

Why Can't I Just Be Myself?: A Social Cognitive Analysis of the Working Self-Concept Under Stereotype Threat

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Toni Schmader¹, Alyssa Croft¹, and Jessica Whitehead²

Abstract

We examined the hypothesis that stereotype threat disrupts reflexive cuing of the default self-concept and instead evokes a more reflective process of self-definition. Across two studies, a reaction time measure of math schematicity assessed prior to a math test was predicted by baseline math schematicity among men (Study 1) and women in a nonthreatening condition (Study 2). However, among women under stereotype threat, math schematicity measured prior to a diagnostic math test was unrelated to baseline math schematicity and was instead associated with explicit endorsement of math. These effects occurred for math and not language self-schemas, suggesting that under threat, the working self-concept might be derived from conscious reflection rather than automatic activation.

Keywords

stereotype threat, self-schematicity, working self-concept, social cognition

Being the target of group stereotypes can raise questions about one's "fit" within an environment (Cheryan, Plaut, Davies, & Steele, 2009; Walton & Cohen, 2007). In the face of being negatively stereotyped, even those who are explicitly motivated to excel confront the possibility that they will not measure up. Although stereotype threat research has largely focused on performance impairments, we know little about how this experience affects self-definition.

In the present research, we sought to understand how performing in the context of negative stereotypes changes the process by which one defines the self. Because stereotype threat often occurs when one's abilities are being assessed, targets' own self-perceptions are likely to be affected. We propose that performing under the weight of stereotyped expectancies prevents the activation of the default self-schema and instead leads to a more reflective mode of self-definition. We report two studies yielding support for this hypothesis among women negatively stereotyped in math.

Social cognitive theorizing suggests that only a portion of one's entire self-schema is activated in any given situation and has the ability to influence current attitudes and behavior (McConnell, 2011). This currently activated self is called the *working self-concept*, and its content is determined both by chronically accessible self-aspects and those cued by the environment (Kawakami et al., 2012; Markus & Wurf, 1987). Thus, a college student sitting in a classroom should have his "student self" activated. If he is about to take a calculus exam, his math self-schema should be activated in particular. But what about a woman in the same class? Given evidence that

stereotype threat impairs performance, does it also affect the *process* or the *content* of self-definition?

According to the integrated process model of stereotype threat (Schmader, Johns, & Forbes, 2008), activated stereotypes suggest an expectancy of poor performance that conflicts with one's desire to do well. The resulting dissonance breeds uncertainty about one's fit or ability in the domain. Situations that arouse no such dissonance should cue one's self-domain connection automatically, facilitating schema-consistent behavior (McConnell, 2011). Indeed, a benefit of being the default group in society is that one can be relatively mindless of the self across contexts (Frale, Blackstone, & Scherbaum, 1990). In this mode of reflexive processing, self-associations and behavior are cued automatically in a way that need not align with explicit self-perceptions (Bargh, Gollwitzer, Lee-Chai, Barndollar, & Trötschel, 2001). Such fluid, reflexive processing, lacking in any self-consciousness, could be a component of the experience of flow (Csíkszentmihályi, 1975). Thus, we predict that for those who do not experience threat, the process of self-definition should occur reflexively in both

¹ University of British Columbia, Vancouver, British Columbia, Canada

² University of Arizona, Tucson, Arizona, AZ, USA

Corresponding Author:

Toni Schmader, Department of Psychology, University of British Columbia, 2136 West Mall, Vancouver, Canada V6T 1Z4.

Email: tschmader@psych.ubc.ca

a neutral and an evaluative context, resulting in a working self-concept that is stable across context.

In contrast, those who confront negatively stereotyped expectancies for their performance might not automatically access their default self-schema and instead exhibit a working self-concept generated by a more reflective process. The rationale for this prediction is derived from evidence for metacognitive monitoring of performance under threat. Situations of stereotype threat elicit increased attention to errors (Forbes, Schmader, & Allen, 2008), metacognitions of arousal (Schmader, Forbes, Zhang, & Mendes, 2009), increased task effort (Jamieson & Harkins, 2007), more deliberative search strategies (Rydell et al., 2010), and more step by step rather than automatic behavior (Beilock, Jellison, Rydell, McConnell, & Carr, 2006; Beilock, Rydell, & McConnell, 2007). Together, these effects suggest a more reflective than reflexive mind-set under threat that should not only affect performance but also self-definition (Gawronski & Bodenshausen, 2012; Strack & Deutsch, 2004).

If threat elicits a more reflective process of self-definition, then the implicit self-concept for the domain is likely to be informed by one's concurrent propositional based self-construal (*yes, I could imagine being an engineer*), rather than the automatic association that would be cued in a more neutral context (*self = engineer*). Instead of simply *being* oneself, one considers which self one *should* be or *wants* to be, reducing stability in the working self-concept measured across neutral and threatening contexts. Importantly, this shift in the *process* of self-construal can take place even when the *outcome* of that process is the same. For example, in other research, those who fear evaluation exhibit less stability in their implicit self-concept assessed across a neutral and evaluative context (Gamer, Schmukle, Luka-Krausgrill, & Egloff, 2008). Furthermore, the implicit self-concept is more strongly related to an explicit measure when people are asked to elaborate on self-relevant experiences, even though mean levels of implicit self-associations are unaffected (Egloff, Weck, & Schmukle, 2008). These shifting patterns of correlations across context and type of measure (implicit and explicit) suggest that contextual manipulations can change the *process* by which self-definition occurs, while leaving the *content* relatively intact. By extension, the working self-concept activated under threat might be more consistent with one's current reflective manner of defining the self than with the default self-view in the domain that would be activated in a neutral context.

We drew upon Markus's (1977) self-schematicity theory to test these hypotheses. In Markus's research, individuals who saw themselves as independent were both faster to endorse independence-related adjectives as self-defining and slower to reject any independence-related adjectives that were not self-descriptive. We used a modified schematicity task designed to measure the speed at which participants were able to imagine themselves in math- or language-related professions. Participants completed this measure twice—first under neutral task instructions as a means of assessing baseline math schematicity, and later when they believed their math ability

was about to be tested. We designed the study with a primary focus on associative aspects of the self because we expected this measure to be more sensitive to the subtle manner in which threat is induced. We also suspect that associative aspects of self-definition might be affected earlier than any changes in propositional assertions about the self, and thus could predict avoidance of a stereotyped domain even before people explicitly disidentify from the domain.

Our repeated measures design enabled us to test competing hypotheses. A *heightened schematicity hypothesis* would suggest that activated stereotypes increase the accessibility of the self-domain link because performance in that domain becomes more self-relevant, given the heightened motivation to disconfirm a negative stereotype. Thus, similar to von Hippel, Hawkins, and Schooler's (2001) demonstration that stigmatized individuals become more chronically schematic for domains where they excel despite stereotypes, women might manifest this heightened schematicity for math temporarily when those stereotypes are primed.

Alternatively, a *disengagement hypothesis* can be derived from the theory that repeated experiences of being negatively stereotyped lead to chronic disidentification from a domain (Cheryan et al., 2009; Davies, Spencer, Quinn, & Gerhardstein, 2002; Murphy, Steele, & Gross, 2007; Nosek, Banaji, & Greenwald, 2002; Steele & Ambady, 2006). The first step toward eventual disidentification might be seen as a temporary decrease in math schematicity for those who are negatively stereotyped. This pattern would also be consistent with shared reality theory where stereotypes act as negative expectancies that implicitly cue a negative self-definition (Gustafsson & Bjorklund, 2008; Kawakami et al., 2012; Sinclair, Hardin, & Lowery, 2006; Sinclair, Huntsinger, Skorinko, & Hardin, 2005).

A third hypothesis, and the one supported by our data, is that performing in the context of a negative stereotype changes the process of self-definition. If self-definition is cued reflexively for those not experiencing threat, then domain schematicity measured in a neutral frame should positively predict schematicity measured in an evaluative frame. Thus, men's math schematicity at baseline should predict math schematicity measured just before a math test. Likewise, explicit endorsement of math might have less association with these reflexively cued self-associations. However, if stereotype threat cues a more reflective mode of self-definition, the correlation between women's baseline math schematicity and schematicity under threat should be weakened. Instead, women's activated math self-schema might be more closely related to their explicit endorsement of math.

Study 1 compares these patterns between women and men about to take a diagnostic math test. Study 2 tests these competing hypotheses not just as a function of expected gender differences in math, but instead as cued by a more biologically essentialized and thus threatening explanation of those differences (Dar-Nimrod & Heine, 2006). Finally, we expect these effects to be specific to the stereotyped domain and thus only revealed on measures of math and not language schematicity.

Table 1. Correlations Between Math and Language Schematicity (MS and LS) and Explicit Endorsement of Math and Language Careers (ME and LE) at Time 1 and Time 2.

	T1 MS	T1 ME	T2 MS	T2 ME	T1 LS	T1 LE	T2 LS	T2 LE
T1 Math schema	—	.57***	.32*	.40**	-.25	.03	-.17	-.02
T1 Math endorse	.29**	—	.39*	.86***	-.12	.12	-.05	.04
T2 Math schema	.28*	.42***	—	.42**	-.14	-.05	.00	.01
T2 Math endorse	.34**	.88***	.32**	—	-.19	.08	-.04	.11
T1 Lang schema	.12	.06	.00	.03	—	.60***	.38*	.44**
T1 Lang endorse	-.11	.24*	.10	.13	.32**	—	.26	.89***
T2 Lang schema	.13	.02	-.11	.05	.33**	.27*	—	.30 [#]
T2 Lang endorse	-.12	.18	.04	.15	.38***	.87***	.34**	—

Note. Study 1 below diagonal, Study 2 above diagonal.

* $p < .05$, ** $p < .01$, *** $p < .001$.

Study 1

Method

Participants

The sample included 83 American university students (39 men, 44 women) recruited from psychology classes to receive either course credit or \$15.

Procedure

A female experimenter conducted each session with one male and one female participant. Participants were told that the study was a collaboration with the university's career advising program and concerned career preferences and tutoring in distancing learning. Participants first performed a career categorization task (described below). After completing this initial measure of domain schematicity and a working memory task, participants were told that they would next be taking a math exam that would be evaluated by a math graduate student (whom they met via video) as part of a separate study on effective math tutoring.

To emphasize the difficulty of the math test, participants were provided with five difficult sample math questions to review and were informed that the math test is an established measure of math ability and that their score would be used to establish math intelligence norms for men and women. Such instructions are effective in inducing stereotype threat among female but not male college students (Schmader & Johns, 2003).

Participants were then asked to complete the categorization task again before they took the math exam, ostensibly because the program failed to save their earlier responses. They completed a battery of supplementary measures before being informed that they would not be taking a math exam and were debriefed.¹

Career Categorization Task. Participants performed a computerized categorization task modified from Markus's (1977) self-schematicity task. Specifically, they were asked to categorize 51 different careers or roles as those they either "can" or "cannot" imagine someone like themselves having. We used this

language to maximize the number of careers participants would associate with themselves rather than only selecting the career they are actively pursuing. The careers were pretested to be associated with language (e.g., writer, publicist, and reporter), math (e.g., engineer, biochemist, and economist), or were neutral (e.g., designer, chef, and traveler), with 17 in each category. The careers were randomly presented one at a time at the center of the screen. Each career was presented twice during each administration of the task, and the computer recorded both their response and reaction time.

Explicit math and language endorsement was assessed by the number of math careers to which participants responded "can imagine" out of the total number of all possible math careers. Across the sample at Time 1, participants endorsed an average of 16.13 math careers ($SD = 7.77$, range = 0–34) and 18.53 language careers ($SD = 6.93$, range = 5–34).

Calculating Schematicity. Participants with an implicit connection between "self" and "math" should be facilitated in endorsing a math-related career (e.g., I could imagine being a scientist), but inhibited in rejecting a math-related career (e.g., I cannot imagine being an accountant; Aron, Aron, & Smollan, 1992; Smith & Henry, 1996). Thus, math schematicity was calculated by subtracting reaction times to "can imagine" math responses from reaction times to "cannot imagine" math responses (higher numbers index stronger math schematicity). The same calculation was done for language reaction times. Five participants had missing data on a schematicity measure because they had no variability in their endorsement of a given domain (e.g., always said cannot imagine). Before creating averages, reaction times faster than 300 and slower than 3,000 ms were recoded to 300 and 3,000, respectively (Bargh & Chartrand, 2000). Five average scores that were greater than 3 SD from the sample mean were Winsorized to preserve their rank order in the distribution while minimizing the influence of these extreme scores.

To confirm the initial validity for this measure, we examined the correlations across the sample between explicit domain endorsement and schematicity (see Table 1). At both Time 1 and 2, participants who endorsed more math careers also scored higher in math schematicity, although the moderate strength of these relationships suggests they assess distinct

constructs. Likewise, the language measures were independent of the math measures and being high in math schematicity does not imply being low in language schematicity.

Results

Explicit Endorsement of Math and Language

To explore whether there were differences between men and women's endorsement of math- and language-related careers at both time points, a 2 (gender) \times 2 (time) \times 2 (domain) mixed analysis of variance (ANOVA) was conducted with time and domain as repeated measures. Results revealed a marginal effect of time, $F(1, 81) = 2.71, p = .103$, and a significant effect of domain, $F(1, 81) = 7.63, p < .01$. Participants endorsed more language ($M = 18.48$) than math ($M = 15.70$) careers and tended to endorse more careers at Time 1 ($M = 17.36$) than at Time 2 ($M = 15.70$). A similar analysis conducted on math- and language-schematicity scores revealed no significant main effects or interactions, all $F_s < 2.0$. Thus, we observed no support for hypotheses predicting increased or decreased domain schematicity under threat; we next tested predictions that threat affects the process of self-definition.

Predicting Math Schematicity Under Threat

The following analyses test whether the working math self-concept in anticipation of a math performance is correlated with baseline math schematicity in a less threatening context (suggesting automatic activation of the relevant self-view), and with explicit math endorsement in a more threatening context (suggesting a more reflective process of self-definition). We conducted a moderated regression analysis predicting post-manipulation math schematicity from gender, baseline math schematicity, postmanipulation math endorsement on Step 1 (with the continuous variables standardized), and the two interactions of condition with math schematicity and endorsement on Step 2. This analysis yielded a significant Gender \times Baseline math-schematicity interaction, $\beta = -.35, p < .05$, but no Gender \times Math Endorsement interaction, $\beta = .16, p > .30$. Examination of simple slopes demonstrated that among men, baseline math schematicity was a significant predictor of schematicity just prior to performance, $\beta = .47, p < .01$, but current math endorsement was not, $\beta = .13, p > .40$. Among women, however, current math endorsement significantly predicted schematicity, $\beta = .35, p < .05$, but baseline math schematicity did not, $\beta = .01, p > .90$. Thus, women's working self-concept under threat was predicted by how they were currently reflecting on math, not by their baseline association of self with math.

When the same analysis was conducted predicting postmanipulation language schematicity from baseline language schematicity and current language endorsement, only the main effects of these predictors were significant. Regardless of gender, postmanipulation language schematicity was uniquely predicted both by baseline language schematicity, ($\beta = .25, p < .05$); and by current language endorsement, ($\beta = .28,$

$p < .04$). Gender did not predict language schematicity nor did it moderate these effects, $ps > .25$.

Finally, we examined whether the relationship between Time 1 and Time 2 domain endorsement variables was moderated by gender. For math and language endorsement, baseline measures were highly predictive of postmanipulation measures ($\beta_{\text{math}} = .89, p < .001$; $\beta_{\text{language}} = .87, p < .001$), and these relationships were not moderated by gender, $ps > .35$.

Discussion

Results of this study provided initial evidence that stereotype threat creates less cross-situational stability in the working self-concept of women with math. Although women in a situation of stereotype threat did not significantly reduce the number of math careers they explicitly endorsed or exhibit a general reduction in math schematicity, they exhibited no correspondence between math schematicity measured prior to taking a math test and at baseline. Men on the other hand showed the positive association expected in a test-retest paradigm. This pattern suggests that men more than women activate consistent self-schemas for math regardless of whether their abilities are being tested.

Additionally, there was some evidence that women's working self-concept under threat was significantly related to their explicit endorsement of math, whereas men's was not. Although the magnitude of these relationships was not significantly moderated by gender, these patterns are in line with the prediction that self-definition under stereotype threat occurs through a more explicit and less automatic process. Study 2 sought to replicate this pattern.

Study 2

Although Study 1 provided initial evidence that being negatively stereotyped erodes the cross-situational stability of the working self-concept, the quasi-experimental nature of the design prevents us from drawing strong conclusions about the effects of threat per se. For example, if women have lower self-concept clarity (Campbell et al., 1996), they might show lower test-retest associations in general. Study 2 tested hypotheses among women by manipulating alternative explanations for gender differences in math. Specifically, after women completed the same baseline career categorization task used in Study 1, they read one of the two essays suggesting either biological or sociocultural bases for gender differences in math before completing the career categorization task again. Dar-Nimrod and Heine (2006) demonstrated that biological explanations as compared with sociocultural explanations for gender differences induce lower math performance among women. Extending this work to self-definition, we predicted that women would show correspondence between their baseline and performance-relevant math self-schemas when given a sociocultural explanation for performance differences. However, we might again see a lack of correlation between Time 1 and 2 math schematicity when women read a more threatening biological explanation for gender differences in math.

Method

Participants

We tested 55 female undergraduates from a Canadian university (62% Asian, 25% White) in exchange for course credit. Participants were randomly assigned to either the biological or the sociocultural condition. Six participants were excluded from analyses due to suspicion that the true purpose of the study was related to stereotype threat ($n = 4$), a failure to take the tasks seriously ($n = 1$), or program errors ($n = 1$; final sample, $N = 49$).

Procedure

Similar to Study 1, participants completed measures as part of a cover story about career choice. After completing baseline measures of domain schematicity, participants were told they would take verbal and math aptitude tests. The purported verbal test contained our manipulation: an essay explaining gender differences in math as being due to biological factors or deriving from socialization processes (Dar-Nimrod & Heine, 2006). As in Study 1, participants were given difficult practice math problems to prime stereotype threat. Due to an ostensible programming error, they were asked to complete the categorization task again before taking the math test, which they did not actually complete.²

Measures

Manipulation Check. As a check of the manipulation, participants rated two items: “Based on what you learned in this study, to what extent do you think gender differences in math are due to SITUATIONAL factors (experiences)?” and “Based on what you learned in this study, to what extent do you think gender differences in math are due to BIOLOGICAL factors (genes)?” Responses were reported on a 1 (*not at all due to situational or biological factors*) to 7 (*entirely due to situational or biological factors*) Likert-type scale.

Measures. Domain-endorsement and schematicity measures were calculated as in Study 1. Individual reaction times less than 300 or greater than 3,000 were truncated to 300 and 3,000 respectively; one outlier on Time 1 language schematicity was Winsorized to reduce the impact of this extreme score. Degrees of freedom for analyses vary because some participants showed no variation in their endorsement of math ($n = 8$) or language ($n = 11$) careers, precluding the calculation of that schematicity score.

Results and Discussion

Manipulation Check

Independent samples t -tests confirmed that participants in the social condition ($M = 5.58$, $SD = 1.06$) were more likely to attribute gender differences to social factors compared to those in the biological condition ($M = 4.83$, $SD = 0.92$), $t(47) =$

2.47, $p = .017$. Those in the biological condition ($M = 4.04$, $SD = 1.46$) were more likely to attribute gender differences to biological factors compared to those in the sociocultural condition ($M = 2.38$, $SD = 1.58$), $t(47) = -3.80$, $p < .001$. Thus, our manipulation successfully created different explanations for gender differences in math.

Testing Mean Differences

A 2 (condition) \times 2 (time) \times 2 (domain) mixed ANOVA on women’s explicit math endorsement revealed no significant effects, *all* F s < 2.10 , except for a main effect of domain, $F(1, 48) = 8.69$, $p < .01$. As in Study 1, women endorsed more language ($M = 19$) than math careers ($M = 13$).

A 2 (condition) \times 2 (time) \times 2 (domain) mixed ANOVA on women’s schematicity scores revealed a Condition \times Domain interaction, $F(1, 31) = 5.26$, $p < .05$, as well as a significant three-way interaction, $F(1, 31) = 6.12$, $p < .05$. Examining math schematicity, there was a marginal Condition \times Time interaction, $F(1, 38) = 2.90$, $p < .10$. Women in the social condition became somewhat more schematic for math from pre ($M = -37.27$, $SD = 170.79$) to post ($M = 33.84$, $SD = 167.41$), $t(20) = -1.94$, $p = .067$. Whereas, women in the biological condition exhibited no significant shift ($M_{\text{pre}} = 87.79$, $SD = 248.00$; $M_{\text{post}} = 39.56$, $SD = 150.94$), $t < 1$. There were no significant effects for language schematicity, *all* p s $> .10$. Although these results could imply that the less threatening, sociocultural framing of gender differences elevates women’s sense of math schematicity, this pattern partly reveals a failure of random assignment in baseline schematicity scores. Because this effect was quite small and did not occur in Study 1, we draw no conclusions from it.

Predicting Math Schematicity Under Threat

As in Study 1, we conducted a moderated regression analysis predicting postmanipulation math schematicity from condition, baseline math schematicity, postmanipulation math endorsement on Step 1 (with the continuous variables standardized), and the two interactions of condition with math schematicity and endorsement on Step 2. This analysis revealed nearly significant Condition \times Baseline math schematicity, $\beta = -.60$, $p = .052$, and Condition \times Math Endorsement interactions, $\beta = .44$, $p = .056$. Simple slope analyses suggested that when women received a sociocultural frame on gender differences, their baseline math schematicity was a significant predictor of schematicity just prior to performance, $\beta = .75$, $p < .05$, but current math endorsement was not, $\beta = -.08$, $p > .70$. In contrast, when women received a biological frame on gender differences in math, current math endorsement predicted schematicity prior to performance, $\beta = .58$, $p < .05$, but baseline math schematicity did not, $\beta = -.02$, $p > .90$.

When the same analysis is repeated predicting language schematicity prior to the math test, no effects were significant, *all* p s $> .20$. In addition, regardless of condition, Time 1 math endorsement predicted Time 2 math endorsement, $\beta = .86$,

$p < .001$, and Time 1 language endorsement predicted Time 2 language endorsement, $\beta = .90$, $p < .001$. These effects were not moderated by condition, $ps > .20$.

General Discussion

Results of the two experiments suggest that stereotype threat changes the process of self-definition. In both studies, when negative and essentialized stereotypes were made salient, women's math schematicity before taking a diagnostic math test were unassociated with their baseline levels of math schematicity, even though these measures were positively related for those not threatened. Interestingly, we did not find evidence that activation of a stereotype in an anticipated performance setting reduced (or elevated) mean levels of math schematicity for the targeted group. Thus, stereotype threat does not generally make one *less* schematic for math, or heighten domain schematicity. Instead, both studies offered evidence that the working self-concept under threat, while unrelated to baseline math schematicity, is more closely aligned with one's conscious self-definition at that moment. In other words, threat seems to shift self-definition from an automatically activated reflexive process to a more consciously reflective process.

What might this mean? Research on the shifting activation of the self-concept suggests that cues in the environment bring to mind the parts of the self that are relevant to meeting the goals of that situation (McConnell, 2011). Such activation of implicit self-knowledge should facilitate more automatized action, enabling fluid access of prior memories and proceduralized skills (Beilock et al., 2006; Kawakami et al., 2012; Schmader & Beilock, 2012). By this logic, a measure of implicit connection to a domain should be activated automatically, and individual differences in an association to math should predict that degree of activation when in a math-relevant context. In accordance with this logic, we see significant positive relationships between Time 1 and Time 2 math schematicity for men in Study 1 and for women provided with a nonthreatening explanation for gender differences in math in Study 2.

However, theorists have argued that situations of stereotype threat force one out of an automatic mode of processing information into more controlled forms of processing (Beilock et al., 2006; Schmader et al., 2008). Theorists have suggested that more reflective modes of processing can impair activation of implicit self-views that are discrepant in content (Hofmann & Wilson, 2010). In a similar way, the reflective mind-set created by threat contexts may attenuate the degree to which self and domain associations established in a neutral context inform the working self-concept activated under threat. Consistent with this reasoning, our studies show that when situations involve evaluation based on negative and essentialized stereotypes, baseline math schematicity does not predict math schematicity in the evaluative context. Thus, in line with research on implicit neuroticism, evaluative situations can erode the stability of implicit self-associations for those most likely to experience these situations as threatening (Egloff et al., 2008). At the same time, the more reflective process of self-definition leads to the

activation of a working self-concept in line with explicit self-views. Both studies provided some evidence that only among women under threat does the explicit endorsement of math careers predict higher math schematicity. This pattern might indicate a motivated activation of implicit self-views to validate the self one wants or does not want to be (Peters & Gawronski, 2011).

Importantly, we are able to rule out several alternative explanations for our effects. First, because effects were specific to the stereotyped group or situation, it is not the case that any evaluative context leads to low test–retest reliability in domain schematicity. Furthermore, the low test–retest reliability was only found on our measure of math and not language schematicity. This pattern speaks against an alternative where anxiety or mind wandering induced by stereotype threat simply erodes one's ability to devote attention to the career categorization task in general. It also speaks against an alternative explanation that women withdrew effort on the categorization task to conserve their energy for the upcoming test (Jamieson & Harkins, 2011).

We found no evidence of an overall decrease in women's math schematicity due to stereotype threat. The lack of mean differences on either math schematicity or math endorsement might seem surprising in light of other theory and research whereby individuals disengage from domains where they confront stereotypes (e.g., Davies et al., 2002). We cannot rule out the possibility that a more explicit manipulation of stereotype threat would affect mean differences in either implicit or explicit self-definition. However, analysis of manipulation checks reveal that our manipulations were effective in creating concerns among women about how gender differences in math performance could be viewed. Nonetheless, future research is needed to replicate these effects using other manipulations and link these patterns to later performance and motivation. For example, although these patterns suggest that the women most likely to explicitly envision themselves in math-related careers activate a strong math self-schema under stereotype threat, this more effortful process of self-definition could feel less authentic, making it difficult to fully immerse oneself in action without reflecting on the self.

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Notes

1. The study also included measures of working memory capacity, self-reported distraction, evaluation apprehension, anxiety, ambivalent sexism, and researcher stereotypes, which only

revealed a surprising effect where men reported greater evaluation apprehension than did women, $t(79) = 3.06, p < .01$. On average, however, both men and women reported a belief that the researcher expected men to outperform women on the math test (i.e., grand mean significantly differed from $0 = \text{researcher expects equal performance}$) suggesting that women did indeed expect to be stereotyped. In retrospect, the process of completing the career categorization task might have individuated participants in a way that dissipated the threat before they could complete other measures (Ambady, Paik, Steele, Owen-Smith, & Mitchell, 2004).

- This study also included measures of effort, math and language identification, and math confidence, none of which showed significant effects of condition.

References

- Ambady, N., Paik, S. K., Steele, J., Owen-Smith, A., & Mitchell, J. P. (2004). Deflecting negative self-relevant stereotype activation: The effects of individuation. *Journal of Experimental Social Psychology, 40*, 401–408. doi:10.1016/j.jesp.2003.08.003
- Aron, A., Aron, E. N., & Smollan, D. (1992). Inclusion of Other in the Self Scale and the structure of interpersonal closeness. *Journal of Personality and Social Psychology, 63*, 596–612. doi:10.1037/0022-3514.63.4.596
- Bargh, J. A., & Chartrand, T. L. (2000). The mind in the middle: A practical guide to priming and automaticity research. In H. T. Reis & C. M. Judd (Eds.), *Handbook of research methods in social and personality psychology* (pp. 253–285). New York, NY: Cambridge University Press.
- Bargh, J. A., Gollwitzer, P. M., Lee-Chai, A., Barndollar, K., & Trötschel, R. (2001). The automated will: Nonconscious activation and pursuit of behavioral goals. *Journal of Personality and Social Psychology, 81*, 1014. doi:10.1037/0022-3514.81.6.1014
- Beilock, S. L., Jellison, W. A., Rydell, R. J., McConnell, A. R., & Carr, T. H. (2006). On the causal mechanisms of stereotype threat: Can skills that don't rely heavily on working memory still be threatened? *Personality & Social Psychology Bulletin, 38*, 1059–1071. doi:10.1177/0146167206288489
- Beilock, S. L., Rydell, R. J., & McConnell, A. R. (2007). Stereotype threat and working memory: Mechanisms, alleviation, and spill over. *Journal of Experimental Psychology: General, 136*, 256–276. doi:10.1037/0096-3445.136.2.256
- Campbell, J. D., Trapnell, P. D., Heine, S. J., Katz, I. M., Lavalley, L. F., & Lehman, D. R. (1996). Self-concept clarity: Measurement, personality correlates, and cultural boundaries. *Journal of Personality and Social Psychology, 70*, 141–156. doi: 10.1037/0022-3514.70.1.141
- Cheryan, S., Plaut, V. C., Davies, P., & Steele, C. M. (2009). Ambient belonging: How stereotypical environments impact gender participation in computer science. *Journal of Personality and Social Psychology, 97*, 1045–1060. doi:10.1037/a0016239
- Csikszentmihályi, M. (1975). *Beyond Boredom and Anxiety*. San Francisco, CA: Jossey-Bass.
- Dar-Nimrod, I., & Heine, S. J. (2006). Exposure to scientific theories affects women's math performance. *Science, 314*, 435–435. doi: 10.1126/science.1131100
- Davies, P. G., Spencer, S. J., Quinn, D. M., & Gerardstein, R. (2002). Consuming images: How television commercials that elicit stereotype threat can restrain women academically and professionally. *Personality and Social Psychology Bulletin, 28*, 1615–1628. doi:10.1177/014616702237644
- Egloff, B., Weck, F., & Schmukle, S. C. (2008). Thinking about anxiety moderates the relationship between implicit and explicit anxiety measures. *Journal of Research in Personality, 42*, 771–778. doi:10.1016/j.jrp.2007.08.005
- Forbes, C., Schmader, T., & Allen, J. J. B. (2008). The role of devaluing and discounting in performance monitoring: A neurophysiological study of minorities under threat. *Social Cognitive Affective Neuroscience, 3*, 253–261. doi:10.1093/scan/nsn012
- Frable, D. E., Blackstone, T., & Scherbaum, C. (1990). Marginal and mindful: Deviants in social interactions. *Journal of Personality & Social Psychology, 59*, 140–149. doi:10.1037/0022-3514.59.1.140
- Gamer, J., Schmukle, S. C., Luka-Krausgrill, U., & Egloff, B. (2008). Examining the dynamics of the implicit and the explicit self-concept in social anxiety: Changes in the implicit association test–anxiety and the social phobia anxiety inventory following treatment. *Journal of Personality Assessment, 90*, 476–480. doi: 10.1080/00223890802248786
- Gawronski, B., & Bodenhausen, G. V. (2012). Self-insight from a dual-process perspective. In S. Vazire & T. D. Wilson (Eds.), *Handbook of self-knowledge* (pp. 22–38). New York, NY: Guilford.
- Gustafsson, U., & Björklund, F. (2008). Women self-stereotype with feminine stereotypical traits under stereotype threat. *Current Research in Social Psychology, 13*, 1–13.
- Hofmann, W., & Wilson, T. D. (2010). Consciousness, introspection, and the adaptive unconscious. In B. Gawronski & B. K. Payne (Eds.), *Handbook of implicit social cognition: Measurement, theory, and applications* (pp. 197–215). New York, NY: Guilford.
- Jamieson, J. P., & Harkins, S. G. (2007). Mere effort and stereotype threat performance effects. *Journal of Personality and Social Psychology, 93*, 544–564. doi:10.1037/0022-3514.93.4.544
- Jamieson, J. P., & Harkins, S. G. (2011). The intervening task method: Implications for measuring mediation. *Personality and Social Psychology Bulletin, 37*, 652–661. doi:10.1177/0146167211399776
- Kawakami, K., Phillis, C. E., Simard, D., Pontiero, J., Brnjas, A., & Khan, B., . . . Dovidio, J. F. (2012). In perfect harmony: Synchronizing the self to activated social categories. *Journal of Personality and Social Psychology, 102*, 562–575. doi:10.1037/a0025970
- Markus, H. (1977). Self-schemata and processing information about the self. *Journal of Personality and Social Psychology, 35*, 63–78. doi:10.1037/0022-3514.35.2.63
- Markus, H., & Wurf, E. (1987). The dynamic self-concept: A social psychological perspective. In M. R. Rosenzweig & L. W. Porter (Eds.), *Annual review of psychology (Vol. 38, pp. 299–337)*. doi: 10.1146/annurev.ps.38.020187.001503
- McConnell, A. R. (2011). The multiple self-aspects framework: Self-concept representation and its implications. *Personality and Social Psychology Review, 15*, 3–27. doi:10.1177/1088868310371101
- Murphy, M. C., Steele, C. M., & Gross, J. J. (2007). Signaling threat: How situational cues affect women in math, science, and engineering. *Psychological Science, 18*, 879–885. doi:10.1111/j.1467-9280.2007.01995.x

- Nosek, B. A., Banaji, M. R., & Greenwald, A. G. (2002). Math = male, me = female, therefore math \neq me. *Journal of Personality and Social Psychology*, *83*, 44–59. doi:10.1037/0022-3514.83.1.44
- Peters, K. R., & Gawronski, B. (2011). Mutual influences between the implicit and explicit self-concepts: The role of memory activation and motivated reasoning. *Journal of Experimental Social Psychology*, *47*, 436–442. doi:10.1016/j.jesp.2010.11.015
- Rydell, R. J., Shiffrin, R. M., Boucher, K. L., Van Loo, K., & Rydell, M. T. (2010). Stereotype threat prevents perceptual learning. *Proceedings of the National Academy of Sciences*, *107*, 14042–14047. doi: 10.1073/pnas.1002815107
- Schmader, T., & Beilock, S. L. (2012). Mechanisms: An integration of processes that underlie stereotype threat. In M. Inzlicht & T. Schmader (Eds.), *Stereotype threat: Theory, Process, and Application* (pp. 34–50). New York, NY: Oxford University Press.
- Schmader, T., Forbes, C. E., Zhang, S., & Mendes, W. B. (2009). A meta-cognitive perspective on cognitive deficits experienced in intellectually threatening environments. *Personality and Social Psychology Bulletin*, *35*, 584–596. doi:10.1177/0146167208330450
- Schmader, T., & Johns, M. (2003). Converging evidence that stereotype threat reduces working memory capacity. *Journal of Personality and Social Psychology*, *85*, 440–452. doi:10.1037/0022-3514.85.3.440
- Schmader, T., Johns, M., & Forbes, C. E. (2008). An integrated process model of stereotype threat effects on performance. *Psychological Review*, *115*, 336–356. doi:10.1037/0033-295X.115.2.336
- Sinclair, S., Hardin, C. D., & Lowery, B. S. (2006). Self-stereotyping in the context of multiple social identities. *Journal of Personality and Social Psychology*, *90*, 529–542. doi:10.1037/0022-3514.90.4.529
- Sinclair, S., Huntsinger, J., Skorinko, J., & Hardin, C. D. (2005). Social tuning of the self: Consequences for the self-evaluations of stereotype targets. *Journal of Personality and Social Psychology*, *89*, 160–175. doi:10.1037/0022-3514.89.2.160
- Smith, E. R., & Henry, S. (1996). An in-group becomes part of the self: Response time evidence. *Personality and Social Psychology Bulletin*, *22*, 635–642. doi:10.1177/0146167296226008
- Steele, J. R., & Ambady, N. (2006). “Math is hard!” The effect of gender priming on women’s attitudes. *Journal of Experimental Social Psychology*, *42*, 428–436. doi:10.1016/j.jesp.2005.06.003
- Strack, F., & Deutsch, R. (2004). Reflective and impulsive determinants of social behavior. *Personality and Social Psychology Review*, *8*, 220–247. doi:10.1207/s15327957pspr0803_1
- von Hippel, W., Hawkins, C., & Schooler, J. W. (2001). Stereotype distinctiveness: How counterstereotypic behavior shapes the self-concept. *Journal of Personality and Social Psychology*, *81*, 193–205. doi:10.1037/0022-3514.81.2.193
- Walton, G. M., & Cohen, G. L. (2007). A question of belonging: Race, social fit, and achievement. *Journal of Personality and Social Psychology*, *39*, 456–467. doi:10.1037/0022-3514.92.1.82

Author Biographies

Toni Schmader is a professor and Canada research chair of social psychology at the University of British Columbia.

Alyssa Croft is currently a PhD candidate at the University of British Columbia.

Jessica Whitehead received her PhD from the University of Arizona in 2010; she is currently self-employed as a business and data consultant.