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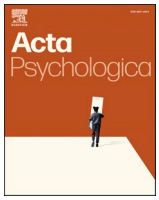

The impact of a self-affirmation intervention on the mental and social health, and academic performance of minoritized students in STEM

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ABSTRACT

Racial/ethnic minoritized students are at an increased risk of psychological distress. Supporting these students by providing them with opportunities to flourish could positively impact their mental and social health, and academic performance. This study explored the impact of values affirmation writing (intervention) compared to neutral writing (control) on the mental and social health and academic performance of first year students from minoritized racial and ethnic backgrounds in STEM fields. A total of 69 students participated in the study and were randomized into one of two conditions: (1) values affirmation (n = 34); or (2) neutral writing (n = 35). Participants completed a pre-intervention survey that consisted of a demographic questionnaire and 9 scales measuring mental and social health outcomes. Students were then asked to complete 3 writing prompts, specific to their condition. Post-intervention, participants completed the same scales previously administered and self-reported their grade point averages. There was a significant interaction between time and condition on anxiety and belonging scores, such that values affirmation participants experienced a decrease in anxiety over time relative to control participants, and the neutral writing control condition participants experienced a decrease in belonging compared to the values affirmation intervention condition. Additionally, there was a significant main effect of time on loneliness scores, such that there was a decrease over time in loneliness for both conditions. Affirming one's personal values can buffer against negative mental and social health outcomes among minoritized students and highlight the potential for values affirmation interventions to have a lasting positive effect through sustained reductions in anxiety and loneliness.

1. Introduction

University students experience several stressors that can negatively impact their mental health and wellbeing (Ribeiro et al., 2018). Consequently, students face an increased risk of developing mental disorders (Pedrelli, Nyer, Yeung, Zulauf, & Wilens, 2015). National trends reflect this concern with 78.8% of college students in the United States (U.S.) reporting moderate to high levels of stress, 24.2% of students reporting a diagnosis of depression, and 31.7% reporting anxiety (American College Health Association [ACHA], 2024). While these challenges affect university students broadly, racial/ethnic minority students (hereafter referred to as minoritized students) are at an increased risk for psychological distress (Sanchez & Awad, 2016), including depression and anxiety (Miller & Orsillo, 2020). Minoritized students are historically marginalized and have limited access to resources due to systemic oppression (National Institutes of Health, 2024). Minoritized students experience unique stressors including microaggressions (Franklin, 2016; Miller & Orsillo, 2020), discrimination from peers, faculty, and staff (Park, Kim, Salazar, & Hayes, 2020), and other experiences signaling that they do not belong at their institution

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(Freire & Hurd, 2023). Not only do minoritized students experience a lack of belonging on campus (Fan, Luchok, & Dozier, 2021; Taff & Clifton, 2022), but they are also severely underrepresented in Science, Technology, Engineering, and Mathematics (STEM) disciplines (National Science Board, 2018). Taken together, microaggressions, discrimination, and underrepresentation can create identity-based threats for minoritized students that undermine their sense of self, belonging, and academic performance.

Lack of belonging is a common experience for minoritized students in higher education (Fan et al., 2021, Taff & Clifton, 2022) and belongingness is a key predictor of student satisfaction (Fan et al., 2021). When minoritized students experience a weaker sense of belonging, they report greater dissatisfaction with their university experience (Fan et al., 2021). These findings highlight the importance of inclusive environments for improving student satisfaction and academic success. In STEM, Snidman, Rice, and Sparger (2024) found that limited representation in course materials exacerbated stress and diminished minoritized students' sense of belonging. Whitcomb, Cwik, and Singh (2021) revealed significant grade point average (GPA) disparities between minoritized students and their peers, with compounded disadvantages for those with intersecting identities, such as first-generation status. Similarly, Chang, Sharkness, Hurtado, and Newman (2011) highlighted how systemic barriers, such as hostile climates and insufficient institutional support, hinder minoritized student retention in STEM. Additionally, Yaqoup (2025) demonstrated that psychosocial factors significantly affected performance outcomes in workplace settings, underscoring the novelty and feasibility of integrating wellbeing and academic performance within a STEM student population. Together, these findings highlight the systemic inequities deeply entrenched within higher education and reinforce the urgent need for inclusive, supportive academic spaces to improve academic outcomes and persistence for minoritized students in STEM.

One way to support minoritized university students is to provide them with opportunities to flourish, which could, in turn, improve students' mental and social health, as well as their academic performance. In the present study, mental health is defined as internal psychological states (e.g., anxiety, wellbeing) and social health is defined as dimensions of social connectedness (e.g., belonging, loneliness). This distinction aligns with established wellbeing frameworks which differentiate mental health from social health while recognizing that the two domains are closely related (Keyes, 2002; Ryff & Keyes, 1995). Given the interconnectedness, interventions that target both psychological and social processes, such as self-affirmation, are particularly relevant. Self-affirmation has been found to positively impact the health (Creswell et al., 2005; Dutcher et al., 2020; Howell, 2017; Lakuta, 2023; Nelson, Fuller, Choi, & Lyubomirsky, 2014; Sherman, Bunyan, Creswell, & Jaremka, 2009) and academic achievement of university students (Borman, 2017; Jordt et al., 2017; Purdie-Vaughns et al., 2009). Values affirmation, a type of self-affirmation, involves self-reflection on one's core personal values and is grounded in self-affirmation theory (Cohen & Sherman, 2014; Sherman & Cohen, 2006). According to self-affirmation theory, values affirmation is an approach used to cope with stressful experiences by focusing on the self to counter self-threatening events (Cohen & Sherman, 2014; Sherman & Cohen, 2006). This makes values affirmation particularly relevant for minoritized students, whose stressors are often tied to identity threats, such as being questioned, marginalized, or ignored in academic spaces (Sherman & Cohen, 2006). The process of values affirmation involves a threat to self-regard, which "motivates a desire to re-establish one's self-identity", resulting in cognitive or behavioral changes to reduce the threat (Howell, 2017, p. 294; Steele, 1999). While values affirmation does not directly address the threat itself, it calls upon domains of the self to reduce the threat by reaffirming a sense of self-integrity, supporting positive psychological resources even in the face of identity threat (Howell, 2017; Steele, 1999). This theoretical mechanism directly informs how strengthening student's sense of self may buffer the social and psychological stressors disproportionately experienced by minoritized students.

Individuals who engage in values affirmation are asked to review a list of values and identify the top values most important to them (Cohen & Sherman, 2014). They then write a brief essay describing why the selected values are most important to them and describe a time when the values were apparent in their life (Cohen & Sherman, 2014). The success of values affirmation lies in the design of the intervention, as "a key aspect of the affirmation intervention is that its content is self-generated and tailored to tap into each person's particular valued identity" (Cohen & Sherman, 2014, p. 337). It is not surprising then, that self-affirmation has been linked to a slew of positive health outcomes including decreased stress (Creswell et al., 2005; Dutcher et al., 2020; Sherman et al., 2009), anxiety (Lakuta, 2023), and depressive symptoms (Lakuta, 2023), improved wellbeing (Howell, 2017; Lakuta, 2023; Nelson et al., 2014), increased prosociality (Crocker, Niiya, & Mischkowski, 2008; Howell, 2017; Lindsay & Creswell, 2014; Thomaes, Bushman, de Castro, & Reijntjes, 2012) and self-compassion (Lindsay & Creswell, 2014), and a greater sense of belonging (Cook, Purdie-Vaughns, Garcia, & Cohen, 2012) and satisfaction with life (Yan, Wang, Jiang, Peng, & Cohen, 2024). Notably, a reduction in stress as a result of self-affirmation can be explained, in part, by activation of the brain's reward system (Dutcher et al., 2020). Dutcher et al. (2020) found that students who engaged in values affirmation experienced lower self-reported stress and greater ventral striatum and ventromedial prefrontal cortex activity, highlighting the neural implications of self-affirmation on stress, compared to a control condition (Dutcher et al., 2020). In addition to the positive health outcomes associated with values affirmation, self-affirmation interventions have successfully narrowed the achievement gap between minoritized students and White students in university settings (Borman, 2017; Jordt et al., 2017; Purdie-Vaughns et al., 2009).

Values affirmation has been shown to positively impact the academic trajectory of minoritized and non-minoritized students alike (Borman, 2017; Jordt et al., 2017; Purdie-Vaughns et al., 2009); however, less is known about its impact on mental and social health, particularly for minoritized students in STEM. This study was designed to examine whether the established benefits of values affirmation generalize to minoritized STEM students. Therefore, the purpose of this study was to assess the impact of values affirmation writing (intervention) compared to neutral writing (control) on the mental health, social health, and academic performance of first year minoritized students in STEM. First-year students were specifically targeted as experiences of discrimination in this critical year could have significant, long-term impacts on their sense of belonging, mental health, and academics (Freire & Hurd, 2023). This study was designed to accommodate individual needs, allowing students to engage with the writing process that felt most relevant to their lived experiences. By offering students the opportunity to explore personal values in a supportive, low-pressure format, the intervention aimed to improve mental and social health outcomes and enhance academic performance while addressing the unique challenges faced by first-year students, especially those from minoritized backgrounds. The current study had three hypotheses: (1) that values affirmation participants would experience decreased symptoms of depression, anxiety, and stress, and improved psychological wellbeing, relative to the control condition (mental health outcomes); (2) that values affirmation participants would experience greater satisfaction with life, enhanced belongingness, self-compassion, and prosocial behavior, as well as decreased loneliness, relative to the control condition (social health outcomes); and (3) that values affirmation participants would have improved academic performance, relative to the control condition. To test these hypotheses, we implemented a values affirmation intervention with first-year minoritized students in STEM and examined its effects on psychological, social, and academic outcomes.

2. Methods

2.1. Participants

To be eligible for this study participants were required to be: (1) aged 18 or older; (2) a first year undergraduate STEM student (based on the National Science Foundation list of STEM-designated fields) at the host institution; (3) from a diverse/minoritized ethnic background; (4) able to read, write, and understand English; and (5) willing to share their grade point average (GPA) data with the research team. Sample size was determined using an a priori power analysis conducted in G*Power. Because G*Power does not provide an option for fixed-effects repeated-measures linear models, we selected the ANOVA: repeated measures, within–between interaction test as the closest available approximation to our planned analysis. Parameters included a medium effect size ($f = 0.25$), an alpha error probability of 0.05, and a desired statistical power of 0.95 (1 - β). Results indicated that a minimum of 54 participants (27 per group) would be sufficient to detect differences between groups under these conditions. Human subjects research approval was received from the institutional review board (IRB) at the host institution (#804860). The study was not preregistered.

2.2. Study procedures

This was a repeated-measures, quantitative study that occurred from November 2023 to July 2024. The writing intervention took place during the Winter quarter (January–March 2024). Survey data was collected pre- and post-intervention, in addition to GPA data that was collected following the Fall, Winter, and Spring quarters. Students were recruited via posters distributed on campus, classroom announcements made by professors, as well as student-oriented clubs/organizations. Specifically, we posted the advertisements on public bulletin boards and buildings that first-year students frequented on campus. Additionally, the research team contacted 94 professors teaching first-year STEM courses (e.g., introductory biology, chemistry, engineering, and mathematics courses) and asked professors to share the study advertisement with their classes. Lastly, campus clubs/organizations geared towards students of minoritized racial/ethnic backgrounds (e.g., campus cultural organizations and student scholar success programs) were asked to share the study advertisement with members of their groups. Interested participants scanned the QR code on the study advertisement, which brought them to a survey administered via Qualtrics^{XM} (Qualtrics, Provo, UT). The survey included the letter of information as well as the eligibility and consent process. Participants were asked to submit their email address to be contacted for study-related activities.

Eligible students who consented to participate in the study were asked to complete a pre-intervention survey (January 2024) that consisted of demographic information and nine previously validated scales to measure mental health and social outcomes (see Measures). Those that completed the pre-intervention survey were randomized into one of two conditions: (1) values affirmation (intervention); or (2) neutral writing (control; adapted from Dutcher et al., 2016; Dutcher et al., 2020). Students consented to participate in a general writing intervention and were thus blind to their condition assignment. Participants were asked to complete three writing prompts over the course of the Winter quarter (sent January 15, 2024; February 5, 2024; and February 26, 2024), which they had five days to complete. Writing prompts were adapted from previous studies (Dutcher et al., 2016; Dutcher et al., 2020; McQueen & Klein, 2006). Additionally, the number of prompts (i.e., three) was based on prior research indicating the multiple brief exercises can enhance wellbeing and buffer identity threat (Cohen & Sherman, 2014; Sherman & Cohen, 2006). The timing of the prompts was strategically planned to occur at the beginning, middle, and the end of academic quarter, allowing the intervention to target different periods of student stress within the academic year. Furthermore, the time between writing prompts was intentional, as research suggests that repeated, spaced exercises are more effective in improving psychological outcomes compared to a singular exercise (Fadhil, Jameel, Fadhil, & Battal, 2024). Immediately following the intervention, participants were asked to complete a post-intervention survey (sent March 4, 2024) that included the same scales measured at baseline. Participants were given until March 15, 2024 to complete the post-intervention survey. To assess students' academic performance over time, participants were also asked to submit their Fall and Winter GPAs in April 2024, and their Spring GPA in July 2024. Study participants were provided with a unique numeric ID that was randomly generated to link students' data across time points.

2.2.1. Writing tasks

2.2.1.1. Values affirmation condition. For writing prompt 1, participants in the values affirmation condition were provided with a list of 12 values/characteristics and asked to rank them in order of importance, identify their top three values, and describe why their top three values were meaningful to them. Examples of values/characteristics included: relations with friends/family, creativity, leadership, spontaneity/living life in the moment, science, athletics, and business. For writing prompt 2, values affirmation condition participants were asked to write about an area of their life that was both important to them and made them feel proud. For example, they were encouraged to write about a basic value that was important to how they viewed themselves. Lastly, for writing prompt 3, values affirmation condition participants were asked to identify their most cherished personal value/characteristic and provide examples of times when they demonstrated this value/characteristic in their life. Values affirmation condition writing tasks were adapted from previous values affirmation studies (Dutcher et al., 2016; Dutcher et al., 2020).

2.2.1.2. Control condition. For writing prompt 1, control condition participants were asked to rank their values from the same list given to values affirmation participants, identify their 12th most important value, and write about why this value might be important to someone else. For writing prompt 2, control condition participants were asked to write about their morning routine, and for writing prompt 3, participants were asked to write about their evening routine. Control condition writing tasks were adapted from previous values affirmation studies (Dutcher et al., 2016; Dutcher et al., 2020).

2.3. Measures

For the purpose of the present study, depression, anxiety, stress, satisfaction with life, and wellbeing were classified as mental health outcomes, while belonging, loneliness, self-compassion, and prosocial behavior were conceptualized as social health outcomes. At the same time, it is worth acknowledging the conceptual overlap among the variables (Keyes, 2002; Ryff & Keyes, 1995).

2.3.1. Demographics

Participants self-reported their age, gender, ethnicity, immigrant generational status, school/department, STEM major, and guardians' highest levels of education.

2.3.2. Mental health outcomes

2.3.2.1. Depression. The Center for Epidemiologic Studies Depression Scale (CES—D) was used to measure depressive symptoms (Radloff, 1977) and had excellent internal consistency in the current sample (Cronbach's $\alpha = 0.91$). The scale consisted of 20-items identifying ways in which participants may have felt or behaved (e.g., "During the past week I was bothered by things that usually don't bother me" and "During the past week I had crying spells"). Participants were asked to report, using a 4-point Likert scale ranging from *rarely or none of the time* (0) to

all of the time (3), how often in the last week they felt this way. To calculate the total score for the CES—D, four items were reverse-scored and then all items were summed, yielding a total score ranging from 0 to 60. Higher scores indicated greater depressive symptoms.

2.3.2.2. Anxiety. The Generalized Anxiety Disorder-7 Scale (GAD-7) was used to measure anxiety (Spitzer, Kroenke, Williams, & Löwe, 2006) and had good internal consistency in the current sample (Cronbach α = 0.89). The scale consisted of 7-items and participants were asked to identify how often they had been bothered by the described problems, over the last two weeks, using a 4-point Likert scale ranging from *not at all* (0) to *nearly every day* (3). Examples of items included, "Feeling nervous, anxious, or on edge" and "Worrying too much about different things". To calculate the total score for the GAD-7, items were summed, with total scores ranging from 0 to 21. Higher scores indicated severe anxiety.

2.3.2.3. Stress. The Perceived Stress Scale-10 (PSS-10) was used to measure stress in the current study (Cohen, Kamarch, & Mermelstein, 1983) and had a Cronbach's α of 0.77 in the current study sample. The scale included 10-items and participants were asked to identify how often they felt or thought a certain way in the past month, using a 5-point Likert scale ranging from *never* (0) to *very often* (4). Examples of questions included, "In the last month, how often have you been upset because of something that happened unexpectedly?" and "In the last month, how often have you found that you could not cope with all the things that you had to do?". To calculate the total score for the PSS-10, four items were reverse-scored and then all items were summed to yield a total score ranging from 0 to 40, with higher scores indicating higher levels of perceived stress.

2.3.2.4. Satisfaction with life. To measure satisfaction with life, the Satisfaction with Life Scale (SWLS) was used (Diener, Emmons, Larsen, & Griffin, 1985). The SWLS had good internal consistency in the current sample (Cronbach α = 0.80) and included 5-items. Participants were asked to indicate their level of agreement with the five statements using a 7-point Likert scale ranging from *strongly agree* (7) to *strongly disagree* (1). Examples of questions included, "In most ways my life is close to my ideal" and "If I could live my life over, I would change almost nothing". To calculate the total score for the SWLS, the scores for each item were summed, yielding a possible range in scores of 5–35, with higher scores indicating greater satisfaction with life.

2.3.2.5. Psychological wellbeing. The Psychological Wellbeing Scale (PWB) was used to measure wellbeing (Diener et al., 2009). The PWB is an 8-item scale that describes aspects in human functioning ranging from positive relationships to having purpose in life. The scale had good internal consistency in the current sample (Cronbach α = 0.82). Participants were asked to indicate the extent to which they agreed or disagreed with each statement using a 7-point Likert scale ranging from *strongly agree* (7) to *strongly disagree* (1). Examples of items included, "I lead a purposeful and meaningful life" and "I actively contribute to the happiness and wellbeing of others". To score the PWB, responses were summed yielding a possible range of scores from 8 to 56, and high scores represented possessing many psychological resources and strengths.

2.3.3. Social health outcomes

2.3.3.1. Belonging. To measure social belonging, the Sense of Social Fit Scale (SSF) was used (Walton & Cohen, 2007). The SSF included 17-items that were tailored to the institution at which it was administered and had excellent internal consistency (Cronbach's α = 0.90) in the current study sample. Participants were asked to indicate the extent to which they agreed or disagreed with each statement using a 7-point Likert scale ranging from *strongly disagree* (1) to *strongly agree* (7). Examples of items included, "I fit in well at [school name]" and "I belong at [school name]". To score the SSF, five items were reverse-scored and then all items were averaged, yielding a possible range of scores from 1 to 7. Higher scores indicated a greater sense of social belonging.

2.3.3.2. Loneliness. The UCLA Loneliness Scale (version 3; ULS) was used to measure loneliness in the current study (Russell, 1996) and had excellent internal consistency (Cronbach's α = 0.92) in the current study sample. The ULS included 20-items describing how people sometimes feel. Participants were asked to indicate how often they felt the following statements using a 4-point Likert scale ranging from *never* (1) to *always* (4). Examples of questions included, "How often do you feel that there is no one you can turn to?" and "How often do you feel that your interests and ideas are not shared by those around you?". To score the ULS, 10 items were reverse-scored and then all items were summed, yielding a total score ranging from 20 to 80. Higher scores indicated a higher degree of loneliness.

2.3.3.3. Self-compassion. To measure self-compassion, the Self-Compassion Scale Short Form (SCS-SF) was used (Raes, Pommier, Neff, & Van Gucht, 2011). The scale had a Cronbach's α of 0.85 in the current study sample and included 12-items with statements reflecting how one might act towards themself during difficult times. Participants were asked to indicate how often they behaved in the stated manner using a 5-point Likert scale ranging from *almost never* (1) to *almost always* (5). Examples of items included, "When something painful happens I try to take a balanced view of the situation" and "When I feel inadequate in some way, I try to remind myself that feelings of inadequacy are shared by most people". The SCS-SF yields six subscale scores and one total score. Subscales include self-kindness, self-judgement, common humanity, isolation, mindfulness, and over-identification. To yield the total self-compassion score, six items were reverse scored, and then the mean of each subscale was used to compute a total mean, by averaging the six subscale means. For the total self-compassion score, as well as the self-kindness, common humanity, and mindfulness subscales, higher scores indicated greater self-compassion, self-kindness, common humanity, and mindfulness. However, for the self-judgement, isolation, and over-identification subscales, higher scores indicated lower self-judgement, isolation, and over-identification.

2.3.3.4. Prosocial behavior. The Prosocialness Scale for Adults (PSA) was used to measure prosocial behavior in the current study (Caprara, Steca, Zelli, & Capanna, 2005). The scale had excellent internal consistency in the study sample (Cronbach α = 0.93). The PSA included 16-items reflecting common situations; participants were asked to indicate their level of engagement for each situation using a 5-point Likert scale ranging from *never/almost never* (1) to *always/almost always* (5). Examples of items included, "I am empathic with those who are in need" and "I try to be close to and take care of those who are in need". To score the PSA, responses were summed and then a total mean was computed. Higher scores indicated greater prosocial behavior.

2.3.4. Academic outcomes

To assess how the intervention impacted students' academic performance over time, participants were asked to self-report their Fall, Winter, and Spring quarter grade point averages (GPAs). The Fall GPA reflected their performance prior to the intervention, the Winter GPA captured progress during the intervention, and the Spring GPA reflected outcomes following the intervention.

2.4. Data analysis

Data analyses were conducted in SPSS (version 29). Measures of central tendency and dispersion were computed for demographic variables. To determine if there were baseline differences on scale data

between conditions, a series of independent samples *t*-tests were conducted. Independent samples t-tests were conducted without correction for multiple comparisons, as these analyses served as exploratory checks for baseline equivalence rather than hypothesis-driven tests. Similarly, to determine if there were significant differences in writing prompt and post-intervention survey completion (i.e., attrition) between conditions, chi square tests of association were conducted. A binary logistic regression was conducted to examine whether baseline psychological variables predicted post-intervention survey completion (see Supplementary Material). Fixed-effects repeated-measures linear models were used to assess the impact of values affirmation writing (intervention) compared to neutral writing (control) on all outcomes. Condition (values affirmation versus control) and time (pre- and post-intervention) were entered as fixed effects. No random effects were entered, and time was modelled as a repeated factor using a compound symmetry covariance structure. Post-hoc comparisons were conducted using the Bonferroni correction to adjust for multiple comparisons. Fixed-effects repeated-measures models were employed instead of repeated measures ANOVAs, as ANOVAs require complete data, whereas fixed-effects repeated-measures models can accommodate datasets with missing observations (Krueger & Tian, 2004). This approach enabled us to preserve the full sample by retaining participants with incomplete post-intervention data. Data from the main scales are presented below; self-compassion subscale data can be found in the Supplementary Material, as it was not needed for the primary analyses.

3. Results

3.1. Demographics

Table 1 shows demographic characteristics by condition. A total of 69 students participated in the study ($n = 34$ values affirmation; $n = 35$ control). The mean age of participants across both conditions was 18, and the majority of students identified as women ($n = 27$ values affirmation; $n = 25$ control). The sample was relatively diverse, with the most prominent ethnicity being Hispanic/Latine for both conditions ($n = 17$ values affirmation; $n = 15$ control). Most participants identified as a first-generation student ($n = 22$ values affirmation; $n = 19$ control).

Preliminary *t*-tests revealed that at baseline there were no condition differences in depressive symptoms, anxiety, satisfaction with life, psychological wellbeing, belonging, loneliness, self-compassion, and prosocialness; however, values affirmation condition participants had significantly higher baseline stress scores than the control condition ($t(67) = 2.22$, $p = 0.03$; Table 2). All participants completed the pre-intervention survey. Overall writing prompt completion rates were high, with 53 (76.81%) completing all three writing prompts ($n = 23$ values affirmation; $n = 30$ control), and 4 (5.80%) completing just two out of three writing prompts ($n = 2$ values affirmation; $n = 2$ control). Three participants (4.35%) in the values affirmation condition completed only one writing prompt, one of whom completed the post-intervention survey. A total of nine participants (13.04%) were considered dropouts, as they did not complete any of the writing prompts ($n = 6$ values affirmation; $n = 3$ control). There were no significant differences between conditions in writing prompt completion for writing prompts 1 and 2; however, there was a significant difference between conditions for writing prompt 3 ($\chi^2(1) = 4.90$, $p = 0.027$), such that control condition participants were significantly more likely to complete writing prompt 3. A total of 59 participants completed the post-intervention survey ($n = 27$ values affirmation; $n = 32$ control). Post-intervention survey completion did not differ by condition. One participant did not complete the intervention writing prompts but completed the pre- and post-intervention surveys; post-intervention data from this participant was not included in the analyses. All other participants were included the primary analyses (see Fig. 1). To assess the robustness of the findings, a per-protocol sensitivity analysis was conducted (see Supplementary Material). No study-related adverse events were reported.

Table 1
Demographic information.

Participant characteristics ($N = 69$)[a]	Values affirmation ($n = 35$)		Control ($n = 34$)	
Age (years), *M* (*SD*)	18.56 (1.74)		18.23 (0.43)	
	n	%	*n*	%
Gender[b]				
Woman	27	79.40	25	71.40
Man	6	17.60	10	28.60
Gender queer/gender fluid/non-binary	2	5.80	2	5.80
Questioning/unsure	–	–	2	5.70
Prefer to self-identify	–	–	1	2.90
Ethnicity[b]				
Indigenous	3	8.80	1	2.90
African/Black	2	5.90	2	5.70
East Asian	2	5.90	6	17.10
European/Caucasian	1	2.90	3	8.60
Latin, South, or Central American	4	11.80	6	17.10
Hispanic or Latine	17	50.00	15	42.90
Polynesian	1	2.90	–	–
South Asian	5	14.70	3	8.60
Southeast Asian	9	26.50	11	31.40
West Asian	1	2.90	–	–
Immigrant Generational Status				
Immigrant	5	14.70	6	17.10
First generation	22	64.70	19	54.30
Second generation	3	8.80	7	20.00
Third generation	4	11.80	3	8.60
Guardian 1 - Highest Level of Education				
Elementary school	2	5.90	1	2.90
Middle school	3	8.80	3	8.60
High school	6	17.60	6	17.10
Community college/some college	5	14.70	4	11.40
College	8	23.50	13	37.10
Graduate school	9	26.50	7	20.00
Not applicable	1	2.90	1	2.90
Guardian 2 - Highest Level of Education				
Elementary school	–	–	1	2.90
Middle school	3	8.80	5	14.30
High school	14	41.20	5	14.30
Community college/some college	6	17.60	5	14.30
College	4	11.80	9	25.70
Graduate school	4	11.80	5	14.30
Not applicable	3	8.80	5	14.30

[a] The total sample size was 69 participants; not all categories summed to equal the total sample due to missing data.

[b] Participants were able to select multiple response options for 'Gender' and 'Ethnicity' because the demographic questions were presented in a 'select all that apply' format. This approach was intentionally chosen to allow for more inclusive self-identification, recognizing that individuals may hold multiple identities that do not fit neatly into a single category. As a result, it is possible that some participants are included in multiple categories under 'Gender' and 'Ethnicity'.

3.2. Mental and social health outcomes

Table 3 contains the means, standard errors, and the interaction effects of the fixed-effects repeated-measures linear models for the main scales separated by time and condition. Models tested for time (pre- and post-intervention) by condition (values affirmation, control) effects on mental health, social health and academic performance outcomes.

3.2.1. Mental health outcomes

We predicted that the values affirmation condition participants

Table 2
Baseline differences by condition.

Characteristic	Values affirmation *M (SD)*	Control *M (SD)*	Condition difference
Depressive Symptoms	19.62 (12.60)	18.66 (9.63)	$t(67) = 0.36$, $p = 0.723$, $d = 0.086$, 95% CI [−4.42, 6.34]
Anxiety	9.26 (5.75)	7.14 (4.74)	$t(67) = 1.67$, $p = 0.099$, $d = 0.40$, 95% CI [−0.41, 4.65]
Stress	21.15 (4.97)	18.26 (5.78)	$t(67) = 2.22$, $p = 0.030$*, $d = 0.54$, 95% CI [0.30, 5.48]
Satisfaction with Life	23.65 (7.21)	23.40 (4.96)	$t(58.36) = 0.16$, $p = 0.869$, $d = 0.040$, 95% CI [−2.72, 3.21]
Psychological Wellbeing	43.82 (6.98)	45.31 (5.09)	$t(67) = -1.02$, $p = 0.313$, $d = -0.24$, 95% CI [−4.42, 1.44]
Belonging	4.63 (0.77)	4.83 (0.93)	$t(67) = -1.01$, $p = 0.314$, $d = -0.23$, 95% CI [−0.62, 0.20]
Loneliness	46.94 (10.22)	49.14 (10.41)	$t(67) = -0.89$, $p = 0.379$, $d = -0.21$, 95% CI [−7.16, 2.76]
Self-Compassion	2.73 (0.72)	2.90 (0.61)	$t(67) = -1.03$, $p = 0.307$, $d = -0.25$, 95% CI [−0.48, 0.15]
Prosocialness	3.77 (0.65)	3.97 (0.73)	$t(67) = -1.24$, $p = 0.220$, $d = -0.29$, 95% CI [−0.54, 0.13]

Note: Data reported as means and (SDs); $n = 34$ values affirmation; $n = 35$ control; An asterisk (*) denotes significance.

would have significant improvements in mental health outcomes relative to controls (hypothesis 1). Mental health measures of anxiety and psychological wellbeing were consistent with hypothesis 1. For self-reported anxiety, there was not a significant main effect of time ($F(1,60.88) = 0.38$, $p = 0.537$) or condition ($F(1,69.25) = 0.30$, $p = 0.588$) but the interaction between time and condition was significant, $F(1,60.88) = 7.17$, $p = 0.010$ (see Fig. 2). Post-hoc testing analysis of the simple main effects within this significant interaction suggested that there was a statistically significant decrease in anxiety from pre- to post-intervention for values affirmation participants ($M_{difference} = 1.81$, $SE = 0.81$, $p = 0.029$, 95% CI [0.19, 3.42]), but not for control participants ($M_{difference} = -1.13$, $SE = 0.74$, $p = 0.132$, 95% CI [−2.60, 0.35]). Likewise, for psychological wellbeing, there was not a significant main effect of time ($F(1,61.54) = 0.017$, $p = 0.896$) or condition ($F(1,68.49) = 0.18$, $p = 0.669$) but there was a significant time by condition interaction, $F(1,61.54) = 6.08$, $p = 0.016$. However, after controlling for Type I error using Bonferroni-corrected post hoc pairwise comparisons, the effect demonstrated for psychological wellbeing was not significant for values affirmation participants ($M_{difference} = 2.27$, $SE = 1.29$, $p = 0.083$, 95% CI [−4.86, 0.31]) or control participants ($M_{difference} = 2.04$, $SE = 1.18$, $p = 0.089$, 95% CI [−0.32, 4.41]). Further, there were no value affirmation effects on measures of self-reported depressive symptoms, stress, and satisfaction with life.

3.2.2. Social health outcomes

We predicted that the values affirmation condition participants would have significant improvements in social health outcomes relative to controls (hypothesis 2). Social belonging was consistent with hypothesis 2: there was not a significant main effect of time ($F(1,59.15) = 1.72$, $p = 0.195$) or condition ($F(1,68.51) = 0.028$, $p = 0.869$), but the interaction between time and condition was significant, $F(1,59.15) = 11.09$, $p = 0.001$ (see Fig. 3). Post-hoc analysis of the simple main effects within this significant interaction revealed a statistically significant decrease in feelings of belonging from pre- to post-intervention for control participants, ($M_{difference} = 0.34$, $SE = 0.10$, $p = 0.001$, 95% CI [0.14, 0.53]), but not for values affirmation participants ($M_{difference} = -0.15$, $SE = 0.11$, $p = 0.178$, 95% CI [−0.36, 0.07]). For loneliness, there was a statistically significant main effect of time, $F(1,57.83) = 4.64$, $p = 0.035$, such that there was a significant decrease over time in feelings of loneliness for both conditions, $M_{difference} = 1.82$, $SE = 0.85$, $p = 0.035$, 95% CI [0.13, 3.52] (see Fig. 4). However, there was no significant main effect of condition ($F(1,67.41) = 0.56$, $p = 0.458$), and no time by condition interaction ($F(1,57.83) = 0.16$, $p = 0.692$). Contrary to hypothesis 2 predictions, there were no value affirmation effects on measures of self-compassion or prosocial behavior.

3.3. Academic outcomes

There was not a significant main effect of time ($F(2,81.45) = 0.44$, $p = 0.645$) or condition ($F(1,47.20) = 0.42$, $p = 0.519$), and no significant time by condition interaction ($F(2,81.45) = 1.28$, $p = 0.284$, $\eta^2 p = 0.030$) on GPA for Fall, Winter, and Spring quarters.

4. Discussion

Minoritized undergraduate students are severely underrepresented in STEM disciplines and are at an increased risk for psychological distress (Sanchez & Awad, 2016). Providing these students with opportunities to flourish may improve their mental and social health, as well as academic performance. Therefore, the purpose of this study was to assess the impact of values affirmation writing (intervention) compared to neutral writing (control) on the mental and social health, and academic performance of first year undergraduate minoritized students in STEM. Values affirmation is an intervention that has been found to positively impact individuals' health and wellbeing. Therefore, it is not surprising that the current intervention had positive effects, as values affirmation participants experienced a decrease in anxiety over time. Additionally, control condition participants reported a decrease in belonging, highlighting the buffering effects of values affirmation on student belongingness. Further, both groups experienced a decrease in loneliness over time. Although we hypothesized broadly positive effects on mental and social health outcomes, prior research indicates that the effects of self-affirmation are inconsistent (McQueen & Klein, 2006; Yan et al., 2024). Systematic reviews have found that self-affirmation can reduce stress and anxiety, but findings for depression, loneliness, and wellbeing are mixed (McQueen & Klein, 2006). These inconsistencies align with the present study, as the intervention did not have a significant impact on values affirmation participants' depressive symptoms, stress, satisfaction with life, wellbeing, belonging, self-compassion, or prosocial behavior. This variability highlights the role of both institutional and individual factors in shaping intervention efficacy and highlights the strong link between the outcomes studied and the experiences of identity threat.

Participants in the values affirmation condition experienced a reduction in anxiety from pre- to post-intervention, which aligns with the literature (Lakuta, 2023). Notably, Lakuta (2023) found that adults who engaged in self-affirmation experienced a decrease in anxiety over time. Similarly, Li, Wu, Zhang, Xu, and Zhou (2020) explored whether reflecting on personal values buffered against anxiety during the COVID-19 pandemic. The authors concluded that there was a significant interaction between time and condition on anxiety (Li et al., 2020). Specifically, the control group demonstrated significantly higher levels of anxiety post-intervention, compared to the values affirmation condition. Further, the authors found evidence of positive lasting effects, with values affirmation participants reporting lower anxiety than control participants at both one- and two-weeks post-intervention (Li, Xu, & Zhou, 2022). Though the current study was not in the context of the COVID-19 pandemic, it is not surprising that similar patterns were observed, as university students are prone to experiencing anxiety (Miller & Orsillo, 2020; Pedrelli et al., 2015). Further, the observed reductions in anxiety are consistent with self-affirmation theory, which posits that reflecting on core personal values can buffer identity threats

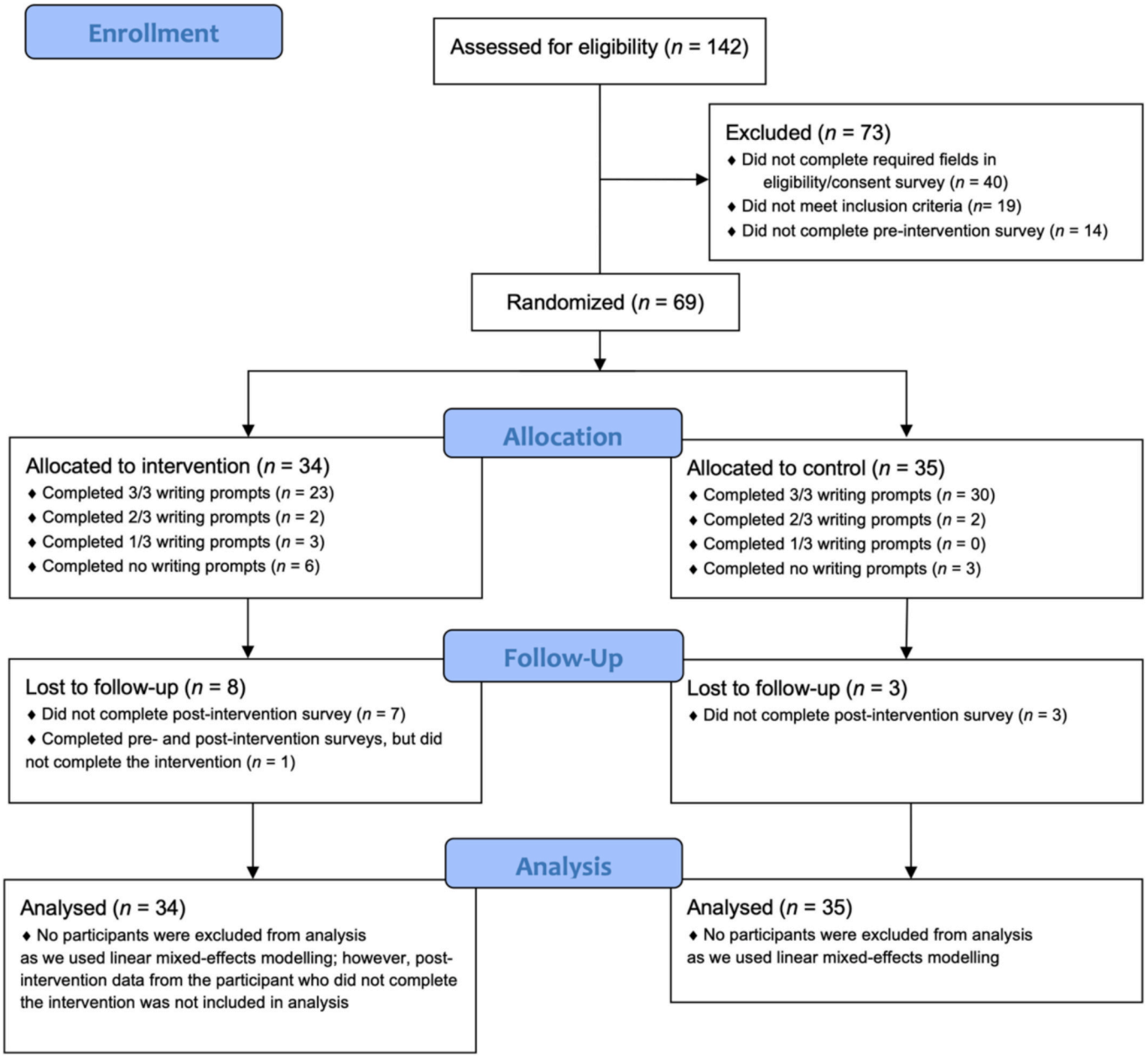

Fig. 1. CONSORT Diagram.

(Howell, 2017; Steele, 1999). This is particularly important for minoritized students who navigate microaggressions, discrimination, and underrepresentation in STEM (Howell, 2017; Steele, 1999). Given the positive outcomes, it is recommended that future studies further explore the relationship between values affirmation and anxiety by recruiting a larger cohort and comparing anxiety levels between minoritized and non-minoritized students, to assess whether students of minoritized backgrounds experience a reduction in anxiety more readily.

Interestingly, both values affirmation and control condition participants experienced a decrease in loneliness from pre- to post-intervention. This finding is particularly noteworthy, as research examining the impact of values affirmation on student loneliness remains relatively rare. Among the limited studies, Yan et al. (2024) found that affirming one's values did not alleviate feelings of loneliness among intervention group participants. In contrast, the present study observed decreases in loneliness over time for values affirmation participants; however, this effect was not unique to the intervention, as control participants also reported reductions. Consistent with Yan et al. (2024), these findings suggest that the decrease in loneliness may not be attributable to the intervention itself. Rather, it is possible that the act of being involved in something outside of themselves (i.e., by way of engaging in an intervention) contributed to the observed decrease in loneliness among both conditions. This said, control condition participants also demonstrated a significant decrease in belonging. Therefore, while participating in an intervention that involved neutral writing and constant communication from the research team might have contributed to a reduction in loneliness, it did not result in feelings of social belonging among control condition participants.

Although values affirmation participants did not demonstrate a significant increase in belonging, they did not decline; in fact, their mean scores trended upwards. These results are promising given that students of minoritized backgrounds attending predominantly White institutions often report lower belonging (Taff & Clifton, 2022), which can

Table 3
Interaction between condition and time on values affirmation and control condition participants' mental and social health outcomes.

Variable	Pre-intervention Mean ± SE	Post-intervention Mean ± SE	*F* (condition x time)
Depressive Symptoms			
Values Affirmation	19.62 ± 2.01	18.61 ± 2.18	$F(1,61.53) = 2.05$, $p = 0.158$, $\eta^2p = 0.032$
Control	18.66 ± 1.98	21.33 ± 2.03	
Anxiety			
Values Affirmation	9.26 ± 0.92	7.46 ± 0.99	$F(1,60.88) = 7.17$, $p = 0.010$, $\eta^2p = 0.10$
Control	7.14 ± 0.91	8.27 ± 0.93	
Stress			
Values Affirmation	21.15 ± 0.97	21.32 ± 1.06	$F(1,61.66) = 1.67$, $p = 0.202$, $\eta^2p = 0.026$
Control	18.26 ± 0.96	20.05 ± 0.98	
Satisfaction with Life			
Values Affirmation	23.65 ± 1.02	25.30 ± 1.09	$F(1,59.81) = 2.04$, $p = 0.158$, $\eta^2p = 0.033$
Control	23.40 ± 1.01	23.43 ± 1.03	
Psychological Wellbeing			
Values Affirmation	43.82 ± 1.23	46.10 ± 1.36	$F(1,61.54) = 6.08$, $p = 0.016$, $\eta^2p = 0.090$
Control	45.31 ± 1.21	43.27 ± 1.25	
Belonging			
Values Affirmation	4.63 ± 0.15	4.77 ± 0.16	$F(1,59.15) = 11.09$, $p = 0.001$, $\eta^2p = 0.16$
Control	4.83 ± 0.15	4.50 ± 0.15	
Loneliness			
Values Affirmation	46.94 ± 1.85	45.45 ± 1.94	$F(1,57.83) = 0.16$, $p = 0.692$, $\eta^2p = 0.0027$
Control	49.14 ± 1.82	46.98 ± 1.85	
Self-Compassion			
Values Affirmation	2.73 ± 0.12	2.86 ± 0.12	$F(1,58.50) = 1.07$, $p = 0.306$, $\eta^2p = 0.018$
Control	2.90 ± 0.12	2.90 ± 0.12	
Prosocialness			
Values Affirmation	3.77 ± 0.11	3.89 ± 0.13	$F(1,61.31) = 0.89$, $p = 0.349$, $\eta^2p = 0.014$
Control	3.97 ± 0.11	3.94 ± 0.12	

Note: η^2p indicates effect size. Guidelines for interpretation: 0.01 = small, 0.06 = medium, 0.14 = large.

contribute to increased experiences of discrimination and negative mental health outcomes over time (Freire & Hurd, 2023). Recent research has highlighted the role of inclusive and immersive learning environments in fostering belonging among diverse student populations (Dutta, Sekiwu, Unogwu, Catherine, & Helal, 2023). Combined with self-affirmation interventions, these approaches show great promise in helping minoritized students buffer the psychological impact of discrimination and marginalization, through the mechanism by which values affirmation reinforces sense of self and belonging. Freire and Hurd (2023) concluded that experiencing discrimination during minoritized students' first year of college can lead to a lower sense of belonging in year two and increased depression and stress in year three. Thus, intervening early and providing students with opportunities to enhance their sense of belonging in year one is imperative. The current study aimed to do this and as a result, demonstrated the buffering effects of values affirmation on student belongingness. Future researchers might consider administering a longitudinal intervention with multiple

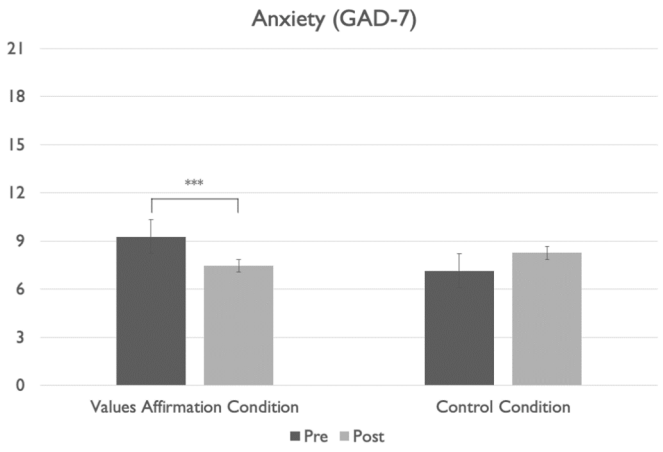

Fig. 2. Anxiety over time by condition.

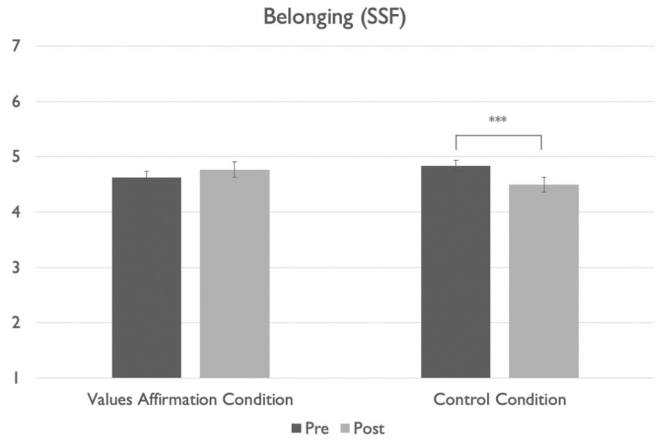

Fig. 3. Belonging over time by condition.

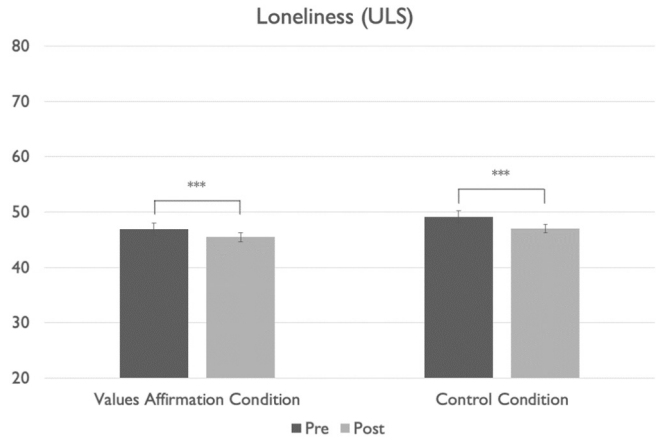

Fig. 4. Loneliness over time by condition.

follow-up time points to determine if the buffering effects are long-lasting. Additionally, emerging immersive and inclusive learning environments, such as metaversities, have shown promise in fostering belonging among diverse student populations (Dutta et al., 2023), suggesting that combining values affirmation with such approaches could further strengthen STEM students' sense of identity, promoting inclusion and connectedness.

Although a significant interaction effect was observed for psychological wellbeing, pairwise comparisons revealed no group differences

after controlling for Type I error. Nonetheless, mean wellbeing scores for values affirmation participants trended upward, while scores for control participants decreased. This pattern is consistent with prior findings (Jessop et al., 2023; Lakuta, 2023; Lakuta, Krankowska, Marcinkiewicz, Bociąga-Jasik, & Komorska-Błażewicz, 2022). For example, Lakuta (2023) concluded that adults who engaged in self-affirmation practices experienced improved wellbeing. Similarly, Jessop et al. (2023) found that spontaneous self-affirmation predicted hedonic and eudaimonic wellbeing outcomes. However, the psychological wellbeing finding from the current study should be interpreted with caution in the context of other literature, as no significant group differences were observed. Further, contrary to our hypotheses, values affirmation did not yield significant effects on depressive symptoms, stress, satisfaction with life, belonging, self-compassion, or prosocial behavior. This outcome is consistent with prior research, which has reported variability in the effects of self-affirmation on certain mental and social health outcomes. For example, some researchers have reported that self-affirmation can reduce symptoms of stress (Creswell et al., 2005; Dutcher et al., 2020; Sherman et al., 2009), depression (Dang, Wu, Bai, & Zhang, 2023; Lakuta, 2023), and anxiety (Dang et al., 2023; Lakuta, 2023; Venturo-Conerly et al., 2022), alleviate feelings of loneliness (Dang et al., 2023), and improve individuals' psychological wellbeing (Jessop et al., 2023; Lakuta, 2023; Lakuta et al., 2022), life satisfaction, and mental health (Yan et al., 2024). In contrast, other researchers have reported the opposite effects, highlighting that values affirmation had no effect on depression (Lakuta et al., 2022; Venturo-Conerly et al., 2022; Yan et al., 2024), anxiety, and loneliness (Yan et al., 2024). The inconsistency of findings highlights the importance of contextual and individual moderators that may shape intervention efficacy. Further, it is possible that the current study was influenced by ceiling/floor effects, which may help to explain the non-significant findings. Notably, many participants reported relatively high levels of wellbeing and satisfaction with life and low levels of depression at baseline. Such scores are atypical for the target population and therefore left limited room for values affirmation to produce measurable change. Additionally, the timing of survey administration could have affected results. Notably, participants in the current study were asked to complete the post-intervention survey three days after the intervention ended, with a week and a half provided for completion. Administering measures so close to the intervention may have limited the ability to detect meaningful changes, particularly if values affirmation exerts delayed effects on certain mental or social health outcomes.

4.1. Study implications

While the intervention produced effects that were largely consistent with previous self-affirmation research, findings from the current study carry broad institutional significance when contextualized within the systemic challenges faced by minoritized students in STEM. Self-affirmation theory posits that reflecting on core values can buffer identity threats (Sherman & Cohen, 2006); however, for minoritized students, such threats are shaped not only by individual lived experiences but also by structural inequities embedded in STEM environments, including discrimination, underrepresentation, and marginalization. In this context, the positive effects of values affirmation observed in the current study suggest that strengthening students' sense of self may support their ability to navigate institutional climates that impose disproportionate psychological burdens. At the same time, the mixed and null findings underscore the limitations of individual-level interventions when systemic inequities remain unchanged. Therefore, values affirmation is likely more impactful when embedded within broader equity-driven institutional reforms. As a result, this study contributes to ongoing discussion of how values affirmation interacts with the contextual barriers in academic environments and how it may be more effective when paired with other structural changes aimed at reducing identity threat.

4.2. Limitations

This study has the opportunity to expand to include a much larger sample size compared to the current study which consisted of a small sample size ($N = 69$). The current study was limited to first-year undergraduate students to facilitate adjustment to college for new students; however, this affected the size of the potential participant pool. In the future, researchers should aim for a longer recruitment period to accommodate the academic calendar. Future research could also consider developing a mixed-methods study to obtain a more nuanced understanding of participants' lived experiences of mental and social health outcomes, as the current data represent self-reported, questionnaire-based assessments. Additionally, while the focus of the current study was on minoritized undergraduate students, future research should also include non-minoritized students to determine whether values affirmation exerts distinct or comparable effects across groups. Moreover, participants in the current study primarily identified as women, with approximately 10% of students representing diversity in gender. Though the purpose of this study was not on sexual and gender minorities, it would be worthwhile to assess the impact of self-affirmation on the mental health and social outcomes of other disadvantaged groups, including gender minority students. It is recommended that researchers build off the findings from the current study to implement a large-scale, longitudinal intervention targeting first-year university students across the State. Additionally, the current study was not preregistered; however, in order to increase transparency and reproducibility, it is recommended that researchers building off of the findings from the current study preregister their predictions.

5. Conclusion

The purpose of this study was to assess the impact of values affirmation writing compared to neutral writing on the mental and social health, and academic performance of first year minoritized students in STEM at a 4-year public institution in the United States. In general, the intervention had a positive impact as students who reflected on their core values experienced a significant decrease in anxiety. Findings from the current study also suggest that values affirmation may help protect students' sense of belonging, as control group participants reported a significant decrease in belonging over time. Further, both groups decreased in loneliness. Affirming one's personal values can therefore serve as a buffer against negative mental and social health outcomes and boost psychological resources among minoritized students. Given that minoritized students experience high rates of discrimination and victimization in college (Freire & Hurd, 2023), intervening during students' freshmen year is particularly important. Researchers in the future might consider developing a longitudinal study to assess whether values affirmation has a lasting positive effect on the health of minoritized students.

CRediT authorship contribution statement

Katie J. Shillington: Writing – original draft, Resources, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Helen Ho:** Writing – review & editing, Resources, Project administration, Investigation, Conceptualization. **Leigh Eck:** Writing – review & editing, Resources, Project administration, Investigation, Funding acquisition, Conceptualization. **Stanley M. Lo:** Writing – review & editing, Supervision, Conceptualization. **J. David Creswell:** Writing – review & editing, Supervision, Methodology, Funding acquisition, Conceptualization. **Janine Dutcher:** Writing – review & editing, Supervision, Resources, Methodology, Investigation, Funding acquisition, Formal analysis, Conceptualization. **Gentry N. Patrick:** Writing – review & editing, Supervision, Methodology, Investigation, Funding acquisition, Conceptualization.

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Declaration of competing interest

The authors have declared that no competing interests exist.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.actpsy.2026.106640.

Data availability

The participants of this study did not provide written consent for their data to be shared publicly. Due to the sensitive nature of the research, supporting data is not available.

References

American College Health Association. (2024). *American College Health Association-National College Health Assessment III: Undergraduate Student Reference Group Executive Summary Fall 2023*. Silver Spring, MD: American College Health Association.

Borman, G. D. (2017). Advancing values affirmation as a scalable strategy for mitigating identity threats and narrowing national achievement gaps. *Proceedings of the National Academy of Sciences, 114*(29), 7486–7488. https://doi.org/10.1073/pnas.1708813114

Caprara, G. V., Steca, P., Zelli, A., & Capanna, C. (2005). A new scale for measuring adults' prosocialness. *European Journal of Psychological Assessment, 21*(2), 77–89. https://doi.org/10.1027/1015-5759.21.2.77

Chang, M. J., Sharkness, J., Hurtado, S., & Newman, C. B. (2011). What matters in college for retaining aspiring scientists and engineers from underrepresented racial groups. *Journal of Research in Science Teaching, 47*(5), 564–582. https://doi.org/10.1002/tea.20346

Cohen, G. L., & Sherman, D. K. (2014). The psychology of change: Self-affirmation and social psychological intervention. *Annual Review of Psychology, 65*(1), 333–371.

Cohen, S., Kamarch, T., & Mermelstein, R. (1983). A global measure of perceived stress. *Journal of Health and Social Behavior, 24*, 385.

Cook, J. E., Purdie-Vaughns, V., Garcia, J., & Cohen, G. L. (2012). Chronic threat and contingent belonging: Protective benefits of values affirmation on identity development. *Journal of Personality and Social Psychology, 102*(3), 479. https://doi.org/10.1037/a0026312

Creswell, J. D., Welch, W. T., Taylor, S. E., Sherman, D. K., Gruenewald, T. L., & Mann, T. (2005). Affirmation of personal values buffers neuroendocrine and psychological stress responses. *Psychological Science, 16*(11), 846–851. https://doi.org/10.1111/j.1467-9280.2005.01624.x

Crocker, J., Niiya, Y., & Mischkowski, D. (2008). Why does writing about important values reduce defensiveness? Self-affirmation and the role of positive other-directed feelings. *Psychological Science, 19*(7), 740–747. https://doi.org/10.1111/j.1467-9280.2008.02150

Dang, Q., Wu, J., Bai, R., & Zhang, B. (2023). Self-affirmation training can relieve negative emotions by improving self-integrity among older adults. *Current Psychology, 42*, 8816–8823. https://doi.org/10.1007/s12144-021-02201-9

Diener, E., Wirtz, D., Biswas-Diener, R., Tov, W., Kim-Prieto, C., Choi, D. W., & Oishi, S. (2009). New measures of well-being. In E. Diener (Ed.), *39. assessing well-being. Social indicators research series*. Dordrecht: Springer. https://doi.org/10.1007/978-90-481-2354-4_12.

Diener, E. D., Emmons, R. A., Larsen, R. J., & Griffin, S. (1985). The satisfaction with life scale. *Journal of Personality Assessment, 49*(1), 71–75. https://doi.org/10.1207/s15327752jpa4901_13

Dutcher, J. M., Creswell, J. D., Pacilio, L. E., Harris, P. R., Klein, W. M., Levine, J. M., … Eisenberger, N. I. (2016). Self-affirmation activates the ventral striatum: a possible reward-related mechanism for self-affirmation. *Psychological Science, 27*(4), 455–466. https://doi.org/10.1177/0956797615625989

Dutcher, J. M., Eisenberger, N. I., Woo, H., Klein, W. M., Harris, P. R., Levine, J. M., & Creswell, J. D. (2020). Neural mechanisms of self-affirmation's stress buffering effects. *Social Cognitive and Affective Neuroscience, 15*(10), 1086–1096. https://doi.org/10.1093/scan/nsaa042

Dutta, P. K., Sekiwu, D., Unogwu, O. J., Catherine, A. T., & Helal, A. H.(T.) (2023). Metaverse revolution in higher education: The rise of metaversities and immersive learning environments. *Babylonian Journal of Internet of Things, 2023*, 59–68. https://doi.org/10.58496/BJIoT/2023/008

Fadhil, S., Jameel, A. K., Fadhil, R., & Battal, A.(T.) (2024). Impact of COVID-19 pandemic on academic performance: A comparison between the E-learning and classical classroom learning for Arabic language department. *Mesopotamian Journal of Arabic Language Studies, 2024*, 35–41. https://doi.org/10.58496/MJALS/2024/004

Fan, X., Luchok, K., & Dozier, J. (2021). College students' satisfaction and sense of belonging: Differences between underrepresented groups and the majority groups. *SN Social Sciences, 1*, 1–22. https://doi.org/10.1007/s43545-020-00026-0

Franklin, J. (2016). Racial microaggressions, racial battle fatigue, and racism-related stress in higher education. *Journal of Student Affairs at New York University, 12*(44), 44–55.

Freire, D. S., & Hurd, N. M. (2023). Discrimination and mental health outcomes among underrepresented college students: The role of sense of belonging at predominantly white institutions. *Emerging Adulthood, 11*(3), 654–668. https://doi.org/10.1177/21676968231166696

Howell, A. J. (2017). Self-affirmation theory and the science of well-being. *Journal of Happiness Studies, 18*, 293–311. https://doi.org/10.1007/s10902-016-9713-5

Jessop, D. C., Harris, P. R., & Gibbons, T. (2023). Individual differences in spontaneous self-affirmation predict well-being. *Self and Identity, 22*(2), 247–275. https://doi.org/10.1080/15298868.2022.2079711

Jordt, H., Eddy, S. L., Brazil, R., Lau, I., Mann, C., Brownell, S. E., & Freeman, S. (2017). Values affirmation intervention reduces achievement gap between underrepresented minority and white students in introductory biology classes. *CBE Life Sciences Education, 16*(3), 1–10. https://doi.org/10.1187/cbe.16-12-0351

Keyes, C. L. M. (2002). The mental health continuum: From languishing to flourishing in life. *Journal of Health and Social Behavior, 43*(2), 207–222. https://doi.org/10.2307/3090197

Krueger, C., & Tian, L. (2004). A comparison of the general linear mixed model and repeated measures ANOVA using a dataset with multiple missing data points. *Biological Research for Nursing, 6*(2), 151–157. https://doi.org/10.1177/1099800404267682

Lakuta, P. (2023). Brief self-affirmation intervention for adults with psoriasis for reducing anxiety and depression and boosting well-being: Evidence from a randomized controlled trial. *Psychological Medicine, 53*(6), 2574–2584. https://doi.org/10.1017/S0033291721004499

Lakuta, P., Krankowska, D., Marcinkiewicz, P., Bociąga-Jasik, M., & Komorska-Błażewicz, A. (2022). Enhancing well-being and alleviating depressive symptoms in people with HIV/AIDS: An intervention based on if-then plans with self-affirming cognitions. *Applied Psychology. Health and Well-Being, 14*(3), 899–919. https://doi.org/10.1111/aphw.12357

Li, S., Wu, Y., Zhang, F., Xu, Q., & Zhou, A. (2020). Self-affirmation buffering by the general public reduces anxiety levels during the COVID-19 epidemic. *Acta Psychologica Sinica, 52*(7), 886–894. https://doi.org/10.3724/SP.J.1041.2020.00886

Li, S., Xu, Q., & Zhou, A. (2022). Follow-up to a randomized controlled trial of the effect of self-affirmation on anxiety during the COVID-19 pandemic. *Psychology, Health & Medicine, 27*(2), 361–366. https://doi.org/10.1080/13548506.2021.1917770

Lindsay, E. K., & Creswell, J. D. (2014). Helping the self help others: Self-affirmation increases self-compassion and pro-social behaviors. *Frontiers in Psychology, 5*, Article 421. https://doi.org/10.3389/fpsyg.2014.00421

McQueen, A., & Klein, W. M. P. (2006). Experimental manipulations of self-affirmation: A systematic review. *Self and Identity, 5*(4), 289–354. https://doi.org/10.1080/15298860600805325

Miller, A. N., & Orsillo, S. M. (2020). Values, acceptance, and belongingess in graduate school: Perspectives from underrepresented minority students. *Journal of Contextual Behavioral Science, 15*, 197–206.

National Institutes of Health. (2024). Race and national origin: Minoritized populations. January 17 https://www.nih.gov/nih-style-guide/race-national-origin#:~:text=Minoritized%20populations%20are%20groups%20that,when%20writing%20about%20specific%20populations.

National Science Board. (2018). Our nation's future competitiveness relies on building a STEM-capable U.S. workforce. https://www.nsf.gov/nsb/sei/companion-brief/NSB-2018-7.pdf.

Nelson, S. K., Fuller, J. A. K., Choi, I., & Lyubomirsky, S. (2014). Beyond self-protection: Self-affirmation benefits hedonic and eudaimonic well-being. *Personality and Social Psychology Bulletin, 40*, 998–1011.

Park, J. J., Kim, Y. K., Salazar, C., & Hayes, S. (2020). Student– Faculty interaction and discrimination from faculty in STEM: The link with retention. *Research in Higher Education, 61*(3), 330–356. https://doi.org/10.1007/s11162-019-09564-w

Pedrelli, P., Nyer, M., Yeung, A., Zulauf, C., & Wilens, T. (2015). College students: Mental health problems and treatment considerations. *Academic Psychiatry, 39*, 503–511. https://doi.org/10.1007/s40596-014-0205-9

Purdie-Vaughns, V., Cohen, G. L., Garcia, J., Sumner, R., Cook, J. C., & Apfel, N. (2009). Improving minority academic performance: How a values-affirmation intervention works. *Teachers College Record, 23*.

Radloff, L. S. (1977). The CES-D scale: A self-report depression scale for research in the general population. *Applied Psychological Measurement, 1*(3), 385–401. https://doi.org/10.1177/014662167700100306

Raes, F., Pommier, E., Neff, K. D., & Van Gucht, D. (2011). Construction and factorial validation of a short form of the self-compassion scale. *Clinical Psychology & Psychotherapy, 18*(3), 250–255. https://doi.org/10.1002/cpp.702

Ribeiro, Í. J., Pereira, R., Freire, I. V., de Oliveira, B. G., Casotti, C. A., & Boery, E. N. (2018). Stress and quality of life among university students: A systematic literature review. *Health Professions Education, 4*(2), 70–77.

Russell, D. W. (1996). UCLA loneliness scale (version 3): Reliability, validity, and factor structure. *Journal of Personality Assessment, 66*(1), 20–40. https://doi.org/10.1207/s15327752jpa6601_2

Ryff, C. D., & Keyes, C. L. M. (1995). The structure of psychological well-being revisited. *Journal of Personality and Social Psychology, 69*(4), 719–727. https://doi.org/10.1037/0022-3514.69.4.719

Sanchez, D., & Awad, G. H. (2016). Ethnic group differences in racial identity attitudes, perceived discrimination and mental health outcomes in African American, Black Caribbean and Latino Caribbean college students. *International Journal of Culture and Mental Health, 9*(1), 31–43. https://doi.org/10.1080/17542863.2015.1081955

Sherman, D. K., Bunyan, D. P., Creswell, J. D., & Jaremka, L. M. (2009). Psychological vulnerability and stress: The effects of self-affirmation on sympathetic nervous system responses to naturalistic stressors. *Health Psychology, 28*(5), 554.

Sherman, D. K., & Cohen, G. L. (2006). The psychology of self-defense: Self-affirmation theory. *Advances in Experimental Social Psychology, 38*, 183–242. https://doi.org/10.1016/S0065-2601(06)38004-5

Snidman, H. R., Rice, L., & Sparger, K. (2024). Representation, belongingness, and rumination in underrepresented psychology students. *Teaching of Psychology, 51*(2), 188–198. https://doi.org/10.1177/0098628322109511

Spitzer, R. L., Kroenke, K., Williams, J. B., & Löwe, B. (2006). A brief measure for assessing generalized anxiety disorder: The GAD-7. *Archives of Internal Medicine, 166*(10), 1092–1097. https://doi.org/10.1001/archinte.166.10.1092

Steele, C. M. (1999). The psychology of self-affirmation: Sustaining the integrity of the self. In R. F. Baumeister (Ed.), *The self in social psychology* (pp. 372–390). Psychology Press.

Taff, S. D., & Clifton, M. (2022). Inclusion and belonging in higher education: A scoping study of contexts, barriers, and facilitators. *Higher Education Studies, 12*(3), 122–133.

Thomaes, S., Bushman, B. J., de Castro, B. O., & Reijntjes, A. (2012). Arousing "gentle passions" in young adolescents: Sustained experimental effects of value affirmations on prosocial feelings and behaviors. *Developmental Psychology, 48*(1), 103. https://doi.org/10.1037/a0025677

Venturo-Conerly, K., et al. (2022). Single-session interventions for adolescent anxiety and depression symptoms in Kenya: A cluster-randomized controlled trial. *Behaviour Research and Therapy, 151*, Article 104040. https://doi.org/10.1016/j.brat.2022.104040

Walton, G. M., & Cohen, G. L. (2007). A question of belonging: Race, social fit, and achievement. *Journal of Personality and Social Psychology, 92*(1), 82–96.

Whitcomb, K. M., Cwik, S., & Singh, C. (2021). Not all disadvantages are equal: Racial/ethnic minority students have largest disadvantage among demographic groups in both STEM and non-STEM GPA. *AERA Open, 7*, 1–16. https://doi.org/10.1177/23328584211059823

Yan, W., Wang, Y., Jiang, Z., Peng, K., & Cohen, G. (2024). Effects of a self-affirmation intervention among Chinese adolescents during the COVID-19 pandemic: A large-scale randomized controlled trial. *Applied Psychology. Health and Well-Being, 16*(3), 1100–1121. https://doi.org/10.1111/aphw.12516

Yaqoup, H. A. (2025). The impact of career plateau on employee performance: An exploratory study of employees' opinions at the northern technical university. *MEDAAD, 2025*, 1–7. https://doi.org/10.70470/MEDAAD/2025/001