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Analyzing the Effects of a Psychological Intervention on Black Students' Sense of Belonging in Physics and Math: Exploring Differential Impacts for Historically Black Colleges and Universities and Predominantly White Institutions

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Abstract : The lack of diversity in science, technology, engineering, and mathematics (STEM) fields is a persistent and concerning issue. One contributing factor to the underrepresentation of minority groups in STEM fields is a lack of sense of belonging, which can lead to lower levels of academic engagement, motivation, and achievement. In particular, Black students have been shown to experience lower levels of sense of belonging in STEM compared to their white peers. This study aimed to explore the effects of a psychological intervention on Black students' sense of belonging in physics and math courses at historically Black colleges and universities (HBCUs) and predominantly white institutions (PWIs). The study used a randomized controlled trial design and included 305 Black undergraduate students enrolled in physics or math courses at HBCUs and PWIs in the United States. Participants were randomly assigned to either an intervention group or a control group. The intervention consisted of a brief psychological, video-based intervention designed to enhance sense of belonging, which was delivered in a single session. The control group received no intervention. The primary outcome measure was sense of belonging in physics and math courses, as assessed by a validated self-report measure. Other outcomes included academic engagement, motivation, and achievement as measured by physics and math (course) grades. Preliminary results show that the intervention has a significant positive effect on Black students' sense of belonging in physics and math courses, with a moderate effect size. The intervention also had a significant positive effect on academic engagement and motivation, but not on academic achievement. Importantly, the effects of the intervention were larger for Black students enrolled at PWIs compared to those enrolled at HBCUs. Findings, at present, suggest that a brief psychological web-based intervention can enhance Black students' sense of belonging in physics and math courses, and that the effects may be particularly strong for Black students enrolled at PWIs, although they are not negligible for Black students at HBCUs. This is an important finding given the persistent underrepresentation of Black students in STEM fields, the growing number of Black students at PWIs, and the potential for enhancing sense of belonging to improve academic outcomes and increase diversity in these fields. The study has several limitations, including a relatively small sample size and a lack of long-term follow-up. Future research could explore the generalizability of these findings to other minority groups and other STEM fields, as well as the potential for longer-term interventions to sustain and enhance the effects observed in this study. Overall, this study highlights the potential for psychological interventions to enhance sense of belonging and improve academic outcomes for Black students in STEM courses, and underscores the importance of addressing sense of belonging as a key factor in promoting diversity and equity in STEM fields.

Keywords : sense of belonging, achievement, racial equity, postsecondary education, intervention
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