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Satisfied Yet Striving:

Gratitude Fosters Life Satisfaction and Improvement Motivation in Youth

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Abstract

Could 10 minutes of gratitude per week have the potential to change the trajectories of young students' lives? With over one thousand 9th and 10th grade students, we tested whether a simple 4-week classroom-based gratitude intervention would prompt increases in well-being and motivate students to become better people and attain better grades. Over the course of 1 month, students were assigned to spend 10 minutes each week writing gratitude letters to their parents, teachers, coaches, or friends and completing additional gratitude-related reflection activities or to try to become more organized each week by listing their daily activities and reflecting on the obstacles and benefits (control). Importantly, relative to controls, students in the gratitude conditions reported greater life satisfaction and motivation to improve themselves and maintained these levels throughout the semester. This sustained self-improvement motivation and life satisfaction were partially mediated by increases in feelings of connectedness, elevation, and indebtedness. Interestingly, negative affect partially mediated the effect of gratitude on life satisfaction, but not on improvement motivation. No group differences emerged in academic performance over time. This study provides evidence that expressing gratitude and reflecting on their benefactors' actions may help keep high school students motivated and satisfied with their lives over the course of a semester.

The importance of gratitude has been widely recognized for centuries, emerging as a core theme in most major religions. Most recently, with the ubiquity of social media, expressions of gratitude have become increasingly popular in digital contexts, as users share photos and stories with the hashtags “gratitude,” “grateful,” and/or “blessed,” suggesting that gratitude continues to be highly valued and sought after in society.

Gratitude confers a variety of well-being benefits to those who experience it. One recent meta-analysis of 38 studies found that participants assigned to gratitude interventions experienced greater happiness ($d = 0.25$), positive affect ($d = 0.18$), and life satisfaction ($d = 0.17$) than those assigned to neutral control conditions (Dickens, 2017). Another meta-analysis of 18 studies concluded that gratitude interventions outperformed both measurement-only ($d = .20$) and alternative-activity ($d = .17$) control conditions on measures of psychological well-being (e.g., subjective happiness, life satisfaction; Davis et al., 2015).

Broaden-and-build theory (Fredrickson, 2004) suggests that gratitude broadens the scope of individuals’ thoughts and behaviors, enabling them to build personal, psychological, intellectual, and social resources. In line with this theory, dispositional gratitude is associated with greater overall well-being (McCullough, Emmons, & Tsang, 2002) and increased perceived social support (Wood, Maltby, Gillett, Linley, & Joseph, 2008), as well as lower levels of stress (Wood, Maltby, et al., 2008). Importantly, longitudinal studies show that experimentally induced gratitude fosters increases in feelings of life satisfaction over time (Boehm, Lyubomirsky, & Sheldon, 2011). However, these patterns have been found with adults, with little empirical research examining whether gratitude interventions may similarly impact life satisfaction among younger individuals (for exceptions, see Froh et al., 2014; Froh, Sefick, & Emmons, 2008; Owens & Patterson, 2013).

Theory and research indicate that gratitude may also prompt individuals to feel inspired to better themselves, although little experimental work has directly tested this question. Emerging evidence suggests that gratitude interventions may enable engagement in the kinds of self-improvement behaviors necessary to achieve long-term self-improvement goals, while reducing engagement in more proximally rewarding behaviors that may undermine long-term improvement. For example, experimentally-induced gratitude reduces economic impatience (DeSteno, Li, Dickens, & Lerner, 2014). In addition, preliminary evidence suggests that gratitude prompts individuals to strive toward—and to make progress in—goals across multiple domains (Emmons & Mishra, 2011).

Gratitude interventions have the potential to be particularly beneficial in adolescent populations. Among youth samples, gratitude is associated with greater academic interest, better academic performance, and engagement in more extracurricular activities (Ma, Kibler, & Sly, 2013). Gratitude is also linked with reduced risky health behaviors in youth, such as decreased substance use and unsafe sexual behaviors, possibly because it counteracts the effects of materialism and extrinsic values (Froh, Emmons, Card, Bono, & Wilson, 2011; Ma et al., 2013). Given that gratitude reduces economic impatience in adults, it may similarly support delayed gratification in favor of higher rewards in other domains, such as prosociality, health, and academics (DeSteno et al., 2014). Accordingly, gratitude interventions in adolescents may facilitate engagement in self-improvement behaviors geared toward long-term self-improvement goals, as opposed to behaviors with more immediate rewards. Finally, a recent set of studies with Filipino high school and university students found associations between gratitude and motivation, as well as with self-reported and teacher-reported engagement (King & Datu, 2018).

Notably, a longitudinal investigation showed that gratitude growth over a 4-year time frame predicted increases in life satisfaction, prosocial behavior, and intentional self-regulation (i.e., setting goals and working toward them) in youth (Bono et al., 2017). These correlational findings provide evidence that grateful youth not only enjoy greater life satisfaction, but that they also aspire to higher-level goals and are more likely to engage in the behaviors that foster self-improvement.

Although experimental work examining gratitude interventions in adolescents is limited, it supports the notion that gratitude interventions may lead to downstream benefits in this age group. Specifically, in a classroom-based intervention, children as young as eight showed increases in positive affect after performing brief, weekly grateful thinking exercises for 5 weeks, and these increases lasted up to 5 months after the start of the intervention (Froh et al., 2014). However, much of the extant experimental research has focused on elementary or middle school children, to the neglect of older adolescents, such as those in high school. Thus, further research is needed to clarify whether gratitude interventions serve to increase life satisfaction in this age group, to examine the potential motivating power of gratitude interventions, and to explore the durability of these effects.

Adolescence is a vital developmental period for establishing positive trajectories that continue into adulthood. First, educational research suggests that, in general, students decline in motivation and school investment across the adolescent period—a downtrend that may be driven by declines in social self-concept (i.e., lower perceived acceptance by peers and teachers) during the earlier teen years (Hascher, van der Veen, & Roede, 2005). In addition, nationally representative, longitudinal studies have suggested that psychological well-being during adolescence predicts positive outcomes up to a decade later, including better self-reported health,

less engagement in risky health behaviors (e.g., binge drinking), greater educational attainment, better career outcomes, and more civic engagement (e.g., volunteering; Hoyt, Chase-Lansdale, McDade, & Adam 2012; O'Connor, Sanson, Toumbourou, Norrish, & Olsson, 2017). Thus, adolescence may be an optimal time to intervene with students' motivation across domains, and interventions that strengthen social connection with peers and teachers may be particularly potent.

We suggest five key mechanisms by which gratitude can spur one to want to be a better person and lead to greater well-being (Armenta, Fritz, & Lyubomirsky, 2017). First, the feelings of closeness and social connection engendered by gratitude (Boehm et al., 2011; Layous, Sweeny, et al., 2017; Wood, Maltby, et al., 2008) may motivate self-improvement desires and improve well-being by increasing people's intentions to prove themselves worthy of the relationship with their benefactors, by feeling encouraged by role models, and by feeling supported by close others in their efforts to change. Second, expressing gratitude leads individuals to experience elevation (Layous, Sweeny, et al., 2017), an emotion characterized by feeling moved and inspired to emulate moral acts done by others, and by a desire to help others and be a better person. Third, gratitude evokes feelings of humility (Kruse, Chancellor, Ruberton, & Lyubomirsky, 2014), defined by an accurate assessment of one's own strengths and weaknesses, as well as openness to critical feedback and room for self-improvement. Fourth, expressing gratitude engenders feelings of indebtedness, with individuals feeling obligated to repay their benefactor (Layous, Sweeny, et al., 2017). Lastly, gratitude may offset the effects of specific situationally-induced negative emotions (Falkenstern, Schiffrin, Nelson, Ford, & Keyser, 2009) that serve as obstacles to self-improvement endeavors and life satisfaction, including anxiety, frustration, and doubt.

Gratitude bears the potential to help individuals feel more satisfied with their lives in general while still inspiring and motivating them to want to be better. The notion that gratitude can simultaneously make people feel satisfied with their lives and want to improve themselves may seem counterintuitive. However, a wealth of research suggests that well-being, defined in large part by a strong sense of life satisfaction, may boost effort, motivation, and success across a number of outcomes. Specifically, relative to their less happy peers, happy individuals are more productive at work, persevere longer on tasks, and set higher goals for themselves (Lyubomirsky, King, & Diener, 2005; Walsh, Boehm, & Lyubomirsky, 2018). These findings suggest that happy individuals (i.e., those who feel more satisfied with their lives and who experience more frequent positive emotions) are not merely complacent with their current situation. Rather, happy people are driven toward higher-level aspirations, and they seek out new goals and muster effort toward attaining these desires.

In sum, we suggest that gratitude may engender life satisfaction, while also serving as a catalyst for individuals to want to better themselves. Gratitude may stimulate individuals to feel supported by close others, inspired to want to be better, humbled to acknowledge that a change may be necessary, and obligated to make that change, while neutralizing some of the negative affect that stands in the way of that change.

The present study was designed with three main aims. First, we sought to extend the literature by experimentally testing whether gratitude increases life satisfaction among a large sample of older adolescents (i.e., over one thousand high schoolers). Second, we aimed to explore the hypothesis that gratitude can also serve as a catalyst for youth to want to better themselves across life domains that are relevant and important across the lifespan—namely kindness, health, and academics. To this end, 9th and 10th grade students engaged in weekly

gratitude exercises delivered in the classroom over the course of 4 weeks. We expected that expressing gratitude to someone who had helped them with their health, with academics, or by providing a general kindness would lead teens to report greater life satisfaction and to report putting forth more effort into improving themselves in those domains.

Third, and finally, we also investigated the mechanisms by which expressing gratitude and reflecting on one’s experience led to greater improvement motivation. In light of prior work (Layous, Sweeny, et al., 2017), we expected that gratitude would lead students to experience more feelings of connectedness, elevation, humility, and indebtedness, and less general negative affect (e.g., less anxiety that may serve as an obstacle to improvement). We predicted that these variables would, in turn, partially mediate the relationships between gratitude, improvement motivation, and life satisfaction.

As an objective measure of the impact of expressing and reflecting on gratitude, we also explored whether students would attain better grades throughout the study.

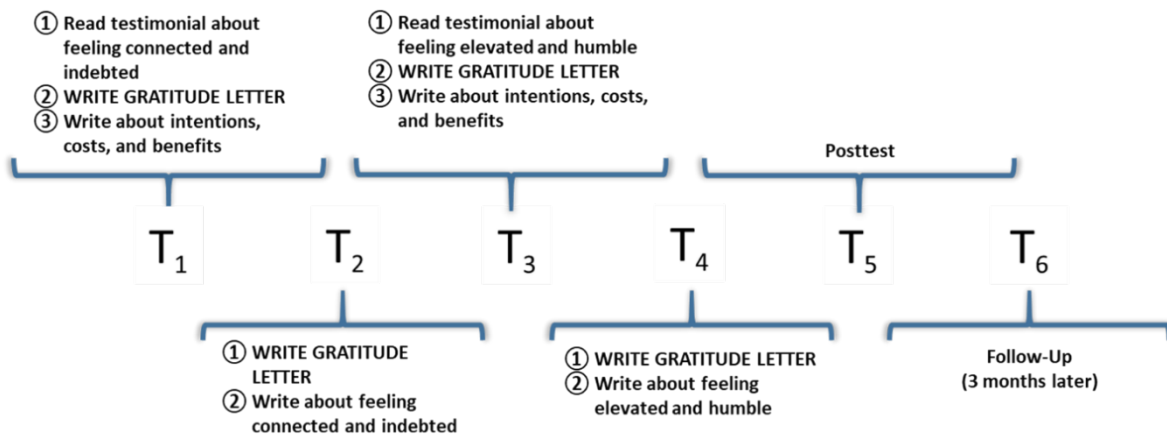


Figure 1. Tasks assigned to participants in the gratitude conditions during each week of the 4-week classroom intervention (baseline [T₁], intervention [T₁-T₄], and posttest [T₅], as well as the 3-month follow up [T₆]).

We investigated changes in life satisfaction, improvement motivation, and grades over time using multilevel growth curve modeling to account for repeated measures nested within individuals and students nested within school. We tested linear growth in life satisfaction, grades, and improvement motivation from baseline to posttest (T_1 – T_5 ; see Figure 1 for study design) and from baseline to follow-up (T_1 – T_6). We report results comparing the three gratitude conditions combined to the control condition. Except where noted, we obtained similar results comparing the effect of each gratitude condition separately to the control condition for improvement motivation, grades, and life satisfaction. For each model, effect size d represents the magnitude of differences in linear rates of change for those who expressed gratitude compared to those who listed their daily activities (Feingold, 2009).

In addition, we tested whether our five hypothesized mediators explained changes in improvement motivation and life satisfaction using Hayes' (2018) recommended approach with 95% confidence intervals and 5000 bootstrapped samples.

Method

Participants

Ninth and tenth grade students ($N = 1,017$) from four high schools in the United States ($n = 3$ schools in the Los Angeles metropolitan area; $n = 1$ in the New York City metropolitan area; $n = 2$ public schools; $n = 2$ independent schools) participated in this study. The difficulty of recruiting participants and collecting data in applied settings originally led us to aim for a sample size of 200 students total ($n = 50$ per cell). However, additional funding and exceptionally high interest from students, teachers, and school administrators ultimately allowed us to recruit over 1000 students. Participants ($M_{\text{age}} = 15.11$ years; range = 13 - 18 years) were mostly White (40.9%), Hispanic (18.4%), and Asian (14.6%), with less than 1% describing themselves as

Black, Hawaiian, or Native American. Approximately 15% of students identified as “more than one” or “other” ethnicity. Students received \$3 in exchange for their participation. This study was conducted as part of a larger project funded by the Character Lab, examining the impact of expressing gratitude on multiple outcomes beyond the scope of our present research questions, including interpersonal self-control, grit, and teacher ratings of task persistence (Armenta, 2017). All data, measures, materials, and analyses can be found at:

https://osf.io/mqgh9/?view_only=97a224203b64468fbc82171579d9cb19.

Procedure

Students provided assent, with parental consent, to participate in a 4-week online study, with a 3-month online follow-up, of the relationship between positive activities, positive experiences, and emotion in teenagers (see Figure 1 for an illustration of the study timeline). Each of the 4 assessment points was introduced to students by teachers, and completed in the classroom setting (e.g., via tablets, individual laptops, or in computer labs). All students began their participation during the first or second week of the second semester of the school year.

Writing Activities

Upon providing consent at T₁, students were randomly assigned to spend 5 minutes each week for 4 weeks writing a letter of gratitude either to someone who helped them with their health (e.g., to a parent for encouraging the student to eat more healthfully), to someone who helped them with their academics (e.g., to a teacher who helped the student prepare for a test), or to someone who did something kind for them (e.g., to a friend for giving the student a ride), or to list their daily activities (control condition). Importantly, randomization was at the student level. Therefore, each classroom and school included a mix of students participating in each condition.

Students were instructed not to discuss their assignments with their peers, and teachers were not aware of any students' assigned condition.

In order to bolster the gratitude activity, particularly in adolescents who may be resistant or find the exercise trivial or uncomfortable, we additionally prompted the students to alternate each week between 1) reading testimonials about expressing gratitude from a hypothetical same-aged peer, 2) writing about the intentions and costs of their benefactors' actions, and the benefits the participants received, or 3) writing about how expressing gratitude made them feel connected, indebted, elevated, or humbled. These additional gratitude-related writing activities were designed to supplement and enhance the gratitude manipulation by providing students with the opportunity to reflect more about the people who have helped them and the impact these actions had on them, as well as to consider and process the emotions they may have felt while expressing gratitude (see Froh et al., 2014, for theory and evidence supporting this approach).

First, at T_1 and T_3 , prior to writing the gratitude letter or listing daily activities, students read hypothetical testimonials from same-aged peers about how writing gratitude letters lead them to feel humbled, connected, elevated, or indebted (gratitude conditions), or about the benefits of striving to be more organized (control condition). Next, students were asked to write about the intentions and costs of their benefactors' actions (T_1 and T_3) or about how expressing gratitude made them feel connected and indebted (T_2) or elevated and humbled (T_4). Students in the control condition read testimonials about the benefits of striving to be more organized and wrote about how listing daily activities can help them become more organized (T_2 and T_4), or about the benefits of and obstacles to becoming more organized (T_3). Refer to Figure 1 for a depiction of the timeline of administration for these additional activities. Following these additional writing activities, students received self-improvement instructions.

Self-Improvement Instructions

All participants received instructions to spend additional time each week working to improve themselves in their assigned domains at T₁ through T₄ (see Supplementary Materials for full instructions). Participants were instructed to spend 30 minutes each week intentionally engaged in efforts to do something kind and generous for another person (in the kindness condition), to improve their health (in the health condition), to improve their school performance (in the academics condition), or to become more organized (in the neutral control condition). Lastly, each week from T₂ to T₅, students were instructed to write a brief narrative explanation of how they had worked to improve themselves (i.e., check-ins).

Materials

Student assent and demographic information. Students provided assent and general demographic information at T₁.

Outcomes. The following measures were assessed at T₁, T₅, and T₆.¹

Life satisfaction. Students completed the Brief Multidimensional Students' Life Satisfaction Scale (BMSLSS; Seligson, Huebner, & Valois, 2003) at T₁, T₃, T₅, and at the follow-up 3 months later. The BMSLSS is designed to assess youths' satisfaction in multiple domains, including family, friendships, school, and life in general, on a 7-point scale from "terrible" to "delighted."

Improvement motivation. Students responded to 4 items assessing the extent to which they felt motivated, competent, and confident in their ability to improve themselves in kindness,

¹ In addition, teachers were asked to rate their participating students on motivation, effort, gratitude, happiness, grit, and prosociality. However, in an effort to convince teachers and schools to participate in this study, teachers learned about the potential impact a positive activity intervention could have on their students, thus biasing the data collected from them. Given this issue, we chose to omit these measures from the current manuscript. Data and analyses can be found at: https://osf.io/mqgh9/?view_only=97a224203b64468fbc82171579d9cb19.

health, academics, or in general (depending on their experimental condition), as well as how much they believed that simple activities could help them improve themselves in these respective areas, on a 7-point scale (1 = *not at all*, 7 = *very much*).

Grade point average (GPA). Students self-reported their current semester grades in English, History, Math, and Science at T₁, T₅, and at the 3-month follow up.

Mediators. The following measures were assessed at all time points.

Connectedness. To assess state feelings of connectedness, participants completed a modified version of the connectedness subscale from the Balanced Measure of Psychological Needs (BMPN; Sheldon & Hilpert, 2012), which includes three positively scored statements (e.g., “I felt close and connected with other people who are important to me”) and three reverse-scored statements (e.g., “I felt lonely”; 1 = *no agreement*, 5 = *much agreement*).

Elevation. Participants responded to eight items assessing the extent to which they felt positive, uplifting emotions while completing their assigned writing activity as a measure of elevation (Haidt, 2003; e.g., “Moved”; 1 = *don't feel at all*, 7 = *feel very strongly*).

Humility. Humility was assessed using the 6-item Brief State Humility Scale (Kruse, Chancellor, & Lyubomirsky, 2017) in which participants indicated their agreement to statements indicating humility, such as “I feel that I have both many strengths and faults” on a 7-point scale (1 = *strongly disagree*, 7 = *strongly agree*).

Indebtedness. Participants were asked to rate the extent to which they felt indebted using a 7-point scale (“Indebted [feeling like you need to repay another for their actions that benefitted you];” 1 = *not at all*, 7 = *extremely*).²

² A definition of indebtedness was included because in previous studies some students expressed confusion about its meaning.

General negative affect. Negative affect was assessed using a 5-item subscale of the Affect-Adjective Scale (Diener & Emmons, 1985), in which participants indicated the extent to which they felt negative emotions (e.g., worried/anxious) in that moment on a 7-point scale (1 = *not at all*, 7 = *extremely*).

Results

As a manipulation check, we first conducted a planned contrast comparing the three gratitude conditions to the control condition. Immediately after completing the writing activities at T₁, participants in the gratitude conditions reported feeling relatively more grateful $t(962) = 2.80, p < .01, r = 0.09$. See Table 1 for bivariate correlations among variables throughout the study.

Multilevel Modeling

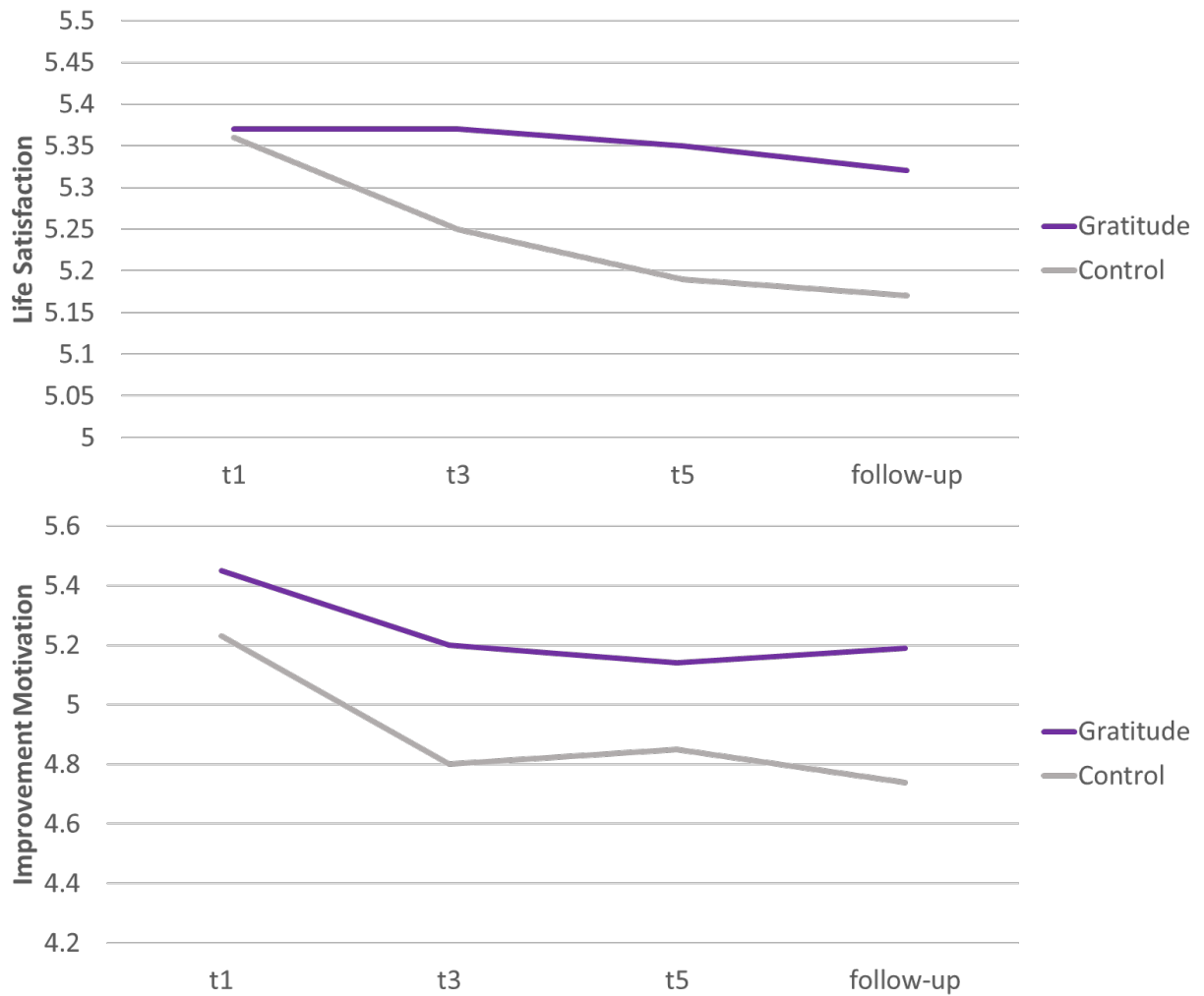
All participants declined on average in life satisfaction and improvement motivation over time (life satisfaction: $\gamma_{10} = -0.10, p = .02$; improvement motivation: $\gamma_{10} = -0.11, p < .001$). However, students in the gratitude conditions reported relatively greater life satisfaction and improvement motivation both from baseline to posttest (life satisfaction: $\gamma_{11} = 0.08, p = .02, d = 0.33$; improvement motivation: $\gamma_{11} = 0.05, p = .03, d = 0.29^{3, 4}$), as well as from baseline to

³ Students who expressed gratitude to someone who did something kind for them did not experience significant increases in improvement motivation from T₁ to T₅ ($\gamma = 0.03, p = .24$) or T₁ to T₆ ($\gamma = 0.04, p = .16$). Students who expressed gratitude to someone who helped them with their academics reported marginally greater improvement motivation from T₁ to T₅ ($\gamma = 0.05, p = .07$), but students in this condition did not report significantly different improvement motivation from T₁ to T₆ ($\gamma = 0.04, p = .10$).

⁴ The effect size d was calculated with the following formula $\gamma_{11} / SD_{\text{change}}$ (Feingold, 2009). This effect size represents the magnitude of differences in linear rates of change for those who expressed gratitude compared to those who listed their daily activities.

follow-up (life satisfaction: $\gamma_{11} = 0.06, p = .01, d = 0.35$; improvement motivation: $\gamma_{11} = 0.05, p = .02, d = .29$)⁵. Furthermore, adding condition significantly improved the models ($p < .05$). See Table 2 for parameter estimates and model fit indices.

There were no significant changes in GPA over time ($\gamma_{10} = -0.005, p = .82$), and students who expressed gratitude did not report significantly different GPAs over the course of the study than those who listed daily activities ($\gamma_{11} = 0.003, p = .88, d = .02$).



⁵ Students who expressed gratitude to someone who helped them with their health did not experience significant changes in life satisfaction from T₁ to T₅ ($\gamma = 0.06, p = .11$), but those in this gratitude condition reported feeling marginally greater life satisfaction from T₁ to T₆ ($\gamma = 0.05, p = .08$).

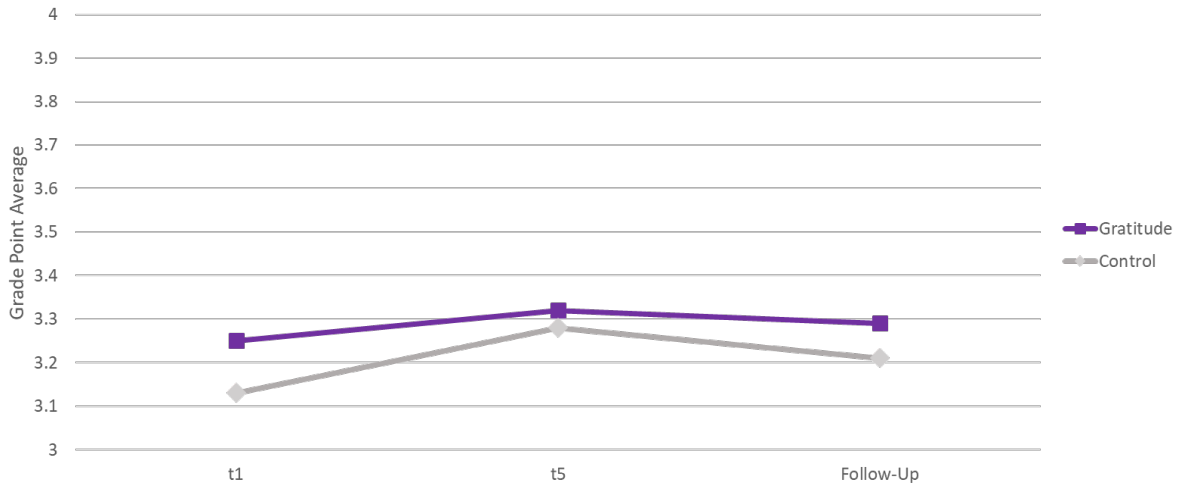


Figure 2. Life satisfaction (top), self-improvement motivation (middle), and grade point average (bottom) over time, by condition.

Mediation Analyses

As planned, we then explored why expressing gratitude led to relatively greater improvement motivation (IM) and life satisfaction (LS) over time.

Elevation. Expressing gratitude predicted greater elevation throughout the study⁶ (IM: a path; $b = 0.71, p < .001$; LS: $b = 0.78, p < .001$; see Figure 3) and elevation predicted greater motivation and life satisfaction at the post-test (IM: b path; $b = 0.28, p < .001$; LS: $b = 0.23, p < .001$). The indirect effect of elevation extended to the follow-up, as expressing gratitude again predicted greater average elevation (IM: a path; $b = 0.78, p < .001$; LS: $b = 0.85, p < .001$), and this increased elevation then predicted greater motivation and life satisfaction at the follow-up (IM: b path; $b = 0.26, p < .001$; LS: $b = 0.18, p < .001$). Furthermore, the percentile bootstrap confidence intervals supported our hypotheses that students who expressed gratitude reported greater elevation throughout the study, which was then associated with greater improvement

⁶ The scores for elevation, connectedness, indebtedness, and negative affect from T₁ to T₄ were averaged to test whether increases in these variables throughout the study mediated the relationship between gratitude and improvement motivation. We obtained similar results when testing T₁ elevation, connectedness, indebtedness, and negative affect as mediators.

motivation and life satisfaction at both the posttest (IM: estimate = .20, 95% CI [0.13, 0.27]; LS: estimate = .18, 95% CI [0.12, 0.24]) and follow-up IM: estimate = .20, 95% CI [0.12, 0.29]; LS: estimate = .15, 95% CI [0.09; 0.22]).

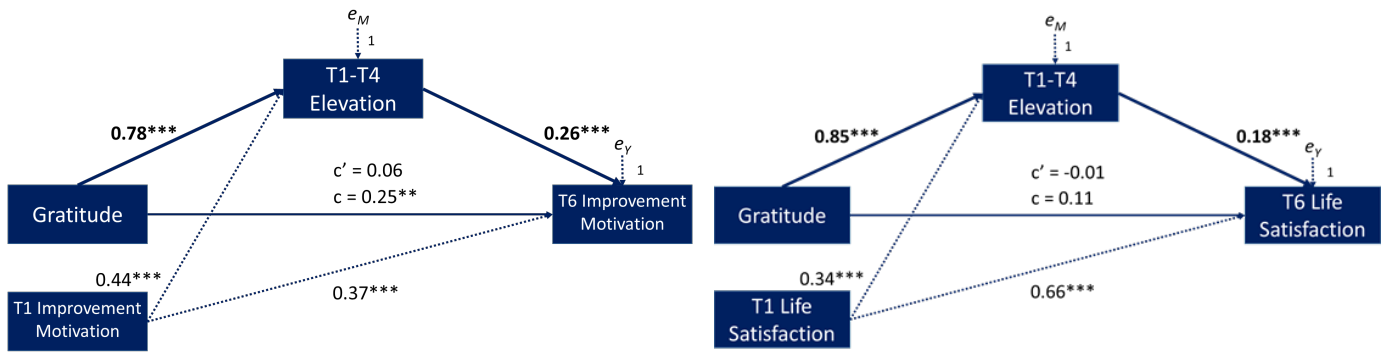


Figure 3. Effect of expressing gratitude on improvement motivation (left) and life satisfaction (right) at the follow-up via increased elevation, controlling for baseline improvement motivation and life satisfaction. All continuous variables were standardized. † $p \leq .10$. * $p \leq .05$. ** $p \leq .01$. *** $p \leq .001$.

Connectedness. Expressing gratitude led participants to feel closer and more connected to others throughout the study (IM: a path; $b = 0.43, p < .001$; LS: a path; $b = 0.49, p < .001$), and this increased connectedness predicted greater motivation at the posttest (IM: b path; $b = 0.24, p < .001$; LS: b path; $b = 0.34, p < .001$), controlling for baseline motivation and life satisfaction, respectively. This effect persisted to the follow-up, such that expressing gratitude predicted greater average connectedness (IM: a path; $b = 0.48, p < .001$; LS: a path; $b = 0.46, p < .001$), and this increased connectedness predicted greater motivation at the follow-up (IM: b path; $b = 0.16, p = .001$; LS: b path; $b = 0.23, p = .001$), controlling for baseline motivation and life satisfaction. Importantly, the percentile confidence intervals supported the indirect effect of gratitude on both T₅ improvement motivation (estimate = .10, 95% CI [0.06, 0.15]) and life

satisfaction (estimate = .17, 95% CI [0.11, 0.23]), as well as T₆ improvement motivation (estimate = .08, 95% CI [0.04, 0.13]) and life satisfaction (estimate = .11, 95% CI [0.06, 0.16]), via increased connectedness. See Figure 4 below.

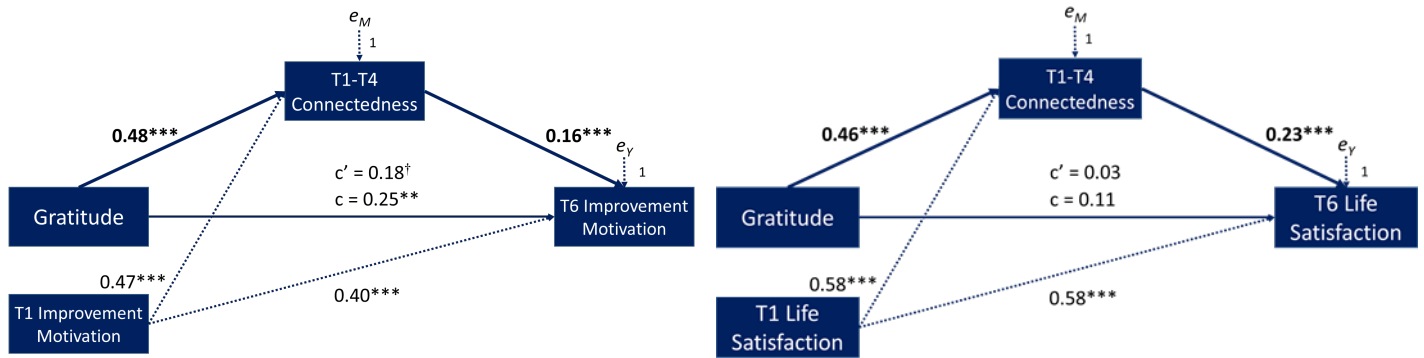


Figure 4. Effect of expressing gratitude on improvement motivation (left) and life satisfaction (right) at the follow-up via increased connectedness, controlling for baseline improvement motivation and life satisfaction. All continuous variables were standardized. † $p \leq .10$. * $p \leq .05$. ** $p \leq .01$. *** $p \leq .001$.

Humility. We predicted that expressing gratitude would lead to greater feelings of humility, which would then be associated with greater improvement motivation and life satisfaction. However, participants in our three gratitude groups did not report greater feelings of humility. We proceeded to test the indirect effect of expressing gratitude on improvement motivation and life satisfaction via increased humility based on Hayes (2018) recommendation. However, we did not find evidence to suggest that humility mediated the effect of gratitude on either of our proposed outcomes at the posttest (IM: estimate = .004, 95% CI [-.01, .02]; LS:

estimate = .01, 95% CI [-.01, .02]) or follow-up (IM: estimate = .001, 95% CI [-.01, .02]; LS: estimate = .01, 95% CI [-.01, .04]). See Figure 5 below.

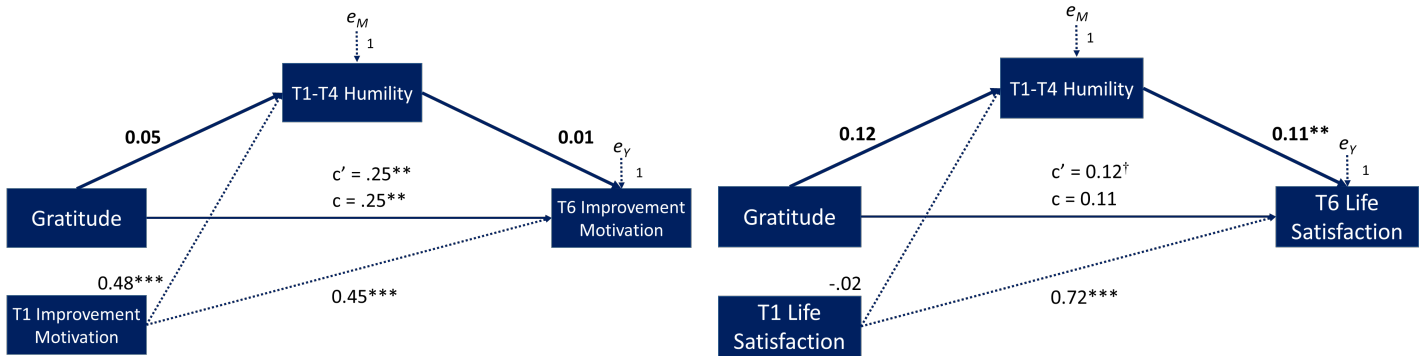


Figure 5. Effect of expressing gratitude on improvement motivation (left) and life satisfaction (right) at the follow-up via increased humility, controlling for baseline improvement motivation and life satisfaction. All continuous variables were standardized. † $p \leq .10$. * $p \leq .05$. ** $p \leq .01$. *** $p \leq .001$.

Indebtedness. Expressing gratitude predicted greater average indebtedness (IM: a path; $b = 0.68, p < .001$; LS: a path; $b = 0.72, p < .001$), and indebtedness predicted greater motivation and life satisfaction at the posttest (IM: b path; $b = 0.14, p = .0001$; LS: b path; $b = 0.11, p = .0001$). Importantly, this effect extended to the follow-up, such that expressing gratitude led to greater indebtedness throughout the study (IM: a path; $b = 0.85, p < .001$; LS: a path; $b = 0.88, p < .001$), and average indebtedness predicted greater motivation and life satisfaction at T₆ (IM: b path; $b = 0.13, p = .002$; LS: b path; $b = 0.11, p = .001$; see Figure 6). The percentile bootstrap confidence intervals supported our prediction, such that students who wrote letters of gratitude felt more obligated to their benefactors, which was then associated with greater motivation and life satisfaction at both the posttest (IM: estimate = .09, 95% CI [0.05, 0.15]; LS: estimate = .08,

95% CI [0.04, 0.12]) and the follow-up (IM: estimate = .11, 95% CI [0.04, 0.18]; LS: estimate = .09, 95% CI [0.04, 0.16]).

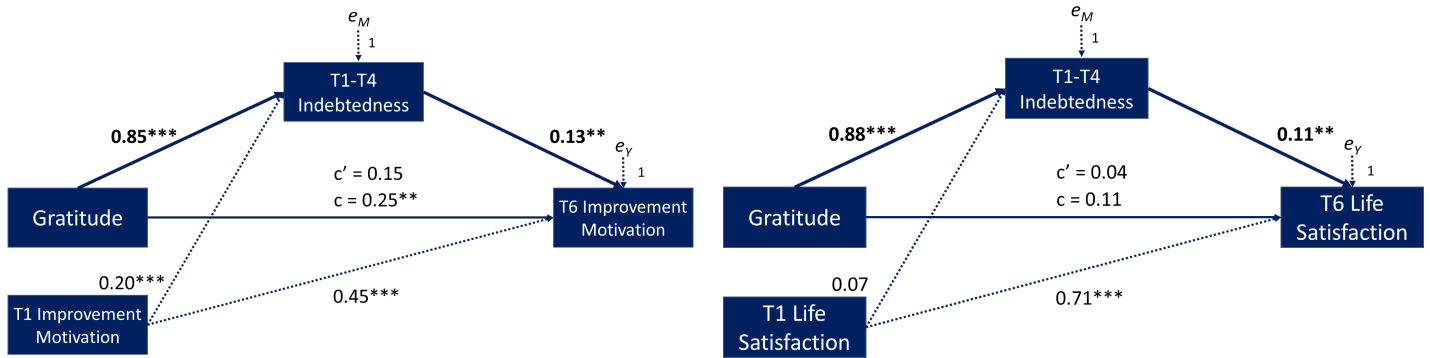


Figure 6. Effect of expressing gratitude on improvement motivation (left) and life satisfaction (right) at the follow-up via increased indebtedness, controlling for baseline improvement motivation and life satisfaction. All continuous variables were standardized. † $p \leq .10$. * $p \leq .05$. ** $p \leq .01$. *** $p \leq .001$.

Negative Affect. Next, we tested the indirect effect of negative affect on the relationship between gratitude and motivation and life satisfaction. However, the percentile confidence intervals largely did not support our prediction for either improvement motivation or negative affect. Although reduced negative affect throughout the study predicted greater improvement motivation at the posttest and follow-up, expressing gratitude only marginally reduced negative affect (a path; $b = 0.14$, $p = .10$). As such, reduced negative affect did not significantly explain the relationship between gratitude and improvement motivation at T₅ (estimate = .02, 95% CI [-0.003, 0.04]) or T₆ (estimate = .02, 95% CI [-0.001, 0.05])⁷. Interestingly, expressing gratitude led to greater negative affect (a path; $b = 0.18$, $p = .01$), and negative affect predicted greater life

⁷ Expressing gratitude to someone who helped one with their academics or to someone who did something kind for them did not lead to greater improvement motivation at T₅ or T₆ via decreased negative affect. However, the combined gratitude conditions did reach statistical significance for the model, including the follow-up.

satisfaction at the posttest (b path; $b = 0.23, p < .0001$). However, this effect did not persist to the follow-up. Although negative affect predicted greater life satisfaction at the follow-up (b path; $b = 0.17, p < .0001$), expressing gratitude only marginally predicted negative affect (a path; $b = 0.16, p = .051$). The percentile confidence intervals supported our prediction for life satisfaction at T₅ (estimate = .04, 95% CI [0.01, 0.08]), but not T₆ (estimate = .03, 95% CI [-0.001, 0.07]).

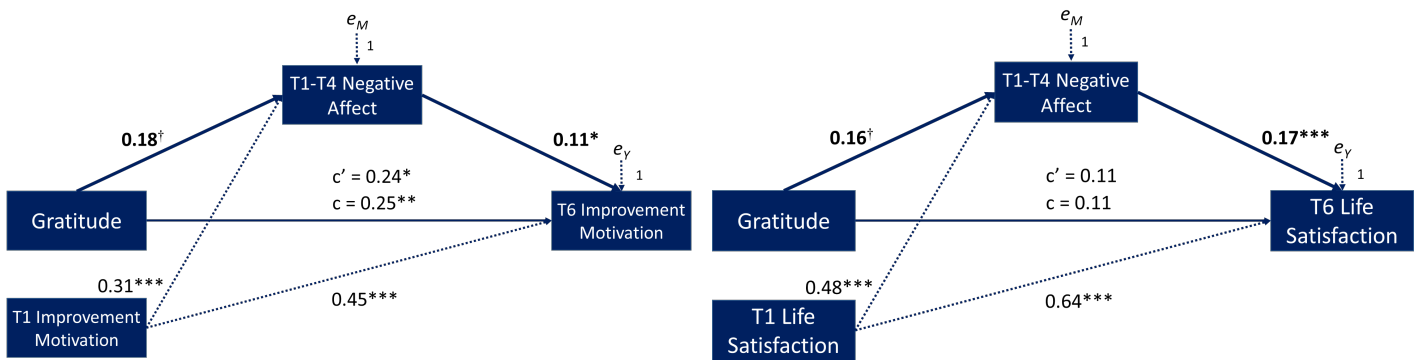


Figure 7. Effect of expressing gratitude on improvement motivation (left) and life satisfaction (right) at the follow-up via decreased negative affect, controlling for baseline improvement motivation and life satisfaction. All continuous variables were standardized. † $p \leq .10$. * $p \leq .05$. ** $p \leq .01$. *** $p \leq .001$.

In sum, the results of our study provide evidence that expressing gratitude can motivate adolescents to improve themselves in various domains, while offsetting the natural declines in life satisfaction that may occur over time. Furthermore, we demonstrate the feasibility of incorporating a classroom-based gratitude intervention into students' school days. Our study provides a conservative test of the motivating role of gratitude in self-improvement. Because all participants focused on improving themselves in some way, we were able to isolate the impact of expressing gratitude on improvement motivation and life satisfaction.

Table 1. Bivariate Correlations Among Variables Throughout the Study

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
Time 1																											
1. State gratitude	--																										
2. Connectedness	.60	--																									
3. Elevation	.51	.54	--																								
4. Indebtedness	.19	.21	.54	--																							
5. Negative Affect	.45	.55	.24	-.02	--																						
6. Humility	.14	.13	.09	.10	.07	--																					
7. Life Satisfaction	.56	.54	.32	.02	.54	-.02	--																				
8. Improvement Motivation	.49	.40	.44	.17	.24	.06	.39	--																			
9. Grade Point Average	.13	.08	.05	.01	.11	-.01	.18	.06	--																		
Time 3																											
10. State gratitude	.65	.49	.40	.14	.38	.16	.46	.43	.09	--																	
11. Connectedness	.46	.58	.45	.19	.38	.12	.42	.38	.11	.61	--																
12. Elevation	.40	.43	.67	.33	.18	.08	.25	.38	.06	.50	.58	--															
13. Indebtedness	.18	.18	.39	.46	-.01	.06	.03	.14	.01	.22	.23	.53	--														
14. Negative Affect	.30	.37	.19	.06	.59	.12	.38	.23	.12	.47	.53	.26	.00	--													
15. Humility	.17	.11	.16	.17	.07	.60	.03	.08	.05	.24	.18	.10	.08	.16	--												
16. Life Satisfaction	.55	.56	.37	.06	.49	.03	.77	.44	.18	.60	.54	.37	.09	.48	.04	--											
17. Improvement Motivation	.40	.38	.41	.16	.26	.04	.35	.62	.08	.48	.49	.53	.21	.35	.14	.46	--										
18. Grade Point Average	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Time 5																											
19. State gratitude	.59	.49	.40	.17	.38	.20	.43	.41	.06	.74	.53	.38	.18	.41	.28	.52	.41	--	--								
20. Connectedness	.40	.52	.38	.14	.39	.11	.39	.38	.06	.47	.64	.43	.16	.41	.16	.50	.40	--	.59	--							
21. Elevation	.38	.41	.59	.28	.22	.08	.30	.35	.08	.37	.47	.71	.38	.18	.12	.36	.44	--	.41	.57	--						
22. Indebtedness	.17	.21	.38	.39	.05	.05	.12	.16	.06	.13	.18	.41	.52	-.01	.08	.11	.22	--	.14	.24	.60	--					
23. Negative Affect	.24	.32	.13	-.02	.55	.09	.33	.23	.08	.35	.40	.15	0.06	.64	.14	.43	.26	--	.46	.55	.20	-.06	--				
24. Humility	.17	.18	.16	.15	.11	.55	.06	.12	.001	.22	.20	.10	.10	.21	.72	.08	.13	--	.34	.20	.12	.06	.20	--			
25. Life Satisfaction	.53	.53	.40	.12	.47	.06	.70	.47	.12	.53	.52	.36	.10	.45	.12	.79	.44	--	.59	.57	.44	.15	.47	.14	--		
26. Improvement Motivation	.37	.37	.36	.16	.22	.07	.29	.56	.02	.42	.40	.46	.18	.25	.14	.39	.66	--	.47	.47	.51	.24	.26	.16	.49	--	
27. Grade Point Average	.14	.15	.09	.03	.16	-.01	.18	.15	.85	.09	.09	.05	-.01	.12	.002	.20	.02	--	.10	.11	.07	.05	.09	.03	.16	.05	--

Time 6

28. State gratitude	.58	.47	.37	.17	.36	.17	.46	.40	.14	.62	.49	.37	.22	.37	.25	.46	.41	--	.66	.52	.39	.19	.34	.29	.55	.43	.11
29. Connectedness	.43	.51	.40	.10	.39	.06	.45	.36	.10	.44	.54	.43	.20	.34	.14	.47	.38	--	.48	.62	.50	.16	.38	.22	.52	.38	.11
30. Elevation	.34	.34	.54	.27	.17	.06	.27	.29	-.00	.29	.36	.62	.40	.14	.04	.31	.36	--	.30	.41	.66	.41	.10	.11	.30	.38	.05
31. Indebtedness	.13	.15	.35	.36	-.03	.06	.06	.14	-.07	.08	.09	.33	.43	-.02	.00	.05	.14	--	.08	.16	.36	.49	-.09	.05	.07	.16	-.01
32. Negative Affect	.21	.31	.11	.004	.50	.10	.32	.25	.09	.32	.34	.16	.04	.50	.10	.36	.27	--	.29	.39	.20	-.01	.52	.14	.36	.24	.10
33. Humility	.14	.13	.08	.10	.05	.52	-.03	.06	.02	.21	.17	.09	.12	.10	.60	.02	.15	--	.27	.12	.11	.09	.06	.65	.10	.18	-.02
34. Life Satisfaction	.51	.48	.37	.11	.44	.03	.71	.43	.18	.53	.49	.37	.17	.43	.12	.74	.42	--	.52	.50	.38	.09	.41	.16	.77	.42	.18
35. Improvement Motivation	.35	.32	.37	.15	.23	-.00	.32	.48	-.02	.38	.36	.44	.27	.22	.05	.39	.58	--	.38	.38	.40	.23	.25	.09	.46	.64	.03
36. Grade Point Average	.20	.17	.11	.06	.15	0.03	.18	.12	.77	.13	.16	.12	.07	.10	.06	.21	.11	--	.14	.11	.11	.03	.10	.02	.19	.09	.80

Note: Correlations (Pearson r s) are all based on at least 442 participants. Correlations .07 and above are significant at $p \leq .05$. Correlations .09 and above are significant at $p \leq .01$.

Table 2. Model Parameters (Standard Errors) and Goodness of Fit for Linear Change for Improvement Motivation and Life Satisfaction from Baseline to Follow-Up (T_6).

	Effect	Parameter	Improvement Motivation		Life Satisfaction		GPA	
			Model 1: Unconditional Growth	Model 2: Gratitude vs Control	Model 1: Unconditional Growth	Model 2: Gratitude vs Control	Model 1: Unconditional Growth	Model 2: Gratitude vs Control
Fixed Effects	Intercept	γ_0	5.34*** (.08)	5.21*** (.11)	5.36*** (.03)	5.34*** (.06)	3.19*** (.06)	3.10*** (.07)
	Time	γ_1	-0.07* (.01)	-0.11*** (.02)	-0.03 (.01)	-0.08** (.02)	-0.001 (.01)	-0.005 (.02)
	Gratitude Conditions	γ_{01}		0.18 [†] (.09)		0.02 (.07)		0.12* (.05)
	Time * Gratitude	γ_{11}		0.05* (.02)		0.06** (.02)		0.003 (.02)
Random Effects	Level 1	σ_e^2	0.55	0.55	0.22	0.22	0.07	0.07
	Level 2	σ^2	0.95	0.95	0.70	0.70	0.38	0.38
	Level 2	σ^2	0.03	0.03	0.03	0.03	0.03	0.03
	Level 3	σ^2	0.02	0.02	0.001	0.00	0.01	0.01
	Level 3	σ^2	0.00	0.00	0.00	0.00	0.00	0.00
Goodness of Fit	Deviance		13144	13124	7050.50	7042.80	3255.90	3249.10
	Akaike Information Criterion		13162	13146	7068.50	7064.80	3273.90	3271.10
	Bayesian Information Criterion		13220	13217	7123.10	7131.40	3325.50	3334.20
	$\Delta\chi^2$			19.61 ***		7.67*		6.74*
	Δdf					2		2

Note. In Model 1, the intercept parameter estimate (γ_0) represents the average level of improvement motivation, life satisfaction, or GPA at baseline across the sample. In Model 2, the intercept parameter estimate represents the average level of improvement motivation, life satisfaction, or GPA for those in the control condition.

[†] $p \leq .10$. * $p \leq .05$. ** $p \leq .01$. *** $p \leq .001$.

Discussion

Overall, students felt less motivated and satisfied with their lives on average over the course of the study. This is unsurprising in light of prior work suggesting that students tend to lose motivation and decline in life satisfaction over the course of the academic year (see Bono et al., 2017; Otis, Grouzet, & Pelletier, 2005). These declines may have negative effects on students' academic success and career trajectories. Notably, however, the high school students prompted to write weekly gratitude letters and to reflect on the meaning and impact of their benefactors' actions reported relatively greater motivation and life satisfaction over the course of the study than those who listed their daily activities and reflected on the benefits and obstacles of trying to become more organized. Therefore, gratitude buffered the declines in improvement motivation and life satisfaction over the course of the semester. For example, it is possible that youth who expressed gratitude subsequently felt more connected to the important people in their lives, or felt moved, uplifted, or inspired to make a change. These effects, in turn, may have protected against the natural declines in improvement motivation across time observed in student populations.

Notably, our gratitude manipulation did not lead to better academic performance over time. One possible reason for this null finding is that expressing and reflecting on gratitude may not actually have downstream effects on high school students' grades. However, students were asked to self-report their grades in English, History, Math, and Science, possibly providing a skewed view of their grades over time. In addition, the intervention period (1 month) and follow-up period (3 months) may have been too short to observe an impact on students' grades. Future research could explore more comprehensive and school-reported grades over a longer time frame, as well as other objective and intervention-sensitive indicators of academic work.

Importantly, we further found support for our hypotheses regarding the mediating effects of elevation, connectedness, and indebtedness on self-improvement motivation and life satisfaction. Students who expressed gratitude and reflected on their benefactors' actions felt relatively more elevated, connected, and indebted than did students who kept track of their daily activities, and these states, in turn, led students to feel more satisfied with their lives, as well as more motivated to better themselves. Thus, writing letters of gratitude and taking the time to reflect on and process one's grateful feelings may have spurred students to feel inspired to work toward their goals, supported by their loved ones in their efforts, and just indebted enough to previous benefactors to compel making a change. Investing the time to work on and make progress towards one's goals while feeling supported and inspired may have led students to feel more satisfied with their lives. Contrary to our hypothesis, however, writing letters of gratitude did not foster feelings of humility in our study. It is possible that our gratitude intervention was not strong enough to generate themes of humility among teenagers, particularly given that this developmental period is generally characterized by a focus on the self. Finally, although reduced negative affect did not significantly explain the relationship between expressing gratitude and improvement motivation, it predicted greater improvement motivation at both the posttest and follow-up. This finding suggests that negative affect, such as worry and frustration, may be an obstacle to feeling motivated.

Our study provided evidence for the motivating role of gratitude across a diverse sample of participants. However, several limitations that should be addressed in future research are described below.

First, we aimed to create an efficacious classroom intervention. To this end, in addition to prompting students to write gratitude letters, we added instructions to read weekly testimonials

from presumed former students, as well as to reflect on their own experiences with their benefactors. Importantly, these additional writing activities may have had an effect on our proposed mediators and dependent variables. As such, writing letters of gratitude may not be solely responsible for our findings. Instead, the effect of gratitude on improvement motivation and life satisfaction may hinge on students' deep introspection and reflection on the consequences and benefits of gratitude. Importantly, these additional activities – adapted from previous interventions – focused on the thoughts and feelings associated with the gratitude experience, including elevation, connectedness, indebtedness, and humility. For example, reading peer testimonials about how others felt while writing gratitude letters may have boosted feelings of elevation when considering the moral actions of peers' benefactors. In addition, these testimonials may have triggered a desire in our participants to react similarly to their own gratitude expressions. As such, our mediation findings may, at least in part, be due to demand characteristics or social conformity. Future investigators may wish to compare testimonials, gratitude letters, and the additional writing reflection activities to further isolate the effects of expressing versus reflecting on gratitude on motivation and life satisfaction.

Fortunately, our study included an active control condition, which served to maximize the use of valuable classroom time and to foster comparable positive treatment expectancies among conditions. Accordingly, students in the control condition were informed that writing about and reflecting on their daily activities would confer benefits to them (i.e., help them become more organized). Furthermore, striving toward goals in general may improve well-being (Brunstein et al., 1998; Emmons, 1986; Wiese, 2007). Thus, students may have experienced a number of well-being benefits as a result of our control activities. Our study, therefore, provided a very conservative test of our hypotheses, rendering it difficult to detect differences among the

experimental and control conditions as a result. However, future studies could include a waitlist control or a neutral weekly task to further explicate which, if any, of our effects were due to gratitude as opposed to nonspecific/general intervention effects (e.g., positive treatment expectancies) shared across all conditions.

Although students were instructed not to discuss or share their weekly assignments or writing activities with teachers, peers, or benefactors, it is possible that a bleed-over effect emerged between conditions. Students may have mentioned their assignments to peers or teachers, or decided to thank their benefactors in person for the help they received. Furthermore, students in other conditions (including controls) may have witnessed these interactions and become more helpful or affiliative (see Algoe et al., 2019). In addition, the knowledge that some students may have been assigned to express gratitude and to work on self-improvement may have led teachers to notice and reward helpful behaviors or discuss self-improvement strategies. Together, these bleed-over effects could have made it more difficult to detect differences between the gratitude conditions and control, thus providing an even more conservative test of the effect of gratitude on our hypothesized outcomes.

Despite the intensive nature of our intervention, the effect sizes ranged from small to medium in size. Importantly, these effect sizes are comparable to those found in other gratitude and positive activity interventions (Davis et al., 2015; Dickens, 2017; Sin & Lyubomirsky, 2009), as well as school-based anxiety and depression prevention programs (for a meta-analysis, see Werner-Seidler, Perry, Calear, Newby, & Christensen, 2017). Despite their small size in absolute terms, these effect sizes may bear significant benefits for the lives of youth, as relatively small effects may aggregate across a student's academic career and beyond (Funder & Ozer, 2019) and produce upward spirals. Ninth and tenth grade students who feel even marginally

more motivated to improve themselves in academics, health, or kindness may demonstrate subtle but meaningful improvements in grades, health behaviors, or relationships, which could, in turn, shift them towards better long-term outcomes. For example, a ninth-grade student may feel inspired to pay more attention in class today, which may earn her a placement in a more advanced class next year, and ultimately shift her toward a better college and brighter future (cf. Cohen, Garcia, & Goyer, 2017).

In addition, the magnitude of the present effect sizes is not surprising, considering the diversity of the students in this study. Participants hailed from markedly different types of schools (e.g., wealthy West coast private versus working-class Catholic), cultural backgrounds (e.g., primarily white versus primarily Latinx), and socioeconomic statuses (e.g., students from low income versus very high income backgrounds). Additionally, our intervention entailed a relatively low dosage of gratitude (i.e., 10 minutes per week for just 4 weeks), and longer interventions may elicit stronger effects on such relatively difficult to shift outcomes as life satisfaction and motivation. Future investigators may wish to explore the effects of expressing gratitude with different age groups and cultures. Our participants were transitioning or newly transitioned into high school, which may be an opportune time to intervene with students (see Cohen et al., 2017). Additional work could explore the impact of gratitude on other transitional periods, including the transition to college, to a new job, or even to parenting. Additionally, our findings warrant replication with adolescents from a wider geographical range in the U.S. and other countries. For example, participants from Asian cultures have been found to experience significantly smaller (or no) gains in well-being from expressing gratitude than participants from the U.S. (Boehm et al., 2011; Layous, Lee, Choi, & Lyubomirsky, 2013), suggesting that members of collectivist cultures may not similarly benefit from gratitude interventions (but see

King & Datu, 2018). As such, future researchers should continue to explore how, when, and for whom gratitude may be most beneficial.

Another potentially fruitful future direction is to analyze the high school students' gratitude letters to advance our understanding of what expressing gratitude looks like in adolescence. Letters could be coded for whom the participant wrote the letter to or about, the magnitude of the kind act, and the type of help the participant received, as these factors may moderate the impact of gratitude.

Gratitude may have the power to change young students' lives. This study provides evidence that expressing and reflecting on gratitude may buffer the typical and unfortunate decline in motivation and life satisfaction throughout a school semester. Our findings suggest that routine expressions and reflections of gratitude may ultimately lead high schoolers to do better in school and thus become well-adjusted, productive members of society. Due to its relative ease of implementation, gratitude interventions can be used in schools to potentially foster greater academic achievement (e.g., King & Datu, 2018), better relationships (e.g., reduced bullying; see Layous et al., 2012), and improved health (e.g., healthier eating behavior; see Fritz, Armenta, Walsh, & Lyubomirsky, 2019) in students.

At an age when adolescents begin to withdraw from their families and are struggling to establish their identities, expressing gratitude may have important impacts on their overall well-being and motivation to do better. Furthermore, the states and emotions elicited by gratitude—feeling more uplifted, more connected to others, and more indebted to benefactors—may have the power to encourage and inspire teens to do more than follow through on the types of self-improvement activities encouraged in this study. Students may seek social support and help from others and gain in confidence and self-esteem over the course of their academic careers, thus

ultimately aiming for better colleges and professions. In sum, gratitude may play an important role in motivating students, thus allowing them to become more successful in all aspects of their lives.

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