

Securing self-integrity over time: Self-affirmation disrupts a negative cycle between psychological threat and academic performance

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Abstract

Adolescence can be a tumultuous period with numerous threats to self-integrity. A 3-year field experiment tested whether repeated affirmations of self-integrity can help lessen the impact of psychological threat on adolescent (11–14 years old) students' core course GPA over time. A diverse cohort of students ($N = 163$) was randomly assigned to a control condition or to an affirmation condition, in which teachers repeatedly administered classroom writing exercises that affirmed students' personal values. Results showed that affirmation lessened a downward trajectory of GPA over time. In contrast to previous research, this effect occurred among all ethnic groups rather than only among stereotype-threatened ethnic minority groups. Affirmation did not reduce self-reported psychological threat, but it severed its relationship with performance: Among control students, psychological threat predicted lower GPA. Among affirmed students, psychological threat was unrelated to performance. Beyond their practical implications, these results make two theoretical contributions. First, affirmation can have broader benefits than those previously documented among negatively stereotyped groups, if timed to

co-occur with different sources of threat that emerge over a long developmental window. Second, the effect of affirmation may not be so much to reduce threat as to disrupt its adverse cognitive and motivational effects.

INTRODUCTION

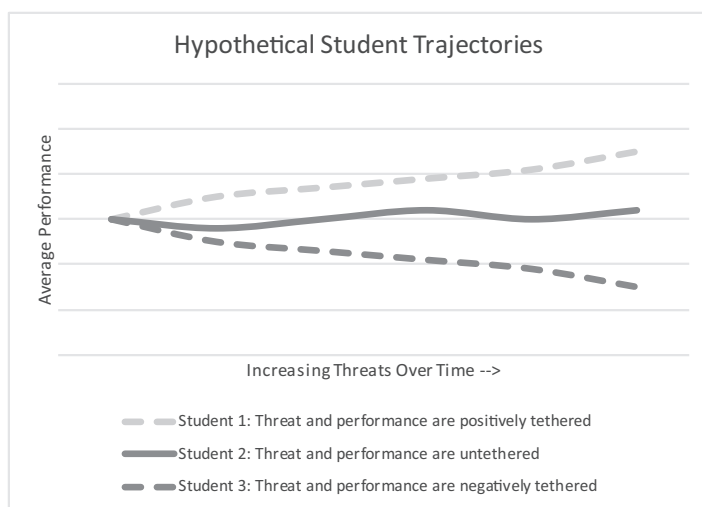
For many students, the beginning of adolescence marks a stressful transition. Concerns about fitting in, about being evaluated by others, and about being “smart” all tend to increase, while academic outcomes tend to deteriorate (e.g., lower cognitive and behavioral engagement; Eccles et al., 1993; Wang et al., 2021). Such patterns are not, however, universal (Arnett, 1999). While some students are undermined by the threats and stressors of adolescence, others are not. Still others may even thrive in face of threat and adversity. Given this, much research has sought to understand how psychological factors moderate the impact of stressors and self-threats during the adolescent middle school years (ages 11–14). In the present research, we articulate a self-affirmation framework for understanding how the psychological threats of middle school relate to students’ academic performance over time.

Psychological threat is a response that occurs when a person’s sense of adaptive or moral adequacy, or self-integrity, is thrown into question (Steele, 2011). A prototypical example of psychological threat is stereotype threat, which occurs in situations where people can be seen in terms of a negative stereotype about their group (Steele, 1997). The first experiment to test a self-affirmation intervention in education were designed to reduce the effects of negative intellectual stereotypes on African–American middle schoolers (Cohen et al., 2006). However, psychological threat can come from many sources (see Cohen & Sherman, 2014; Steele, 1988). The transition to middle school, for example, coincides with heightened concerns about social status (Prinstein, 2017), as students begin to engage in the task of forming a lasting identity, a narrative conception of “who I am” (McAdams, 2011). There are, in addition, multiple stressors associated with peer and sexual relations in the digital age (Nesi et al., 2018). In the present research, we consider psychological threat as a construct with multiple and potentially varying sources over time. These include factors such as test anxiety (Wigfield & Eccles, 1989), challenges to students’ sense of belonging (Anderman, 2003), and fears of academic failure (De Castella et al., 2013), which all tend to increase over middle school and predict poorer outcomes (e.g., lower test scores, lower engagement). The experience of psychological threat seems inevitable, but what is critical is whether the threat is chronic and whether it is associated with worse outcomes such as lower academic performance. As resiliency researchers have long noted, adversity does not necessarily lead to worse outcomes (Wright & Masten, 2005). Individuals vary in their resiliency and experiences can shape this variability. In the present research, we explore whether a self-affirmation intervention provides a general resiliency to psychological threat over time.

This general resiliency, we posit, will take a specific form, manifesting as an “untethering” between psychological threat on the one hand and academic performance on the other. In the absence of intervention, psychological threat may lead to worse performance, and worse performance in turn may lead to heightened psychological threat, in a repeating cycle that leads to worse performance over time (Cohen et al., 2009). But if an intervention can weaken either of these two links, early on or in an enduring way, this downward trend may be ameliorated.



FIGURE 1 Hypothetical student trajectories depicting the relationship between increasing threats over time (x-axis) and average academic performance (e.g., GPA). Threat and performance are positively tethered for Student 1, negatively tethered for Student 3, and untethered for Student 2



To illustrate, consider three hypothetical students, each of which begins the transition to middle school with similar preparation and similar experience of middle school as a threatening environment. As shown in Figure 1, each student encounters an increasing number of threats over time, typical for the middle school experience. For Students 1 and 3, threat and performance are tethered, meaning that threat is correlated with performance over time. For Student 1, the correlation is positive. Increasing threats evoke a challenge response (e.g., Blascovich & Mendes, 2000), motivating the student to exert increased effort, resulting in improved performance. Student 3, by contrast, has a negative tethering between threat and performance: As threats increase, performance declines, and as performance declines, threat further increases. Finally, for Student 2, threat and performance are untethered, meaning that increasing threat does not correlate with either higher or lower performance. Such a student encounters the same threats as other students, but the threats neither arise from, nor feed into, lower performance.

In the present research, we argue that whether a student's threat and performance are tethered or untethered is dependent, in part, on the robustness of students' sense of *self-integrity*. Although people may feel threatened by a specific event, such as an imminent test, whether or not that feeling of threat has a destabilizing effect on performance will depend on the security of people's sense of self-integrity. While the security of one's self-integrity can vary due to individual differences, here we attempt to experimentally manipulate it by giving students repeated self-affirmation interventions throughout their middle school tenure. The self-affirmation intervention we test is a standard value affirmation activity, in which students reflect on core values they hold (Cohen et al., 2006). Self-affirmations secure self-integrity, making it less likely to be disrupted by periodic threats to it. Consistent with this notion, affirmation has been found to weaken the link between various kinds of threats in students' academic environments and their performance (Cook et al., 2012) resulting in a pattern similar to that displayed by Student 2.

Why would self-affirmation help to break the cycle between threat and performance? Self-affirmations broaden people's conception of self, rendering specific threats less dire (Critcher & Dunning, 2015; Sherman, 2013; Steele, 1988). Against the backdrop of a broadened conception of oneself as holding core values such as relationships or religion, a specific threat, such as a bad grade, is less likely to de-stabilize psychological functioning. Consider a self-affirmed

student who has written about the importance of relationships in her life. She gets a bad grade on a test early in the school year. Although she may feel badly about the test (i.e., threatened), the test result is less likely to implicate the students' sense of global self-integrity. As research suggests, when their global self-integrity is secure, students tend to perform better (see Binning & Browman, 2020). Note, also, that a robust sense of self-integrity is apt to interrupt two processes: First, whether perceived threat undermines performance, and second, whether worse performance further exacerbates perceived threat. Because the process relies on a feedback loop, even a small interruption of one link or the other could have effects that compound over time (Cohen & Sherman, 2014).

Affirmation effects have been found to persist over time, and a number of processes have been examined to understand them (see Easterbrook et al., 2021; Sherman et al., 2021 for review). In one study, affirmation activities delivered to 7th Grade African American students produced short-term benefits (e.g., higher core-course GPA; Cohen et al., 2006) and long-term benefits 7–9 years later (e.g., increased college enrollment; Goyer et al., 2017). Similarly, affirmations delivered to Latinx 7th Graders not only improved their GPA over the next three years (Sherman et al., 2013), but also increased their rates of enrollment in advanced courses, participation in a college preparatory program, and lowered their rate of high school dropout (Goyer et al., 2017). This prior work illustrated that affirmations can shift students' long-term academic trajectories. In the present research, we seek test whether some of these long-term effects may be driven by a weakening or untethering of the relationship between psychological threat and performance.

Present research

Seeking to further illuminate how students' respond to threat over time, we examined the relationship between threat and performance via analysis of data collected as part of a 3-year affirmation field experiment (Binning et al., 2019). An earlier report found that students assigned to the affirmation condition had a dramatically reduced rate of discipline incidents in 8th Grade—an effect that was not moderated by participant ethnicity/race. Here we analyze both grades and psychological threat, available through comprehensive surveys administered to students over their 3 years of middle school, among the same student sample. The present study commenced just after students transitioned to middle school to begin 6th Grade (when most students were age 11), and it followed them through the end of their final year of middle school, the 8th Grade (when most students were age 14).

As one of the first affirmation studies to examine the effects of affirmation comprehensively, from the transition to the completion of middle school, the study employs a broader temporal lens and a more robust protocol of affirmation exercises than seen in past research. By delivering affirmation early and often, the design is well-suited for examining the relationships between affirmation, threat, and performance over time. Below we test the hypotheses that repeated in-class self-affirmation exercises would, (1) bolster student performance over time, and (2) untether the link between psychological threat and academic performance over time. Following prior research, we also examined if any such effects were particularly pronounced among ethnic groups associated with negative intellectual stereotypes.



METHODS

Participants

The study took place at the middle school serving a medium-sized suburban town on the Eastern seaboard of the United States, in which approximately one-third of students received free or reduced lunches. At the beginning of the first year of the study, we sought consent to participate from all students in 6th Grade. The study used an active consent procedure in which students received consent from their parents to participate in the longitudinal study. In all, 55% of 6th Graders ($N = 163$) provided consent and enrolled in the study. The sample was 50% girls, 48% White, 39% African American, 7% Latinx, and 6% Asian American. The ethnic classification was based on administrative records, except in one case where a student who was listed as “other” in the administrative records was placed in the White category based on their self-reported ethnicity/race. The demographics of the full sample were similar to the demographics of the school as a whole. To simplify the ethnicity/race analyses while retaining the full sample, ethnicity/race was dichotomized into potentially threatened groups (Borman et al., 2018) in line with academic stereotypes, resulting in one group students from ethnic groups that are negatively stereotyped in school (i.e., African Americans and Latinx) and one group of students from groups who are not negatively stereotyped (i.e., Whites and Asian Americans). All results remain virtually unchanged when the analyses are limited to African Americans and Whites ($N = 141$; see SOM). Attrition was very low overall, with 87% of the original sample ($N = 145$) students completing the study at the end of 8th Grade; there was no differential attrition as a function of condition (see Binning et al., 2019 for additional details about the sample, attrition, and design).

Intervention design

The first self-affirmation activities were administered just after the transition to middle school. Each student was randomly assigned to either the affirmation or control condition using a within-classroom stratification procedure to ensure a roughly equal number of boys and girls, and of members of each ethnic group, in the affirmation and control conditions within each classroom. Students who did not provide consent were provided an alternative assignment to occupy their time during class sessions in which the interventions were delivered.

Consistent with Cohen et al. (2006), teachers were trained to deliver the intervention materials in a way that would make it difficult for them to ascertain students' condition assignments. To accomplish this double-blind design, students were randomly assigned to receive either affirmation or control writing exercises with materials that were formatted to look as similar as possible. In addition, research staff placed the exercises in manila envelopes with students' names written on them, and the teacher simply distributed and collected the envelopes with the materials inside. Students were told that the writing exercises were part of everyday classroom activities, and teachers were instructed not to frame the exercise as designed to be helpful. Although it was possible for students to determine that their writing exercises differed slightly from their peers (e.g., by comparing them side-by-side), teachers reported this rarely happened. In addition, teachers reported

rarely hearing students discuss the activity with peers, although teachers were of course not privy to what students discussed outside of class.¹

Maintaining their initial condition assignments, students received up to eight additional administrations throughout 6th, 7th, and 8th Grades.

6th and 7th Grade implementation

To limit repetition and fatigue from repeating the same exercises multiple times, there were three main variants of the affirmation procedure. Over 6th and 7th Grades, the timing and order of the materials were very similar, as students completed two standard affirmation procedures that have been widely used in past research (see McQueen & Klein, 2006), followed by two procedures that have also been used in prior research (Cohen et al., 2006, 2009; Sherman et al., 2013, Study 1). For the most frequent affirmation manipulation (also the first affirmation manipulation given each school year), students were presented with the following list of values: Athletic Ability, Being Good at Art, Creativity, Independence, Living in the Moment, Membership in a Social Group, Music, Politics, Relationships with Friends and Family, Religious Values, Sense of Humor. Students in the affirmation condition were asked to select their three most important values and to write a few sentences about “why those values are important to you.”

Control students were prompted to write about various non-affirming topics, such as their unimportant values (and why they might be important to others), their morning routine, or their typical afternoon. For example, for several exercises students in the control condition asked students to select their three least important values and to write about “why those values might be important to someone else, like an acquaintance or someone they heard about.” Materials were delivered on four occasions in each of the first 2 years (6th and 7th Grade), and they followed the same schedule for each year. Students were on a traditional 9-month calendar. They completed the first and second exercises in September and October, respectively. They completed additional exercises in early January and March.

8th Grade implementation

In the 8th Grade, due to a funding gap, only one writing exercise was administered. This exercise took place in March, and it incorporated a dosage manipulation. Students who had been assigned to the affirmation condition were randomly allocated to two different groups. In one condition, the “booster” affirmation condition, they received an additional, 9th affirmation. In the “no booster” affirmation condition, they received a control exercise. All students who had previously been in the control condition received another control exercise. However, the results of the booster analyses were inconclusive due to limited power. Accordingly, we collapsed across this manipulation and do not report more detailed analyses of the 8th Grade booster variable.

¹As such, while contamination between conditions was possible, we do not regard it as a strong threat to validity. Such contamination would likely not have been systematic and would likely work against our ability to detect condition differences.



Measures

Prior performance

Prior academic performance was assessed by collecting students' 5th Grade GPA and state standardized test scores, which is consistent with past affirmation research (e.g., Sherman et al., 2013, Study 1). To minimize missing data, each of these measures was transformed into a z-score and then whatever data were available for each student were averaged to form a single composite of prior performance. The resulting composite was then re-standardized for ease of interpretation. To test for equivalence in prior performance across cells in the design, we subjected prior performance to a Condition (affirmation vs. control) \times Gender (boy vs. girl) \times Ethnicity/race (Black and Latinx vs. White and Asian) between-subjects factorial ANOVA. The analysis found no difference in prior performance between affirmation (*Estimated M* = .03) and control conditions (*Estimated M* = -.01), $F(1, 155) = .11$, $p = .741$, nor were there any significant interactions ($ps > .13$), indicating that random assignment was successful in terms of participants' prior performance. To increase statistical precision and power, we included prior performance as a covariate for all inferential tests reported below. However, as displayed in the figures, unadjusted means yielded similar results. We mean-centered prior performance within each ethnic grouping before analyses (cf. Sherman et al., 2013). Group-mean centering in this way avoided statistically equating ethnic groups in terms of their baseline achievement and allowed us to gauge if ethnic group performance differences were affected by the intervention. Results were nearly identical when using the grand-mean centered prior-performance variable.

Core course GPA

Academic performance was operationalized using students' official transcripts. Grades for each course could range from 0 ('F') to 4.33 ('A+'). Following previous research (Cohen et al., 2006, 2009; Sherman et al., 2013), we calculated quarterly GPA over four core courses (Language Arts, Mathematics, Science, and Social Studies). This was done for all available student data, up to 12 quarters for each student (annual *Ms* = 2.90, 2.55, and 2.56; *SDs* = .86, .98, and .99 for 6th Grade, 7th Grade, and 8th Grade, respectively).

Measures of psychological threat

Student surveys were administered twice a year for each of the 3 years of the study, resulting in a total of six possible measurements per student (see SOM for additional detail). As noted below, most of the scales were adapted from previously published scales. Moreover, all scales composing the psychological threat index share a high level of face validity as representatives of different types of threat.

Racial stereotype threat

Five items assessed racial stereotype threat (adapted from Cohen & Garcia, 2005), including: "In school, I worry people will judge my racial group based on my behavior/performance," "In school,

I worry people will judge me based on what they think about my racial group.” Note that while these items emphasized different referents of threat (i.e., “me” or “my racial group”), all items captured students’ general worries about confirming negative ingroup stereotypes. Students were provided with a response range labeled 1 (*Very much disagree*) to 6 (*Very much agree*; Average $\alpha = .88$, range = .83-.91).

School belonging

Students at each measurement occasion responded to 10 items that assessed academic belonging (adapted from Walton & Cohen, 2007). Sample items included, “I feel like I belong at my school,” and “People at my school accept me” (1 = *Very much disagree*; 6 = *Very much agree*; Average $\alpha = .73$, range = .64-.84).

Test anxiety

Four items were used to assess test anxiety (adapted from Sarason, 1977), with sample items including “Even when I am well prepared for a test, I feel very nervous about it,” and “During a test I often think about what will happen if I fail.” Response options ranged from 1 (*Never*) to 4 (*Always*; Average $\alpha = .80$, range = .76-.83). Like the stress variable above, this variable was linearly transformed to be on a 6-point scale (1 = *Never*; 6 = *Always*).

Academic stress

Students responded to two items at each measurement occasion that assessed the level of stress they felt when engaging in the following activities: “Doing my homework,” and “Raising my hand in class.” A third stress item was also included at each measurement occasion, “Being late with my homework,” but this item did not load together statistically with the other two and so was dropped from the composite. Students responded using 5-point scales with endpoints labeled 1 (*No stress*) to 5 (*A great deal*). Alpha reliabilities within each of the six measurement occasions averaged to a rather low .59, with a range from .52 to .72. To be consistent with the other variables, this 5-point variable was linearly transformed into a 6-point variable (1 = *No stress*; 6 = *A great deal*).

Social evaluative threat

Students answered the following three questions at each measurement period: “In school, I worry people will think I’m dumb if I do badly,” “In school, I often get nervous and worry when I talk to others,” “In school, I sometimes worry that people will dislike me.” Students responded on separate scales ranging from 1 (*Very much disagree*) to 6 (*Very much agree*; Average $\alpha = .69$, range = .64-.77)



Gender stereotype threat

Gender stereotype threat was assessed with five items that captured threat in science (with two items) and math (with three items) (adapted from Cohen & Garcia, 2005). Sample items include, “In science, I worry people will judge me based on what they think about my gender,” and, “In math, I worry people will judge my gender group based on my behavior or performance.” Students again responded on scales ranging from 1 (*Very much disagree*) to 6 (*Very much agree*); Average $\alpha = .92$, range = .89-.95).

Developing a psychological threat index

One goal of the present study was to develop a way to capture the diversity of threats that a wide range of students may encounter in middle school over time. One potential difficulty is that different types of threats may emerge for different students at different times. For example, a student who is both African American and a girl could experience racial threat or gender stereotype threat and these may be experienced at different times, the same time, or not at all. Any student, regardless of their ethnic or gender group, may also variously experience test anxiety, general doubts about academic ability, uncertainty about whether they are accepted by peers, and other concerns. Although the subjective experience of different threats will differ, from the perspective of self-affirmation theory they all have the potential to challenge one's sense of global self-integrity. If affirmations address threat, regardless of its source, a broad and general measure of threat may be able to approximate average threat levels over time and help shed light on how affirmations affect the link between psychological threat and performance.

Using the survey measures above, we sought to develop and establish the dimensionality and reliability of a comprehensive psychological threat index. To obtain the most reliable representations of each candidate construct, we conceptualized each variable as an average across middle school. For example, students completed up to six measures of academic stress. Step 1 was to calculate the mean stress level at each of the six measurement occasions. Step 2 was to average the six occasions into a single measure to represent stress over middle school. We similarly created average indexes for each of five other constructs (social evaluative threat, gender threat, racial threat, test anxiety, and belonging). We then subjected the constructs to exploratory factor analyses. Results of a principle-components analysis revealed the presence of only one factor with an eigenvalue (3.33) larger than 1.0, which explained 55% of the total item variance. The factor loadings were, in descending order, .78 for social evaluative threat, .78 for gender threat, .75 for stereotype threat, .72 for test anxiety, .70 for academic stress, and .67 for (reverse scored) belonging. Cronbach's alpha for internal consistency of the six-construct measure was high ($\alpha = .92$). Notably, split file analyses indicated the single factor structure and high reliability held across ethnic groups, gender groups, and experimental conditions (see SOM for additional details).

Finally, having established a reliable and unidimensional measure of average middle school threat, we returned to Step 1 and, using all six measures, calculated the mean psychological threat variable at each measurement occasion. Within each of the six measurement occasions, the composite had an acceptable average alpha reliability of .73 (range .65-.80). This repeated measure served as a longitudinal psychological threat index (six measurements over 3 years). Below we use this index to understand how the experience of threat varied over time and the extent to which such variation was related to students' performance level (GPA) as well as their affirmation

condition. For ease of presentation, threat scores were re-scaled to yield a possible range from 0 (no threat) to 100 (maximum threat). The grand mean across all observations revealed average threat levels were relatively low ($M = 28.59$, $SD = 14.24$) and somewhat positively skewed (skewness = .49) with an observed range from 0 to 83.80. We used robust standard errors for all inferential tests.

RESULTS

Analytic approach

All analyses below were conducted using multi-level modeling and restricted maximum likelihood estimation, with repeated observations (e.g., GPA or threat) at Level 1 nested within students at Level 2. Since random assignment took place within-classrooms, the effect of the condition assignment was also analyzed at Level 2. Following recommendations of Raudenbush and Bryk (2002), before examining the effects of the intervention or individual differences on Level 2, we examined how outcomes changed over time using an unconditional model (i.e., with no Level 2 predictors in the model). We assessed if each outcome varied in a linear trend (straight line), a quadratic trend (a line with one bend), or a cubic trend (a line with two bends). This was done by simply adding Level 1 predictors to represent each of the three trend lines. To help give the most accurate model estimates, when non-linearity was found, the non-linear slopes were always retained in the models, even if the non-linearity was not further moderated at Level 2. To make the findings as generalizable as possible, we report the results of maximal random effects structure (i.e., with random effects modeled wherever possible; Barr et al., 2013).

Using Raudenbush and Bryk's (2002) notation, the Level 1 equation is represented as follows

$$Y_{ti} = \pi_{0i} + \pi_{1i}a_{ti} + \pi_{2i}a_{ti}^2 + \pi_{3i}a_{ti}^3 + e_{t1}$$

In this equation, Y represents the observed status on an outcome variable (e.g., GPA) at time t for individual i , π_{0i} represents the intercept for person i at the beginning of the intervention (initial status), π_{1i} represents the rate of change for person i , a represents the point in time at which person i 's outcome is estimated, and e represents random error. The coefficients for the non-linear change were calculated by simply squaring (for quadratic) or cubing (for cubic) the linear change term (a).

After determining the shape of variation over time, we used the variables in Level 2 to explain any variation over time. The base Level 2 equation was as follows:

$$\beta_{p0} + \beta_{p1}(\text{Treatment}_i) + \beta_{p2}(\text{Gender}_i) + \beta_{p3}(\text{Race}_i) + \beta_{p4}(\text{Prior performance}_i) + r_{0i}$$

For example, for $p = 0$ (initial status), the equation holds that students' outcomes are a function of the sample mean at the beginning of the intervention (i.e., the intercept, β_{00}), whether person i was in the affirmation condition (β_{01}), his or her gender (β_{02}), ethnicity/race (β_{03}), and prior performance (β_{04}), and then a term to represent individual error (r_{1i}). This same equation was then applied to estimate variability in Level 1 slopes on the outcome. Doing so allowed us to test our focal research questions, such as whether the linear effect of time (at Level 1) was further moderated at Level 2 (e.g., by affirmation, ethnicity/race, gender, or generalized threat). All control variables and the same analytic approach were employed in Binning et al. (2019).

In keeping with previous affirmation research (e.g., Cohen et al., 2006; Sherman et al., 2013), we expected Black and Latinx students to show particularly strong effects of the affirmation. We tested the effects of ethnic group status (Black and Latinx vs. White and Asian), because members of negatively stereotyped ethnic groups may experience heightened psychological threat (cf., Cohen et al., 2006). Similarly, we tested the effects of gender because we suspected psychological threat over middle school may differ between boys and girls. The possible interactions were tested by simply adding the respective interaction terms to the models (i.e., Ethnicity \times Condition; Gender \times Condition). However, these effects were consistently not significant and thus analyses focused on the more general effects of affirmation collapsing across sub-groups.

Core course GPA

As displayed in Figure 2, affirmation altered the shape of students' performance trajectory through time. We first ran unconditional models to test for linear and non-linear variation over time (see Raudenbush & Bryk, 2002). There was no evidence of cubic change, but a model that included a linear ($B = -.11$, $SE = .02$, $t(162) = -6.71$, $p < .001$) and a quadratic slope ($B = .005$, $SE = .001$, $t(162) = 3.53$, $p < .001$) revealed that both slopes explained significant variation in GPA over time. Our next step was to test whether these slopes on GPA varied as a function of the Level 2 predictors (i.e., prior performance, gender, ethnicity/race, and treatment condition). Notably, tests for Treatment \times Ethnicity and Treatment \times Gender interactions indicated that the treatment effect on the linear and quadratic effects were not moderated by student ethnicity/race or gender, $ps > .11$, $ts < 1.61$.

However, as shown in Table 1, there was a significant Treatment \times Linear interaction, $B = .03$, $SE = .01$, $t(158) = 2.70$, $p = .008$. Specifically, affirmation forestalled a slow but persistent downward trend in performance over time. In the control condition, GPA declined, as evidenced by a significant linear slope, consistent with a negative recursive cycle, $B = -.12$, $SE = .02$, $t(158) = -7.25$, $p < .001$. Between any two quarters, the decline was not large. But the effect of these small incremental drops in performance over 3 years compounded. Between the first and final quarter of middle school, control students' GPA fell by three-quarters of a letter grade (.77 grade points), a decline from a B average ($M = 3.03$) to a C+ average ($M = 2.26$).

The Treatment \times Linear interaction effect indicated that this downward linear trend was significantly weakened in the affirmation condition, $B = -.09$, $SE = .02$, $t(158) = -5.49$, $p < .001$. There, students' GPA fell almost only .43 points over 4 years, which translated into a decline from a B average (2.97) to a B-average (2.55). The affirmation effect over time was even more dramatic at the lower end of the grade distribution. After the first semester of 6th Grade, just 4% of control students and 4% of affirmed students had an average of a D or lower. In the last semester of 8th Grade, by contrast, the percentage of control students averaging D or lower jumped to 13% against 7% in the affirmation condition (cf. Cohen et al., 2006).

On average, across the 12 quarters, affirmed students averted .03 points of decrement in GPA each quarter experienced by students in the control condition. There were no significant predictors of quadratic change over time ($ps > .10$), indicating that grades for the full sample followed a quadratic function but that the shape of this function did not vary significantly between conditions or as a function of any control variables.

The finding that the affirmation altered the trajectory of performance implies that, early on, its effects may have been weak or negligible but with time they grew stronger and significant. Indeed, as presented in Figure 2, a plot of the model-estimated means over time showed that

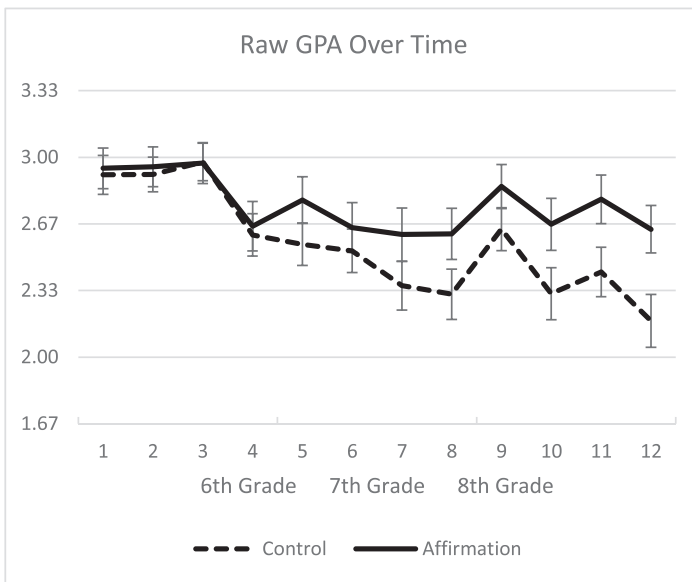
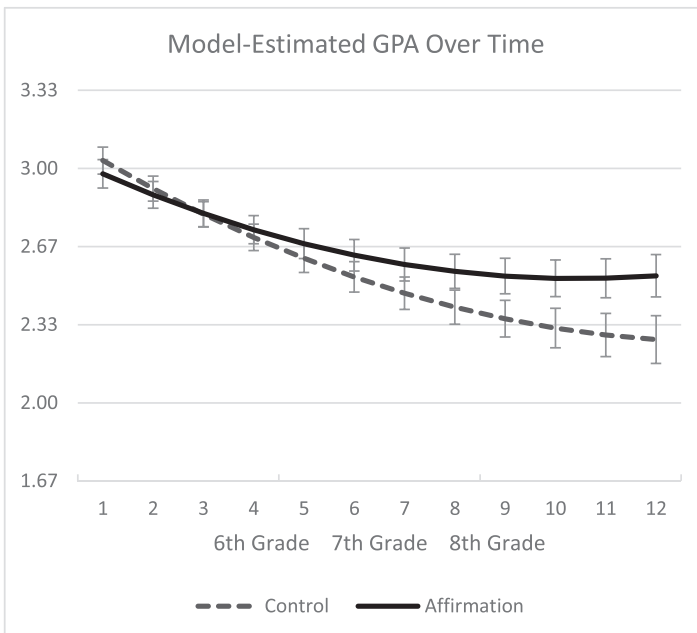


FIGURE 2 Raw (top panel) and model-estimated (bottom panel) GPA in core courses over 12 quarters as a function of condition. Model controls for pre-intervention performance, gender, and ethnicity/race. Error bars represent ± 1 standard errors



affirmation benefits on GPA were not statistically significant during the first 2 years of middle school. However, by the last quarter of 8th Grade, students earned a GPA that was .29 grade points higher in the affirmation condition than in the control condition. More simply, affirmed students had a GPA that was 14% higher (*Estimated M* = 2.55) than the GPA of students in the control condition (*Estimated M* = 2.26).

**TABLE 1** Multi-level modeling output for analyses on core course GPA

	Core GPA
Number of measurements	12
Unconditional Models	
Linear	-.11 (.01)
Quadratic	.005 (.001)
Cubic	-
Final Models	
Outcome: Initial status	
Intercept	3.02 (.06)
Gender	.23 (.09)
Affirmation	-.05 (.08)
Pre-Performance	.69 (.06)
White or Asian	.74 (.08)
Outcome: Linear change	
Intercept	-.12 (.02)
Gender	.02 (.01)
Affirmation	.03 (.01)
Pre-Performance	.01 (.01)
White or Asian	-.01 (.01)
Outcome: Quadratic change	
Intercept	.005 (.002)

Notes. Multi-level model used to estimate GPA over 12 quarters. Coefficients (and standard errors) in bold indicate significance at $p < .05$. Level 2 predictor variables (Gender: Boys = 0, Girls = 1; Ethnicity/Race: Black or Latinx = 0, White or Asian = 1) were grand mean centered except for affirmation condition, which was coded (0 = Control; 1 = Affirmation) for ease of interpretation.

Does affirmation affect the relationship between psychological threat and GPA?

We next examined whether affirmation changed the relationship between threat and performance over time. We re-scored the 12 quarterly GPA measurements into six semesterly GPA measurements by averaging the GPA for the first two quarters and the last two quarters of each school year. This allowed both threat and GPA to be represented with six measurements that roughly corresponded to one another in time. Our research question was whether within-person variability in GPA was associated over time with within-person variability in psychological threat. That is, during semesters in which students experienced relatively high psychological threat, did they also tend to have lower GPAs? As predicted, this was only the case in the control condition.

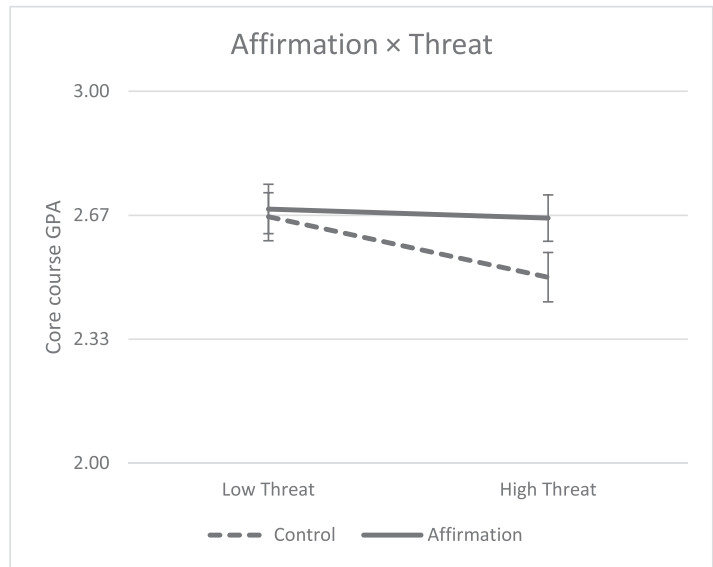
As depicted in Table 2, to address this question, we entered GPA as an outcome variable. We entered psychological threat (individual-mean centered) as a Level 1 predictor. At Level 2 we then entered the condition variable and control variables (gender, ethnicity/race, prior performance). The analysis yielded a significant Treatment \times Threat interaction, $B = .01$, $SE = .003$, $t(158) = 2.70$, $p = .008$. A breakdown of this interaction, depicted in Figure 3, revealed that in the control condition, threat was psychologically “coupled” or tethered to GPA (Cook et al., 2012; Walton &

TABLE 2 Multi-level modeling output for analyses on threat and core course GPA

No. of measurements	Threat 6	Core GPA 6
Unconditional Models		
Linear	.23 (1.23)	-.21 (.05)
Quadratic	-.04 (.60)	.03 (.02)
Cubic	.001 (.08)	-.001 (.003)
Threat	-	-.01 (.0005)
Final Models		
Outcome: Initial status		
Intercept	28.31 (1.46)	2.96 (.06)
Gender	2.85 (2.00)	.15 (.09)
Affirmation	.21 (2.30)	-.02 (.08)
Pre-Performance	-6.30 (1.25)	.67 (.06)
White or Asian	-7.19 (2.02)	.75 (.09)
Outcome: Linear change		
Intercept	-3.65 (1.77)	-.23 (.07)
Gender	2.66 (2.88)	.14 (.10)
Affirmation	8.14 (2.90)	-.02 (.10)
Pre-Performance	.94 (1.93)	-.01 (.08)
White or Asian	3.41 (2.96)	.13 (.10)
Outcome: Quadratic change		
Intercept	2.20 (.86)	.04 (.03)
Gender	-1.72 (1.38)	-.03 (.04)
Affirmation	-4.30 (1.41)	.02 (.05)
Pre-Performance	.70 (1.00)	.03 (.03)
White or Asian	-2.17 (1.45)	-.09 (.04)
Outcome: Cubic change		
Intercept	-.28 (.11)	-.004 (.01)
Gender	.21 (.17)	.002 (.01)
Affirmation	0.55 (.18)	.004 (.01)
Pre-Performance	-.13 (.13)	-.01 (.01)
White or Asian	.29 (.18)	.01 (.01)
Outcome: Psychological threat		
Intercept	-	-.01 (.002)
Gender	-	-.001 (.01)
Affirmation	-	.01 (.003)
Pre-Performance	-	.003 (.01)
White or Asian	-	.003 (.01)

Notes. The table reports output from multi-level models used to estimate threat and the interactive effect of treatment and threat on GPA. Coefficients (and standard errors) in bold indicate significance at $p < .05$. Level 2 predictor variables (Gender: Boys = 0, Girls = 1; Ethnicity/Race: Black or Latinx = 0, White or Asian = 1) were grand mean centered, except for condition, which was dummy coded (0 = Control; 1 = Treatment) and threat, which was individual-mean centered for the analyses on GPA.

FIGURE 3 Model-estimated average semester GPA as a function of threat (± 1 SD, measured within-persons) and affirmation status. Model controls for pre-intervention performance, gender, ethnicity/race, and time. Error bars represent ± 1 standard errors



Cohen, 2007). During semesters of relatively high psychological threat, students tended to have relatively lower GPA, $B = -.01$, $SE = .002$, $t(158) = -4.98$, $p < .001$.

That is, for every one-standard deviation increase in threat there was an approximately .15-point decrease in GPA during that semester. By contrast, in the affirmation condition, threat was untethered from GPA. That is, fluctuations in psychological threat over time were not associated with fluctuations in GPA, $B = -.001$, $SE = .002$, $t(158) = -.91$, $p = .363$, and they did not vary by ethnicity/race or gender. This pattern reflects an untethering effect of affirmation, as in prior work (e.g., Cook et al., 2012; Sherman et al., 2013; Walton & Cohen, 2007), whereby the grades of control but not affirmed students rose and fell with their level of threat over time.

Psychological threat over time

Finally, we ask the question of whether affirmation had a direct effect on students' threat levels or their trajectory of their reported threat over time. To answer this question, we return to the growth curve modeling approach described above to explore the relationship between affirmation and threat over time, using threat as the outcome variable. The six-survey measurements were treated at Level 1 to model change over time, and the condition variable, prior performance, gender, and ethnicity/race were entered at Level 2 to explain this variation over time. As above, we examined Treatment \times Ethnicity and Treatment \times Gender interactions. However, as above, neither of these terms explained significant variation across any time trajectories (linear, quadratic, or cubic) and the interaction terms were dropped from the model. Results revealed a complex pattern of threat over time. The results detailing mean levels of psychological threat over time below should be interpreted as exploratory. Though informative, the particular fluctuations in threat over time were not specified by prior theoretical considerations.

Specifically, analyses revealed distinct patterns of threat over time for affirmation and control students. That is, the condition variable, entered at Level 2, significantly moderated linear change, $B = 8.14$, $SE = 2.90$, $t(158) = 2.81$, $p = .006$, quadratic change, $B = -4.30$, $SE = 1.40$, $t(158) = -3.06$, $p = .003$, and cubic change, $B = .55$, $SE = 0.18$, $t(157) = 3.10$, $p = .003$.

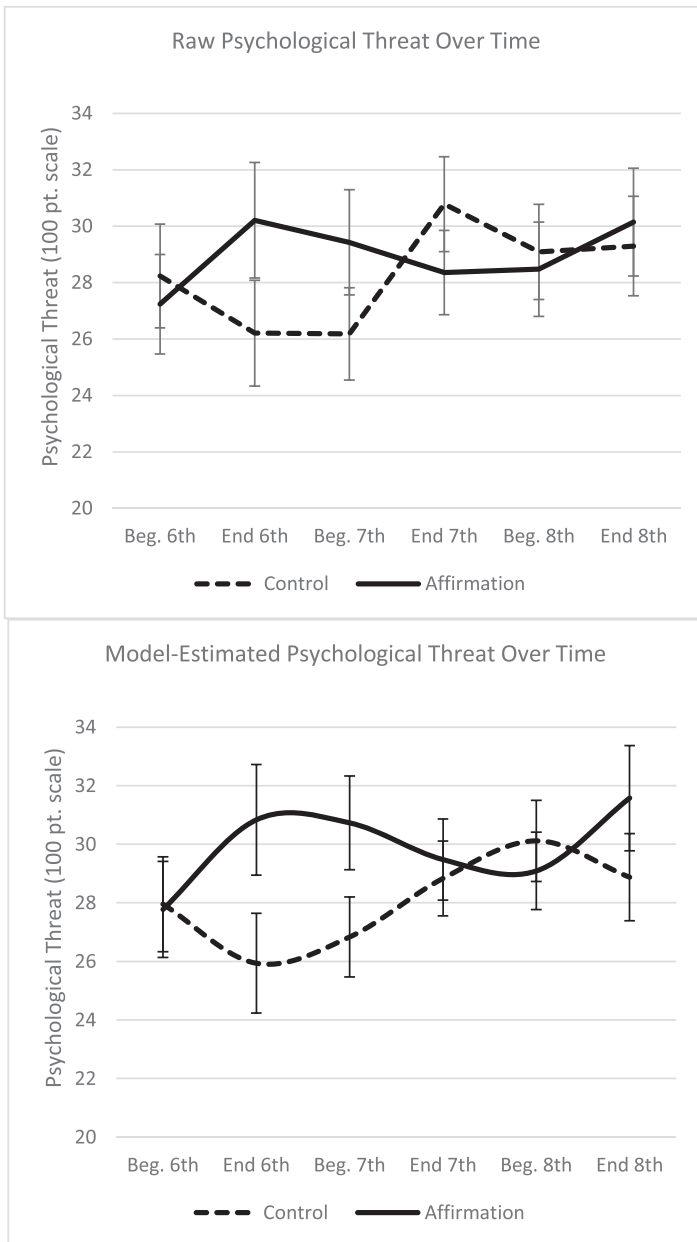


FIGURE 4 Raw (top panel) and model-estimated (bottom panel) psychological threat over time as a function of condition. Model controls for pre-intervention performance, gender, and ethnicity/race. Error bars represent ± 1 standard errors

Model output is presented in Table 2 and a plot of the model-estimated means is displayed in Figure 4. A breakdown of the simple slopes within affirmation and control conditions revealed that the affirmation inverted the trends that occurred in the control condition. In the control condition, there was a significant pattern of linear change ($B = -3.65$, $SE = 1.77$, $t(158) = -2.07$, $p = .040$), quadratic change ($B = 2.19$, $SE = .86$, $t(158) = 2.57$, $p = .012$), and cubic change ($B = -.28$, $SE = .11$, $t(158) = -2.62$, $p = .010$). In the affirmation condition, each of these effects trended in the opposite direction (linear: $B = 4.49$, $SE = 2.30$, $t(158) = 1.95$, $p = .053$; quadratic: $B = -2.10$, $SE = 1.12$, $t(158) = -2.14$, $p = .062$; cubic: $B = .27$, $SE = .14$, $t(158) = 1.88$, $p = .062$).



More detailed analyses of the opposing trends over time revealed two noteworthy patterns. First, although control and affirmed students started 6th Grade with essentially identical threat levels, threat in the control condition declined during 6th Grade ($t[158] = -2.26, p = .024$) while threat in the affirmation condition increased ($t[158] = 2.13, p = .033$). These diverging trends resulted in significantly higher threat levels in the affirmation compared with the control condition at the end of 6th Grade ($t[158] = 2.82, p = .003$). Second, after 6th Grade the trends reversed. Control students showed increasing threat levels during the period between the end of 6th Grade the beginning of 8th Grade ($t[158] = 2.68, p = .004$). Among affirmed students, by contrast, threat levels remained stable or slightly declined over the same period ($t[158] = -1.02, p = .155$). In summary, it seems that affirmation accelerated the emergence of the psychological threat. Instead of rising in 7th Grade, as it did among control students, it rose in the 6th.

The results of these analyses are informative in multiple ways. They suggest that although there were no behavioral effects of affirmation in 6th Grade, the affirmation did affect students psychologically. Surprisingly, affirmed students reported experiencing *more* threat in 6th Grade than did control students. But after 6th Grade, control students then experienced an escalation of threat, paralleling the accelerating downward trend in GPA that they displayed during the same time. At the same point when affirmation began to improve grades over time, control students began to experience increasing threat.

The pattern of increasing benefits over time observed in the GPA data in the affirmation condition was thus not paralleled in the pattern of psychological threat over time. In light of previous research (e.g., Cook et al., 2012; Sherman et al., 2013), we reasoned that what may matter is not the overall level of threat but its implications for performance. The effect of the affirmation may not be to reduce threat so much as to alter its effect, making it less likely to interfere with adaptive functioning (Cohen & Sherman, 2014).

GENERAL DISCUSSION

A longitudinal field experiment illustrated how self-affirmation writing exercises can bolster students' academic outcomes during middle school. First, this study demonstrated that repeated self-affirmation manipulations delivered throughout students' middle school careers can have a gradual benefit on grades over time. The affirmation forestalled the 3-year decline in grades seen among students in the control condition. Unlike previous research, the benefits of this affirmation intervention were dispersed widely across various social groups rather than confined to students who may contend with negative academic stereotypes. By being given to students repeatedly, beginning at the start of their transition to middle school, the affirmations had the opportunity to address the manifold threats that arise throughout this potentially difficult developmental period (Eccles et al., 1993).

This study also demonstrated how affirmation operated psychologically over time. Namely, both affirmed and control students experienced varying levels of threat during middle school. But evidence from multi-level model examining within-person associations between threat and performance showed that the implications of threat seemed to differ by condition. That is, it was not the total *amount* of threat that set affirmed and control participants apart. Rather, they differed in how the threat experience correlated with performance. Among control students, threat and performance were negatively tethered: when threat was high, grades were relatively low. In the affirmation condition, by contrast, grades and performance were *untethered*: There was no association between the level of threat students reported and their grades during the proximate

semester. These findings are consistent with prior research (e.g., Cook et al., 2012) and provide additional clarity about how affirmation effects may emerge over time, regardless of students' demographic background.

As Lewin (1947) suggested, an intervention can have durable effects when it changes not an outcome but the process that produces that outcome. What process did affirmation change? The analyses of psychological threat over time point to a partial answer: affirmation appeared to weaken the degree to which threat and performance mutually influenced one another, interrupting the recursive link between them. It seems that threat no longer triggered poorer performance, and poorer performance no longer triggered threat, as evidenced by the nil correlation between them. As a result, the escalating threat that students experienced over time did not impair their performance (like Student 2 in Figure 1). Meanwhile, for non-affirmed students, this psychological threat slowly eroded performance, a little bit with each passing semester (like Student 3 in Figure 1). The absence of a within-person correlation between threat and performance in the affirmation condition is consistent with the notion that affirmation weakened the *process* through which psychological threat worsened performance over time. Below we further unpack these findings and consider the implications and limitations of the present research.

Understanding threat and performance over time

Affirmation shifted students' academic trajectories such that, (1) grades were bolstered, and (2) threat did not correlate with grades. Affirmation did not reduce threat, in fact, it seemed to initially increase students' self-reported threat. But it did reduce the association between threat and performance over time. Such a pattern is consistent with the idea that the affirmations affected how students perceived, understood, and managed threats in their environment. Rather than a bad grade making students question their belonging, they may have seen it from a broadened self-perspective (Brady et al., 2016; Sherman et al., 2013). With the threat looming less large, it may have consumed fewer self-resources and become untethered from their academic performance.

As noted, affirmed students surprisingly reported higher threat in sixth grade than did control students. Although such a result has not been seen in educational contexts, the willingness to acknowledge and be open to threat in the environment echoes research outside the education context. For example, large meta-analyses have found that affirmation has small but reliable effects on increasing openness to threatening health information (e.g., an anti-smoking message for people who smoke) and improved health behavior (Epton et al., 2015; Ferrer & Cohen, 2019). In the political domain, affirmed participants were more willing to acknowledge wrong-doing from their ingroup (Čehajić-Clancy et al., 2011), and in another study, affirmed participants reported higher levels of general openness in the days before an election (Binning et al., 2010) compared to control participants. In other words, there is precedent for the finding that affirmation can make people more open or able to acknowledge threatening information in their environment. At the same time, in other studies in the education domain, affirmed students did report lower threat (Cook et al., 2012) or showed no difference in threat (Sherman et al., 2013) compared to control participants. As such, evidence to date suggests that while affirmation can reduce threat, such a reduction may not be necessary for long-term benefits of affirmation to emerge. Rather, affirmation may weaken or sever the link between threat and performance over time. This topic warrants further study.

Although we did not assess precisely when the multiple, varied threats of middle school came online for different students, the present research design—with the early, frequent, varied



affirmations over multiple years—helped ensure that affirmations would be delivered when threats did come online. Meta-analyses of affirmation effects in the health literature indicate the timing of affirmation with the emergence of threat is a key factor in shaping whether affirmations are effective (Ferrer & Cohen, 2019). Our results showed that threats to self-integrity ebbed and flowed over time. The patterns seen in Figure 4 suggest that affirmation may have shifted *when* students perceived threat, a potentially interesting question for future research. However, more importantly, over time threat levels between affirmed and control students did not differ. Affirmed and control students cumulatively perceived a similar average amount of threat over the course of middle school. Again, we argue affirmation may change *how* threat is perceived over time, rather than *how much* threat is perceived over time (see Griffin & Harris, 2011, for a similar argument).

Lack of moderation by ethnicity/race

Contrary to expectations and several prior studies, the effects of affirmation were not concentrated among students subject to negative academic stereotypes, African Americans and Latinx students. Although benefitting more students is a positive outcome on a practical level, the lack of heightened benefits among these groups raises theoretical and practical questions. Critically, self-affirmation theory asserts that affirmation will be moderated, not by an objective or demographic variable, but by a *psychological state*, namely, a felt threat to self-integrity. The degree to which different people experience this threat may vary by group, context, and time (Steele, 2011). While we cannot definitively address why affirmation had broader benefits in this study than in previous studies, we suspect that the early implementation and the longer-range delivery of affirmation may have helped counter the multiple, time-varying threats of middle school that most students encounter. The benefits of affirmation may hinge, like virtually all social-psychological interventions, on their being given at the right time, in the right place, and to the people who need it (Cohen et al., 2018). By blanketing the intervention as we did, we may have increased the chances that those affirmations were timed to coincide with more threats for more students than in prior research. Recent proof-of-concept evidence has shown that affirmations may be delivered in a timely fashion via mobile technology, which could serve as an effective means to deliver affirmations when and to whom they are needed (Manke et al., 2021).

Understanding psychological threat in middle school: What is a self-affirmed learner?

Across all affirmation work, the present work included, affirmations are theorized to mitigate the effects of psychological threat. Whereas previous research has examined threat as a between-group phenomenon, in the present work we show it is also a within-person phenomenon with multiple sources and causes. Such stressors include the transition to middle school (Alspaugh, 1998; Wigfield et al., 1991), and they include factors not examined in the present research, including the emotional challenges faced by students' teachers (Arens & Morin, 2016), the specter of standardized testing (Segool et al., 2013), the stress of peer relations (Cohen & Prinstein, 2006), the social threats that occur from the intensive use of social media (Nesi et al., 2018; Woods & Scott, 2016), harsh parenting (Woolley & Bowen, 2007), and more. Threat also varies across subject domains, school culture, and geography (see Easterbrook & Hadden, 2021). Although threat

may be a necessary ingredient for affirmation effects to emerge, it is also heterogeneous in its form throughout social life.

The present research provides a clearer picture of a self-affirmed learner (Brady et al., 2016). Affirmed individuals act not without threat but *despite* it. Indeed, they reported more threat in the first year of our study. But the affirmation seemed to instill resiliency, as affirmed students staved off some of the negative outcomes of threat that materialized for control students over time. The present research shows that there is hidden potential in students, potential that can be suppressed by psychological threat in students' social environment (Walton & Spencer, 2009). With their self-integrity secured, affirmed learners more effectively manage threat, weakening its impact over time. As such, understanding how to foster affirmed learners is a worthy research and policy priority for educators everywhere (Easterbrook et al., 2021).

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of the article.

How to cite this article: Binning KR, *et al.* Securing self-integrity over time: Self-affirmation disrupts a negative cycle between psychological threat and academic performance. *Journal of Social Issues*. 2021;1–23. <https://doi.org/10.1111/josi.12461>