Basic and Applied Social Psychology

ISSN: 0197-3533 (Print) 1532-4834 (Online) Journal homepage: https://www.tandfonline.com/loi/hbas20

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To cite this article: Eduardo O. Jones & Stanley J. Huey Jr. (2020) Affirmation and Majority Students: Does Affirmation Impair Academic Performance in White Males?, Basic and Applied Social Psychology, 42:3, 176-191, DOI: 10.1080/01973533.2020.1732389

To link to this article: https://doi.org/10.1080/01973533.2020.1732389

Published online: 06 Mar 2020.

BASIC AND APPLIED SOCIAL PSYCHOLOGY
2020, VOL. 42, NO. 3, 176–191
https://doi.org/10.1080/01973533.2020.1732389

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Affirmation and Majority Students: Does Affirmation Impair Academic Performance in White Males?

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ABSTRACT

Self-affirmation is a promising brief intervention for reducing the academic achievement gap between majority and stigmatized groups (e.g., underrepresented minorities, women in STEM fields). Affirmations are thought to improve academic performance among stigmatized groups by expanding one's sense of self, buffering social belonging, and reducing social identity threat. Despite encouraging results, some studies suggest that affirmations may inadvertently *decrease* the academic performance of nonthreatened White students. We conducted experimental studies to evaluate whether an affirmation focused on the theme of social belonging (i.e., belonging-affirmation) decreased the math performance of White males. We hypothesized that the belonging-affirmation would enhance performance for female participants but diminish math performance for White male participants. Two studies were conducted to evaluate these hypotheses: (1) a lab-based study involving 122 White male and mixed-ethnicity female undergraduates, and (2) an online study involving 197 young adult White males and females. Results failed to support study hypotheses, with no substantive differences in math performance found between male and female participants randomized to a belonging-affirmation versus neutral writing control. These findings are consistent with recent large-scale field replication failures of self-affirmation interventions, indicating that the phenomena may be more nuanced and fragile than suggested by early research findings.

Over the past two decades, self-affirmation has received considerable empirical attention as a brief, cost-effective, intervention capable of reducing the academic achievement gap between majority and stigmatized groups. Affirmations encourage individuals to consider core personal values, and reflect on the importance of these values in their lives. Values affirmation interventions have been shown to improve the academic performance of African American and Latino middle-school students (Cohen, Garcia, Apfel, & Master, 2006; Sherman et al., 2013), female undergraduate physics students (Miyake et al., 2010), first-generation (i.e., those without a parent with a 4-year degree) undergraduate biology students (Harackiewicz et al., 2014), and Latino undergraduate students (Brady et al., 2016).

According to self-affirmation theory, values affirmation inventions are effective because they reduce the performance limiting effects of stereotype and identity threat, the fear that one will be judged negatively in light of their ethnic background, gender, or other social identities (Sherman & Cohen, 2006). Lab-based experimental studies demonstrate that affirmations completed directly before a threatening academic task can improve the academic performance of threatened students (Martens, Johns, Greenberg, & Schimel, 2006; see Sherman & Cohen, 2006 for a review). Additionally, randomized field trials of affirmation interventions show that only a few brief affirmation writing exercises throughout the academic year can improve the overall GPA of minority students over the course of 2 years (Cohen et al., 2006; Cohen, Garcia, Purdie-Vaughns, Apfel, & Brzustoski, 2009). In these real-world settings, values affirmation interventions have been shown to significantly reduce the academic achievement gap between marginalized and majority students (see Cohen & Sherman, 2014, for a review).

Despite encouraging effects on academic achievement for disadvantaged students, an emerging literature suggests that affirmations may actually *decrease* academic performance for some students. Because affirmations are thought to only affect threatened students, in practice they should have no effect on the

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Table 1. Summary of affirmation studies demonstrating iatrogenic effects on academic performance of white students.

	Sample & design	Results for "threatened" participants	Results for "majority" participants
Brady et al., 2016	183 Latino and White undergraduates randomized to values affirmation or control exercise.	Affirmed Latino students had *higher* GPAs at 2-year follow-up compared with control.	Affirmed White students had *lower* GPAs at 2-year follow-up compared with control.
Kizilcec et al., 2017	1,165 MOOC students randomized to complete values affirmation, social-belonging intervention, or control exercise.	Affirmed LDC students studied *more* course material and had a *higher* course completion rate compared with control.	Affirmed MDC students studied *less* course material and had a *lower* course completion rate compared with control.
Miyake et al., 2010	399 predominately White undergraduate physics students randomized to values affirmation or control exercise.	Affirmed female students received *higher* course grades compared with control.	Affirmed male students received *lower* course grades compared with control.
Shnabel et al., 2013	117 White undergraduate students randomized to one of three affirmation interventions or control exercise.	Affirmed females who wrote about social belonging tended to answer *more* math problems correctly.	Affirmed males who wrote about social belonging tended to answer *fewer* math problems correctly.
Woolf et al., 2009	348 White and ethnic minority medical students randomized to values affirmation or control exercise.	Affirmed ethnic minority students showed no significant differences on a written exam.	Affirmed White students performed *worse* on a written examination compared with control.

Note. LDC: less-developed country; MDC: more developed country; MOOC: massive open online courses.

academic performance of nonthreatened White students (Cohen et al., 2006, 2009). Yet, five studies report findings suggesting that affirmations may have a negative effect on the academic performance of White students (Brady et al., 2016; Kizilcec, Saltarelli, Reich, & Cohen, 2017; Miyake et al., 2010; Shnabel, Purdie-Vaughns, Cook, Garcia, & Cohen, 2013; Woolf, McManus, Gill, & Dacre, 2009; see Table 1).

For example, Miyake and colleagues (2010) evaluated the effects of affirmation on the academic performance of undergraduate physics students and found that the intervention improved the performance of affirmed female students and reduced the gender achievement gap in exam scores and end-of-semester grades. However, when examining the impact of the intervention on male students, an unexpected pattern emerged—the affirmation had a *negative* effect. Affirmed males had significantly lower exam scores and marginally lower course grades relative to their unaffirmed peers. A similar pattern was found by Brady and colleagues (2016) in a lab-based evaluation of a values affirmation among Latino and White undergraduates: Affirmation improved the GPA of Latino students but reduced the GPA of White students over 2 years. Both studies found that affirmation substantially reduced achievement gaps, in part, by lowering the performance of nonthreatened majority students.

How might affirmation reduce the academic performance of majority students? Two studies by Shnabel and colleagues (2013) provide some clues. In their first study, Shnabel et al. (2013) conducted a content analysis of middle-school affirmation essays collected in a prior affirmation trial (Cohen et al., 2006). They found that, regardless of race, youth in the affirmation condition were much more likely to write about themes of social belonging (i.e., how their personal values connected them with others) than those in the control condition. However, writing about social belonging appeared to have a differential impact on Black and White students; it was associated with an increase in GPA for Black students but a decrease for White students.

In a second study, Shnabel et al. (2013) directly tested the hypothesis that writing about social belonging accounts for affirmation effects. They randomly assigned White undergraduates to one of four conditions designed to differentially elicit social belonging themes. They then had participants complete a difficult math test intended to evoke social identity threat. Results showed that the condition which elicited the greatest frequency of social belonging content (i.e.,

belonging-affirmation) reversed the gender gap in performance—affirmed female participants performed markedly better than affirmed male participants. Moreover, consistent with their first study, there was a trend for conditions that elicited more social belonging content (i.e., how important values connected them with others) to be associated with poorer performance among White males. Males completing the belonging-affirmation condition performed marginally worse than males in the other three conditions, suggesting that affirmation had an iatrogenic effect and that affirming social belonging may be contraindicated for nonthreatened students in some contexts.

Why might some majority students be negatively affected by affirmation, particularly affirmations that emphasize themes of social connectedness? To understand this phenomenon, we draw on cultural mismatch theory. The theory posits that there is a cultural mismatch between the interdependent norms of first-generation students and the independent norms of American universities. This mismatch results in increased psychological stress for these students and undermines their academic performance (see Stephens, Markus, & Phillips 2014b, for a review). In a series of experiments, Stephens, Fryberg, Markus, Johnson, and Covarrubias (2012; Stephens, Hamedani, & Destin, 2014a) demonstrated that (1) first-generation college students endorsed greater interdependent norms compared with continuing-generation students (those with at least one parent with a 4-year degree); (2) endorsing greater interdependent norms was associated with poorer academic outcomes; and (3) interventions that reduced the cultural mismatch between interdependently-oriented students and colleges improved academic outcomes.

We speculated that affirmations focused on interdependent values (e.g., belonging-affirmation) may create a cultural mismatch with independently-oriented majority students, and decrease academic performance and psychological functioning as a result. Such interventions may increase psychological stress by subtly threatening majority students value of "expressive independence." (Stephens, Markus et al., 2014b). Indeed, there is some evidence to suggest that interventions focused on fortifying students' sense of belonging can decrease such feelings among White students (Walton & Cohen, 2007). Although cultural mismatch theory provides a plausible frameworks through which affirmations may diminish performance for nonthreatened students, there is limited empirical evidence to support its direct relevance to affirmation interventions. To better understand the potential negative consequences of affirmation on majority students, the current work sought to empirically examine affirmation effects with White males.

Current studies

We conducted two experimental studies to examine whether an affirmation focused on social connectedness (i.e., belonging-affirmation) negatively affected the math performance and psychological functioning of White males. In the first study, White male and mixed-ethnicity female undergraduate students completed a lab-based belonging-affirmation intervention, and we evaluated its effects on math performance, self-integrity, and social belonging. The primary aim was to replicate prior findings (Shnabel et al., 2013) demonstrating that belonging-affirmation improves the math performance of female undergraduates while hindering the performance of White male undergraduates. In a second study, we again sought to evaluate belonging-affirmation effects on Whites. We also sought to evaluate whether cultural mismatch impacted affirmation effects. We recruited an online sample of White male and female young adults through Amazon Mechanical Turk (MTurk). This online study examined the effects of a belonging-affirmation on math performance and psychological variables (i.e., self-integrity, personal mastery) and tested for potential moderators of affirmation effects (i.e., math identity, cultural norms).

Study 1

Because Study 1 was intended to replicate prior research, study design and procedures were similar to Shnabel et al. (2013), with a few exceptions. First, since our primary population of interest was White male students, males of other ethnic backgrounds were excluded from participation. Asian female students were also excluded from participation due to the possibility of positive stereotypes regarding Asians and math ability (e.g., stereotype boost, stereotype susceptibility) obfuscating the effects of the affirmation intervention (Armenta, 2010; Gibson, Losee, & Vitiello, 2014; Shih, Pittinsky, & Ambady, 1999). This effect was not expected to occur for women of other ethnic backgrounds, as we reasoned that women from underrepresented backgrounds (e.g., African American, Latina) who are negatively stereotyped in math based on two identities (gender and ethnicity) are more likely to benefit from affirmation. Second, because we were specifically interested in the effects of the belonging-affirmation, participants were

randomized to complete only the belonging-affirmation or neutral writing control (i.e., we did not include the other two affirmation conditions used by Shnabel et al., 2013). Third, we included two post-intervention measures to assess the effect of the affirmation manipulation on psychological factors (i.e., self-integrity, social fit). Similar to Shnabel and colleagues (2013), we hypothesized that among female participants, the belonging-affirmation would lead to enhanced math performance. We also predicted that affirmation would have positive effects on female participants' perceptions of self-integrity and feelings of social belonging compared with control. By comparison, among White male participants, we hypothesized that the belonging-affirmation would lead to diminished math performance, ratings of self-integrity, and feelings of social belonging compared with control.

Method

Participants

One hundred twenty-two undergraduates were recruited from the psychology subject pool at a private university in California and were compensated with course credit for participating. Two affirmation participants did not complete the exercise correctly and were excluded from subsequent analyses. The final sample consisted of 40 White male and 82 ethnically diverse females. Ages ranged from 18 to 24 years old ($M = 19.92$, $SD = 1.43$). The majority of female participants identified as White (69.5%) with the remaining participants identifying as African American (11%), Latino (9.8%), and biracial (9.8%). Most participants (82.3%) were continuing-generation students (e.g., had at least one parent with a 4-year degree).

Procedures and measures

Participants were run individually or in groups of up to seven participants at a time, but completed all tasks at separate desks and did not interact throughout the study. At the beginning of the experiment, participants were greeted by the experimenter (the first author or one of two female undergraduate research assistants) and completed informed consent. All experimenters were blind to condition. Participants were told that they would be participating in two ostensibly separate studies: one examining students' values, and a second focused on how students solve math problems. Once seated, participants were provided a large sealed envelope with their names written on it, containing the affirmation writing exercise materials. All participants were presented with a list of 11 values and asked to rank them in order of personal importance (i.e., being good at art, physical attractiveness, creativity, independence, membership in a social group, music, politics, relationships with friends or family, religious values, sense of humor, and sports ability). Next, participants completed one of two randomly assigned hand-written exercises: (1) *belonging-affirmation*, or (2) *neutral writing* (Shnabel et al., 2013). Participants in the *belonging-affirmation* condition were instructed to think about a time when their top-ranked value made them feel closer with others, and write a brief essay about why it made them feel closer and more connected. Participants in the *neutral writing control* were instructed to think about a time when an unimportant value (i.e., 9th ranked value) was important to someone else, and write a brief essay about why it would be important to someone else. They were given 10 min to complete the writing exercise and instructed to reflect on the value they wrote about if they finished early. Following completion of the affirmation writing exercise, participants were thanked and told they would be beginning the "second" study, which was completed in the same room with the same participants.

In the ostensible second study, participants were given a very challenging math test that included 30-multiple choice questions drawn from difficult GRE math problems (adapted from Shnabel et al., 2013). To cue stereotype threat, the exam was labeled as a "Math Assessment Test" from the university they attended, and participants were informed it was diagnostic of *math ability*. They were instructed that to get the best assessment of their current math ability, it was "very important" for them to give their best effort. Following completion of the math test, participants completed several post-intervention measures, including a brief demographic questionnaire, an 8-item measure of self-integrity ($\alpha = .79$; Self-Integrity Scale; Sherman et al., 2009), a 6-item measure of social belonging (Social Fit Questionnaire; Walton & Cohen, 2007), and an awareness probe ($\alpha = .80$; adapted from Sherman et al., 2009). The awareness probe was intended to assess what factors participants believed contributed to their math performance, and whether they suspected the values writing exercise was intended to influence their math performance. Participants were asked to list any factors they thought may have impacted their performance and to rate the degree to which 11 specific factors (i.e., math ability, effort on the test, personal background, beliefs, and attitudes, familiarity with math problems, first

writing exercise, reasoning ability, self-esteem, mood, gender of the research assistant, time of day, and today's weather) contributed to their performance. Following completion of these measures, participants were debriefed and thanked for their participation.

Results

Participant values and manipulation check

During the values ranking task, most participants selected "relationships with friends and family" (69.4%) as their top value, followed by "religious values" (13%) and "independence" (12%). All other values were infrequently ranked ($n < 3$). To assess whether our manipulation was effective, we coded participants' affirmation essays to determine whether the two conditions differed in frequency of social belonging themes. One trained undergraduate coder evaluated whether each essay included a social belonging theme based on the coding instructions used by Shnabel and colleagues (2013). As expected, the manipulation produced essays with belonging themes in the belonging-affirmation condition (100%) but not in the neutral writing condition (0%).

On an open-ended question (i.e., awareness probe) where participants were instructed to report any factors that contributed to their math performance, none of the participants reported that they believed the first study (values affirmation) was intended to influence their performance on the math test. Of eleven listed factors that may have contributed to participants' math performance, their "familiarity with math problems" and "math ability" were the highest rated factors by both genders. The values affirmation exercise was rated as the least influential factor by male participants and the second least influential factor by female participants. Overall, participants did not suspect that the values affirmation was intended to influence their performance on the math test.

Primary analyses

We first tested our primary hypotheses that (a) women's math performance would be enhanced in the affirmation condition compared to control, and (b) men's math performance would be reduced in the affirmation condition compared to control. The number of problems correctly answered by affirmed females ($M = 3.59$, $SD = 2.55$), was similar to that of unaffirmed females ($M = 3.61$, $SD = 2.30$), $d = .01$. Likewise, the math performance of affirmed males ($M = 4.43$, $SD = 2.54$) and unaffirmed males ($M = 4.42$, $SD = 2.36$) was nearly identical, $d = .00$ (see Table 2 and Figure 1). The interaction between gender and affirmation condition on math performance was negligible ($\eta_p^2 < .00$). Given that the affirmation manipulation appeared inert on math performance, we combined conditions and examined differences by gender. Results showed that male participants ($M = 4.43$, $SD = 2.43$) outperformed female participants ($M = 3.60$, $SD = 2.42$) on average by approximately one third of a standard deviation ($d = .34$).

Next, we evaluated our secondary hypotheses that (a) women's ratings of self-integrity and social fit would be enhanced in the affirmation condition compared to control, and (b) men's ratings of self-integrity and social fit would be poorer in the affirmation condition compared to control. Perceptions of self-integrity among females in the affirmation condition ($M = 45.39$, $SD = 5.39$) were somewhat lower compared to females in the control condition ($M = 46.84$, $SD = 4.33$), $d = .30$. Differences in ratings

Table 2. Study 1 descriptive statistics for math performance, self-integrity, and social fit.

	Female		Male		Total	
Measure	Affirmation ($n = 44$)	Control ($n = 38$)	Affirmation ($n = 21$)	Control ($n = 19$)	Affirmation ($n = 65$)	Control ($n = 57$)
Math performance (problems correct)						
Range	0–13	0–9	1–9	0–8	0–13	0–9
Mean	3.59	3.61	4.43	4.42	3.86	3.88
Median	3.00	3.50	4.00	4.00	3.00	4.00
SD	2.55	2.97	2.54	2.36	2.55	2.33
Self-integrity						
Range	32–55	35–56	40–56	36–56	22–56	35–56
Mean	45.39	46.84	46.67	46.53	45.80	46.74
Median	46.00	47.00	46.00	47.00	46.00	47.00
SD	5.39	4.33	5.13	5.82	5.30	4.83
Social fit						
Range	23–42	16–42	17–39	18–40	17–42	18–42
Mean	33.20	34.29	31.52	32.89	32.66	33.82
Median	33.50	35.00	33.00	33.00	33.00	35
SD	4.90	5.44	5.77	6.45	5.21	5.78

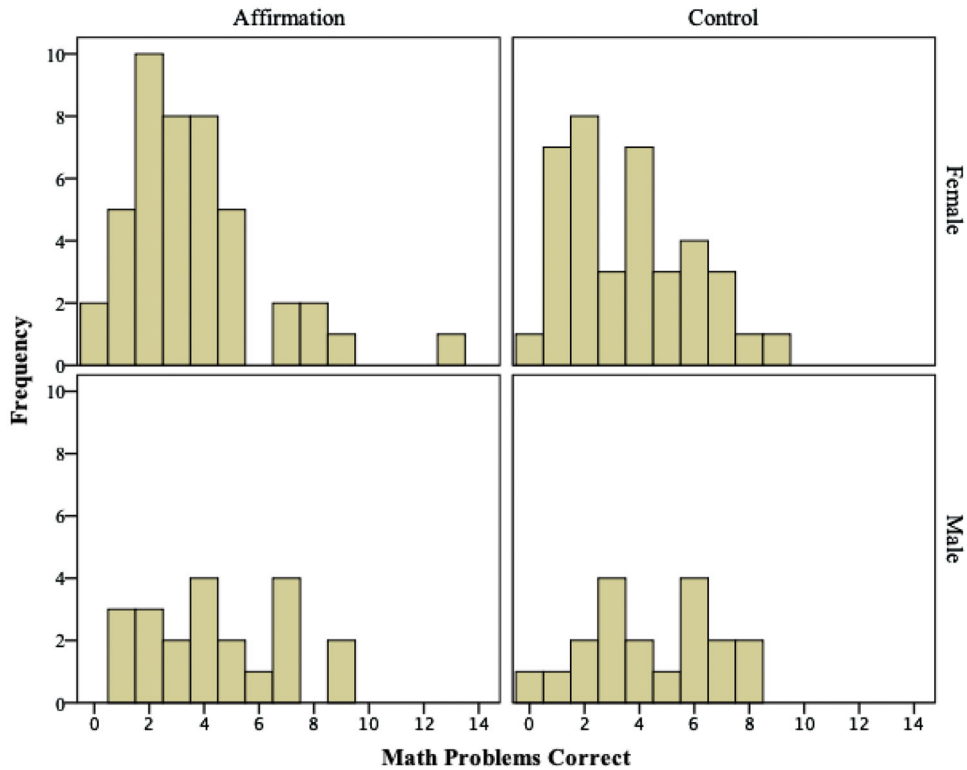

Figure 1. Study 1 frequency of math problems correct by condition and gender.

of self-integrity among males who were affirmed ($M = 46.67$, $SD = 5.13$) and those who were unaffirmed ($M = 46.53$, $SD = 5.82$) were minimal, $d = .03$. Further, the interaction between gender and affirmation condition on self-integrity was relatively weak ($\eta_p^2 = .01$). Concerning ratings of social fit, affirmed females ratings ($M = 33.20$, $SD = 4.88$) were slightly lower than those of unaffirmed females ($M = 34.29$, $SD = 5.44$), $d = .24$. Affirmed males social fit ratings ($M = 31.52$, $SD = 5.77$) were also modestly lower than those of unaffirmed males ($M = 32.89$, $SD = 6.45$), $d = 0.22$. The interaction effect of gender and affirmation on social fit was minimal ($\eta_p^2 < .00$). Overall, differences between affirmed and unaffirmed participants' self-integrity and social fit ratings were relatively small, and appeared unaffected by affirmation.

Precision analyses

To determine whether our sample size was sufficient to reliably estimate our effects of interest (i.e., differences in math performance, self-integrity, and social fit) we used the a priori procedure (APP) (Trafimow, 2017). APP allows researchers to calculate the sample size needed to achieve predetermined levels of closeness and confidence to the population parameters they are seeking to estimate (e.g., population mean, difference in means between two populations). In other words, it allows investigators to assess how well their sample mean (or samples mean difference) is likely to correspond to the true population mean (or populations mean difference). Results of a APP are expressed in terms of the sample size necessary to be within (*f*) fractions of a standard deviation from the population mean for a specified level of confidence (e.g., 90% confidence, 95% confidence). APP may be used as an alternative to traditional power analysis and has the benefit of not being dependent on null hypothesis significance testing (NHST) and *p*-values for results (see Trafimow & Myüz, 2019 for an in-depth explanation of the differences between power analysis and APP).

Although APP can be utilized prior to data collection to determine the sample size necessary to obtain a specified level of closeness and confidence, it can also be used in a posteriori fashion after data have been collected and analyzed. In such instances, APP provides researches with the estimated closeness of their obtained results to the population parameters of interest for a given confidence level. Because we were interested in using APP to determine our level of precision in estimating the mean differences in outcomes

between the affirmation and control group by gender, we used APP equations for independent sample means where sample sizes are unequal (Trafimow, 2019; Trafimow, Wang, & Wang, 2020):

$$f \geq \frac{t_{\frac{\alpha}{2},q}}{\sqrt{\frac{n}{k+1}}}$$

The precision of the samples mean difference, f, is expressed in fractions of a standard deviation. The equation can be understood as follows: "where, $t_{\frac{\alpha}{2},q}$, is the critical t-score that corresponds to the level of confidence level 1 – α and degrees of freedom $q = n + \left[\frac{n}{k}\right]$ is rounded to the nearest upper integer" (see Trafimow, 2019 equation 9, p. 8). In this equation, n is the number of participants in the smaller group (e.g., unaffirmed females) and m the number of participants in the larger group (e.g., affirmed females). Using this equation, we estimated that we had a 95% probability of being within .44 standard deviations of the population mean difference between females in the affirmation ($n = 44$) and control condition ($n = 38$). For male participants, we estimated that we had a 95% probability of being within .64 standard deviations of the population mean difference between affirmed ($n = 21$) and unaffirmed ($n = 19$) males. Results indicate that sampling precision was better for our female sample compared with our male one (.44 *SD*s vs. .64 *SD*s); however, both estimates suggest relatively weak precision ranging from "unacceptable" to near "poor" as put forth by Trafimow (2019).

Discussion

Results from Study 1 failed to support our hypotheses and replicate the pattern of results observed by Shnabel et al. (2013). The affirmation manipulation did not substantively affect math performance or psychological outcomes (i.e., self-integrity, social fit) for male or female participants. We attempted to replicate Shnabel et al. (2013) procedures by using a comparable sample (e.g., undergraduate college students recruited from psychology classes), the same study instructions (e.g., participants were told they were participating in two separate studies), the same math test, and the same affirmation materials. However, our procedures differed from Shnabel and colleagues (2013) in several ways that could have impacted our outcomes.

Shnabel and colleagues (2013) reasoned that the presence of other participants, particularly males, may help increase female participants' sense of evaluative pressure during the math test and cue stereotype threat. Consequently, they had participants complete the study procedures in mixed-gender groups of three to nine participants. We attempted to have participants complete the study in mixed-gender groups but some completed the study individually and without the presence of a male participant. Within our sample, most participants (72.1%) completed the study in a group of two or more (2–7 participants), and approximately half the participants (48.4%) completed the study in a mixed-gender cohort. Prior research suggests affirmations can be effective when completed individually or in group settings (Covarrubias, Herrmann, & Fryberg, 2016; Tibbetts et al., 2016). Nevertheless, the inclusion of participants completing the study alone or in same-gender cohorts was likely the most significant difference between our procedures and those of the original study.

A second limitation of our study was our relatively modest sample size and the low resulting precision. A priori procedure (APP) analyses showed our sampling precision was poor, particularly for our White male participants, our primary population of interest. This was the case even though the number of participants who completed the affirmation and control condition in our study was twice that of the original study (122 vs. 58 participants). These findings suggest that precision was likely even worse in Shnabel et al., 2013, potentially undermining the veracity of their results and their replicability. Poor precision and replicability are widespread concerns within the psychological literature (Open Science Collaboration, 2015; Trafimow & Myüz, 2019) and ones that, unfortunately, extend to the present study.

A final limitation worth noting is that we did not assess for potential moderators of affirmation effects (e.g., math identity, cultural norms). Research on affirmation suggests that participants' identification with the domain of the perceived threat (e.g., academics, math) can moderate intervention effects. Specifically, those who are high in academic or math identification are thought to be more vulnerable to social identity threat in academic settings, and may be more likely to benefit from affirmation (Schmader, 2002; Sherman et al., 2013). Also, although we speculated that the belonging-affirmation might be particularly aversive for those with greater independent norms (i.e., cultural mismatch), we did not assess cultural norms directly and were unable to test this hypothesis. We thus conducted a second study designed to improve upon Study 1, capture potential affirmation moderator effects, and evaluate whether

cultural mismatch contributes to affirmation's iatrogenic effects.

Study 2

The goal of Study 2 was similar to Study 1—to evaluate whether an affirmation focused on social belonging (i.e., belonging-affirmation) could enhance math performance among White females, but diminish performance among White males. Given the results of Study 1, we made several changes to our procedures to increase the likelihood of observing the hypothesized effects. First, to increase the sample of White males, we recruited a convenience sample through Amazon Mechanical Turk (MTurk). Second, we limited study participation to those who identified as European American and who reported having at least one parent who received a 4-year college degree. We reasoned that that these participants would be more likely to express independent cultural norms compared with those who did not have at least one parent who had completed college (e.g., first-generation students).

Third, we assessed participants' math identification and cultural norms prior to the affirmation manipulation. Some research suggests that stereotype threat effects may depend on the degree to which one is identified with the domain of threat, with those who are more identified being at increased risk of threat (Nguyen & Ryan, 2008; Sherman et al., 2009; Spencer, Steele, & Quinn, 1999). Based on this literature, we reasoned that those who were highly math-identified would benefit more from affirmation than those low in math identification. We also assessed participants' independent and interdependent motives for attending college (e.g., cultural norms). Previous research suggests that those with more interdependent values may be more likely to benefit from affirmations focused on interdependence (Covarrubias et al., 2016). We hypothesized that belonging-affirmations may hinder the performance of more independently-oriented participants, while enhancing the performance of those who are more interdependent in orientation. Fourth, our instructions regarding the affirmation were different from Study 1 in that we chose not to use deception (i.e., participants were not instructed that they were participating in two separate studies). Instead, we remained vague about the purpose of the study and informed participants that it was about "understanding values and problem-solving." Recent research suggests affirmations can be effective when participants are aware of their intent if they are freely chosen (Silverman, Logel, & Cohen, 2013; Walton, Logel, Peach, Spencer, & Zanna, 2015), so it seemed unnecessary to directly deceive participants. Fifth, because we expected our online sample to be less skilled at math than the sample in Study 1 (MTurk workers vs. undergraduates) and wanted to reduce the likelihood of a floor effect, we used a less challenging math task as our primary outcome measure. Sixth, assuming it would not be a relevant outcome to online participants due to their diverse locations, we chose not to evaluate participants' sense of social fit following the affirmation manipulation. Instead, we evaluated participants' sense of control (i.e., personal mastery), as we hypothesized this construct would capture feelings similar to self-integrity and would be affected by the affirmation manipulation.

Method

Participants

MTurk workers were assessed for eligibility using a screening survey. A large number of MTurk workers took the screening survey ($N = 1{,}265$) and were compensated 25 cents for their participation. To meet eligibility criteria, participants had to reside in the United States, identify as European American, have at least one parent who completed a 4-year degree, and be 18–35 years old. Of those MTurk workers who completed the screen, 292 met eligibility criteria and were contacted by email and invited to participate in the online affirmation study, and 198 participants were randomized to conditions. One participant did not complete the affirmation essay and was eliminated from subsequent analyses. Thus, the final sample consisted of 103 White males and 94 White females. Participants ages ranged from 18 to 35 years old ($M = 28.25$, $SD = 4.36$). Nearly all participants had attended at least some college (95.9%), and most had earned a 4-year degree or higher (61.9%) and were employed full-time (61.4%). All participants were compensated $3 for completing the study.

Procedures and measures

Procedures were similar to Study 1, but participants were recruited online through MTurk and study procedures were completed through Qualtrics. Demographic information and putative moderators of affirmation effects (e.g., math identity, cultural norms) were collected through the screening survey as to not interfere with the affirmation manipulation. Math identification, the degree to which participants were invested in their math performance, was assessed

using the mean of a 2-item scale ("*How skilled are you at math?*", "*How important is doing well on standardized math tests to you?*") adapted from Sherman et al. (2009; $\alpha = .75$). Participants' cultural norms were assessed using the 6-item independent ($\alpha = .78$) and 6-item interdependent ($\alpha = .88$) motives subscales of the Motives for Attending College Questionnaire (Stephen et al., 2012). To assess sense of control, we used the mean of six items from the Personal Mastery and Constraint Scale ($\alpha = .81$; adapted from Lachman & Weaver, 1998). We again used an awareness probe but adapted it for our online sample. Participants were asked to estimate the degree to which 10 factors (i.e., math ability, effort on the test, personal background, beliefs, and attitudes, familiarity with math problems, first writing exercise, reasoning ability, self-esteem, mood, their gender, and the amount paid to complete the task) contributed to their math performance. Lastly, participants were asked in an open-ended fashion what they believed the study was about. Participants were informed that the study was to understand values and problem-solving, and that they would be writing about commonly held values and complete a problem-solving task. They ranked 12 (rather than 11) values (i.e., career, the environment, creativity, independence, learning and gaining knowledge, athletic ability, financial success, music, politics or government, relationships with friends and family, spiritual or religious values, and sense of humor). They were then randomized to complete the *belonging-affirmation* or *neutral writing*, which were identical to those used in Study 1. Following completion of the affirmation exercise, participants were instructed that they had 15 min to complete a 15-item math test (adapted from Oyserman & Lewis, 2017) designed to elicit stereotype threat (i.e., participants were informed the test was diagnostic of *math ability*). After the math test, participants completed a measure of self-integrity, a measure of personal mastery, and the awareness probe.

Results

Participant values and manipulation check

Similar to Study 1, "relationships with friends and family" (52%) and "spiritual or religious values" (10.7%) were the most frequent top-ranked values, followed by "learning and gaining knowledge" (8.6%) and "independence" (8.1%). Using the same method as Study 1, we coded participants' essays to determine whether social belonging themes varied by study condition. Affirmation and control essays were coded by the first author. Essays in the affirmation condition included belonging themes 90% of the time, whereas essays in the control condition included belonging themes only 3.5% of the time. As intended, participants in the affirmation condition were much more likely to include a social belonging theme in their affirmation essays than those in the control condition, χ^2 (2, $N = 197$) = 149.20.

On an open-ended question (i.e., awareness probe) where participants were asked what factors they believed contributed to their math performance, only a small percentage (6.6%) reported that they suspected the values affirmation was intended to affect their performance. Removing these participants from subsequent analyses did not meaningfully impact our results. Of eleven listed factors that could have contributed to participants' math performance, "reasoning ability," "effort," and "math ability" were rated as the most influential factors by both genders. The affirmation exercise and gender were rated the second least and least influential factors, respectively, by both female and male participants. Overall, participants did not suspect that the belonging-affirmation was intended to influence their performance on the math test. They also did not believe that their gender substantially contributed to their performance.

Primary analyses

To adapt our procedures to the online sample and decrease the likelihood of a floor effect, we used a less challenging math test than the one used in Study 1. Study 2 participants answered nearly half the test problems correctly (52.4%; $M = 7.86$, $SD = 3.29$), suggesting that the math test was less difficult for participants than the one used in Study 1 (12.9% problems answered correctly; $M = 3.87$, $SD = 2.44$), and did not result in a floor effect.

We first tested our primary hypotheses that (a) women's math performance would be enhanced in the affirmation condition compared to control, and (b) men's math performance would be diminished in the affirmation condition compared to control. Affirmed females ($M = 6.58$, $SD = 3.02$) answered slightly fewer problems correctly compared with their unaffirmed peers ($M = 7.22$, $SD = 2.92$). The difference in performance was relatively small, less than one quarter of a standard deviation ($d = .22$). Among male participants, those in the affirmation condition ($M = 8.89$, $SD = 3.41$) performed similarly to those in the control condition ($M = 8.63$, $SD = 3.25$), $d = .08$. When comparing math test performance between genders our

Table 3. Study 2 descriptive statistics for math performance, self-integrity, and personal mastery.

	Female		Male		Total	
Measure	Affirmation ($n = 53$)	Control ($n = 41$)	Affirmation ($n = 46$)	Control ($n = 57$)	Affirmation ($n = 99$)	Control ($n = 98$)
Math performance (problems correct)						
Range	1–12	2–13	2–14	0–14	1–14	1–14
Mean	6.58	7.22	8.89	8.68	7.66	8.07
Median	7.00	7.00	9.00	9.00	7.00	8.00
SD	3.02	2.92	3.41	3.26	3.40	3.19
Self-integrity						
Range	22–56	26–56	27–56	33–56	22–56	26–56
Mean	45.09	45.02	45.46	46.39	45.26	45.82
Median	46.00	47.00	46.50	47.00	46.00	47.00
SD	6.46	6.15	6.22	5.62	6.32	5.85
Personal mastery						
Range	13–42	15–42	21–41	15–42	13–42	15–42
Mean	30.83	29.63	31.15	30.91	30.98	30.38
Median	31.00	30.00	31.50	31.00	31.00	30.00
SD	5.87	5.46	4.88	6.24	5.41	5.93

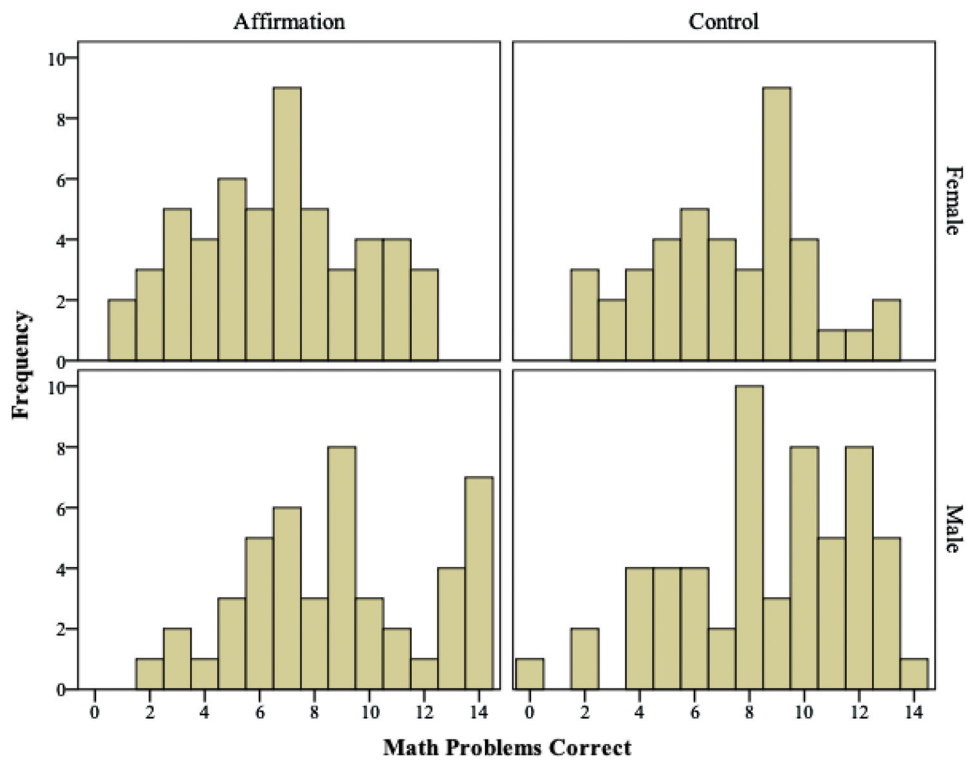

Figure 2. Study 2 frequency of math problems correct by condition and gender.

results showed that, regardless of condition, male participants answered more math problems correctly ($M = 8.78$, $SD = 3.32$) on average compared with female participants ($M = 6.86$, $SD = 2.98$), $d = 0.61$. The interaction between gender and condition on math performance was minimal ($\eta_p^2 < .00$). Thus, affirmation did not appear to affect participants' math performance (see Table 3 and Figure 2).

Next, we evaluated our secondary hypotheses that (a) women's ratings of self-integrity and personal mastery would be enhanced in the affirmation condition compared to control, and (b) men's ratings of self-integrity and personal mastery would be poorer in the affirmation condition compared to control. For self-integrity, affirmed females ratings of self-integrity ($M = 45.09$, $SD = 6.46$) were nearly identical to unaffirmed females ratings ($M = 45.02$, $SD = 6.15$), $d = .01$. Affirmed male participants' self-integrity ratings ($M = 45.46$, $SD = 6.22$) were very similar to that of unaffirmed males ($M = 46.03$, $SD = 6.18$), $d = 0.09$. Overall, participants ratings of self-integrity were comparable by gender and across conditions, and the

interaction effect was negligible ($\eta_p^2 < .00$; see Table 3). When examining participants' sense of personal mastery, females in the affirmation condition reported ratings that were slightly greater ($M = 30.83$, $SD = 5.87$) compared with those in the control condition ($M = 29.63$, SD = 5.46), $d = 0.21$. Differences in affirmed males' ratings ($M = 31.15$, $SD = 4.88$) and unaffirmed males' ratings ($M = 30.91$, $SD = 6.24$) of personal mastery were minimal, $d = .04$. The condition by gender interaction effect was also negligible ($\eta_p^2 < .00$). Psychological functioning was not impacted by the affirmation manipulation.

Math-identity moderator analyses

We examined math-identity as a moderator of affirmation effects. As expected, math identity was positively correlated with math test performance ($r = .35$), with participants who were more math identified answering more math problems correctly. Moreover, males reported being more math-identified ($M = 4.71$, $SD = 1.42$) compared with females ($M = 4.02$, $SD = 1.47$), $d = .48$. Using the PROCESS Macro in SPSS, we regressed math test performance (problems correct) on the mean-centered math identification measure, affirmation condition (contrast coded: control condition = −1, affirmation = 1), and the interaction. Increases in math identity were associated with improved math performance ($b = .752$, $SE = .157$); however, the effect of condition ($b = .000$, $SE = .236$) and interaction effect of condition by math identity ($b = .088$, $SE = .157$) were relatively weak (see Table 4, Model 1).

Since we hypothesized that the affirmation manipulation would have a different effect on male and female participants, we also examined whether there was a three-way interaction between condition, gender, and math identity on math performance. We regressed math test performance (problems correct) on mean-centered math identity, affirmation condition (contrast coded: control condition = −1, affirmation = 1), gender (contrast coded: female = −2, male = 2), and all possible two-way and three-way interactions. There was not a meaningful three-way interaction ($b = -.003$, $SE = .080$), and the only substantive effects were those of gender (b = .336, $SE = .115$) and of math identity ($b = .647$, $SE = .160$; see Table 4, Model 2). In sum, participants' math identification did not interact with the affirmation manipulation and gender to affect math performance.

Cultural norms moderator analyses

Using the same analytic method used to evaluate math identification as a moderator, we assessed whether independent and interdependent motives moderated affirmation effects. Differences between males' ($M = 31.50$, $SD = 6.55$) and females' ratings ($M = 32.57$, $SD = 6.00$) of independent motives were small, $d = .17$. Likewise, differences between males' ratings of interdependent motives ($M = 24.00$, $SD = 7.69$) and females' ratings ($M = 24.56$, $SD = 7.56$) were small, $d = .07$. There was a tendency for those who endorsed more interdependent motives to answer fewer problems correctly ($r = -.16$). This relationship did not hold for those who reported greater independent motives ($r = -.06$).

To assess whether independent motives moderated affirmation effects, we regressed math test performance (problems correct) on the mean-centered independent motives subscale, affirmation condition, and the interaction. The effect of independent motives ($b = -.068$, $SE = .040$), affirmation condition ($b = -.269$, $SE = .235$), and the interaction of independent motives by condition was small ($b = .090$, $SE = .040$; see Table 5). We also regressed math test performance

Table 4. Testing moderation effects of math identity on the relationship between affirmation condition, gender, and math performance.

	Model 1		Model 2	
	b	*ß*	*b*	*ß*
Intercept	7.887 (.236)	.007 (.069)	7.879 (.230)	.005 (.070)
Affirmation	.000 (.236)	.000 (.226)	.045 (.230)	.014 (.070)
Math identity	.752 (.157)	.339 (.071)	.647 (.160)	.291 (.072)
Affirmation × Math Identity	.088 (.157)	.130 (.233)	.068 (.160)	.031 (.072)
R^2 Δ = .001				
Gender			.336 (.115)	.102 (.035)
Gender × Affirmation			.041 (.115)	.012 (.035)
Gender × Math Identity			−.034 (.080)	.031 (.072)
Gender × Math Identity × Affirmation			−.003 (.080)	−.002 (.036)
R^2 Δ = .000				
R	.350		.404	
R^2	.122		.163	

Note. *b* = unstandardized regression coefficients; *ß* = standardized regression coefficients; standard errors are in parentheses.

Table 5. Testing moderation effects of independent and interdependent motives on the relationship between affirmation and math performance.

	Independent motives		Interdependent motives	
	b	ß	*b*	ß
Intercept	7.943 (.235)	.025 (.071)	7.898 (.232)	.011 (.071)
Affirmation	−.269 (.235)	−.082 (.071)	−.264 (.232)	−.080 (.071)
Independent motives	−.068 (.040)	−.130 (.076)		
Affirmation × Independent Motives	.090 (.040)	.173 (.076)		
R^2 Δ = .026				
Interdependent motives			−.080 (.031)	−.184 (.071)
Affirmation × Interdependent Motives			.047 (.031)	.109 (.071)
R^2 Δ = .012				
R	.184		.210	
R^2	.034		.044	

Note. *b* = unstandardized regression coefficients; ß = standardized regression coefficients; standard errors are in parentheses.

(problems correct) on the mean-centered interdependent motives subscale, affirmation condition, and the interaction. Results showed a modest effect of interdependent motives ($b = -.080$, $SE = .031$). The effect of affirmation condition ($b = -.264$, $SE = .232$), and the interaction effect of interdependent motives and affirmation condition, were relatively weak ($b = .475$, $SE = .031$; see Table 5). Overall, participants' cultural norms did not appear to moderate the effects of affirmation on math performance.

Precision analyses

Similar to Study 1, we used a priori procedure (APP) in a posteriori fashion to evaluate the confidence and closeness of our sample in estimating our population effects of interest (i.e., differences in math performance, self-integrity, and personal mastery). Using the APP equation for determing the precision of the difference between two independent sample means with unequal sample sizes (Trafimow, 2019; Trafimow et al., 2020), we estimated that we had a 95% probability of being within .42 standard deviations of the population mean difference in outcomes for affirmed ($n = 53$) and unaffirmed females ($n = 41$). For males, APP results found we had a 95% probability of being within .39 standard deviations of the population mean difference in outcomes for affirmed ($n = 46$) and unaffirmed male ($n = 57$). Compared with Study 1, precision was improved, particularly for our male sample (.39 vs. .64 *SD*s); however, overall precision remained relatively "poor" (Trafimow, 2019).

Discussion

Study 2 results did not support our hypotheses. Males outperformed females on the math test, but no affirmation effects were found on math performance or psychological outcomes. The gender gap in average test scores suggests that female participants may have been affected by stereotype threat, and the belonging-affirmation could have failed to attenuate the threat. However, because males reported being more math identified than female participants, and there was a significant association between math identity and math performance, differences in performance could also be attributed to gender differences in math skills in our sample.

When evaluating putative moderators, there was no evidence that math identification or cultural norms moderated affirmation effects. Interdependent norms were negatively associated with math performance but they did not moderate affirmation effects. It is worth noting that the latter finding is consistent with previous cultural mismatch research demonstrating that first-generation students with more interdependent norms are at risk of poorer academic outcomes (Stephens et al., 2012).

Methodologically, the present study improved on Study 1 in that it: (a) included a larger sample of White male participants (103 vs. 40); (b) limited participation to European Americans who had at least one parent with a 4-year degree; (c) evaluated potential moderators of affirmation effects; and (d) decreased variability in study procedures (e.g., group size, experimenter gender) by having them administered online in a standardized format. Despite these improvements, Study 2 results were largely consistent with Study 1, and the affirmation manipulation did not appear to affect outcomes. In the next section, we review potential reasons for our results within the broader context of the stereotype threat and affirmation literatures.

General discussion

This study assessed whether a belonging-affirmation enhanced the math performance of females, while

diminishing the performance of White males. We also examined whether the affirmation affected psychological functioning, and hypothesized that the affirmation would buffer women psychologically but hinder men. Concerning our predictions for male participants, we drew on cultural mismatch theory and hypothesized that a belonging-affirmation would impair White male performance, possibly due to a mismatch between the task and cultural norms of this group. Across two experiments, we found no substantive affirmation effects on math performance or psychological outcomes for either gender.

We identified four plausible reasons for our null effects. First, it is possible that the math performance of female participants was not hindered by stereotype threat. Only Study 2 found evidence of a substantive gender gap in math achievement, but this may have been explained by gender differences in math skill (e.g., math-identification). Meta-analytic evidence of stereotype threat effects in math performance suggest that when stereotype threat does contribute to gender differences, the effect may be more modest than initially thought (Flore & Wicherts, 2015; Stoet & Geary, 2012). In their meta-analytic review of stereotype threat effects in girls' math performance, Flore and Wicherts (2015) found that overall effects were small, but also cautioned that significant publication bias may seriously distort the literature base. Stoet and Geary's (2012) meta-analysis also identified flaws in the stereotype threat literature, including a high percentage of studies that failed to replicate the original stereotype threat finding regarding gender differences in math performance (Spencer et al., 1999). They argue that overexuberance of stereotype threat explanations of gender differences may hinder research into other potential contributing factors (e.g., gender differences in interests in nonsocial domains). If stereotype threat does not consistently impair women's math performance, results of affirmation interventions in this domain are likely to be mixed, with null findings being routine rather than the exception.

A second explanation for our null results may be related to the timing of our outcome assessments. We only evaluated the immediate consequences of a belonging-affirmation intervention and did not assess whether it had long-term effects on math performance or psychological functioning. Early lab-based affirmation research highlighted value affirmation's immediate impact in reducing bias, psychological discomfort, and stereotype threat (Martens et al., 2006; McQueen & Klein, 2006; Sherman & Cohen, 2006). However, as the affirmation literature evolved, research began to emphasize its long-term benefits in bolstering academic outcomes (Brady et al., 2016; Cohen et al., 2009; Sherman et al., 2013). In their review of the self-affirmation literature, Cohen and Sherman (2014) assert that values affirmations exert their influence through "recursive" and "interactive" psychological processes that compound over time. Such reasoning suggests that affirmation interventions are likely to have the greatest impact when evaluated over the long term (Goyer et al., 2017). Two recent affirmation trials with undergraduate students support this notion: both found evidence that affirmation lifted the academic achievement of vulnerable students over multiple years, but neither study identified any immediate academic benefits (Brady et al., 2016; Layous et al., 2017). With increasing evidence suggesting that affirmation effects are likely to unfold over time through "recursive" processes (Cohen & Sherman, 2014) future research should focus on the distal, rather than proximal, effects of affirmation interventions.

Third, the benefits of affirmation interventions on academic performance may be less robust than previously suggested. The first set of randomized field trials showed that affirmation reduced the racial achievement gap of middle-school youth by 30% (Cohen et al., 2006, 2009; Sherman et al., 2013), and initial replication studies with college students found that affirmation interventions reduced achievement gaps by 50% or more (Harackiewicz et al., 2014; Miyake et al., 2010). However, two recent large-scale replication trials of affirmation interventions aimed at enhancing the academic performance of African American and Latino middle-school youth failed to find evidence that such interventions improved their performance (Dee, 2015; Hanselman, Rozek, Grigg, & Borman, 2017). These replication studies included a larger number of students and schools than the initial studies (Cohen et al., 2006, 2009), indicating that affirmation effects are more modest and nuanced than suggested by prior findings.

Fourth, poor sampling precision and replicability in studies demonstrating iatrogenic effects of affirmation on academic performance may undermine the validity of those results. Only one of the studies we identified showing an iatrogenic effect of affirmation (Kizilcec et al., 2017) would likely have met Trafimow's (2019) criteria for "good" precision at the 95% confidence level ($f = .2$) based on sample size and number of study groups being compared. The other four studies (i.e., Brady et al., 2016; Miyake et al., 2010; Shnabel et al., 2013; Woolf et al., 2009) would likely have sampling precision estimates ranging from "unacceptable"

($f \leq .6$; e.g., Shnabel et al., 2013) to "poor" ($f = .4$; e.g., Woolf et al., 2009). Such findings regarding poor sampling precision decrease the likelihood that these study results would replicate even under conditions of an "idealized universe" (Trafimow & Myüz, 2019). From this perspective, the present work may simply have failed to find an effect because none exists. Results showing that affirmation has salutary benefits on academic performance have been inconsistent and early findings likely overestimate actual effect sizes (Hanselman et al., 2017). Results showing affirmation can negatively impact academic functioning are far less common and may be spurious and reflect a multiple-comparison problem (Dee, 2015). Put simply, they may just be noise!

Conclusion

The present work attempted to replicate prior results showing that affirmation may decrease academic performance for nonthreatened students while improving performance for threatened students. In two separate studies, however, we did not find that affirmation either improved or decreased the math performance or psychological functioning of participants. In the preceding section, we briefly reviewed the broader stereotype threat and affirmation literature as it relates to academic performance. Based on this literature we contend that: (1) stereotype effect sizes are smaller than initially estimated; (2) affirmation effects are smaller and more context dependent than initially estimated; and (3) affirmation effects may be most salient when evaluated in the long term (e.g., semesters, academic years). Compared with other interventions for augmenting academic performance (e.g., mentorship and tutoring programs, charter schools), these brief writing interventions are relatively cost-effective to administer at scale. Given the (remote) possibility that affirmations may reduce academic performance for some nonthreatened students, we encourage affirmation researchers to attend to this possibility when evaluating results of these interventions. Future affirmation studies should include large enough samples to enhance replicability and the ability of researchers to draw more reliable conclusions regarding the effects of these interventions on academic performance. Additional large-scale online studies may be one avenue for investigators to accomplish this at relatively low cost (e.g., Kizilcec et al., 2017). For affirmation theory and research to advance, investigators need to learn from the problems that emerged in the stereotype threat literature — significant publication bias and a disproportionate number of studies with small samples and poor replicability distorted the literature base, and led to much greater estimates of stereotype threat effects than now appears justifiable (Shewach, Sackett, & Quint, 2019; Stoet & Geary, 2012). The consequence was countless resources expended in an attempt to reduce achievement gaps by explicitly targeting stereotype threat; a factor that appears to only modestly, if at all, contribute to such gaps (Shewach et al., 2019). We hope that future affirmation research will avoid these pitfalls.

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