Commentary

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In Search of an Association Between Conception Risk and Prejudice

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Recent theory and evidence suggest that physiological processes, such as women's menstrual cycles, influence psychological processes. For example, Navarrete, Fessler, Fleischman, and Geyer (2009) demonstrated that women with higher levels of conception risk (higher likelihood of becoming pregnant given the day in their menstrual cycle) exhibited stronger racial biases favoring White men over Black men on a variety of measures. McDonald, Asher, Kerr, and Navarrete (2011) found that the link between conception risk and racial bias (controlling for participants' race) was more pronounced among women who held stronger implicit stereotypes associating Black men with "physical" and White men with "mental." These effects reflect the presumed safety of in-group compared with out-group members, and thus the higher perceived threat of unwanted conception by women when they are in the fertile phase of their cycle.

Intrigued by this evidence, we sought to examine the boundary conditions for the link between intergroup bias and conception risk. Is the effect limited to racial and ethnic out-groups, or might it extend to groups defined by age, weight, religion, national citizenship, or other distinctions? The answer to this question would have important implications for theoretical refinement. In Study 1, as a first step, we aimed to replicate the original correlation between conception risk and racial bias with a high-powered design, closely following the published materials, procedure, and analysis strategy of the previous research. We failed to replicate the original effect. Thus, we revised our research objective from replication and extension to replication only of both the link between conception risk and racial bias (Studies 2–4) and the moderation of that relationship by implicit physicality stereotypes (Studies 3 and 4). In all four studies (total $N = 2{,}226$), we found no evidence for an association between conception risk and racial bias.

Method

Women ages 18 through 60 were recruited through Project Implicit (https://implicit.harvard.edu/). Studies 1 ($N = 867$) and 2 ($N = 878$) tested the simple association between conception risk and racial bias. Studies 3 ($N = 175$) and 4 ($N = 306$) tested whether physicality stereotypes moderated this relationship. The demographics of the samples, exclusion criteria (based on fertility and menstrual-cycle information), materials, and procedure mirrored those of the original investigations (for details, see the Supplemental Material available online).

Using participants' reports of their previous two menstrual cycles, we calculated each woman's current cycle day and length with the forward-counting method and assigned a corresponding conception-risk value (ranging from .00 to .094) based on actuarial data (Wilcox, Dunson, Weinberg, Trussell, & Baird, 2001). Explicit racial bias and explicit physicality stereotypes were assessed with single relative self-report items. In Studies 1 and 2, participants also rated how warm or cold they felt toward African Americans and European Americans. Implicit racial bias and stereotypes were assessed with Implicit Association Tests (IATs; Greenwald, McGhee, & Schwartz, 1998). In all four studies, evaluative bias was assessed with an IAT using the category labels "African American" and "European American" as well as "Good" and "Bad." In Studies 3 and 4, we also assessed implicit stereotypes, with an IAT using the category labels "African American" and "European American" as well as "Mental" and "Physical."

Plans for Study 4 were reviewed by one of the authors of the original reports and were preregistered at Open

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Table 1. Multiple Regression Results From Studies 3 and 4: Predicting Implicit Intergroup Bias From Conception Risk and Implicit Physicality Stereotypes, Controlling for Participant's Race

	Study 3 (n = 92)			Study 4 (n = 154)		
Predictor	b	95% CI (b)	β	b	95% CI (b)	β
Race	−0.01	[−0.17, 0.14]	−0.02	−0.01	[−0.10, 0.08]	−0.01
Conception risk	1.09	[−1.47, 3.64]	0.08	−0.14	[−2.10, 1.83]	−0.01
Implicit physicality stereotypes	0.54	[0.31, 0.77]	0.46	0.32	[0.17, 0.47]	0.36
Conception Risk × Implicit Physicality Stereotypes	0.20	[−6.73, 7.14]	0.01	−2.53	[−7.54, 2.48]	−0.08

Note: The *n*s indicate the sample sizes when analyses were restricted to Black and White women. Race was coded as Black (−1) or White (+1). Conception risk and implicit physicality stereotypes were centered on their means.

Science Framework (https://osf.io/dr42m/) to ensure a strong confirmatory test. The main change implemented in Study 4 at the suggestion of the original author was that we used only male stimuli on the IATs and changed the category labels to "Black Men" and "White Men." Statistical power to detect the effect sizes reported by Navarrete et al. (2009) and McDonald et al. (2011) was greater than 99% for Studies 1 and 2 (correlation) and was 77% and 95% for Studies 3 and 4, respectively (interaction effect).[1]

Results

For all racial measures, higher scores represented pro-White bias. The mean score for implicit racial bias was 0.34 (SD = 0.43) in Study 1, 0.33 (SD = 0.42) in Study 2, 0.27 (SD = 0.41) in Study 3, and 0.18 (SD = 0.37) in Study 4. The mean score for explicit racial bias was 0.30 (SD = 1.09) in Study 1, 0.30 (SD = 1.05) in Study 2, 0.27 (SD = 0.83) in Study 3, and 0.53 (SD = 1.05) in Study 4. Mean rated warmth toward European Americans was 7.18 (SD = 2.07) in Study 1 and 7.15 (SD = 2.00) in Study 2, and mean rated warmth toward African Americans was 6.69 (SD = 2.06) in Study 1 and 6.78 (SD = 2.12) in Study 2. The mean score for explicit physicality stereotypes was 0.80 (SD = 0.83) in Study 3 and 0.81 (SD = 0.85) in Study 4, and the mean score for implicit physicality stereotypes was 0.26 (SD = 0.36) in Study 3 and 0.21 (SD = 0.38) in Study 4. As in Navarrete et al. (2009), we created composite bias scores in each study by standardizing and then averaging all racial-bias measures (warmth toward African Americans was subtracted from warmth toward European Americans to create a warmth difference score prior to standardizing). Mean conception risk was 0.03 (SD = 0.03) in Study 1, 0.03 (SD = 0.03) in Study 2, 0.04 (SD = 0.03) in Study 3, and 0.03 (SD = 0.03) in Study 4.

Correlations were computed between conception risk and each race variable, including the composite score. To best match the existing literature, we computed correlations for White women only (see the Supplemental Material for additional analyses). Conception risk did not significantly correlate with any of the individual measures of racial bias (see Table S4 in the Supplemental Material) or with the composite score in Study 1, r = .00, 95% confidence interval (CI) = [−.09, .08]; Study 2, r = .00, 95% CI = [−.09, .08]; Study 3, r = .03, 95% CI = [−.17, .22]; or Study 4, r = .05, 95% CI = [−.11, .21].

For the moderation analyses in Studies 3 and 4, implicit physicality stereotypes and implicit racial bias were reverse-scored for Black participants so that higher scores represent implicit pro-in-group preference for both White and Black participants. Conception risk and implicit physicality stereotypes were then centered on their means, and both main effects and interactions were entered into a multiple regression as predictors of implicit intergroup bias. To replicate precisely the analysis in Study 1 of McDonald et al. (2011), we controlled for participant's race (Black = −1, White = +1) in the regression. There was no interaction between conception risk and implicit physicality stereotypes in Study 3, b = 0.20, 95% CI = [−6.73, 7.14], or Study 4, b = −2.53, 95% CI = [−7.54, 2.48]. Table 1 summarizes the results of the regression analyses.

Meta-Analysis

Using tools provided by Neyeloff, Fuchs, and Moreira (2012), we conducted a meta-analysis on the four studies reported here and those of Navarrete et al. (2009) and McDonald et al. (2011), to estimate the cumulative effect size and try to understand the discrepancies between our findings and the previous ones. Combining the published correlations with those obtained in our four studies (restricted to White participants) revealed a very small correlation in a random-effects model, r = .07, 95% CI = [−.01, .14], k = 7, Q = 7.21. Removing the minimal-group study (Study 2 from McDonald et al., 2011) and focusing only on the race-based studies also revealed a very small correlation, r = .04, 95% CI = [−.02, .10], k = 6, Q = 5.49. Table S5 in the Supplemental Material presents a summary of the studies and effect sizes. The meta-analysis worksheet is available at Open Science Framework (https://osf.io/g3sca/).

General Discussion

In four high-powered studies (total $N = 2{,}226$), we failed to replicate the finding that fertile women demonstrate stronger racial bias than nonfertile women, and we found no evidence for moderation of that effect by implicit physicality stereotypes. The cumulative evidence combining the original studies with those reported here shows little support for a meaningful relationship between conception risk and racial bias.

Possible explanations for the failure to replicate

Our results suggest, but do not demand, the conclusion that there is no relationship between conception risk and racial bias (cf. Harris, Chabot, & Mickes, 2013). Despite our best efforts, some details about our procedure, sample, or analysis may be incorrect or incomplete. For example, our studies were conducted online, and the sample recruited was heterogeneous, whereas the previously published work (McDonald et al., 2011; Navarrete et al., 2009) examining the link between conception risk and prejudice was conducted on undergraduate students in the lab. However, other than the samples and setting, our studies followed the same procedure and used the same materials as the previous studies. We note that Navarrete, McDonald, Mott, Cesario, and Sapolsky (2010) conducted a similar study online and observed a relationship between conception risk and intended voting for Barack Obama. Also, a larger meta-analysis of menstrual-cycle effects found no difference between laboratory and online samples, or between primarily student and mixed community samples (Wood, Kressel, Joshi, & Louie, in press). Further, our studies were very highly powered, which minimized the possibility of false negatives. Finally, we obtained generous and helpful feedback from one of the original authors prior to running Study 4 to ensure the quality of the research design. Even so, the possibility of design or calculation error remains. To maximize opportunity to detect potential errors, we have made the materials and data for all four studies available at Open Science Framework (https://osf.io/g3sca/).

The failure to replicate may also have substantive origins. For example, it is possible that there is an unidentified moderating variable and that the present samples happened to be biased toward one end of that variable, whereas prior samples happened to be biased toward the other end. The fact that the samples were large and heterogeneous reduces the likelihood of this possibility, but does not eliminate it. In the absence of evidence for moderating influences that would differentiate our samples from prior ones, this possibility is speculative. If differences in the samples or settings are responsible for the disparate findings, it would suggest that the link between conception risk and prejudice is not generalizable beyond students in the lab and may encourage theoretical innovation to identify the conditions necessary for obtaining the effect.

Closing

Our findings are unlikely to quell debates about menstrual-cycle effects on attitudes, decision making, and behavior (Gildersleeve et al., 2013; Harris, 2011; Harris et al., 2013; Penton-Voak & Perrett, 2000; Penton-Voak et al., 1999; Peters, Simmons, & Rhodes, 2009; Wood et al., in press). Our failure to find a relationship between conception risk and racial bias does not mean that no relationship exists. It does, however, suggest that theoretical refinement is needed to clarify the conditions necessary for observing this relationship.

Author Contributions

C. B. Hawkins and B. A. Nosek designed the research. C. B. Hawkins and C. E. Fitzgerald performed the research and analyzed the data. All three authors wrote the manuscript.

Declaration of Conflicting Interests

B. A. Nosek is an officer and C. B. Hawkins is a consultant of Project Implicit, Inc. The mission of this nonprofit organization includes the following: "To develop and deliver methods for investigating and applying phenomena of implicit social cognition, including especially phenomena of implicit bias based on age, race, gender or other factors." The authors declared that they had no additional conflicts of interest with respect to their authorship or the publication of this article.

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Supplemental Material

Additional supporting information can be found at http://pss.sagepub.com/content/by/supplemental-data

Open Practices

All data and materials have been made publicly available via Open Science Framework and can be accessed at https://osf.io/g3sca/wiki/home. The plan for Study 4 was preregistered at Open Science Framework (https://osf.io/dr42m/). The complete Open Practices Disclosure for this article can be found at http://pss.sagepub.com/content/by/supplemental-data. This article has received badges for Open Data, Open Materials, and Preregistration. More information about the Open Practices badges can be found at https://osf.io/tvyxz/wiki/view/ and http://pss.sagepub.com/content/25/1/3.full.

Note

1. We report (either in the article or in the Supplemental Material) all data exclusions, manipulations, and measures, and how we determined our sample sizes.

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