Research on the effects of emotion regulation has consistently shown that trying to control the expression of negative feelings can exact a measurable toll on cognitive functioning (e.g., Baumeister, Bratslavsky, Muraven, & Tice, 1998; Richards & Gross, 2000). For example, Schmeichel, Vohs, and Baumeister (2003) instructed a group of participants to engage in expressive suppression by not showing any visible signs of emotion while viewing a distressing film. Following this emotion regulation task, participants completed a test that contained difficult logic problems. Compared to participants who were not given any instructions on how to behave while viewing the film, participants who had been instructed to avoid expressing negative emotions performed significantly worse on this test. However, emotional suppression did not impair performance on a test requiring the use of simple heuristics and general knowledge. More recently, Schmeichel (2007) has shown that regulating the expression of emotions reduces subsequent performance on the same dual-task measure Schmader and Johns (2003) used in their studies of stereotype threat and working memory. Thus, if emotion regulation depletes the executive resources needed for high-order cognitive functioning and stereotype threat elicits emotion regulation tendencies, then emotion regulation could play a role in creating group differences in performance.

The Present Research

The idea that targets of negative stereotypes try to regulate their emotional experience of stigma suggests one way that stereotype threat consumes executive resources. The purpose of this research was to examine whether targets of stereotype threat allocate cognitive resources to the process of regulating anxiety using suppression. We conducted four experiments designed to test the degree to which targets of stereotype threat attempt to suppress anxiety and deplete the executive resources needed to do well on cognitively demanding tasks. On the basis of our logic, we expected that targets of negative stereotypes would spontaneously attempt to regulate their emotional experience by trying to suppress the expression of anxiety (Study 1), that this kind of emotion-focused regulation strategy would be associated with reduced executive resources (Studies 1 and 2), and that reduced executive resources would be associated with reduced performance on a cognitively demanding test of intellectual ability (Studies 2 and 3). Studies 2 and 3 additionally tested the effectiveness of cognitive reappraisal of either the situation (Study 2) or one's own anxiety (Study 3) as a form of emotion regulation that would not deplete executive resources and would improve intellectual test performance during stereotype threat. The final study (Study 4) was designed to verify that cognitive reappraisal reduces anxiety suppression efforts and increases executive resources only for the targets of negative stereotypes.

Study 1

Study 1 was designed to provide an initial test of our emotion regulation hypothesis by examining targets' efforts to suppress their expression of anxiety while under stereotype threat. One challenge in testing this hypothesis is that techniques do not exist to measure spontaneous suppression tendencies, particularly if individuals might be reluctant to admit feeling anxious in the first place. To solve this problem we adapted a reaction time task designed to measure anxiety by assessing patterns of attention to anxiety-related stimuli (Mathews & MacLeod, 1986). Although typically used as an implicit measure, we manipulated whether participants knew the intent of the task so that their responses could be used to index efforts to regulate the

expression of anxiety. In one condition, this reaction time measure was described in neutral terms in order to measure participants' anxiety levels without their awareness. We expected that stereotype-threatened participants would automatically attend to anxiety-related stimuli, providing evidence of increased anxiety when the measure was implicit. In a second condition, we described the reaction time measure as an instrument designed to assess anxiety and provided information about the logic of the measure. In this condition, we expected that this information would allow targets to engage in *expressive suppression* by actively redirecting their attention away from threat-related stimuli. This prediction is based on the idea that participants under threat would be motivated to avoid any expression of anxiety as part of the effort to suppress their experience of anxiety (e.g., Jackson, Malmstadt, Larson, & Davidson, 2000). In this way, we were able to use the same measure to capture the experience of anxiety and efforts to suppress it.

We tested these hypotheses by exposing women to stereotype threat in the domain of math ability and having them complete a working memory measure of executive resources after completing the reaction time measure of anxiety. We predicted that we would detect evidence of active suppression when stereotype threat was present and when the women were aware that their anxiety levels were being assessed. Because awareness that anxiety is being measured is not necessary for the experience of stereotype threat, we expected that stereotype threat would deplete executive resources regardless of the whether or not participants were aware that anxiety was being assessed.

Method

Participants and Design—The participants were 85 Caucasian female psychology students attending a large American university who participated for course credit or $10. Participants were recruited if they reported scoring at least 500 on the quantitative section of the SAT (or equivalent converted ACT score) and reported awareness of the relevant stereotype (i.e., responded 3 or below to this question: "Regardless of what you personally believe, do you think there is a stereotype that men and women differ in their math ability?" where 1 = *men are stereotyped as better than women*, 4 = *there is no stereotype that men and women differ*, and 7 = *women are stereotyped as better than men*). Participants were randomly assigned to one of four conditions in a 2 (stereotype threat) × 2 (anxiety measure description) between-subjects design. Four women were excluded from analyses due computer malfunction ($n = 1$), a failure to follow task instructions ($n = 2$), or for knowing a member of the study personnel ($n = 1$). All analyses were conducted on a final sample of 81 women.

Materials

Dot probe task: We measured anxiety and the suppression of anxious responses using the dot probe task (Mathews & MacLeod, 1986). This measure relies on the logic that anxiety tends to increase attention toward threat-related stimuli (MacLeod, Mathews, & Tata, 1986). In this task, two words were presented on a computer screen simultaneously, one word above the center point of the screen and the other word below the center point. The words disappeared after 1 s and a small dot appeared in the same position as one of the previously displayed words.[2] Participants were instructed to indicate as quickly as possible whether the dot was located in the top or bottom position. On the 20 critical trials, one of the words in the pair was related to anxiety (e.g., *nervous, anxious, scared*) while the other was a neutral word matched for length and frequency. There were 10 filler trials containing only pairs of neutral words. The position of the dot varied randomly such that it appeared in the same position as the anxiety word for

[2]We increased the typical exposure time for the word stimuli from 500 ms to 1 s, in order to allow participants sufficient time to redirect their attention. This logic is supported by the finding that individuals can read words and launch saccades in less than 1 s (Reichle, Pollatsek, Fisher, & Rayner, 1998).

half of the critical trials and in the position of a neutral word for the remaining trials. The position of the anxiety word also varied randomly and was located in the top or bottom position an equal number of times. Reaction times were recorded from the onset of the dot appearing.

We computed an index of *attention allocation* to anxiety-related words by subtracting the average reaction time to identify the location of the dot for trials when it appeared in the same location as the anxiety word from the average reaction time for trials when the dot appeared in the same position as the neutral word. Thus, higher positive scores indicate increased vigilance for anxiety-related stimuli, a response associated with increased anxiety (MacLeod et al., 1986). However, if participants under threat are attempting to suppress anxious responses, we expected that they would actively avoid the anxiety words when told that attention to these words is a sign of increased anxiety. As a result, participants trying to suppress the expression of anxiety under threat would tend to be slower in identifying the location of the dot when it appeared in the same location as the anxiety word (i.e., lower negative values should indicate expressive suppression in the threat condition).

Working memory: We measured executive resources using dual-processing measure of working memory called the reading span task (see Schmader & Johns, 2003). In this task, participants were first presented with a word, which they were directed to memorize for later recall. A sentence was presented next and participants were asked to count the number of vowels contained in the words. At the end of a series of sentence–word combination trials (i.e., a set) participants were asked to recall as many of the words from the preceding series as possible. Each set included 4, 5, or 6 word–sentence trials, and the sets were presented in random order. There were four blocks of each set size (12 sets total) for total of 60 word–sentence trials. We assessed working memory using the *absolute span score*—summing the total number of words recalled from only those sets where all the words were recalled correctly (La Pointe & Engle, 1990).

Self-reported anxiety: Self-reported anxiety ($\alpha = .86$) was measured as the average of participants' ratings of how agitated, anxious, nervous, uneasy, and worried they felt using a 7-point scale anchored by *not at all* (1) and *very much* (7).

Procedure—We manipulated stereotype threat using procedures Inzlicht and Ben-Zeev (2000) developed and validated. Upon entering the lab, all participants were seated at adjacent computer workstations. In the stereotype threat condition, the female participant was seated at the middle workstation so that she was flanked by two male confederates. A male experimenter explained that the purpose of the study was to administer a test of mathematical aptitude in order to collect normative data on men and women. In the no-threat condition, 3 female participants were told by a female experimenter that the purpose of the study was to administer a problem-solving exercise in order to collect normative data on college students. All participants were told that they would complete the math test/problem-solving exercise in two parts, separated by two filler tasks, and that they would receive performance feedback at the end of the session. In actuality, the filler tasks were the tasks of interest: the dot probe task and working memory measure.

After completing an initial set of word problems (to induce threat and bolster the cover story), participants were presented with the dot probe task. In the neutral description condition, the task was identified as a measure of perceptual focus, whereas in the anxiety measurement condition the task was identified as a measure of state anxiety. Participants in this condition were also told that "people who are feeling more anxious should be quicker to identify the location of the dot when it appears in the same position as the anxiety-related word." We predicted that if women under threat try to regulate anxiety they would avoid directing their attention toward the threat-related words on the dot probe task in order to suppress the

expression of their anxious affect. Participants then completed the working memory task, also described as filler task, and the self-report measure of anxiety. The experimenter then announced that there would not be sufficient time to complete the second problem set. Participants were then probed for suspicion, debriefed, and thanked for their participation.

Results and Discussion

Working Memory—Our prediction about the effect of emotion regulation on executive functioning translates into a main effect of stereotype threat on the number of words recalled on the working memory task. A 2 (stereotype threat) × 2 (anxiety measure description) between-subjects analysis of variance (ANOVA) on the absolute span score yielded only the predicted main effect of stereotype threat, $F(1, 77) = 9.53$, $p < .01$. Replicating previous research (Schmader & Johns, 2003), women in the stereotype threat condition ($M = 24.99$) recalled fewer words compared to women in the problem-solving control condition ($M = 33.03$; $d = 0.69$).

Dot Probe Task—Only reaction times for correct responses were used to compute the attention allocation index. Error rates were not affected by the manipulations and were low overall (1.73%). Analysis of attention allocation yielded only the predicted interaction between stereo type threat and anxiety measure description, $F(1, 77) = 6.41$, $p = .01$. In the stereotype threat condition, when the dot probe task was described as a measure of perceptual focus, women directed more attention toward anxiety-related words ($M = 15.68$) compared when the task was described as a measure of anxiety ($M = -16.83$), $F(1, 77) = 5.16$, $p < .05$ ($d = 0.73$). This response pattern (displayed in Figure 1) suggests that women under stereo type threat were experiencing increased anxiety but attempted suppress their expression of anxiety when they were aware that the dot probe task measured this state. Women in the problem-solving condition did not show differential attention toward anxiety related words when the task was described as a measure of perceptual focus ($M = -15.28$) compared to when the task was described as a measure of anxiety ($M = 6.83$), $F(1, 77) = 1.84$, ($d = 0.43$). Thus, it was not the case that women showed a general tendency to shift attention away from anxiety-related stimuli when they thought that their anxiety was being assessed. Rather, stereo type threat appears to instigate efforts to suppress the expression anxiety.

We also examined the correlations between the attention allocation index and working memory separately in each condition When the dot probe task was described in neutral terms, allocation of attention to threat-related stimuli was negatively correlated with working memory when under stereotype threat, $r(23) = -.42$, $p = .05$, but uncorrelated with working memory in the control condition, $r(16) = .05$. This pattern suggests that women under stereo type threat were in fact feeling anxious and that those feelings corresponded to reduced working memory efficiency. However, when the dot probe task was described as a measure of anxiety, working memory was positively correlated with attention allocation to anxiety words for women under stereotype threat, $r(21) = .54$, $p = .01$, but uncorrelated for women in the control condition, $r(21) = -.13$, *ns*. These results suggest that women under stereotype threat who thought the task measured anxiety directed their attention away from threat-related stimuli to avoid appearing anxious, and the more they tried to regulate their anxiety, the fewer executive resources they had available.

Self-Reported Anxiety—Analysis of the self-reported anxiety measure did not yield any significant effects (Fs < 1.0). The overall average of self-reports ($M = 2.96$) was significantly lower than the scale midpoint of 4, $t(80) = -7.26$, $p < .001$. Also, in the stereotype threat condition, self-reported anxiety did not correlate with responses on the dot probe task when it was described as a measure of perceptual focus ($r = .04$) or anxiety ($r = -.14$). Thus, although women under stereotype threat did not report feeling more anxious while expecting to take a

math test, the implicit dot probe measure suggests that they were. The lack of differences in self-reported anxiety, along with the lack of correlation between the implicit and explicit measures, is consistent with previous studies showing a dissociation between direct and indirect measures of the psychological experience of stereotype threat (Bosson et al., 2004;C. M. Steele et al., 2002; Wheeler & Petty, 2001). Such dissociation would be expected if participants experiencing stereotype threat suppress the expression of anxiety as part of an attempt to regulate their experience of this negative emotion (Gross, 2002; Jackson et al., 2000).

The results of this study offer preliminary support for the hypothesis that regulating anxiety through suppression contributes to the effect of stereotype threat on executive resource depletion. Taken together, the overall pattern of responses in this study indicates that stereotype threat was anxiety provoking but that it also motivated a desire to avoid displaying those anxious feelings. The fact that responses on the reaction time measure corresponded to reductions in working memory efficiency in the stereotype threat condition suggests further that emotion regulation efforts deplete the executive resources of targets. The correlational nature of these data, however, limits our ability to conclude that emotion regulation caused reductions in executive functioning. Consequently, in Study 2 we directly manipulated emotion regulation strategies in order to provide more direct evidence of the causal relationship between emotion regulation and executive resource depletion under threat.

Study 2

The primary goal of Study 2 was to explore the effects of emotional suppression on executive function directly and to establish a causal chain of evidence (Spencer, Zanna, & Fong, 2005). Thus, whereas the prior study revealed a pattern of results suggesting that targets spontaneously attempt to suppress their anxiety in response to stereotype threat, Study 2 experimentally manipulated the use of suppression strategies to provide a more direct test of the role of suppression in depleting executive resources.

An additional goal in this study was to compare a suppression strategy to a more adaptive means of regulating emotion under threat. According to Gross's (1998) process model of emotion regulation, there are two primary ways people can cope with negative emotions. *Response-focused coping* refers to attempts to minimize the experience of a negative emotion only after it has been aroused. Someone using response-focused coping would try to suppress the expression of their emotions so as not to feel them (Jackson et al., 2000). Research has shown that response-focused coping can disrupt cognitive processes (Richards & Gross, 2000; Schmeichel et al., 2003) and interpersonal interactions (Butler et al., 2003) and elevate physiological markers of stress (Gross, 1998; Gross & Levenson, 1997). An alternative approach to emotion regulation is *antecedent-focused coping*, wherein one cognitively reappraises a situation in neutral terms in order to minimize its emotional impact. Unlike response-focused coping, antecedent-focused coping does not bear costs to psychological functioning because it does not require the same amount of online cognitive activity to monitor one's feelings and behavior (Gross, 2002).

If targets of stereotype threat experience depleted resources because they use a response-focused coping strategy, then directing targets to reappraise the situation should promote antecedent-focused coping and reduce the effects of stereotype threat on executive functioning. It also follows that if stereotype threat naturally leads to spontaneous response-focused coping, then explicitly directing targets to suppress their emotions should produce similar effects as stereotype threat alone. We tested this hypothesis with women in the domain of math by assigning participants to reappraisal, suppression, or threat-only conditions. After these manipulations, participants completed a Stroop task to measure executive resource depletion and then took a difficult math test. The primary prediction was that women in the reappraisal

condition would show the least Stroop interference and the best math test performance compared to women in the suppression and threat-only conditions.

Method

Participants and Design—The participants were 46 female students at a large Canadian university who received course credit for completing the study. These participants were selected on the basis of their knowledge of the stereotype that men are better at math than women, which we determined using the same question as in Study 1. Only women who responded 1 or 2 on the scale were contacted to participate.

Data from 2 participants were excluded from all analyses due to excessive error rates (>66%) on the Stroop task. In addition, 1 participant's Stroop data were recorded improperly and her missing Stroop values were inferred from the condition mean. Participants were randomly assigned to one of three conditions—emotion suppression, emotion reappraisal, and threat-only control—in a one-way between-subjects design.

Measures

Suppression intention manipulation check: To determine whether participants in the suppression and reappraisal conditions followed instructions, all participants answered the question "What kind of attitude will you adopt when viewing the test? Will you adopt a neutral, objective attitude or will you take the attitude of suppressing and hiding your feelings?" using a 7-point scale, ranging from 1 (*I will take a neutral attitude*) to 7 (*I will take a suppressing/hiding attitude*) and a midpoint of 4 (*I will take neither a neutral nor suppressing attitude*).

Stroop task: Following research by Inzlicht et al. (2006), we used performance on the color-naming Stroop task as a measure of executive resource depletion. Stimuli consisted of color words (e.g., *red*, *blue*, *green*, *yellow*) presented in either red, blue, green, or yellow font. Participants pressed a keyboard button to indicate the color in which the stimuli were presented. Each trial consisted of a fixation cross (+), shown for 1 s followed immediately by a color word. Participants were given 2 s to respond, after which time the stimulus disappeared and responses were no longer accepted. Trials were separated by a 1-s interval. On congruent trials, the color word appeared in a color that matched its semantic meaning (e.g., *BLUE* presented in blue font); on incongruent trials, it appeared in a color that mismatched its semantic meaning (e.g., *BLUE* presented in green font). There were 12 trials per block, with each block containing 8 congruent and 4 incongruent trials. Following one practice block, each participant completed nine blocks. The overall error rate was 2.26%. We calculated mean response times for each trial type using only correct responses.

Math test: Participants completed the same math test used by Marx, Stapel, and Müller (2005) described to them as the Massachusetts Math Achievement Battery. The test resembled the quantitative section of a Graduate Record Exam (GRE) and contained 20 difficult problems.

Procedure—Participants were run in groups of two to four by a male experimenter. All participants learned that they would be taking a test diagnostic of their "genuine math abilities" that could indicate their "strengths and weaknesses" in the quantitative domain. Participants in the threat-only condition were given no additional instruction. Participants in both the suppression and reappraisal conditions were given additional instructions, adapted from Richards and Gross (2000), asking them to engage in a second task while taking the math test. Participants in the suppression group were instructed to suppress and hide all feelings and emotions they had while preparing for, thinking about, and taking the test, and to "behave in such a way that a person watching you would not know you are feeling anything at all." Participants in the reappraisal group were instructed to look at the test in an objective manner,

to adopt a neutral attitude as they prepared for, thought about, and took the test, and to "think about [the test] objectively and analytically rather than as personally, or in any way, emotionally relevant to you." All participants were then given 7 min to look over a sample math test, with answers provided on the last page, but encouraged not to solve any of the items. Participants then completed the Stroop task and a brief questionnaire containing the manipulation check before spending 15 min working on the math test.

Results and Discussion

Suppression Intention Manipulation Check—Analysis of the manipulation check question revealed that the emotion regulation instruction had the intended effect, $F(2, 41) = 5.54$, $p < .01$ (see Table 1). Participants in the reappraisal condition were more likely to take an objective mindset than those in the suppression and the threat-control groups, $t(41) = -3.32$, $p < .01$ ($d = 1.04$), who did not differ from each other, $t(41) < 0.50$ ($d = 0.15$). Although we did not have a specific prediction about the self-reported intentions of participants in the threat-only condition, this pattern of results further suggests that threat leads people to spontaneously suppress their emotions.

Stroop and Math Test Performance—Given the results of Study 1, our a priori prediction was that participants in the suppression group and the threat-only condition would experience an equivalent reduction in executive functioning, relative to those in the reappraisal condition. We tested this predicted pattern with a set of orthogonal contrasts in which the reappraisal condition was assigned a weight of 2, and the suppression and threat-only conditions were each assigned a weight of −1. The second contrast compared the suppression condition (weighted −1) to the threat-only condition (weighted 1; reappraisal condition weighted 0). Together these contrasts test the focal hypothesis that the reappraisal condition will differ from the suppression and threat-only conditions and that the suppression and threat-only conditions will not differ from each other. Table 1 displays the means and standard deviations for the primary dependent measures.

Stroop interference: Performance on the Stroop task was analyzed using both reaction time and error indices of interference. We analyzed reaction time-based interference by subtracting reaction times on congruent trials (when color word and font color matched) from the incongruent trials (when color word and font color were different). Thus, higher numbers are indicative of executive resource depletion. As predicted, the first contrast showed that women instructed to reappraise their emotions had a significantly easier time with the Stroop task than did women in the suppression and threat-only groups, $t(33.62) = -2.20$, $p < .04$ ($d = 0.76$),[3] who did not differ from one another, $t(27.94) = 1.45$, *ns* ($d = 0.55$) Similarly, emotion regulation strategy also affected the relative number of errors participants made (calculated by subtracting individual congruent errors from incongruent errors). As predicted, participants in the reappraisal group made relatively fewer errors than did those in the suppression and threat-only groups, $t(41) = -2.63$, $p < .02$ ($d = 0.82$), who did not differ from one another, $t(41) = -0.96$, *ns* ($d = 0.30$).

Math test performance: Analysis of the total number of questions participants answered correctly on the math test using the contrasts revealed that participants in the reappraisal condition answered more items correctly compared to participants in the suppression and threat-only conditions, $t(41) = 2.22$, $p < .04$ ($d = 0.69$), who did not differ from one another, $t(41) < 1$ ($d = 0.16$). Together, these results suggest that antecedent-focused emotion regulation can protect targets from the negative cognitive effects of stereotype threat.

[3]Degrees of freedom for this analysis are adjusted because interference scores failed the homogeneity test, *Levene Statistic* (1, 40) = 3.31, $p < .05$.

The correlation between Stroop interference and test performance was in the expected direction but was not significant ($r = -.24$, $p = .12$). This small correlation could be the result of the Stroop task capturing only a subset of the processes associated with executive functioning (Kane & Engle, 2003).

Whereas Study 1 suggested that people under stereotype threat spontaneously try to suppress the expression of emotions, this study provides more direct evidence that suppression under threat works to deplete executive resources and undermine intellectual performance. In Study 2, participants directed to suppress their emotions performed very much like participants in the threat-only comparison group: They displayed similarly low levels of executive resources on the Stroop test and performed at similarly low levels on the math test. In combination, these two studies converge on the idea that stereotype threat motivates response-focused emotion regulation, which diverts the executive resources needed to perform well on difficult intellectual tasks. These results also suggest that not all forms of emotion regulation are depleting. Participants directed to adopt an antecedent-focused regulation strategy to cope with their emotions did not show impairments to their executive functioning or intellectual performance.

One of the more noteworthy findings from this study is that a manipulation designed to "turn off" suppression—a maladaptive form of emotion regulation—restored executive resources and subsequent performance on a diagnostic test. It is important to note that the difference between the suppression and reappraisal conditions cannot be explained as resulting from the dual-task nature of the suppression condition: Both the suppression and reappraisal groups were given an "extra" task, but only the suppression group showed deficits. Furthermore, the suppression group performed as poorly as the threat-only group, even though the latter did not have an experimentally created "extra" task.

Study 3

The third study was designed to replicate and extend the effects found in the prior two studies. First, to provide converging evidence for the effectiveness of reappraisal in reducing stereotype threat, we used a reappraisal instruction that focused not on reappraising the situation in an objective way but on reappraising one's emotional reaction to the situation as irrelevant to performance. We reasoned that if targets of stereotype threat experience anxiety and adopt a response-focused coping strategy, then leading them to reappraise anxiety as inert should eliminate this tendency and allow targets to perform to their full potential. This study, therefore, manipulates more directly the motivation to suppress anxiety. We also employed a situation where participants received the reappraisal information from one person but believed that their performance would be evaluated by someone else. Having the experimenter in Study 2 provide information about how to cope with the situation could have been interpreted as "advice" designed to help the participant. As a result, the reappraisal manipulation could have simply made the situation seem less threatening. In Study 3 we disconnected the reappraisal information from the stereotype threat manipulation to assure that these manipulations were independent. If reappraising anxiety under threat buffers performance, it would provide more direct evidence that antecedent-focused coping reduces stereotype threat by eliminating anxiety suppression tendencies. Together, these procedures allow for a more precise and stringent test of the hypothesis that stereotype threat depletes executive resources via emotional self-regulation.

To maximize our ability to assess the relationship between executive resource depletion and test performance we returned to the more general working memory measure used in Study 1 (Wittmann & Süβ, 1999). Women completed this measure and a math test under one of three conditions. In the stereotype threat plus reappraisal condition, women expected their test

performance to be evaluated by a male confederate but were told by the experimenter that anxiety was unlikely to hurt their test performance. In the stereotype threat-only condition women were not provided any information about the effects of anxiety on performance. In a nonthreat control condition, women completed the same tasks described in stereotype-irrelevant terms while expecting to be evaluated by a female confederate. The primary prediction was that women under stereotype threat who were not given any reappraisal information would show lower working memory and math performance compared to women in the other two conditions.

Method

Participants—Participants were 61 Caucasian women attending a medium-sized American university who completed the study for course credit. Participants were recruited if they reported having knowledge of the stereotype about women's math ability (using the same question used in Studies 1 and 2) and being at or above the scale midpoint on a measure of math identification (see Brown & Josephs, 1999). Data from 3 participants were excluded due to procedural errors ($n = 2$) or prior completion of the working memory measure ($n = 1$), leaving a final sample of 58 women.

Materials and Procedure—A male experimenter conducted each session, which included a female participant and a confederate. The experimenter explained that the purpose of the study was to assess peer tutoring practices and that participants would be assigned the role of tutor or student. The female participant was always assigned the student role in which she would complete a task that the confederate, assigned to be the tutor, would then evaluate and provide feedback about. The confederate in the control condition was female and the confederate in the two stereotype threat conditions was male.

Following the role assignment, the experimenter escorted the confederate to another room for tutor training and the participant was given time to review five sample math problems said to be representative of the types of problems that would appear on the upcoming task. The task was described as a problem-solving task in the control condition. In the stereotype threat conditions, the task was described as a math test and the experimenter stated that the study was designed to examine the relationship between anxiety and math performance. Participants in the threat-only condition did not receive any further information. In the stereotype threat plus anxiety reappraisal condition, the experimenter further stated that past research had established that anxiety does not hurt and might even help performance on the type of math problems they would be completing. Before completing this task, participants were asked to complete a filler task for an unrelated study—the same working memory task used in Study 1. After completing this task, participants were given 20 min to complete the problem-solving exercise/math test, which contained 30 multiple-choice word problems taken from the quantitative section of the GRE (Schmader & Johns, 2003).

Finally, participants completed a brief questionnaire containing the same measure of anxiety used in Study 1 ($\alpha = .90$) and two manipulation checks of anxiety reappraisal: "According to the *researcher*, how does anxiety affect performance on the types of problems you just completed?" and "How do *you* think anxiety affects performance on the types of problems you just completed?" Participants responded on a 7-point scale where 1 = *anxiety hurts performance*, 4 = *anxiety does not influence performance*, and 7= *anxiety helps performance.*

Results and Discussion

Manipulation Checks—Because they were correlated ($r = .72$, $p < .001$), we averaged the two manipulation check questions before analyzing them in a one-way ANOVA. Participants in the stereotype threat plus reappraisal condition reported that anxiety had a more benign effect

on performance ($M = 5.44$) compared to participants in the threat-only condition who were not given any information about the effect of anxiety on performance ($M = 2.13$) and participants in the nonthreat control condition ($M = 2.27$), $F(2, 55) = 63.49$, $p < .001$ ($d = 3.33$). In addition to confirming the effectiveness of the manipulation, these results indicate that participants not given information about the influence of anxiety assumed that it would have a negative effect on performance, which conceivably could provide the motivation to suppress anxiety in order to perform well.

Working Memory—To test our a priori prediction that anxiety reappraisal would allow women in that condition to perform at the level of those in a non-stereotype-threatening context, we analyzed the number of words recalled on the working memory task using a set of orthogonal contrasts. The first contrast tested the primary hypothesis: The threat-only condition was assigned a weight of −2 and the control condition and anxiety reappraisal conditions were each assigned a weight of 1. The second contrast compared the control condition (weighted −1) to the anxiety reappraisal condition (weighted 1; the threat-only condition was weighted 0). Table 2 displays the means and standard deviations. As expected, participants in the threat-only condition recalled significantly fewer words compared to participants in the control and reappraisal conditions, $t(55) = 2.31$, $p < .05$ ($d = 0.62$), who did not differ from one another, $t(55) < 0.60$ ($d = 0.13$).

Math Test Performance—The same analysis was conducted on the number of items answered correctly on the math test. As predicted, participants in the stereotype threat condition answered significantly fewer questions correctly compared to participants in the control and reappraisal conditions, $t(55) = 2.11$, $p < .05$ ($d = 0.64$), who did not differ from one another, $t(55) < 0.50$ ($d = 0.10$).

Self-Reported Anxiety—As in Study 1, anxiety ratings did not differ by condition ($F < 1$), and the average anxiety rating (collapsing across conditions, $M = 3.40$) was significantly lower than the scale midpoint of 4, $t(57) = -3.18$, $p < .01$. If the reappraisal manipulation improved performance by reducing the experience of threat-induced anxiety then we might have expected significantly lower levels of self-reported anxiety in that condition. The fact that the reappraisal manipulation did not reduce self-reported anxiety suggests that interpreting anxiety as inert did not reduce stereotype threat by reducing the experience of anxiety.

Mediation—The results suggest that directing participants under stereotype threat to see anxiety as irrelevant to performance "turns off" suppression-focused regulation and buffers their executive resources and math test performance. These findings provide experimental evidence for mediation (Spencer et al., 2005). We conducted additional analyses to assess the degree to which the influence of the manipulation on math test performance was associated with parallel changes in working memory. As described above, the manipulation contrast had a significant effect on the proposed mediator, working memory ($\beta = .30$, $p < .05$). The number of words recalled on the working memory task was marginally related to math test performance ($\beta = .23$, $p < .09$) after controlling for the effect of the manipulation contrast. Furthermore, when controlling for the relationship between working memory and math test performance, the manipulation contrast was no longer a significant predictor of math test performance ($\beta = .20$, $p > .10$). We tested the overall significance of mediation using the bootstrap method recommended by Fritz and MacKinnon (2007). We constructed bias-corrected confidence intervals around the product coefficient of the indirect (mediated) effect using the SPSS macro Preacher and Hayes (2008) created. The product coefficient is based on the size of the relationship between the independent variable and the mediator and the relationship between the mediator and the dependent variable. The indirect effect was .23, with a 95% confidence interval ranging from .02 to .78. Because the confidence interval does not include zero, the

indirect effect is significant at $\alpha = .05$. Within the context of the process manipulation, these analyses provide further evidence that anxiety regulation contributes to the effect of stereotype threat on performance by depleting executive resources (MacKinnon, Lockwood, & Williams, 2004).

Study 4

Our final experiment was designed to provide additional evidence for our interpretation of the previous three studies. In Study 3, we assumed that reappraisal reduced stereotype threat by eliminating the tendency to engage in spontaneous suppression efforts. Thus, our first goal in Study 4 was to provide converging evidence to support this assumption by showing that directing targets to reappraise anxiety as inert also reduces the expressive suppression tendencies captured in Study 1. Secondly, because the prior three studies examined only members of a stigmatized group, in Study 4 we compared stigmatized to nonstigmatized individuals to assess our hypothesis that the spontaneous anxiety suppression tendencies observed in Study 1 are observed only by those experiencing stereotype threat and not by anyone told that their anxiety is being measured. A final goal was to test the generalizability of the effects by comparing Latino and Caucasian students under conditions that have been shown to produce stereotype threat for Latinos (Gonzales, Blanton, & Williams, 2002; Schmader & Johns, 2003).

Study 4 combined elements from Studies 1 and 3 to tackle these issues. Caucasian and Latino participants completed the dot probe task to capture expressive suppression and the working memory task to capture executive resource depletion under a cover story about the role of anxiety in intellectual test performance. As Study 3, we directed half the participants to reappraise anxiety a more benign way. The remaining participants received no reappraisal instruction. We predicted that only Latino students in the no-reappraisal (i.e., threat-only) condition would show evidence expressive suppression and depleted working memory resources Because Caucasian participants should not experience threat-based anxiety that they would feel motivated to regulate, their attention allocation and working memory resources should not be affected by the description of the study and the reappraisal manipulation. In contrast, if stereotype threat increases concern with suppressing one's anxiety, then this motivation should be reduced if not eliminated among Latinos instructed to reappraise anxiety as benign As a result, Latinos in the reappraisal condition should show patterns of attention allocation and working memory equivalent that of Caucasians in this condition.

Method

Participants and Design—The participants were 34 Latino (22 women, 12 men) and Caucasian (28 women, 19 men) undergraduates who participated for course credit or $10. Participants were recruited on the basis their self-reported ethnicity and assigned to one of two conditions in a 2 (ethnicity) × 2 (effect of anxiety) between-subjects factorial design. A computer error resulted in data loss from 1 Latino participant, and 5 additional participants (2 Latino, 3 Caucasian) failed to follow the instructions on the computer tasks. All analyses were conducted on a final sample of 31 Latinos and 44 Caucasians

Procedure—Two Caucasian female experimenters conducted the sessions two- to four-person groups that always included at least 1 Caucasian and 1 Latino participant. Participants learned that the purpose of the experiment was to study group differences in performance on intelligence tests. In the threat-only condition participants were informed by a prerecorded message from a male researcher that another purpose of the study was to assess the relationship between anxiety and performance on such tests. In the anxiety reappraisal condition participants were further told that past research had established that anxiety does not affect

performance on the types of problems they would be completing and that feeling anxious might facilitate performance. In this way anxiety was mentioned for both groups, but only one group was told that anxiety would not debilitate their performance.

The remaining procedures followed those used in the anxiety measure condition of Study 1. Participants were told they would complete the intelligence test in two parts. They then completed a short set of analytical reasoning questions (to elicit stereotype threat) followed by the dot probe task (described as a measure of anxiety) and the working memory task (described as a filler task). After the working memory task, participants completed a brief questionnaire containing the measure of self-reported anxiety ($\alpha = .86$) and the reappraisal manipulation check ($r = .69$, $p < .001$).

Results and Discussion

Manipulation Check—A 2 (reappraisal) × 2 (ethnicity) ANOVA on the anxiety information manipulation check revealed only the expected main effect of the manipulation, $F(1, 71) = 49.86$, $p < .001$ (see Table 3). Regardless of ethnicity, participants in the reappraisal condition had a more benign view of anxiety ($M = 4.57$) compared to those in the threat-only condition ($M = 2.27$; $d = 2.14$). As in Study 3, there was a general tendency for participants in the threat-only condition to assume that feeling anxious would harm performance.

Expressive Suppression and Working Memory—We tested our a priori predictions with orthogonal contrasts in which the first contrast tested the primary prediction that Latinos in the threat-only control condition (weighted −3) would show evidence of expressive suppression and the lowest working memory compared to Latinos in the anxiety reappraisal condition (weighted 1) and Caucasians in both conditions (weighted 1 and 1). The second contrast compared the performance of Caucasians in the threat-only control condition (weighted 2) to Caucasians and Latinos in the anxiety reappraisal condition (each weighted −1). The third contrast tested the simple main effect of ethnicity within the anxiety reappraisal condition. In this condition, Caucasians were assigned a weight of 1 and Latinos a weight of −1, with the remaining condition weighted zero.

Dot probe task: Results of the first contrast confirmed that Latinos in the threat-only control condition ($M = -15.33$) directed less attention to anxiety-related words compared to participants in the other three conditions ($M = 21.83$), $t(71) = 2.47$, $p < .05$ ($d = 0.70$). Following the recommendations of Abelson and Prentice (1997), we also analyzed the residuals from this contrast. They did not vary across conditions ($F < 1$), suggesting that this contrast pattern describes the majority of between-groups variance in attention allocation. Replicating the pattern observed with women in Study 1, this result indicates that Latinos were attempting to suppress anxiety when no reappraisal information was provided However, directing participants to reappraise anxiety as unrelated to performance appeared to prevent Latinos from suppressing anxiety (see Figure 2).[4] Results of the second contrast confirmed that the attention allocation of Caucasians in the threat-only control condition ($M = 19.37$) did not differ from the attention allocation of both Latinos and Caucasians in the anxiety reappraisal condition ($M = 23.12$), $t < 0.50$ ($d = 0.09$). The third contrast indicated that there was no difference between the attention allocation of Latinos ($M = 26.01$) and Caucasians ($M = 21.43$) in the anxiety reappraisal condition, $t < 0.50$ ($d = 0.08$).

These results demonstrate that expressive suppression is specific to targets of stereotype threat. Directing participants to reappraise anxiety as irrelevant for performance appears to reduce attempts among stigmatized targets to suppress anxious responses while under stereotype

[4]A pairwise comparison of attention allocation scores for Latino participants in the two conditions was significant ($p < .05$).

threat. Importantly, Caucasians showed no sign of such suppression tendencies even though they were given the same information that the purpose of the study was to examine the relationship between anxiety and performance on an intelligence test. Given that Caucasians showed no evidence of emotion-focused suppression in the threat-only condition, it is not surprising that the anxiety reappraisal instruction did not moderate their responses on this measure.

Working memory: When the same analysis was conducted on the absolute span score, results for the first contrast confirmed that Latinos in the threat-only control condition ($M = 27.06$) recalled significantly fewer words compared to participants in the other three conditions ($M = 34.91$), $t(71) = 2.18$, $p < .05$ ($d = 0.55$) The residuals for this contrast did not vary across conditions ($F < 1.9$). The second contrast revealed a tendency for Caucasians in the threat-only control condition ($M = 40.10$) to recall more words compared to Latinos and Caucasians in the anxiety reappraisal condition ($M = 32.18$), $t(71) = 1.95$, $p = .06$ ($d = 0.62$). This unpredicted effect appears to be driven by unexpectedly low word recall scores by Caucasians in the anxiety reappraisal condition[5]. The third contrast indicated that word recall for Latinos and Caucasians in the anxiety reappraisal condition ($M = 34.93$) did not differ significantly from one another ($M = 30.58$), $t < 1$ ($d = 0.31$). As in Studies 2 and 3, a manipulation designed to prevent stigmatized targets from engaging in response-focused coping eased the cognitive burden that is typically observed under stereo type threat. Furthermore, reappraisal had no benefits for a nontargeted group.

Self-Reported Anxiety—There were no significant effects on self-reported anxiety (Fs < 1.7).[6]

Taken together, the results from this study highlight that reappraisal is an effective means of buffering executive resources from the deleterious effects of stereotype threat because it reduces efforts to engage in response-focused suppression. The current study also suggests that the results of the prior studies would not apply to nonthreatened individuals under the conditions we have created: Only threatened Latino participants showed evidence of trying to avoid expressing anxiety and consequently benefited from the reappraisal manipulation. Finally, by replicating the results of the prior studies with a different stigmatized group, we also provide evidence suggesting that emotion regulation is a general reaction to stereotype threat and not specific to women.

General Discussion

Research on stereotype threat has been greeted with much enthusiasm both within academic psychology and among members of the general public interested in group disparities in performance. The original C. M. Steele and Aronson (1995) article is now considered a modern classic (Fiske, 2003) and has been cited over 680 times (ISI Web of Science, 2008). Part of the enthusiasm stems from the fact that stereotype threat suggests factors in the situation can contribute to the seemingly intractable problem of group differences in academic and cognitive performance. Although stereotype threat might not account for all group disparities in mental performance (e.g., Sackett, Hardison, & Cullen, 2004), with other factors like environment and socialization playing key roles, it does help explain why some groups perform below their full

[5]Past research by Ben-Zeev et al. (2005, Study 2) also produced a detectable but nonsignificant performance reduction among nontargeted group members in the presence of an external misattribution cue. One possible explanation for these finding is that reappraisal manipulations undermine the stereotype lift effect (Walton & Cohen, 2003). Future research will need to test this idea.

[6]We note that if the anxiety reappraisal manipulation had a self-fulfilling prophecy effect, then participants in this condition should have reported levels of anxiety higher than those of nontargets (Study 4) and participants in the threat-only control condition (Study 3; Darley & Fazio, 1980). The null effects on this measure therefore argue against self-fulfilling prophecy as an explanation for the effects of the reappraisal manipulation.

potential. Because the theory suggests that situations contribute to group differences, understanding stereotype threat offers hope that researchers can devise situational interventions to help members of stereotyped groups overcome this predicament. Developing effective interventions, however, requires a complete understanding of how stereotype threat undermines performance. Our results provide evidence that stereotype threat operates via the interplay between cognitive and affective processes. The results of these studies converge to show that during stereotype threat, targets experience anxiety that they try to regulate through suppression. This very act of emotion regulation—characterized here as response-focused coping—seizes on the same cognitive resources needed for the central task (e.g., taking a math test) and can result in suboptimal performance.

The results from the four experiments develop a chain of causality (Spencer et al., 2005) to provide converging evidence that stereotype threat depletes executive resources via emotion-focused regulation. Study 1 established that targets of stereotype threat not only experience anxiety but that situations of threat cue attempts to monitor and suppress their expression of these feelings. Study 2 directly manipulated emotion regulation and revealed that suppression has the same negative effect on executive resources and test performance as stereotype threat alone. More noteworthy, the effect of stereotype threat can be eliminated by directing targets to reappraise the situation in a way that prevents the need to suppress one's emotions. Study 3 further demonstrated the benefits of reappraisal by instructing participants to reappraise not the situation, but the anxiety they felt as a result of the situation. The results of this study provide further evidence that executive resources are preserved when targets are given an opportunity to deal with their emotions in a way that does not involve response-focused regulation. Finally, Study 4 generalized these findings to a different stigmatized group and provided evidence that suppression tendencies are specific to stereotyped group members. It is noteworthy that our results converge across studies that vary considerably in methodology. We manipulated stereotype threat in four different ways and reappraisal in two different ways, examined two different stigmatized groups, both measured and manipulated suppression tendencies, and used two different measures of executive resource depletion. The fact that the results support our predictions across these varying manipulations and measures suggests that the emotion regulation hypothesis provides the most parsimonious explanation for all four studies.

Integrated Model of Stereotype Threat

The current work is consistent with an integrated process model of stereotype threat that Schmader et al. (2008) have recently proposed. This model suggests that stereotype threat leads to impaired intellectual performance via three distinct, yet interconnected pathways. The model implicates (a) a physiological stress response, (b) performance monitoring, and (c) emotion regulation as the processes that reduce working memory efficiency and intellectual performance. For example, when called upon in class to answer a difficult question an African American woman may feel anxious, uncertain, and physiologically aroused and may be monitoring her performance and trying to suppress and deny the negative emotions created by the specter of confirming a negative racial stereotype. All three of these processes can tax the limited quantity of executive resources she has at her disposal, the same cognitive resources needed to skillfully answer the question posed to her. The result is that she is more likely to answer the question incorrectly than if she did not have to cope with the burden of a negative stereotype. The current work sits squarely in the third pathway of emotion regulation.

The studies presented here suggest that emotion, and its cognitive collaborator emotion regulation, plays a key role in the experience of stereotype threat. When confronted by negative stereotypes, targets may not only become stressed and agitated but also motivated to regulate these negative emotions. Our research suggests that response-focused coping in the form of emotional suppression can be costly and counterproductive. Although our focus is on the

experience of those targeted by negative stereotypes, it is worth noting that the same processes described here could also play a role in situations where members of positively stereotyped groups choke under the pressure of having to live up to high expectations for their performance (e.g., Cheryan & Bodenhausen, 2000; Shih, Ambady, Richeson, Fujita, & Gray, 2002). In both cases, individuals might be depleted by efforts to suppress their anxiety, but whereas stigmatized individuals are likely to be anxious about the possibility of confirming a negative stereotype, members of the advantaged group can become anxious about failing to confirm a positive stereotype.

The results of Studies 3 and 4 specifically show that antecedent-focused strategies, like reappraisal, are likely to be more effective than suppression. It is worth noting, however, that we focused exclusively on one specific antecedent-focused strategy of cognitive reappraisal. When a threatening environment cannot be avoided or changed, members of stereotyped groups can also deploy their attention strategically and focus on less threatening aspects of the environment. For example, people can try to distract themselves from thinking about negative stereotypes and think about something neutral instead. Consistent with this idea, several studies have revealed that when instructed to replace stereotypic thoughts with less threatening ones, women under stereotype threat showed no ill effect on performance (McGlone & Aronson, 2007; Spencer, 2003).

The current work is also consistent with emerging research detailing the neural structures involved in stereotype threat. Recent neuroimaging work demonstrates that the orbital gyrus and rostral–ventral anterior cingulate cortex (ACC), areas implicated in the regulation of negative and self-conscious emotions, become more activated when individuals must perform in the face of negative self-relevant stereotypes. Further, the more these emotion processing centers become active under stereotype threat, the more errors targets make in stereotype-relevant tasks (Wraga, Helt, Jacobs, & Sullivan, 2007; see also Krendl, Richeson, Kelley, & Heatherton, 2008). Other work indicates that stereotype threat might draw on neural substrates housed in the ACC responsible for error-detection and conflict-monitoring systems necessary for effective self-regulation (Derks, Inzlicht, & Kang, 2008; Forbes, Schmader, & Allen, 2008). Importantly, and in line with the current investigation, these neural systems operate more efficiently when people use antecedent-focused emotion regulation. Reappraisal therefore facilitates normalized activity in the conflict-monitoring neural system and results in robust executive functioning (see also Inzlicht & Gutsell, 2007). In combination, these studies suggest that stereotype threat taxes areas of the brain related to emotional processing and cognitive control, a result that can be avoided when people use more efficient emotion regulation strategies like cognitive reappraisal.

Limitations and Future Directions

One question our results cannot answer directly is what motivation leads targets of stereotype threat to regulate their negative emotions. Were participants motivated to suppress their emotions primarily out of a concern with not *appearing* anxious to the researcher? Or were they motivated primarily out of a concern with not *feeling* anxious in order to perform well? The finding that targets attempt to avoid appearing anxious only when they were told that their anxiety was being assessed (Studies 1 and 4) might suggest that public concern is necessary to motivate emotion regulation under threat. However, this pattern of responses could also be interpreted as evidence that telling threatened participants their anxiety was being measured merely allowed them to exhibit the regulation strategy they were employing. Theoretically, it seems plausible that targets experiencing stereotype threat would be motivated to suppress not only the public expression but also their private experience of anxiety. Thus, we cannot rule out the possibility that a motivation to suppress their emotional experience fueled their efforts to avoid expressing these emotions to others.

Although our results cannot offer a clear answer to the question of how much public concerns contribute to suppression effects we observed, there is research suggesting that stereotype threat effects do not generally rely on public evaluation. Research by Inzlicht and Ben-Zeev (2003), as well as Wout, Danso, Jackson, and Spencer (2008), has found that women underperformed on a math test even when they were reassured that their results would not be seen by anyone else. If stereotype threat were purely a concern with public evaluation, then the possibility of confirming a negative stereotype should disrupt performance only when others can evaluate one's performance. These findings clearly indicate that this is not the case; publicity does not appear to be a necessary condition for stereotype threat to harm performance. Consequently, threatened individuals might try to suppress emotions even in completely private performance situations. Future research will be needed to test this idea.

In the current work we have focused on the suppression of anxiety as the emotion that individuals try to regulate under stereotype threat. Our focus on anxiety follows from theory and research suggesting that it is the dominant affective experience associated with stereotype threat (Beilock et al., 2007; Ben-Zeev et al., 2005; Spencer et al., 1999). However, it is possible that stereotype threat evokes other negative emotions: Negative stereotypes may make individuals feel ashamed about their group membership, dejected by failing to live up to their ideals (Keller & Dauenheimer, 2003), or frustrated when contending with stereotype confirmation (Marx & Stapel, 2006). Isolating the specific emotions that are regulated under stereotype threat would be an intriguing avenue for future research.

Conclusion

In gaining a deeper understanding of stereotype threat and its related processes, we can identify new ways to combat situational influences on group-based differences in educational performance. Our work suggests that one way to help people overcome the deleterious performance effects of stereotype threat is through cognitive reappraisals of the situation and/or their emotional reactions to it. When viewed through the lens of the current framework, interventions that make the experience of stress and doubt seem normal (Walton & Cohen, 2007) can be seen as a form of cognitive reappraisal. Providing evidence that all incoming college students struggle to feel that they belong can help African American freshmen avoid internalizing their stress as evidence of failure. By viewing stress as a normal part of the college experience, the emotions arising from daily setbacks may cease to be disruptive. Similarly, interventions that forewarn people about the nature of stereotype threat (Johns et al., 2005) allow targets to attribute the anxiety they feel during a test situation to an external, situational phenomenon, thereby averting its harmful implications for the self.

The research reported here highlights the importance of considering phenomena like stereotype threat not just as passively experienced predicaments but as experiences stigmatized individuals work to understand and confront. Although our findings reveal that such coping efforts can be counterproductive, they also remind us that those who are targeted by negative stereotypes are not simply targets. Rather, as the opening quote by Shelby Steele suggested, individuals who bear the burden of negative stereotypes engage in active attempts to make sense of their experience, the cues around them, and their internal states in order to regulate how they appear to others. By better understanding these metacognitive processes and the self-regulation strategies they elicit, we will not only reveal core psychological mechanisms that underlie behavior, but we might also discover novel methods of empowering those who are socially stigmatized to more effectively cope with the threats they encounter.

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References

Abelson RP, Prentice DA. Contrast tests of interaction hypotheses. Psychological Methods 1997;2:315–328.

Appelhans BM, Luecken LJ. Attentional processes, anxiety, and the regulation of cortisol reactivity. Anxiety, Stress, & Coping: An International Journal 2006;19:81–92.

Avero P, Corace KM, Endler NS, Calvo MG. Coping styles and threat processing. Personality and Individual Differences 2003;35:843–861.

Baumeister RF, Bratslavsky E, Muraven M, Tice DM. Ego depletion: Is the active self a limited resource? Journal of Personality and Social Psychology 1998;74:1252–1256. [PubMed: 9599441]

Beilock SL, Rydell RJ, McConnell AR. Stereotype threat and working memory: Mechanisms, alleviation, and spillover. Journal of Experimental Psychology: General 2007;136:256–276. [PubMed: 17500650]

Ben-Zeev T, Fein S, Inzlicht M. Arousal and stereotype threat. Journal of Experimental Social Psychology 2005;41:174–181.

Blascovich J, Spencer SJ, Quinn D, Steele CM. African Americans and high blood pressure: The role of stereotype threat. Psychological Science 2001;12:225–229. [PubMed: 11437305]

Bosson JK, Haymovitz EL, Pinel EC. When saying and doing diverge: The effects of stereotype threat on self-reported versus non-verbal anxiety. Journal of Experimental Social Psychology 2004;40:247–255.

Brown RP, Day EA. The difference isn't black and white: Stereotype threat and the race gap on Raven's Advanced Progressive Matrices. Journal of Applied Psychology 2006;91:979–985. [PubMed: 16834521]

Brown RP, Josephs RA. A burden of proof: Stereotype relevance and gender differences in math performance. Journal of Personality and Social Psychology 1999;76:246–257.

Butler EA, Egloff B, Wilhelm FH, Smith NC, Erickson EA, Gross JJ. The social consequences of expressive suppression. Emotion 2003;3:48–67. [PubMed: 12899316]

Cadinu M, Maas A, Rosabianca A, Kiesner J. Why do women underperform under stereotype threat? Evidence for the role of negative thinking. Psychological Science 2005;16:572–578. [PubMed: 16008792]

Cheryan S, Bodenhausen BV. When positive stereotypes threaten intellectual performance: The psychological hazards of "model minority" status. Psychological Science 2000;11:399–402. [PubMed: 11228911]

Croizet JC, Claire T. Extending the concept of stereotype and threat to social class: The intellectual underperformance of students from low socioeconomic backgrounds. Personality and Social Psychology Bulletin 1998;24:588–594.

Croizet JC, Despres G, Gauzins M, Hugeut P, Leyens J. Stereotype threat undermines performance by triggering a disruptive mental load. Personality and Social Psychology Bulletin 2004;30:721–731. [PubMed: 15155036]

Darley JM, Fazio RH. Expectancy confirmation processes arising in the social interaction sequence. American Psychologist 1980;35:867–881.

Davies PG, Spencer SJ, Quinn D, Gerhardstein R. Consuming images: How television commercials that elicit stereotype threat can restrain women academically and professionally. Personality and Social Psychology Bulletin 2002;28:1615–1628.

Derks B, Inzlicht M, Kang S. The neuroscience of stigma and stereotype threat. Group Processes and Intergroup Relations 2008;11:163–181.

Engle RW. Working memory capacity as executive attention. Current Directions in Psychological Science 2002;11:19–23.

Feldman Barrett L, Tugade MM, Engle RW. Individual differences in working memory capacity and dual-process theories of the mind. Psychological Bulletin 2004;130:553–573. [PubMed: 15250813]

Fiske ST. The discomfort index: How to spot a really good idea whose time has come. Psychological Inquiry 2003;14:203–208.

Forbes C, Schmader T, Allen JJB. Error monitoring in an intellectually threatening environment. Social Cognitive and Affective Neuroscience 2008;3:253–261.10.1093/scan/nsn012 [PubMed: 19015117]

Fritz MS, MacKinnon DP. Required sample size to detect the mediated effect. Psychological Science 2007;18:233–239. [PubMed: 17444920]

Gonzales PM, Blanton H, Williams KJ. The effects of stereotype threat and double-minority status on the test performance of Latino women. Personality and Social Psychology Bulletin 2002;28:659–670.

Gross JJ. Antecedent- and response-focused emotion regulation: Divergent consequences for experience, expression and physiology. Journal of Personality and Social Psychology 1998;74:224–237. [PubMed: 9457784]

Gross JJ. Emotion regulation: Affective, cognitive, and social consequences. Psychophysiology 2002;39:281–291. [PubMed: 12212647]

Gross JJ, Levenson RW. Hiding feelings: The acute effects of inhibiting negative and positive emotions. Journal of Personality and Social Psychology 1997;106:95–103.

Hess TM, Auman C, Colcombe SJ. The impact of stereotype threat on age differences in memory performance. Journals of Gerontology: Psychological Sciences and Social Sciences 2003;58(B):3–11.

Inzlicht M, Aronson J, Good C, McKay L. A particular resiliency to threatening environments. Journal of Experimental Social Psychology 2006;42:323–336.

Inzlicht M, Ben-Zeev T. A threatening intellectual environment: Why women are susceptible to experience problem-solving deficits in the presence of men. Psychological Science 2000;11:365–371. [PubMed: 11228906]

Inzlicht M, Ben-Zeev T. Do high-achieving female students underperform in private? The implications of threatening environments on intellectual processing. Journal of Educational Psychology 2003;95:796–805.

Inzlicht M, Gutsell JN. Running on empty: Neural signals for self-control failure. Psychological Science 2007;18:933–937. [PubMed: 17958704]

Inzlicht M, McKay L, Aronson J. Stigma as ego depletion: How being the target of prejudice affects self-control. Psychological Science 2006;17:262–269. [PubMed: 16507068]

ISI Web of Science. Journal citation reports. 2008. [Database]. Available at http://apps.isiknowledge.com

Jackson DC, Malmstadt JR, Larson CL, Davidson RJ. Suppression and enhancement of emotional responses to pictures. Psychophysiology 2000;37:515–522. [PubMed: 10934910]

Johns M, Schmader T, Martens A. Knowing is half the battle: Teaching stereotype threat as a means of improving women's math performance. Psychological Science 2005;16:175–179. [PubMed: 15733195]

Kane MJ, Engle RW. Working-memory capacity and the control of attention: The contributions of goal neglect, response competition, and task set to Stroop interference. Journal of Experimental Psychology: General 2003;132:47–70. [PubMed: 12656297]

Keller J, Dauenheimer D. Stereotype threat in the classroom: Dejection mediates the disrupting threat effect on women's math performance. Personality and Social Psychology Bulletin 2003;29:371–381. [PubMed: 15273014]

Krendl AC, Richeson JA, Kelley WM, Heatherton TF. The negative consequences of threat: An fMRI investigation of the neural mechanisms underlying women's underperformance in math. Psychological Science 2008;19:168–175. [PubMed: 18271865]

La Pointe LB, Engle RW. Simple and complex word spans as measures of working memory capacity. Journal of Experimental Psychology: Learning, Memory, and Cognition 1990;61(6):1118–1133.

Lazarus, RS. Emotion and adaptation. New York: Oxford University Press; 1991.

MacKinnon DP, Lockwood CM, Williams J. Confidence limits for the indirect effect: Distribution of the product and resampling methods. Multivariate Behavioral Research 2004;39:99–128. [PubMed: 20157642]

MacLeod C, Mathews A, Tata P. Attentional bias in emotional disorders. Journal of Abnormal Psychology 1986;95:15–20. [PubMed: 3700842]

Marx DM, Stapel DA. It's all in the timing: Emotional reactions to stereotype threat before and after taking a test. European Journal of Social Psychology 2006;36:687–698.

Marx DM, Stapel DA, Müller D. We can do it: The interplay of construal orientation and social comparisons under threat. Journal of Personality and Social Psychology 2005;88:432–446. [PubMed: 15740438]

Matheson K, Cole BM. Coping with a threatened group identity: Psychosocial and neuroendocrine responses. Journal of Experimental Social Psychology 2004;40:777–786.

Mathews A, MacLeod C. Discrimination of threat cues without awareness in anxiety states. Journal of Abnormal Psychology 1986;95:131–138. [PubMed: 3711436]

McGlone MS, Aronson J. Forewarning and forearming stereotype-threatened students. Communication Education 2007;56:119–133.

Murphy MC, Steele CM, Gross JJ. Signaling threat: How situational cues affect women in math, science, and engineering settings. Psychological Science 2007;18:879–885. [PubMed: 17894605]

O'Brien LT, Crandall CS. Stereotype threat and arousal: Effects on women's math performance. Personality and Social Psychology Bulletin 2003;29:782–789. [PubMed: 15189633]

Preacher KJ, Hayes AF. Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. Behavior Research Methods 2008;40:879–891. [PubMed: 18697684]

Quinn D, Spencer SJ. The interference of stereotype threat with women's generation of mathematical problem-solving strategies. Journal of Social Issues 2001;57:55–71.

Reichle ED, Pollatsek A, Fisher DL, Rayner K. Toward a model of eye movement control in reading. Psychological Review 1998;105:125–157. [PubMed: 9450374]

Richards JM, Gross JJ. Emotion regulation and memory: The cognitive costs of keeping one's cool. Journal of Personality and Social Psychology 2000;79:410–424. [PubMed: 10981843]

Sackett PR, Hardison CM, Cullen MJ. On interpreting stereotype threat as accounting for African American–White differences on cognitive tests. American Psychologist 2004;59:7–13. [PubMed: 14736315]

Schmader T, Johns M. Converging evidence that stereotype threat reduces working memory capacity. Journal of Personality and Social Psychology 2003;85:440–452. [PubMed: 14498781]

Schmader T, Johns M, Forbes C. An integrated process model of stereotype threat on performance. Psychological Review 2008;115:336–356. [PubMed: 18426293]

Schmeichel BJ. Attention control, memory updating, and emotion regulation temporarily reduce the capacity for executive control. Journal of Experimental Psychology: General 2007;136:241–255. [PubMed: 17500649]

Schmeichel BJ, Vohs KD, Baumeister RF. Intellectual performance and ego depletion: Role of the self in logical reasoning and other information processing. Journal of Personality and Social Psychology 2003;85:33–46. [PubMed: 12872883]

Seibt B, Förster J. Stereotype threat and performance: How self-stereotypes influence processing by inducing regulatory foci. Journal of Personality and Social Psychology 2004;87:38–56. [PubMed: 15250791]

Shih M, Ambady N, Richeson JA, Fujita K, Gray HM. Stereotype performance boosts: The impact of self-relevance and the manner of stereotype activation. Journal of Personality and Social Psychology 2002;83:638–647. [PubMed: 12219859]

Skinner N, Brewer N. The dynamics of threat and challenge appraisals prior to stressful achievement events. Journal of Personality and Social Psychology 2002;83:678–692. [PubMed: 12219862]

Smith JL. Understanding the process of stereotype threat: A review of mediational variables and new performance goal directions. Educational Psychology Review 2004;16:177–206.

Smith TW, Snyder CR, Handeslman MM. On the self-serving function of the academic wooden leg: Test anxiety as a self-handicapping strategy. Journal of Personality and Social Psychology 1982;42:314–321. [PubMed: 7057356]

Spencer, S. Media images and stereotype threat: How activation of cultural stereotypes can undermine women's math performance. Paper presented at the annual meeting of the Society for Personality and Social Psychology; Los Angeles, California. 2003 Feb.

Spencer SJ, Steele CM, Quinn D. Stereotype threat and women's math performance. Journal of Experimental Social Psychology 1999;35:4–28.

Spencer SJ, Zanna MP, Fong GT. Establishing a causal chain: Why experiments are often more effective than mediational analyses in examining psychological processes. Journal of Personality and Social Psychology 2005;89:845–851. [PubMed: 16393019]

Steele CM. A threat in the air: How stereotypes shape intellectual identities and performance. American Psychologist 1997;52:613–629. [PubMed: 9174398]

Steele CM, Aronson J. Stereotype threat and the intellectual test performance of African Americans. Journal of Personality and Social Psychology 1995;69:797–811. [PubMed: 7473032]

Steele, CM.; Spencer, SJ.; Aronson, J. Contending with group image: The psychology of stereotype and social identity threat. In: Zanna, MP., editor. Advances in experimental social psychology. Vol. 34. San Diego, CA: Academic Press; 2002. p. 379-440.

Steele, S. The recoloring of campus life: Student racism, academic pluralism, and the end of a dream; Harper's. 1989 Feb. p. 47-44.Available from http://www.harpers.org/archive/1989/02/0058787

Vick SB, Seery MD, Blascovich J, Weisbuch M. The effect of gender stereotype activation on challenge and threat motivational states. Journal of Experimental Social Psychology 2008;44:624–630.

Walton GM, Cohen GL. Stereotype lift. Journal of Experimental Social Psychology 2003;39:456–467.

Walton GM, Cohen GL. A question of belonging: Race, social fit, and achievement. Journal of Personality and Social Psychology 2007;92:82–96. [PubMed: 17201544]

Wheeler SC, Petty RE. The effects of stereotype activation on behavior: A review of possible mechanisms. Psychological Bulletin 2001;127:797–826. [PubMed: 11726072]

Wittmann, WW.; Süβ, HM. Investigating the path between working memory, intelligence, knowledge, and complex problem-solving performances via Brunswik symmetry. In: Ackerman, PL.; Kyllonen, PC.; Roberts, RD., editors. Learning and individual differences: Process, trait, and content determinants. Washington, DC: American Psychological Association; 1999. p. 77-104.

Wout D, Danso H, Jackson J, Spencer S. The many faces of stereotype threat: Group- and self-threat. Journal of Experimental Social Psychology 2008;44:792–799.

Wraga M, Helt M, Jacobs E, Sullivan K. Neural basis of stereotype-induced shifts in women's mental rotation performance. Social Cognitive and Affective Neuroscience 2007;2:12–19. [PubMed: 18985116]

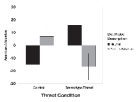

Figure 1.
Means and standard errors for the attention allocation index as a function of the description of the dot probe task and stereotype threat condition in Study 1.

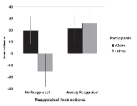

Figure 2.
Means and standard errors for attention allocation on the dot probe task as a function of anxiety reappraisal manipulation and participant ethnicity in Study 4.

Table 1

Means and Standard Deviations for Primary Dependent Measures in Study 2 as a Function of Emotion Regulation Condition

	Suppression		Reappraisal		Threat only	
Dependent measure	***M***	***SD***	***M***	***SD***	***M***	***SD***
Suppression intention	3.50	2.06	1.79	1.12	3.54	1.51
Stroop interference, in ms	146	85	85	51	108	59
Stroop errors	0.69	1.49	−0.79	2.25	1.46	2.82
Math test performance	5.82	3.63	8.29	4.68	5.08	3.43

Table 2

Means and Standard Deviations for Primary Dependent Measures in Study 3 as a Function of Threat and Reappraisal Manipulation

	Nonthreat control		Threat only		Threat + anxiety reappraisal	
Dependent measure	***M***	***SD***	***M***	***SD***	***M***	***SD***
Perceptions of anxiety	2.26	1.22	2.13	0.85	5.44	0.91
Working memory (words recalled)	29.33	9.38	24.32	9.30	31.44	9.29
Math test performance	8.57	5.07	6.05	3.94	9.17	5.21

Table 3

Means and Standard Deviations for Dependent Measures in Study 4 as a Function of Participant Ethnicity and Reappraisal Manipulation

	No reappraisal				Anxiety reappraisal			
	Caucasians		Latinos		Caucasians		Latinos	
Dependent measure	***M***	***SD***	***M***	***SD***	***M***	***SD***	***M***	***SD***
Perceptions of anxiety	2.13	1.15	2.44	1.57	4.39	1.41	4.89	1.58
Working memory (words recalled)	40.10	11.69	27.06	14.77	30.58	13.62	34.93	14.09

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