Social Psychology of Education (2024) 27:493–521
https://doi.org/10.1007/s11218-023-09850-7

Growth mindset and social comparison effects in a peer virtual learning environment

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Received: 26 April 2023 / Accepted: 14 September 2023 / Published online: 6 October 2023

Abstract

Peers become especially influential in adolescence, a developmental period marked by a nadir in school motivation. In the classroom, adolescents often engage in social comparison with their peers to ascertain their own academic competence, which can have substantial effects on their motivation and learning. The present experimental study examined how peer mindset and social comparison processes may interact to affect adolescents' learning outcomes and responses to social comparison. Participants ($N = 120$, $M_{age} = 12.73$ years, 58% female) created avatars to virtually represent themselves and heard growth mindset or neutral statements from purported peer avatars. They then completed a series of online, self-report surveys measuring their learning outcomes, completed problem-solving tasks, and received feedback on their and their peers' performance via a virtual leaderboard. Multivariate between-group comparison revealed growth mindset peers increased adolescents' learning outcomes, while social comparison dampened outcomes. No interactions between peer growth mindset and social comparison were found.

Keywords Growth mindset · Social comparison · Adolescence · Peer relationships · Motivation · Learning

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1 Introduction

Peers have a substantial influence on one another in adolescence (Berndt, 1979; Brown et al., 2008; De Goede et al., 2009). Academically, adolescence is a critical time during which individuals make choices about their future career paths and prepare for the transition from secondary school to college, a process that is greatly influenced by their peer affiliations (Yazedjian et al., 2007). Among other beliefs and attitudes related to education, peers may affect adolescents' implicit beliefs in the malleability of intelligence, or *growth mindsets*, which directly influence their academic motivation and learning outcomes (King, 2020; Yeager et al., 2019). Peer influence is driven by numerous factors, including selection and socialization, but also by social comparison, as students look to their peers as reference points to gauge their own academic competence and potential (Dijkstra et al., 2008). These social comparison processes greatly influence students' academic self-perceptions, including their perceptions of competence, and their academic achievement. As such, social comparison and its resulting consequences may interact with students' implicit beliefs about intelligence to shape their academic trajectories. Although much of the growth mindset literature has examined adolescents in educational settings and there is growing attention on the role of peers, the simultaneous consideration of peer growth mindset and social comparison influences has yet to be studied.

1.1 Mindset and achievement outcomes

Mindset theory posits that children's underlying beliefs about the origin of intelligence impact their academic achievement and motivation. According to Dweck (2000), individuals fall along a continuum of *fixed* to *growth* mindsets. On one end of the spectrum is the fixed mindset, the belief that intelligence is an innate entity that is stable and unchangeable. On the other end of the spectrum is the growth mindset, the belief that intelligence can be improved through practice and effort. Mindset theory arose from achievement goal theory, which is concerned with children's underlying objectives for achievement behaviors and how differing goals affect learning motivation (Dweck & Leggett, 1998; Elliot & Harackiewicz, 1996). Children who endorse fixed mindsets ascribe to performance goals: Their primary aim is to prove their ability to others through successful performance. On the other hand, children who endorse growth mindsets are more inclined to have learning goals: They are not as focused on performance but rather want to gain a deeper understanding of the subject material and master it (Dweck & Leggett, 1988; Payne et al., 2007).

Much empirical literature has garnered support for mindset theory. Research in this area can be classified into two categories: studies on the effects of pre-existing mindsets and studies on the effects of induced growth mindsets. Pre-existing endorsement of a growth mindset is associated with numerous educational advantages, including increased engagement and achievement (Blackwell et al., 2007; Bostwick et al., 2017), persistence (Aditomo, 2015), as well as decreased self-handicapping behaviors (Martin et al., 2013). These associations have been found in numerous age groups spanning young children to emerging adults. For example,

in 7-9th graders, Bostwick et al. (2017) found that students who naturally endorsed a growth mindset earned higher mathematics grades and had increased mathematics engagement. In a study of undergraduates, Aditomo (2015) found that students with a growth mindset showed heightened motivation and persistence throughout the course of a difficult statistics class, ultimately achieving higher grades. Natural endorsement of a growth mindset also may serve as a protective factor for students of low socioeconomic status (Claro et al., 2016) and for those at risk for stereotype threat (Aronson et al., 2002; Good et al., 2012).

Classic research on induced mindsets, as opposed to naturally occurring mindsets, has emphasized the role of *process* versus *ability* praise (Gunderson et al., 2013; Mueller & Dweck, 1998). Process praise, wherein the teacher or parent praises the student based on effort (e.g., "You did great, you must have worked really hard!") has been shown to promote a growth mindset, whereas ability praise, wherein the student's natural talent is emphasized (e.g., "You did great, you must be really smart!") promotes a fixed mindset (Mueller & Dweck, 1998). Apart from praise, other methods of cultivating growth mindsets include interventions that teach learners about the brain's plasticity and ability to grow (e.g., Donahoe et al., 2012), and reframe the learning process by using activities such as having students write letters to younger students about persevering through challenge (Blackwell et al., 2007) or receiving growth mindset-infused letters from instructors (Bostwick & Becker-Blease, 2018). These interventions have had mixed results, with some proving effective at increasing achievement (Blackwell et al., 2007; DeBacker et al., 2018; Porter et al., 2022), and others showing no effects (Fabert, 2014; Ganimian, 2020; Li & Bates, 2020). Recent meta-analyses have revealed that growth mindset interventions have null to small effects on achievement outcomes for the average learner (Burnette et al., 2023; Sisk et al., 2018). However, these findings do not necessarily mean that growth mindset interventions are ineffective. Rather, growth mindset may be more beneficial for students of particular demographics and circumstances, such as those facing academic challenge or low SES, compared to other students (Yeager & Dweck, 2020; Yeager et al., 2019). Indeed, Burnette et al. (2023) assert that it is important to consider heterogeneity when delivering mindset interventions, and that although small effects are evident when interventions are delivered broadly, larger effects are more readily evident when interventions target learners with a greater margin for improvement. Furthermore, mindset interventions are often delivered by teachers or researchers rather than other influential social agents, such as peers.

1.2 Peers and growth mindset influence

Peers refer to individuals who share similar interests, identities, and may interact with one another frequently (Sallee & Tierney, 2007). Like parents and teachers, peers make a unique contribution to children's development, taking center stage during adolescence (De Goede et al., 2009). Peers are most influential when they are perceived as desirable and high in status (Cohen & Prinstein, 2006), and past research has shown that adolescents will model their behavior according to their perceptions of what is normative of their popular peers, regardless of whether their

peers actually engage in these behaviors (Helms et al., 2014; Prentice & Miller, 1996). As children enter adolescence, they spend increasingly more time with peer groups, making peers substantial socializing agents during this age that greatly impact students' academic beliefs and achievement (Rodkin & Ryan, 2012; Ryan, 2000; Wentzel & Caldwell, 1997).

Burgeoning research has specifically investigated how peer beliefs about intelligence influence students' achievement. More direct literature on peer mindsets has shown that both teacher and peer growth mindset uniquely contribute to the "mindset context," with peer mindsets predicting students' motivation, classroom belonging, preference for challenge, and other learning outcomes (Muenks et al., 2021; Sheffler & Cheung, 2020). Regarding mastery goals, an integral component of growth mindset, Laninga-Wijnen et al. (2018) found that, in classrooms in which mastery goals were a perceived norm, there was an increased influence of friends on students' achievement, compared to classrooms with perceived performance goal norms. Other research by Poortvliet et al. (2009) has shown that individuals primed to endorse mastery goals were perceived as more cooperative and helpful to others and provided them with more useful information.

Longitudinal and intervention studies provide further evidence for peer effects on growth mindset. In a study of high school students, King (2020) found that the mindsets of students' classmates predicted their own mindset endorsement, even after controlling for their previous mindset 7 months earlier. In a report on the National Study of Learning Mindsets, Yeager et al. (2019) examined the effects of peer norms on a growth mindset intervention. Results of the study indicated a moderation of peer norms on students' post-intervention grades, such that students' grades increased after the mindset intervention when peer norms corresponded to growth mindset-oriented behaviors (i.e., challenge-seeking). Putting these findings into practice, a "peer-modeled" mindset intervention showed incoming college students videos of peers promoting growth mindset via embracing challenge and struggle (Hecht et al., 2022). This intervention had a positive impact on students' learning, particularly among underrepresented and/or first-generation students.

1.3 Peers and social comparison

Peers influence one another not only through selection and socialization, but also through social comparison processes. Social comparison manifests in three ways: upward, downward, and lateral (Djikstra et al., 2008). Upward comparison occurs when students compare themselves with others who are deemed more competent than themselves, while downward comparison occurs when students compare themselves with worse others. Lateral comparison occurs when students compare themselves to others who are equal in ability. Festinger's (1954) theory of social comparison postulates that individuals choose to engage in upward comparison when they seek to improve their abilities, referred to as self-improvement, lateral comparison when they want to evaluate their own abilities, and downward comparison when they want to feel better about themselves, referred to as self-enhancement. In support of these notions, a study by Ruble et al. (1976) found as early as in second grade,

students reported engaging in upward social comparison for task-oriented reasons, such as wanting to know how the other participant was performing while completing a task (coloring), and exhibited increased effort after comparing, suggesting an aim toward self-improvement. Similarly, Huguet et al. (2001) found that most students ages 12–14 years chose to engage in upward comparison for self-improvement reasons. Past research indicates that upward social comparison has been shown to both positively and negatively affect students' achievement outcomes (Gremmen et al., 2018; Jackson, 2013; Véronneau & Dishion, 2011), though this largely depends on how the student responds to the comparison experience and whether they identify or contrast with the comparison target (Djikstra et al., 2008).

Focusing on the educational context, the theory of social comparison argues that the type and resulting identification/contrast students experience with their classmates shapes their perceptions of academic competence, self-concept, and future potential, which consequently affect their achievement outcomes (Djikstra et al., 2008). In the same vein with the stereotype threat literature, students' identification and contrast with groups shape not only their perceptions and concerns regarding how they will be viewed by others, but also their perceptions of themselves, known as *self-stereotyping* (Sinclair et al., 2006). If students contrast with higher achieving peers and/or identify with lower achieving peers, these resulting self-stereotypes could dampen their perceptions of competence and alter their behavior in the classroom, which can significantly impact them academically (Boissicat et al., 2012; Buunk et al., 2005; Chouinard et al., 2007; Schunk & Pajares, 2005).

1.4 The interplay between mindset and social comparison

Scant research has examined the joint effects of growth mindset and social comparison on academic outcomes concurrently. One study of undergraduates by Nussbaum and Dweck (2008) revealed that students primed to endorse a fixed mindset more frequently engaged in downward comparison (choosing to review strategies of a lower performing other) as a means of self-esteem repair following a failure experience. On the other hand, students primed with a growth mindset engaged in less downward comparison and more frequently chose to compare with an individual who had outperformed them as a means of self-improvement. This study demonstrates the link between growth mindset and social comparison, supporting the notion that implicit theories of intelligence prompt the adoption of different goals in times of challenge, which are accomplished via different types of social comparison.

Other research, though not examining mindset explicitly, has examined its associated mastery and performance goal orientation on social comparison consequences. Following induced upward social comparison, Carmona et al. (2008) found that students who were focused on failure prevention (performance-avoidance goals) were more likely to contrast with the upward comparison target, which resulted in decreased self-efficacy and achievement outcomes. Conversely, Kamarova et al. (2017) found that the adoption of mastery goals resulted in increased positive mood and perceptions of competence following an upward social comparison experience. According to researchers, these results can be explained by the mastery goal

advantage effect, which argues that mastery-approach goals protect students from the harmful effect of upward social comparison on perceptions of competence. This effect also has been documented in studies examining students' responses to negative feedback (e.g., Lee & Kim, 2014).

Burnette et al. (2013) theorize that individuals with growth mindsets gain self-esteem from learning goals, as these indicate that the learner has gained mastery, whereas individuals with fixed mindsets gain self-esteem from performance goals in order to "prove" that they possess a desired skill. These effects are especially strong when learners face situations that may threaten their ego, such as induced failure. Upward social comparison, where the learner receives feedback that others have outperformed them, represents such a scenario. As such, endorsement of a growth mindset may aid students when they are also oriented toward skill and knowledge mastery, such that even after comparing themselves to better performing others, these students remain motivated to engage in positive learning behaviors. In line with these ideas, a growth mindset intervention by Micari and Pazos (2014) found that participants who received training about the malleability of intelligence experienced less concern about social comparison when working in groups compared to those who had not received the training, the effects of which were especially strong for students of lower ability.

1.5 Current research

Drawing from mindset theory, theories of peer influence, and social comparison theory, the present study examined the effects of peer growth mindset endorsement and social comparison experiences on middle school students' mindset endorsement, academic self-perceptions, and learning outcomes. Based on past literature demonstrating the positive effects of growth mindset on academic achievement and the wealth of research on peer influence in adolescence, it was expected that adolescents' growth mindsets would be influenced by peer beliefs, which would subsequently affect their motivation and learning outcomes. However, because peer interactions in the educational context often involve social comparison, which independently influences students' academic perceptions and achievement, it was expected that growth mindset would moderate this relationship, serving to provide a buffer against the negative impact of upward social comparison. Due to the COVID-19 pandemic, the study was conducted remotely via Zoom. Peer beliefs were communicated using avatars to induce a virtual peer social environment (e.g., akin to the "Cyberball" paradigm; Williams et al., 2000) and social comparison was induced using a virtual leaderboard (Christy & Fox, 2014).

2 Method

2.1 Participants

Participants were 120 middle school age adolescents ($M = 12.73$ years, $SD = 0.82$) recruited from the University of California, Riverside Child Studies participant pool.

To be eligible for the study, participants were required to be between the ages of 12–14 to ensure they were in the middle school age range and be fluent in English to be able to complete the surveys and activities. Participants were 57.5% female, 39.2% male, and 3.3% other (i.e., gender-fluid, non-binary), and were of diverse ethnic background (31.1% White, 30.3% Multiracial, 29.4% Hispanic/Latinx, 5.9% Black, 1.7% Asian or Pacific Islander, 1.7% American Indian or Alaskan Native). As compensation for their time, participants were emailed a $10 gift card upon completion of the study.

2.2 Procedure

Participants were invited to participate in the study via email, text, or phone invitation. An opt-in procedure was used for recruitment, such that parents must provide consent for their children to participate in the study and adolescents must provide assent. Upon obtaining parental consent and child assent, the researcher proceeded with a one-time Zoom appointment with the child participant. During the appointment, the participant completed several questionnaires and two sets of problem-solving activities.

The study commenced when the participant entered the Zoom room and was greeted by the researcher, who explained the purpose of the study and instructed the participant to create an avatar using the Nintendo® Mii Studio program. The purpose of creating an avatar was to enable participants to visually represent themselves and simulate a peer group in a virtual environment. Although the "peers" did not know one another, their peer status with the participant was evident in that they were portrayed as being the same age, from the same geographic region, and engaged in the same lab study. After creating their avatar, participants were given a link to the first questionnaire, distributed via Qualtrics. The first questionnaire measured pre-existing growth mindset and assessed baseline achievement and social comparison related variables (i.e., competence, goal orientation, challenge-seeking, and general social comparison tendency).

2.2.1 Mindset manipulation

Upon completion of the first questionnaire, the peer mindset manipulation took place. The researcher shared their screen with the participants, showing them the avatars of four other purported participants alongside their own avatar. Participants were told "I would like to introduce you to four other kids who are about your same age and participated in the study earlier. After the study they recorded their thoughts about the activity." The researcher then pointed to the screen, and, indicating with the mouse, said "So here you are. And here are your four peers, Emma, Sophia, Jacob, and Ethan." Participants were then distributed a survey link where they were instructed to click on each peer's avatar to hear their thoughts about the problem-solving activity (see "Appendix 1").

In the *growth mindset condition*, participants heard statements from their purported peers such as "I've heard about these types of tests before. They measure certain types of intelligence. With practice, you can improve your score." And "After you do the activity, you receive your score. I think if you keep trying, you can always do a little better."
In the *control condition*, participants heard statements of the same length and tone but without growth mindset references, such as "I was told to work on the activity, and it took about 10 minutes for me to complete it. After you do the activity, you receive your score." And "There were different kinds of questions. I spent more time on some of the problems than on others."

The peer statements appeared in speech bubbles to the right of each avatar and were also spoken aloud. The statements were recorded by two adolescents of similar age as the participants (one 12-year-old male and one 14-year-old female), and the pitch was adjusted for two of the avatars so that the voices sounded as though they originated from four different individuals.

2.2.2 Social comparison manipulation

After hearing the statements, participants completed a spatial reasoning task (Raven's Progressive Matrices). When they were finished with the task, the second manipulation was conducted. Participants were told "Now that you are done with the first activity, I'd like to show you how you performed compared to your peers…Your score has been added to our leaderboard of past participants' scores." The participants were then shown a leaderboard with their and their peers' scores listed next to their avatar in order of highest to lowest score (see "Appendix 2").

In the *upward comparison condition*, the leaderboard indicated that the participants performed poorer than the majority of their peers, ranking third lowest with a score of 47/100.
In the *neutral (no comparison) condition*, the leaderboard indicated that the participants performed well, with a score of 89/100, which is between their peers' scores toward the top of the leaderboard, indicating that both the participant and their peers performed equally well.

Following this feedback, the researcher instructed the participant to complete a brief manipulation check survey to ensure the social comparison manipulation was effective. Then, the participant completed a second problem-solving task, followed by a second questionnaire. The purpose of the second questionnaire was to measure changes in growth mindset endorsement, social comparison identification and contrast, and several learning-related perceptions and outcomes (e.g., task self-competence, effort, value, and engagement).

Finally, the researcher debriefed the participant. The researcher explained that the true purpose of the study was to examine peer and social comparison effects on adolescents' views about intelligence and learning outcomes. The researcher

clarified that the feedback the participant received about their score was not indicative of their actual score, and that the peer statements they heard as well as their peers' performance were fictitious. The researcher then distributed the gift card via email, and a parent joined the Zoom session to verify receipt of the gift card by signing an online form. After answering any questions the participant or parent had, the researcher ended the Zoom meeting, concluding the study.

2.3 Measures

Study measures included student self-report measures as well as objective measures of student engagement and performance on the problem-solving task. Participants' scores on the problem-solving tasks were collected as a measure of objective performance, and the second problem-solving task was utilized both for objective performance and mastery behaviors.

2.3.1 General perceptions of academic self-competence, achievement goal orientation, challenge-seeking, and effort

Four items assessed students' general perceived competence in school (Wigfield et al., 1991, e.g., "How good are you at school?" $\alpha = .80$). Four additional single items (Pomerantz et al., 2000; Wigfield et al., 1991) assessed learning (e.g., "How important is it to you that you learn a lot in school?" 1 = Not at all good to 7 = Very good) and performance (e.g., "How important is it to you to do well in school?") goal orientations, challenge-seeking (e.g., "How much do you like to do difficult work in school?"), and effort (e.g., "How much effort do you put into your schoolwork?"). These single construct items were administered to assess their general associations with growth mindset and social comparison tendency.

2.3.2 General social comparison

The 6-item, short version of the Iowa-Netherlands Comparison Orientation Scale (Gibbons & Bunk, 1999; Schneider & Schupp, 2014) measured participants' underlying tendencies toward social comparison (e.g., "I always pay a lot of attention to how I do things compared with how others do things", 1 = Strongly disagree to 5 = Strongly agree). A confirmatory factor analysis indicated that this measure aligned best as two factors (one 4-item and one 2-item factor). Both factors had poor reliability and could not be improved by removing items. The 4-item factor with the better reliability, $\alpha = .65$, was used for subsequent analyses, and parallel models using the 2-item factor did not differ from the 4-item factor.

2.3.3 Implicit theories of intelligence

Six items adapted from Dweck (2000) were used to measure participants' implicit theories of intelligence (e.g., "No matter how much intelligence you have, you can always change it quite a bit", 1 = Strongly disagree to 5 = Strongly agree).

Reliability analyses indicated that initial reliability (α = .68) was beyond the conventionally accepted level. Removal of two items, "The harder you work at something, the better you will be at it" and "Truly smart people do not need to try hard (reverse coded)" resulted in an improved Cronbach's alpha of .76. This 4-item growth mindset measure was used in all subsequent models, which did not differ when the 6-item measure was included. Post-test growth mindset reliability for the four-item measure was also acceptable, α = .77.

2.3.4 Self-regulated learning

Twelve items adapted from Dowson and McInerney (2004) measured participants' methods and use of strategies when working on the problem solving task (e.g., elaboration "When working on the activity, I tried to see how things fit together with things I already know", monitoring "I checked to see if I understood the things I was trying to learn during the activity", and planning "When doing the activity I picked out the most important parts first", α = .92.).

2.3.5 Social comparison identification and contrast

Six items adapted from Van der Zee et al. (2000) and Kang et al. (2013) for the academic setting were used to measure participants' identification and contrast with their peers following a social comparison experience. Participants were asked to "Think about how you felt after receiving feedback on your peers' performance on the problem-solving task." Half of the items measured identification with an upward comparison target (e.g., "I realize it is possible for my score to also improve", α = .76) and half of the items measured contrast with an upward comparison target (e.g., "It is threatening to notice that I am doing not so well on the problem-solving task", α = .80).

2.3.6 Perceptions of competence in the task for the self and peers

Eight items measured on a 5-point scale (1 = Strongly disagree to 5 = Strongly agree) assessed participant's perceived self-competence and peers' competence at the problem-solving task (Bandura, 1986). Items 1–4 measured the participants' perceptions of their own ability (e.g., "I feel confident in my ability to improve at the task") and items 5–8 measure their perceptions of their peers' ability (e.g., "They are capable of learning the material in the task"). Reliability was acceptable for both self-perceptions, α = .85, and peers' perceptions of competence, α = .85.

2.3.7 Task anxiety

An adapted version of the short form Test Anxiety Inventory (TAI) (Spielberger, 2010; Taylor & Deane, 2002) was used to measure participants' test-related anxiety regarding the problem-solving task. This instrument consisted of 5 items and was measured on a 5-point scale (1 = Strongly disagree to 5 = Strongly agree). Example items include "During the problem-solving task I felt very tense" and "During the problem-solving task I felt so nervous that I forgot facts I really know." Reliability was acceptable, $\alpha = .86$.

2.3.8 Task value and effort

Adapted from Pomerantz et al. (2000), this 8-item instrument measured the degree to which participants viewed the problem-solving task as personally meaningful to them and the degree of effort they invested in it. Half of the items were designed to capture task value (e.g., "It's important to me to get the right answers on the problems" and the other half to capture task effort (e.g., "I made sure I understood each step of the problems"). Both subscales achieved acceptable reliability, $\alpha = .81$ (task value), and $\alpha = .82$ (task effort).

2.3.9 Social comparison comprehension

Participants' understanding of the social comparison manipulation was assessed with 3 items (e.g., "Compared to your peers, how well did you perform on the problem-solving activity?", 1 = Not at all well to 5 = Very well). These items were distributed as the Manipulation Check. Self-competence reliability was high, $\alpha = .94$. Other competence reliability could not be calculated as it was a single item.

2.3.10 Problem-solving tasks and objective mastery behaviors

Participants completed two sets of problem-solving activities consisting of Raven's Progressive Matrices (Raven et al., 1977), an abstract reasoning measure in which participants identify the missing piece to a visual pattern. The first set contained both medium and difficult Raven's Progressive Matrices items selected by the researcher and designed to be challenging for the participants (see "Appendix 3"). Average performance (out of 10) on this first set indicated that it was indeed challenging for participants, $M = 5.05$, $SD = 1.78$.

The second set consisted of the PERC Task, an established measure that uses Raven's Progressive Matrices to assess mastery behaviors, including persistence, effort, resilience, and challenge-seeking (Porter et al., 2020). This task begins with four easy Raven's Matrices items to assess baseline ability, then assesses challenge-seeking by asking participants if they would like to do easier or harder puzzles for the next set. Subsequently, participants receive three Raven's items of medium difficulty level and are given the option to view tips on how to solve each problem. The total time spent on these items and tips captures effort. Then, participants are given

one easy item (for a break), followed by four difficult items. Time spent on the four difficult items was assessed as a measure of persistence.

3 Results

Several analyses were conducted to assess the relationship between peer growth mindset and social comparison on participants' learning-related perceptions and behavioral outcomes. First, correlation analyses assessed baseline associations between participants' pre-existing mindsets, learning-related outcomes, and general social comparison tendencies. Next, in accordance with this study's experimental design, a randomization check was conducted to confirm equivalence across groups. Subsequently, a manipulation check assessed the effectiveness of the social comparison experimental manipulation. Finally, a MANCOVA model examined group differences in the learning-related outcome variables. Missing data were low (0.8%). A missing value analysis (Little, 1988) was conducted using SPSS Version 28 to identify any notable patterns of missingness. Results of the analysis indicated that the missing data were missing completely at random (MCAR), evident by a nonsignificant χ^2 value, $\chi^2\,(102) = 118.67$, $p = .124$. As such, imputation methods for missing data were not required, as the missing data were not associated with the values of any of the observed or unobserved variables (Scheffer, 2002).

3.1 Associations of the key variables

Prior to the manipulation, participants reported on their pre-existing growth mindset endorsement, learning-related outcomes, and social comparison tendency. Descriptive statistics for these pre-manipulation measures are shown in Table 1. As expected, participants' growth mindset endorsement was positively associated with nearly all learning-related outcomes, including perceptions of academic competence ($r = .29$, $p < .01$), learning goals ($r = .27$, $p < .01$), and challenge-seeking ($r = .30$,

Table 1 Correlations and descriptive statistics for growth mindset, learning-related outcomes, and social comparison tendency prior to the manipulation

Variables	1	2	3	4	5	6	7
1. Growth mindset	–						
2. Academic competence	.29**	–					
3. Learning goals	.27**	.33**	–				
4. Performance goals	.19*	.45**	.59**	–			
5. Challenge-seeking	.30**	.41**	.49**	.27**	–		
6. Effort	.05	.28**	.39**	.38**	.18	–	
7. Social comparison tendency	.04	.07	.25**	.25**	.09	.10	–
M	3.71	5.15	5.38	5.95	3.58	5.81	3.49
SD	0.81	1.12	1.56	1.35	1.73	1.00	0.66

*$p < .05$; **$p < .01$, two-tailed

$p < .01$). However, in contrast to past literature, growth mindset was not associated with self-reported effort, ($r = .05$, *ns*). Social comparison tendency was positively associated with both learning goals ($r = .25$, $p < .01$) and performance goals ($r = .25$, $p < .01$).

3.2 Randomization check

A set of one-way analysis of variance (ANOVA) was conducted to check for group differences across the continuous demographic measures and learning-related outcomes assessed prior to the manipulations. These include (1) demographics (i.e., age and SES), and (2) reports of attitudes and behaviors (e.g., pre-existing growth mindset, general social comparison tendency). Chi-squared tests of independence were employed for categorical demographic variables (i.e., gender and race/ethnicity). Results revealed no significant differences across the four groups (see "Appendices 4, 5"). This indicates that the randomization of participants into the 2 × 2 factorial design (peer growth mindset/control and upward social comparison/control conditions) was effective. As such, any group differences observed after the manipulations could not be attributed to pre-existing differences among the participants.

3.3 Manipulation check

In the upward social comparison condition, participants were led to believe they had performed more poorly than their peers on the problem-solving task, while in the neutral condition, they were led to believe they had performed equally as well as their peers. To assess the effectiveness of this manipulation, a one-way ANOVA was conducted to check for group differences in participants' self-reported perceptions of their and their peers' competence after completing the first problem-solving task. As expected, the results showed significant differences between groups on perceptions of self versus peer competence $F(3, 115) = 191.19$, $p < .001$, $\eta^2 = .833$. Post hoc analyses indicated that participants in the upward social comparison condition rated their own performance significantly lower than their peers' performance compared to participants in the neutral comparison condition, regardless of peer growth mindset condition, $p's < .001$ (Upward/Growth condition $M = 1.49$, $SD = 0.51$; Upward/Neutral condition $M = 1.53$, $SD = 0.66$; Control/Growth condition $M = 3.92$, $SD = 0.48$; Control/Neutral condition $M = 3.85$, $SD = 0.49$).

3.4 Effects of peer growth mindset and social comparison on learning-related outcomes

A Multivariate Analysis of Covariance (MANCOVA) was conducted to examine the effects of the peer growth mindset manipulation on participants' learning-related perceptions and behaviors. The model included age, gender, race/ethnicity, SES, pre-existing growth mindset, and pre-existing social comparison tendency as covariates. Adjusted means for all outcome variables by peer growth mindset and social comparison manipulation are shown in Table 2. Contrary to expectations, results of

Table 2 Descriptive statistics for learning-related outcomes by condition post-manipulation

Peer growth mindset manipulation	Neutral mindset condition $n=59$		Growth mindset condition $n=59$	
Learning outcome	*M*	*SE*	*M*	*SE*
Post-test GM	3.98	0.06	3.98	0.06
Upward identification	3.96	0.07	4.30	0.07
Upward contrast	2.65	0.12	2.64	0.12
Perceptions of self-competence	3.70	0.09	4.09	0.09
Perceptions of peers' competence	4.06	0.08	4.33	0.08
Task effort	3.51	0.11	3.78	0.11
Task value	3.46	0.12	3.82	0.12
Learning goals	3.35	0.14	3.65	0.14
Self-regulated learning	3.06	0.12	3.42	0.12
Task anxiety	2.70	0.12	2.72	0.12
Mastery behaviors	2.23	0.10	2.54	0.10
Raven's matrices performance	6.47	0.24	6.97	0.24
Social comparison manipulation	Neutral comparison condition $n=60$		Upward comparison condition $n=58$	
Learning outcome	*M*	*SE*	*M*	*SE*
Post-test GM	3.91	0.06	4.05	0.06
Upward identification	4.08	0.07	4.18	0.07
Upward contrast	2.46	0.12	2.83	0.12
Perceptions of self-competence	3.87	0.09	3.92	0.09
Perceptions of peers' competence	4.07	0.08	4.33	0.08
Task effort	3.60	0.11	3.69	0.11
Task value	3.67	0.11	3.61	0.12
Learning goals	3.55	0.14	3.45	0.14
Self-regulated learning	3.20	0.12	3.28	0.12
Task anxiety	2.63	0.12	2.79	0.12
Mastery behaviors	2.31	0.09	2.46	0.10
Raven's matrices performance	6.58	0.23	6.87	0.23

Estimated marginal means adjusted for age, gender, race/ethnicity, socioeconomic status (SES), pre-existing growth mindset (GM) and pre-existing social comparison (SC)

the MANCOVA revealed no significant effect of peer growth mindset condition on participants' change in growth mindset, $F(1, 108)=0.00$, $p=.951$. Participants in both the peer growth mindset and the neutral condition endorsed growth mindset statements to a similar extent ($M=3.98$, $SE=0.06$ for both conditions). However, consistent with hypotheses, there were significant positive effects of peer growth mindset condition on several learning-related perceptions and outcomes, including upward identification, perceptions of self-competence, perceptions of peers'

competence, task value, and self-regulated learning strategies (See Table 3). Furthermore, in examining the effects of peer growth mindset on participants' objective performance on the post-manipulation problem-solving task, results revealed a

Table 3 Peer growth mindset and social comparison effects on learning-related outcomes

Predictor	Learning outcome	*F*	*df*	*p*	η^2
GM condition	Post-test GM	0.00	1, 108	.951	.000
	Upward identification	11.78	1, 108	< .001	.098
	Upward contrast	0.01	1, 108	.940	.000
	Perceptions of self-competence	7.82	1, 108	.006	.067
	Perceptions of peers' competence	5.01	1, 108	.027	.044
	Task effort	2.77	1, 108	.099	.025
	Task value	4.40	1, 108	.038	.039
	Learning goals	2.33	1, 108	.130	.021
	Self-regulated learning	4.29	1, 108	.041	.038
	Task anxiety	0.01	1, 108	.942	.000
	Mastery behaviors	4.89	1, 108	.029	.043
	Raven's matrices performance	2.12	1, 108	.148	.019
SC condition	Post-test GM	2.56	1, 108	.113	.023
	Upward identification	1.26	1, 108	.264	.012
	Upward contrast	4.78	1, 108	.031	.042
	Perceptions of self-competence	0.12	1, 108	.726	.001
	Perceptions of peers' competence	4.90	1, 108	.029	.043
	Task effort	0.36	1, 108	.552	.003
	Task value	0.16	1, 108	.690	.001
	Learning goals	0.28	1, 108	.599	.003
	Self-regulated learning	0.21	1, 108	.650	.002
	Task anxiety	0.96	1, 108	.329	.009
	Mastery behaviors	1.17	1, 108	.283	.011
	Raven's matrices performance	0.76	1, 108	.385	.007
GM × SC condition	Post-test GM	1.47	1, 108	.227	.013
	Upward identification	0.09	1, 108	.769	.001
	Upward contrast	2.39	1, 108	.125	.022
	Perceptions of self-competence	0.00	1, 108	.957	.000
	Perceptions of peers' competence	0.01	1, 108	.916	.000
	Task effort	0.21	1, 108	.650	.002
	Task value	2.42	1, 108	.123	.022
	Learning goals	1.24	1, 108	.269	.011
	Self-regulated learning	0.00	1, 108	.973	.000
	Task anxiety	0.59	1, 108	.444	.005
	Mastery behaviors	1.17	1, 108	.281	.011
	Raven's matrices performance	0.23	1, 108	.635	.002

Age, gender, race/ethnicity, socioeconomic status (SES), pre-existing growth mindset (GM) and pre-existing social comparison (SC) included as covariates

significant main effect of peer growth mindset condition on mastery behaviors, $F(1, 108) = 4.89$, $p = .029$. This indicates that, compared to participants in the neutral mindset condition, participants in the growth mindset condition displayed increased persistence, effort, resilience, and challenge-seeking behaviors. The effects of peer growth mindset on these outcome variables are considered small (Cohen, 2013).

Regarding the effects of social comparison on learning-related consequences, a significant main effect of social comparison condition on upward contrast was found, $F(1, 108) = 4.78$, $p = .031$, such that participants in the upward social comparison condition reported increased upward contrast with peers compared to participants in the neutral social comparison condition. As was found with the growth mindset manipulation, there was also a significant main effect of the social comparison manipulation on perceptions of peers' competence, $F(1, 108) = 4.90$, $p = .029$. Interaction effects of the peer growth mindset and social comparison conditions on participants' learning outcomes and self-perceptions were examined and were not significant, F's $(1,108) = 0.00–2.42$, p's $= .123–.973$.

4 Discussion

The present study examined the effects of peer growth mindset and social comparison on middle school-age adolescents' academic perceptions and learning-related outcomes. The 2×2 experimental design applied a novel online paradigm using simulated peer avatars to manipulate participants' beliefs about their peers' growth mindsets and induce a social comparison experience. Although change in participants' growth mindsets was not evident, peer growth mindset condition showed significant effects on several learning-related outcomes, while the social comparison condition affected competence and upward contrast perceptions. No interactions between peer growth mindset and social comparison were found.

4.1 Effects of peers' growth mindset on learning-related outcomes

Regardless of condition, no change was observed in participants' post-test growth mindset endorsement. This result could be interpreted in three ways. One possibility is that the manipulation did not readily change their mindsets, but rather changed participants' impressions of their peers and the learning task. This aligns with the growth mindset meta-analysis indicating that effects were strongest when no growth mindset manipulation check was employed (Sisk et al., 2018). In other words, peer growth mindset influenced participants' learning outcomes not by changing their mindsets but instead by influencing the learning context. By providing a growth mindset environment embedded with peer endorsement of perseverance and optimism for improvement, participants viewed their peers and themselves as more competent, cared more about the problem-solving task, and engaged in more learning strategies and mastery-oriented behaviors, regardless of their underlying mindset beliefs.

A second possibility relates to the strength and modality of the manipulation. Participants interacted briefly with virtual characters. Pilot participants indicated that they believed the avatars to represent actual peers, and the Nintendo® Mii Studio permitted participants to create avatars that captured their physical appearance, style, and personality. Despite these strengths, this virtual method of examining peer influence did not permit a dynamic peer environment wherein participants could converse with their peers. The virtual peers also represented individuals with whom the participants had no prior connection. Had this study been conducted with real adolescent peers whom the participants knew, or perhaps even highly regarded friends, who are more influential than peer groups (Brown et al., 2008), growth mindset change may have been evident.

A third possibility relates to the potential for delayed growth mindset change. Growth mindset represents a set of implicit beliefs about the nature of a fundamental concept, intelligence, the foundation of which may not be easily shaken. As such, the subtlety of the growth mindset manipulation may have contributed to the absence of a strong peer growth mindset effect. Although many single session growth mindset interventions have proven effective at increasing endorsement of growth mindset (e.g., DeBacker et al., 2018), it can sometimes take time for these core beliefs to change (e.g., Blackwell et al., 2007). For this reason, researchers recommend repeated reinforcement of growth mindset messages for optimal effectiveness (Yeager & Dweck, 2020).

Despite no evidence of mindset change and a lack of significant effects on many other hypothesized outcome variables, participants in the peer growth mindset condition showed a clear pattern of improved motivational and learning-related outcomes. Compared with participants in the neutral mindset conditions, participants identified more with their peers who outperformed them, an adaptive strategy in social comparison scenarios that benefits the learner's motivation while offsetting negative emotional consequences (Buunk et al., 2005). Participants also reported increased perceptions of self-competence, task value and self-regulated learning strategies. Importantly, participants also showed increases in their mastery behaviors, measured via the persistence, effort, resilience, and challenge (PERC) task. This finding is notable because it represents an objective, measurable behavioral outcome. Not only did participants value the task and believe in their abilities to be competent at it, they also showed changes in their observed learning-related behaviors. The effects in this pattern were small, which is consistent with growth mindset meta-analyses (Burnette et al., 2023; Sisk et al., 2018). This supports the notion that growth mindset interventions have small effects on the average student when delivered universally. However, these effects may be magnified for target audiences of students with more room for improvement (Burnette et al., 2023). Had this study recruited only adolescents who face academic difficulties, results may have differed. Future research could recruit a more targeted sample of adolescents who may benefit the most from a growth mindset intervention or include a measure of academic functioning in a broad sample to examine it as a potential moderator.

4.2 Effects of social comparison

In contrast to the numerous main effects of the peer growth mindset manipulation on learning-related outcomes, only two main effects of the social comparison manipulation were present. Participants in the upward comparison condition perceived their peers to be higher in competence compared to participants in the neutral comparison condition. This finding was expected and confirms that the manipulation was effective in persuading participants that their peers had indeed outperformed them on the problem-solving task. More importantly, there was a main effect of the social comparison manipulation on upward contrast, such that participants in the upward comparison condition contrasted more with their peers who had outperformed them compared to participants in the neutral comparison condition. In other words, the participants were not inspired by their higher performing peers in hopes that their future performance on the task might also be high, but instead felt discouraged that their peers had outperformed them and disconnected themselves from them. Unlike identification (the adaptive social comparison strategy that was shown to be promoted by growth mindset peers), contrast represents a maladaptive social comparison strategy (Buunk et al., 2005). Past literature has shown that students who contrast with their higher performing peers in turn show dampened perceived scholastic competence, and this response also may be related to feelings of imposter syndrome (Boissicat et al., 2012; Chayer & Bouffard, 2010). As such, this finding aligns with past research on the effects of social comparison in the academic context, and the different ways in which students may respond to upward comparison scenarios.

4.3 The interplay between growth mindset and social comparison

The present study did not find evidence of interactive effects of peer growth mindset and social comparison. This lack of findings was surprising, given prior work linking social comparison and mastery goals (Kamarova et al., 2017) and intervention research demonstrating the positive impact of growth mindset training on social comparison concern (Micari & Pazos, 2014). From a theoretical standpoint, it is presumed that participants' avatar "peers" acted as socialization agents to influence their attitudes and behaviors. This influence operated at the group, as opposed to dyadic, level, wherein attitude and behavioral changes are a function of conformity to group norms and the internalization of group values (Bukowski et al., 2015). The present results suggest that these processes were at play regarding the influence of peer growth mindset on learning-related outcomes. In contrast, the impacts of the social comparison manipulation on learning-related outcomes were substantially weaker. It may be the case that the social comparison scenario was too subtle and/or brief to substantially impact learning-related behavior and interact with the peer growth mindset effects. Perhaps, though it has been utilized in other studies (e.g., Christy & Fox, 2014), the virtual mode of delivery is not optimal for social comparison experiences. Furthermore, rather than inducing social comparison, the method of manipulating participants' scores may instead have been interpreted as a success/failure experience, as the participants in the upward comparison condition

were shown lower scores compared to the participants in the control condition. This potential confound may have overshadowed the effects of a purer social comparison manipulation in which all participants received the same score and only peers' scores changed. It is also possible that the sample size was too small to reliably detect interaction effects. Power analysis using G*Power indicated that the sample included in the current analysis (N = 120) was sufficient at 75% power (minimum 114 needed) but was insufficient to attain 80% power (128 needed). Notably, some effect sizes of the interaction terms were small per Cohen's (2013) guidelines. This could indicate that the interaction terms were slightly underpowered. Alternatively, the lack of significant interactive effects may speak to the mixed findings regarding upward social comparison effects on learning outcomes, which, though overwhelmingly negative regarding affective outcomes, have been shown to both positively and negatively affect achievement outcomes (Gremmen et al., 2018; Jackson, 2013; Véronneau & Dishion, 2011).

4.4 Limitations and future directions

Several limitations must be considered in the interpretation of this study's results. These include the remote and virtual modality of the study, the nature of peer influence, the single session timepoint of the study design, and the materials of assessment. As implicated in the study description, the present study was conducted remotely using a virtual peer environment with avatars and recorded statements. The study modality was selected out of necessity due to social distancing restrictions as a result of the COVID-19 pandemic. As highlighted above, participants did not have the opportunity to interact with live peers, but instead read and listened to their peers' statements passively, without the ability to exchange dialogue or ask questions. Hence, results may not be generalizable to real-world peer environments, such as a middle school classroom, in which participants engage in face-to-face dialogue, exchange thoughts and beliefs, and build rapport with their peers. On the other hand, due to changes in learning environments as a result of the COVID-19 pandemic (i.e., increased adoption of online learning, Lockee, 2021), as well as adolescents' increasing time spent in virtual peer environments via social media platforms and video games, this online paradigm may represent a good proxy for students' interactions in such non-traditional classrooms and in out of school peer environments, where peer influence is present nevertheless. In traditional, physical classroom environments, future research could employ confederate "peers" using child actors that would better mimic a real-life peer environment and allow mutual dialogue between participants and their peers.

Regarding the nature of peer influence, adolescents ages 12–14 were selected for this study because that is the age at which peer influence is most potent (Berndt, 1979; Brown et al., 2008; De Goede et al., 2009). As discussed, peers represent individuals of similar ages, who are not necessarily friends, but more acquaintances (Sallee &

Tierney, 2007). Although peers have a substantial impact on students' school motivation and achievement (Rodkin & Ryan, 2012; Wentzel & Caldwell, 1997), other research indicates that adolescents' friends may be more influential to their learning outcomes compared to their peer groups (Brown et al., 2008). The design of this study did not permit the investigation of friendship influences. It must also be acknowledged that participants did not know their purported "peers" and had not previously interacted with them. Future research could modify the design to include friendship dyads or small groups, and perhaps manipulate the types of statements participants hear from their friends to include growth mindset statements.

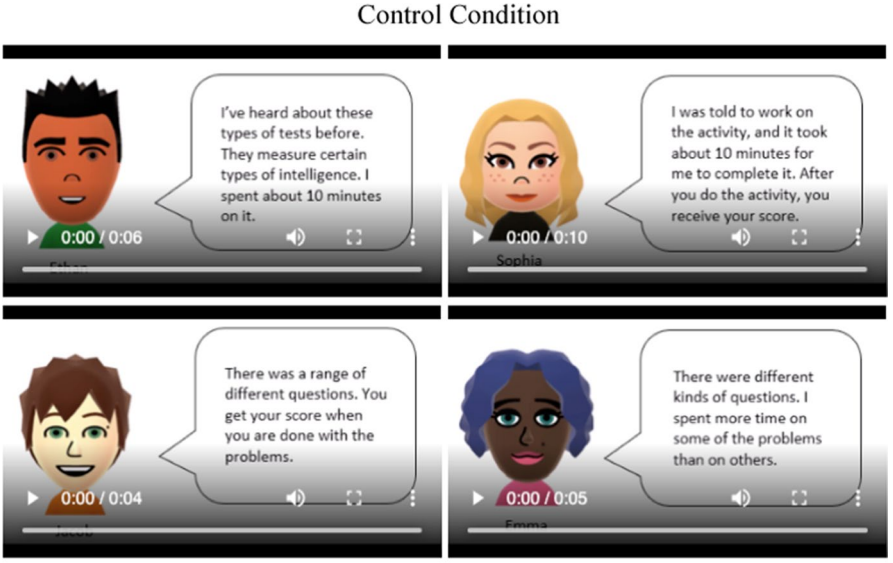
This study assessed adolescents' learning-related behaviors using several self-report measures and an objective behavioral measure of mastery behaviors using the PERC task. As many of the outcome variables were self-reported, they may not have captured participants' true behaviors due to bias in responses (e.g., social desirability). Furthermore, the Raven's Progressive Matrices problem-solving tasks used in the study as the basis for the learning-related outcomes may not have reflected the types of real-world learning activities adolescents typically pursue. These measures were chosen due to their novelty and application in the PERC task, and because Raven's tests are considered relatively "culture-free" assessments that would not be affected by participants' prior knowledge (Raven, 2000). Had more real-world learning assessments been included, the effects may have been strengthened. Lastly, it is important to note that the present study measured growth mindset using the quintessential implicit theories of intelligence items. Beyond intelligence, research has examined implicit theories of other human characteristics, including personality (Spinath et al., 2003) and relationships (Knee et al., 2001; Rudolph, 2010). Future research examining adolescents' implicit theories of other constructs (e.g., implicit theories of peer relationships, social status) and how these relate to social comparison and learning outcomes represent potentially fruitful new avenues.

5 Conclusion

This study furthers our understanding of the influence of peers' beliefs on adolescents' learning-related outcomes, including their reactions to social comparison, self-perceptions and behavioral outcomes. Although no interactive effects between peer growth mindset and social comparison were found, the overarching effects of peer growth mindset on adolescents' identification with higher-performing peers and learning-related outcomes underscore peers as a valuable resource in helping to boost students' motivation, given the negative consequences of social comparison on their academic self-perceptions. Incorporating peers into growth mindset interventions may be especially critical during the middle school years when there is a substantial decline in school motivation and may help improve adolescents' academic experiences so that they feel inspired, rather than threatened, when comparing themselves to their classmates.

Appendix 1: Peer mindset manipulation

Note. All avatar images were created using the Nintendo® Mii Studio program and are the copyright material of Nintendo.



Note. All avatar images were created using the Nintendo® Mii Studio program and are the copyright material of Nintendo.

Appendix 2: Social comparison manipulation

Neutral Comparison Condition

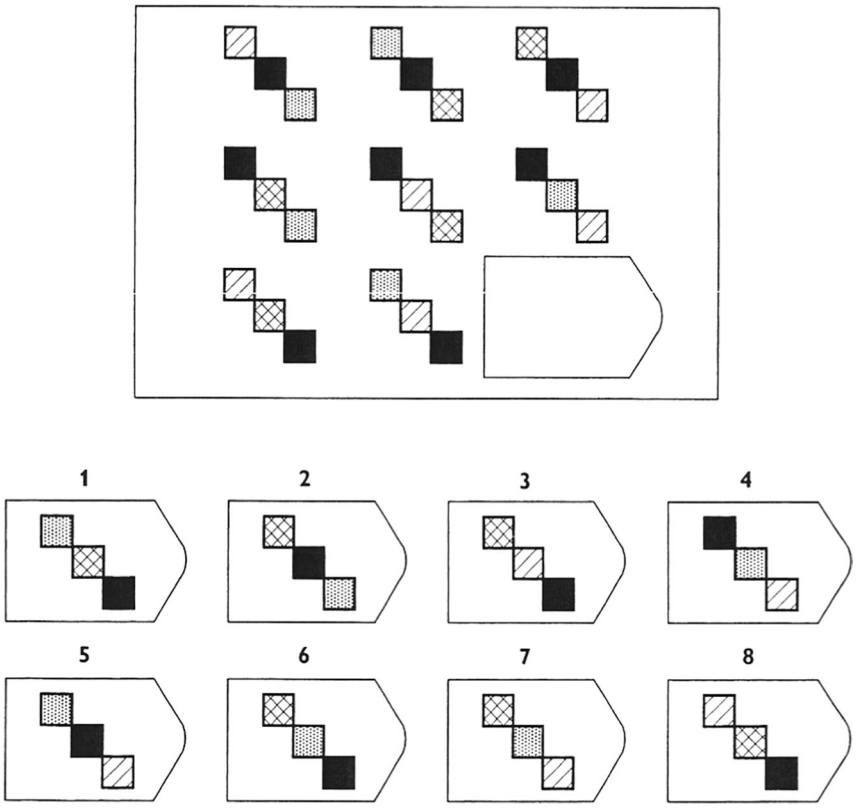
Leaderboard			
Rank	Participant		Score
1		Morgan	98
2		Jose	96
3		Emma	94
4		Jacob	91
5		You	89
6		Ethan	74
7		Sophia	72
8		Mia	70
9		Jayden	69
10		Brooke	65
11		Jorden	61
12		Sam	60
13		Matthew	59
14		Aiden	55
15		Emily	53
16		Jackson	52
17		Finn	49
18		Maya	47
19		Will	45
20		Alex	43

Upward Comparison Condition

Leaderboard			
Rank	Participant		Score
1		Morgan	98
2		Jose	96
3		Emma	94
4		Jacob	91
5		Ethan	89
6		Sophia	74
7		Mia	72
8		Jayden	70
9		Brooke	69
10		Jordan	65
11		Sam	61
12		Matthew	60
13		Aiden	59
14		Emily	55
15		Jackson	53
16		Finn	52
17		Maya	49
18		You	47
19		Will	45
20		Alex	43

Appendix 3: Sample Raven's progressive matrices item

Please select the answer that best completes the pattern.



Appendix 4: Descriptive statistics and randomization tests for pre-manipulation continuous variables by condition

	Condition								*F*	*df*	*p*	η^2
	Neutral/no comparison ~~$n=30$~~		Neutral/upward comparison ~~$n=30$~~		Growth/no comparison ~~$n=30$~~		Growth/upward comparison ~~$n=30$~~					
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*				
Age	12.67	0.76	12.50	0.78	12.87	0.86	12.90	0.85	1.59	3, 116	.196	.039

	Condition								*F*	*df*	*p*	η^2
	Neutral/no comparison ~~*n* = 30~~		Neutral/upward comparison ~~*n* = 30~~		Growth/no comparison ~~*n* = 30~~		Growth/upward comparison ~~*n* = 30~~					
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*				
SES	6.47	1.22	6.43	1.70	6.93	1.51	6.90	1.45	1.00	3, 116	.395	.025
Growth mindset	4.03	0.51	3.64	0.84	3.66	0.81	3.52	0.98	2.22	3, 116	.090	.054
Academic competence	5.10	1.10	5.13	1.16	5.15	1.03	5.22	1.22	0.06	3, 116	.982	.001
Learning goals	5.76	1.24	5.37	1.35	5.30	1.60	5.10	1.94	0.92	3, 116	.433	.023
Performance goals	6.10	1.21	6.13	0.90	5.83	1.44	5.73	1.74	0.63	3, 116	.596	.016
Challenge-seeking	3.80	1.56	3.17	1.78	3.63	1.85	3.70	1.75	0.78	3, 116	.506	.020
Effort	5.60	1.00	5.97	0.93	5.63	1.00	6.03	1.07	1.50	3, 116	.219	.037
SC tendency	3.53	0.62	3.56	0.65	3.43	0.72	3.45	0.68	0.24	3, 116	.870	.006

SC Social comparison

Appendix 5: Descriptive statistics and randomization tests for pre-manipulation categorical variables by condition

	Condition				χ^2	*p*
	Neutral/no comparison *n* = 30	Neutral/upward comparison *n* = 30	Growth/no comparison *n* = 30	Growth/upward comparison *n* = 30		
	n (%)	*n* (%)	*n* (%)	*n* (%)		
Gender					8.80	.185
Female	19 (63)	15 (50)	20 (67)	15 (50)		
Male	11 (37)	15 (50)	9 (30)	12 (40)		
Other	–	–	1 (3)	3 (10)		
Race/ethnicity					16.34	.360
American Indian or Alaskan Native	–	1 (3)	–	1 (3)		
Asian American or Pacific Islander	–	1 (3)	1 (3)	–		
Black	1 (3)	2 (7)	3 (10)	1 (3)		
Hispanic/Latinx	7 (23)	9 (30)	9 (30)	10 (33)		
White	11 (37)	3 (10)	12 (40)	11 (37)		
Multiracial or Other	11 (37)	13 (43)	5 (17)	7 (23)		

	Condition				χ^2	p
	Neutral/no comparison $n = 30$	Neutral/upward comparison $n = 30$	Growth/no comparison $n = 30$	Growth/upward comparison $n = 30$		
	n (%)	n (%)	n (%)	n (%)		
Prefer not to respond	–	1 (3)	–	–		

Percentages are rounded up by tenths to the nearest positive integer and therefore do not add up to 100 in some cases

Funding This work was supported by a University of California Riverside Committee on Research (CoR) Grant.

Declarations

Conflict of interest The authors declare that they have no conflict of interest.

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