



Contents lists available at ScienceDirect

Journal of School Psychology

journal homepage: www.elsevier.com/locate/jschpsycAssessing malleable social-psychological academic attitudes in early adolescence[☆]Jaymes Pyne^{a,*,1}, Christopher S. Rozek^{b,1}, Geoffrey D. Borman^c^a Department of Sociology, University of Wisconsin-Madison, United States of America^b Department of Psychology, University of Chicago, United States of America^c Department of Educational Leadership and Policy Analysis, University of Wisconsin-Madison, United States of America

ARTICLE INFO

Action editor: Craig Albers

Keywords:

Noncognitive factors

Student well-being

Racial differences

Stage-environment fit theory

Social-psychological interventions

ABSTRACT

Although it is important to accurately assess and promote student achievement, it is also critical to accurately assess and promote student social and emotional well-being and positive attitudes about school. Recent research has shown the promise of school-based interventions to improve certain student academic attitudes but has also raised concerns about a lack of reliable measures of these attitudes for early adolescents. We compiled the Malleable Social-Psychological Academic Attitudes (MSPAA) survey to measure school trust, social belonging, evaluation anxiety, self-complexity, locus of control, and identification with school. We adapted MSPAA measures to make them more appropriate for early adolescents in the school context, assessed the measurement properties of the MSPAA survey, and examined how student responses differed based on various demographic factors. We found that this brief survey reliably measured these constructs among early adolescents ($N = 2158$). Additionally, differences by grade level, school context, gender, and racial group revealed insightful patterns of variation that have implications for social and psychological theory, as well as for practices in schools. We close by suggesting further study of this survey for use among education researchers and within schools.

[☆] Research on this paper was supported by grants from the Institute of Education Sciences, U.S. Department of Education (R305A110136 and R305C050055). Findings and conclusions are those of the authors and do not necessarily reflect the views of the supporting agency. Special thanks to Paul Hanselman for his comments as we developed this manuscript. We also thank Sarah Bruch, Dominique Bradley, Sara Dahill-Brown, Adam Gamoran, Jeffrey Grigg, Paul Hanselman, and the rest of the MWAP project team for their help in conducting the study, and the Madison Metropolitan School District for their help and cooperation with this research project.

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<https://doi.org/10.1016/j.jsp.2018.10.004>

Received 26 September 2016; Received in revised form 25 June 2018; Accepted 10 October 2018

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1. Introduction

Schools typically focus on academic achievement and developing students' cognitive abilities. However, there is growing support for the importance of also focusing on measuring and improving students' noncognitive factors² - often defined as attitudes, skills, strategies, behaviors, and attributes that are distinct from intellectual or content-based knowledge (Farrington et al., 2012). This focus is termed the whole child perspective, which emphasizes students' psychological and emotional development in addition to their knowledge development (Moore, Lippman, & Ryberg, 2015). Social scientists across a variety of disciplines, including psychologists (e.g., Duckworth & Yeager, 2015), economists (e.g., Cunha & Heckman, 2010), and sociologists (e.g., Farkas, 2003) have called for increased rigorous study of noncognitive factors and view them as important life and well-being outcomes, alongside measures of cognitive ability.

Why are noncognitive factors important? First, noncognitive factors predict a wide variety of life outcomes such as wage growth, employment, educational attainment, and behavior - independent of the effects of important predictors like schooling, intelligence, and cognitive skills (e.g., Groves, 2005; Hall & Farkas, 2011; Heckman, Stixrud, & Urzua, 2006). Second, they are important standalone outcomes shaped in part by the school environment. That is, they are important not just for what they predict, but because they represent students' *well-being*, or their satisfaction and comfort in school (Jayawickreme & Dahill-Brown, 2016). For example, that students feel like they belong or they can trust teachers are important factors by themselves, whether or not they predict subsequent educational attainment, achievement, or employment opportunities. Since noncognitive factors can be independently important, there is value in understanding how they are measured in specific contexts and how diverse groups of students differ on them as an indication of well-being in schools.

1.1. Malleable social-psychological academic attitudes

Despite increasing recognition of the importance of noncognitive factors and student well-being, the bulk of the research in education continues to focus on improving student achievement. In this paper, we focus on a core set of noncognitive factors that we term “Malleable Social-Psychological Academic Attitudes” (MSPAA). Social psychologists have recently begun testing interventions that target the improvement of specific student academic attitudes in schools, and an emerging group of these interventions have proven successful in randomized field experiments (Beilock, Schaeffer, & Rozek, 2017; Lazowski & Hulleman, 2016; Yeager & Walton, 2011). Thus, we selected the academic attitudes in the MSPAA because these social-psychological interventions can potentially impact them (see Table 1 for a list of factors and relevant highlighted intervention studies). This set of academic attitudes includes school trust, social belonging, evaluation anxiety, self-complexity, external locus of control, and identification with school.

School trust is the degree to which students believe adults in the school care about them and treat them fairly. Studies have concluded that levels of school trust are negatively associated with emotional distress, suicidality, and violence (Resnick et al., 1997) and positively associated with motivation, grades, and effort in school (Goodenow, 1993). Social-psychological intervention research has demonstrated that school trust can be improved through “wise feedback” interventions, which involve critical feedback on assignments from teachers paired with the message that teachers believe in students' capabilities to succeed (Cohen, Steele, & Ross, 1999; Yeager et al., 2014; Yeager, Purdie-Vaughns, Hooper, & Cohen, 2017).

Social belonging is the degree to which students feel like their peers accept them in a given social context. Much research over the years has found that social belonging is related to students' sense of fit in academic departments (Walton & Cohen, 2007), students' motivation and persistence independent of perceptions of ability, self-efficacy, and achievement (Lewis & Hodges, 2015), and overall academic achievement across the ability spectrum (Cook, Purdie-Vaughns, Garcia, & Cohen, 2012). Social belonging can be improved by interventions that help students to manage their social stress (i.e., social belonging interventions; Walton & Cohen, 2011; Yeager et al., 2016) and by interventions that ask students and teachers to focus on group-building and friend-making (Gehlbach et al., 2016; Haslam, Cruwys, Haslam, Dingle, & Bentley, 2016; Rosenthal & Crisp, 2006).

Evaluation anxiety is worry or negative thoughts that occur due to anticipation of poor performance on an evaluation (e.g., test in school). Schlenker and Leary's (1982) work on social anxiety and Markus's (1977) work on self-schemata and performance on cognitive tasks serve as the bases for the development of the construct of evaluation anxiety. Spencer, Steele, and Quinn (1999) developed the scale and found that negative stereotypes about women in math domains increased their evaluation anxiety on difficult math examinations as compared to men. Evaluation anxiety can be reduced by having students write about and express their worries throughout the semester or directly before stressful exams. This can help offload worries associated with anxiety and improve academic achievement (i.e., expressive writing; Hines, Brown, & Myran, 2016; Ramirez & Beilock, 2011), or by teaching students to interpret their evaluation anxiety as helpful energy that they can use to perform well in school (i.e., anxiety reappraisal; Jamieson et al., 2016).

Self-complexity is the degree to which individuals see themselves as elaborate and detailed versus simple and straightforward.

² The term “noncognitive” is embedded in social science research and has been characterized as one that is widely recognized by scholars in various disciplines, but disliked by most. Researchers will refer to this large group of variables nearly interchangeably as [character, virtue, noncognitive, personality, personal, soft] - [traits, skills, attitudes characteristics, qualities], each with their own benefits and detractions. Duckworth and Yeager (2015) argue that all these terms occupy similar conceptual space, despite offering different connotations, and although correct terminology is ultimately of value, they conclude, from a scientific standpoint, that consensus on specific variables and their definitions/operationalization is more important.

Table 1
Interventions that Impact Student Attitudes.

MSPAA scale	Definition	Recommended intervention	Representative paper
School trust	Belief that adults in school care and are fair	Wise feedback	Yeager et al. (2014)
Social belonging	Belief that one fits in at school with one's peers	Social belonging intervention	Walton and Cohen (2011)
Evaluation anxiety	Worry about poor performance	Anxiety reappraisal	Jamieson, Peters, Greenwood, and Altose (2016)
Self-complexity	Belief that one has an elaborate and multifaceted identity or sense of self	Self-affirmation	Cohen, Garcia, Purdie-Vaughns, Apfel, and Brzustoski (2009)
External locus of control	Belief that uncontrollable outside forces direct one's success in school	Attributional retraining	Perry and Penner (1990)
Identification with school	Belief that success in school is important	Utility-value intervention	Hulleman and Harackiewicz (2009)

Because self-complexity is defined as the number of self-aspects that are salient to a person (e.g., being a student, family member, athlete, etc.), it can differ across development and contexts. Within school contexts, stigmatized students might view themselves as less complex because of negative stereotypes about their group, which might focus their attention on this negative aspect of their identity. When a lack of self-complexity includes viewing oneself as something negative (e.g., as a bad student), it can have harmful effects on behavior and academic performance (Critcher & Dunning, 2015; Steele & Aronson, 1995). Studies have shown that higher levels of self-complexity are related to lower levels of depression under high-stress circumstances (Linville, 1987) and reduced perceived threat and defensiveness (Critcher & Dunning, 2015). Theory predicts that if multiple aspects of individuals' identities are salient when they are threatened, they can more easily turn to a non-threatened aspect of their identity in order to escape or buffer themselves from the negative effects of feeling threatened in one domain (Walton, Paunesku, & Dweck, 2012). Self-complexity can be increased by an intervention that asks students to write about various important aspects of their identities (Critcher & Dunning, 2015), which has been found to improve school trust for racial minority students and reduce the racial achievement gap in schools by up to 40% (i.e., self-affirmation: Cohen et al., 2009; Cook et al., 2012).

Locus of control is the degree to which a person believes that he or she can control events, such as getting a good grade in school, and can be internal (i.e., an individual has control) or external (i.e., an individual does not have control). A number of studies have used locus of control as an explanatory measure for educational outcomes and conclude that an external locus of control is related to lower academic achievement (Findley & Cooper, 1983; Strassburger, Rosen, Miller, & Chavez, 1990), decreases in student graduation of high school and college, and lower wages later in life (Heckman et al., 2006). To reduce students' external locus of control, Perry and Penner (1990) used an 8-min video to teach students that ability and effort result in success in school, and failure only indicated a lack of effort, which all students had it within their power to change (i.e., attribution retraining intervention). Results showed that this intervention improved performance for students high in external locus of control, suggesting that they changed from having an external locus of control to an internal locus of control (see also Haynes, Perry, Stupnisky, & Daniels, 2009 for review).

Identification with school represents the degree to which a person cares about or places importance on doing well within a domain (e.g., school) or at an activity (Harackiewicz & Sansone, 1991; Wigfield & Eccles, 2000). Numerous studies have demonstrated that identification with school (also known as “competence valuation” or “task value”) is an important process variable in intrinsic motivation research (Durik, Shechter, Noh, Rozek, & Harackiewicz, 2015; Elliot et al., 2000; Reeve & Deci, 1996). To improve identification with school, Hulleman and Harackiewicz (2009) asked students to write about how what they learned in school was personally relevant in their lives (i.e., utility-value intervention) and found that these writing exercises improved students' identification with school as well as interest, grades, and motivation in ninth grade science courses. Similar effects have been found when identification interventions involve critical socializers in students' lives, such as their parents (Rozek, Svoboda, Harackiewicz, Hulleman, & Hyde, 2017).

Given the apparent importance of these malleable academic attitudes, there likely is value in assessing them by developing psychometrically sound measures for students across age ranges. Reliable and valid measures are needed for both academic and practical purposes. With high quality measures, researchers and practitioners will be able to identify relative differences on scale scores between schools or among students from different grade levels or demographic groups. These efforts could guide universal interventions to help improve groups of students' academic attitudes. However, the majority of existing studies on these academic attitudes have focused on college students (Harackiewicz & Priniski, 2018). The literature lacks reliable measures for k-12 students, such as middle school or high school students, who may benefit from interventions targeting these attitudes. Research on these measures may yield important practical applications, such as their use to assess school climate and discern relative differences between groups of students in a school or among schools in a district.

Thus, in this paper, we describe the Malleable Social-Psychological Academic Attitudes (MSPAA) survey, a new, brief battery of academic attitudes designed to examine a particular group of noncognitive factors, adapted for early adolescents, which can be targeted by the aforementioned evidence-based interventions. Like other noncognitive factors, these specific academic attitudes, described above, are important outcomes because they are general indicators of student well-being. However, the reason we chose this particular set of attitudes is that there are available interventions linked to each of these attitudes that have the potential to shape how they change and develop in students. Additionally, certain groups of students might be more at risk than others of developing negative attitudes about school due to institutional and contextual factors, which we discuss in more detail in some of the following

sections. By examining the measurement properties and mean differences of each construct based on grade level, school context, race, and gender, we respond to recent calls from scholars (e.g., Duckworth & Yeager, 2015; Moore et al., 2015) for the development of brief, reliable measures of additional noncognitive factors. The result is a survey that can assess a particular group of attitudes that were chosen because they are related to universal interventions that were designed to improve those attitudes in schools.

1.2. Psychologically at-risk groups: Increased risk for negative academic attitudes based on age and demographic group

We hypothesize that the attitudes contained within the MSPAA survey develop over time and are responsive to individual differences and contexts. For example, students might feel more comfortable in elementary school as compared to middle school, and students from historically marginalized groups might be less likely to feel belonging or trust in school because of negative societal stereotypes about their groups. Additionally, students are developing these attitudes based on their experiences over time and might be particularly vulnerable to a decline in positive attitudes at certain stages of development. Below, we explore why students might differ in their endorsement of academic attitudes based on developmental period and demographic group membership.

1.3. Academic attitudes in early adolescence: A sensitive period?

Students' attitudes about school can develop throughout adolescence and are shaped by experience and investment (Almlund, Duckworth, Heckman, & Kautz, 2011; Cunha, Heckman, & Schennach, 2010). The malleability of attitudes has implications for how schools and education processes impact students' personal and social development. School context impacts students' academic well-being in early adolescence (Eccles, 2004), which is an important developmental period for the formation of academic attitudes (Cunha & Heckman, 2010; Yeager, Dahl, & Dweck, 2018).

Eccles and Midgley's (1989) stage-environment fit theory characterizes motivational, behavioral, and academic declines in middle school as the result of a mismatch between the environment of middle school and early adolescents' psychological needs. Unlike elementary schools, middle and high schools are usually larger and more bureaucratic, have more departmentalized curricula, lower-quality teacher-student relationships, and more frequent changes in peer groups - all mismatches to adolescents' needs at that point in development (Anderman, Maehr, & Midgley, 1999; Eccles, 2004; Eccles et al., 1993). Researchers hypothesize that students' developmental mismatch with the middle school environment results in declining positive attitudes about school, less motivation, and ultimately decreasing grades starting in middle school and continuing through college (Eccles, 2004). Although there is a general decline in students' positive attitudes about school, some students maintain positive academic attitudes. However, it is at this stage in development that students begin to have more stable concepts of who they are and what they like (Eccles, 2009). Therefore, understanding students' academic attitudes during this important developmental period might help researchers better understand the different ways individuals and groups of students cohere and adapt to the social aspects of the educational environment.

1.4. Can demographic group membership predict psychological risk?

In addition to the developmental and contextual factors described above, students' academic attitudes might also vary by race or gender due to the potentially negative ways that society views certain groups of students, based on stereotypes and prejudice. Research on Black-White achievement gaps and the effects of negative stereotypes on racial minority groups highlights one reason underlying potential attitudinal differences between different racial groups (Walton & Spencer, 2009). Other researchers have pointed to gender-specific socialization in childhood and adolescence as a source of boys' widening academic losses compared to girls' from middle school through college (Diprete & Buchmann, 2013). This gender gap in academic achievement and attainment may begin with early differences in boys' and girls' attitudes about school and the continued and growing gendered patterns of obedience and effort towards schoolwork over time. Overall, there is great potential for the MSPAA survey to quickly help identify gaps in important student attitudes based on demographic factors, such as race and gender.

1.5. Current study

Thus far, we have argued for the importance of academic attitudes as meaningful measures of student well-being and that the field would benefit from having brief and reliable measures of a specific group of malleable social-psychological academic attitudes for younger students, such as early adolescents. In the following sections, we explore the measurement properties and variation of the six academic attitudes that make up the MSPAA survey. As these scales have not been previously tested among early adolescents or across diverse racial groups in an academic context, one contribution of this paper is to show that various groups of students in this age group can reliably respond to the brief measures. Therefore, we examined the internal consistency and measurement structure of the scales to ensure they are appropriate for different populations of middle school students. We then considered the degree to which the scales are related to one another. Finally, we examined how the scales vary across groups of students, school contexts, and age. We close by discussing how and when student academic attitudes are important as standalone school-related outcomes, how schools might use the MSPAA survey, and future directions for research on these academic attitudes.

2. Method

2.1. Participants and procedures

Data were collected as part of the Madison Writing and Achievement Project (MWAP), which is a study that, among other things, involved measurement development with middle school students in 11 schools and 139 classrooms across an entire Midwestern school district (Borman, Grigg, Rozek, Hanselman, & Dewey, 2018; Hanselman, Rozek, Grigg, & Borman, 2017). The focus of this paper is the measurement development of the MSPAA survey, which students completed at the beginning of the school year during normal instructional time (approximately 15 min on average). Students who were missing responses to any of the MSPAA items were removed from the study, resulting in a 10% reduction in the sample.³ Students' parents were given the opportunity to sign and return consent forms allowing their children to participate in the study, and the students were given an opportunity to sign and return an assent form providing researchers permission to view their responses to the survey and exercises. The first cohort consisted of 1030 consented and assented seventh-grade students in the 2012–2013 school year who fully completed the MSPAA (a 55% response rate of all district seventh-graders). The sample was 51% female, 49% White, 21% African American, 16% Hispanic, 14% Asian, and a small proportion (< 1%) of students from another race or ethnicity ($N = 6$). The second cohort consisted of 1128 consented and assented sixth-grade students in the 2013–2014 school year who fully completed the MSPAA (a 63% response rate). The sample was 49% female, 51% White, 25% African American, 16% Hispanic, 8% Asian, and a small proportion (< 1%) of students from another race or ethnicity ($N = 7$). Trained project assistants administered the surveys during normal class times in fall 2012 (seventh-grade) and fall 2013 (sixth-grade) within all 11 middle schools in the district. Pooled sixth- and seventh-grade descriptive statistics for each item in the MSPAA survey are provided in Table 2.

2.2. Assessment measures

The MSPAA survey is a 19-item self-report assessment meant to measure the academic attitudes of student participants across six proposed scales (School Trust, Social Belonging, Evaluation Anxiety, Self-Complexity, External Locus of Control, and Identification with School). All items in the MSPAA survey use a five-point Likert scale ranging from one to five (1 = *Strongly disagree*, 2 = *Disagree*, 3 = *Neither agree nor disagree*, 4 = *Agree*, 5 = *Strongly agree*). As we tested the items on each scale with a younger age group than previous studies (e.g., Spencer et al., 1999; Walton & Cohen, 2007), some adaptations were necessary. When constructing multiple-choice items, Haladyna and Downing (1989) recommended revising item phrasing to minimize student reading time and to include vocabulary that is consistent with the students' level of understanding. Consistent with these recommendations and before administering the survey, a qualitative pilot study was conducted in Summer 2012 with a group of 2011–2012 middle school students ($N = 141$) enrolled in the school district. During the pilot, researchers conducted student focus groups in which members were asked to identify and flag survey questions that took too long to respond to and questions they had difficulty understanding (e.g., due to problems related to reading comprehension), subsequently removing or modifying such items.

2.2.1. School trust

The three items in this scale (i.e., “The teachers at this school treat students fairly”, “The adults at this school care about the students”, “At this school, students are supported”) were adapted from the Add Health survey (Resnick et al., 1997; $\alpha = 0.75$) and the Psychological Sense of School Membership scale (Goodenow, 1993; $\alpha = 0.88$).

2.2.2. Social belonging

The social belonging measure was derived from Walton and Cohen's (2007) Social and Academic Fit scale (i.e., “People in my school accept me”, “I feel comfortable in my school”, “I feel like I belong in my school”, “I feel like an outsider in my school” [reversed]). Their study on college students reported high reliability ($\alpha = 0.89$) for the social belonging scale and references a validation manuscript-in-preparation for the scale. However, to our knowledge, that paper remains unpublished.

2.2.3. Evaluation anxiety

We used Spencer et al.'s (1999) five-item evaluation anxiety scale ($\alpha = 0.82$) that was used for lab studies on academic-like stress for college students (“People will look down on me if I do not do well in school”; “I feel self-confident” [reversed]; “If I do poorly on an important test, people will look down on me”; “If I don't do well on important tests, others may question my ability”; “People will think I have less ability if I do not do well on important tests”).

2.2.4. Self-complexity

This two-item scale (i.e., “I could probably count on one hand the number of things that define who I am” [reversed], “I could describe who I am in a small number of words” [reversed]) was adapted from the Self-Complexity Scale (Britt, Gowen, & Earles,

³ To address the concern that dropping students who did not fully complete the survey might change the results, in results not shown, we also ran all analyses using full information maximum likelihood (FIML). The results from the models using FIML are consistent with the results reported below using listwise deletion (same factor structure and comparable though descriptively worse model fit due to not using a weighted least squares method, which is most appropriate for these data).

Table 2
Descriptive Statistics of Variables.

Item	Mean	SD
1. People in my school accept me (SB)	4.03	0.68
2. People will look down on me if I do not do well in school (EA)	2.77	1.05
3. I feel comfortable in my school (SB)	4.14	0.82
4. I feel self-confident (SConf)	4.10	0.84
5. I could probably count on one hand the number of things that define who I am (SC)	3.16	1.18
6. I feel like I belong in my school (SB)	4.05	0.86
7. Getting the grades you want is mostly a matter of luck (ELOC)	2.21	1.25
8. I could describe who I am in a small number of words (SC)	2.92	1.23
9. It is important to me to do well in school (IWS)	4.65	0.60
10. I want to do well in school (IWS)	4.71	0.55
11. The teachers at this school treat students fairly (ST)	4.08	0.81
12. If I do poorly on an important test, people will look down on me (EA)	2.71	1.02
13. The adults at this school care about the students (ST)	4.22	0.75
14. The main difference between students who get good grades and students who get bad grades is luck (ELOC)	1.97	1.03
15. At this school, students are supported (ST)	4.03	0.78
16. If I don't do well on important tests, others may question my ability (EA)	2.85	1.02
17. People will think I have less ability if I do not do well on important tests (EA)	2.80	1.05
18. I feel like an outsider in my school (SB)	2.13	1.08
19. It takes a lot of luck to be an outstanding student in most classes (ELOC)	2.44	1.31

Note. ST = School trust, SB = Social belonging, EA = Evaluation anxiety, SC = Self-complexity, ELOC = External locus of control, IWS = Identification with school, SConf = Self-Confidence.

2011). The most common way to measure self-complexity has long been the Q-sort procedure created by [Linville \(1987\)](#). This task presents individuals with stacks of pages containing various characteristics, which are then sorted based on how well the characteristics described them personally. This procedure is time-consuming and arduous, so [Britt et al. \(2011\)](#) created a self-report measure for self-complexity for college students, with high reliability ($\alpha = 0.87$).

2.2.5. External locus of control

The utilized measure consisted of a 3-item scale adapted from the Work Locus of Control Scale, created for use in adult populations to assess one's belief that he or she has control in the workplace ([Spector, 1988](#); $\alpha = 0.79$) and reworded for the school context (i.e., “Getting the grades you want is mostly a matter of luck”, “The main difference between students who get good grades and students who get bad grades is luck”, “It takes a lot of luck to be an outstanding student in most classes”).

2.2.6. Identification with school

This was a two-item scale (i.e., “It is important for me to do well in school”, “I want to do well in school”) based on the construct of competence valuation in the intrinsic motivation literature ([Elliot et al., 2000](#); $\alpha = 0.82$).

2.3. Data analysis plan

As many of these scales were not previously used among diverse groups of early adolescents in a middle school context, we began by assessing the measurement properties of the MSPAA constructs. We created primary and replication sixth- and seventh-grade samples by separating each cohort into two randomized groups, blocked by school, and then combined the groups across grade levels to create a pooled dataset for factor analyses and tests of measurement invariance. Primary samples were used for exploratory factor analyses and replication samples were used for confirmatory factor analyses. The primary sample was composed of 1086 sixth- ($N = 570$) and seventh-graders ($N = 516$). The replication sample included 1072 sixth- ($N = 558$) and seventh-graders ($N = 514$). Due to the non-normal categorical distribution of the response items, we used robust weighted least squares (RWLS) estimators for these analyses ([Kaplan, 2000](#)).

For the exploratory factor analysis, we used RWLS estimators with promax rotation. We hypothesized a 6-factor structure a priori, which was supported by empirical evidence we report in the Results section using the guideline of eigenvalues near or greater than one suggested by [Kaiser \(1960\)](#) and parallel analysis standards recommended by [Horn \(1965\)](#). As these items were adapted from six previously-existing scales, the exploratory part of this analysis involved examining whether items loaded on six factors according to those a priori expectations. Next, in the replication sample, we tested the model fit for different factor structures by conducting confirmatory factor analysis with RWLS estimators, restricting survey items to either 1- or 6-factor structures. We compared these two models in order to demonstrate the superiority of the 6-factor model to a comparison 1-factor model. We assessed model fit for the exploratory and confirmatory factor analyses based on chi-squared, comparative fit indices (CFI), and root mean squared error of approximation (RMSEA). [Hu and Bentler \(1999\)](#) used Monte Carlo analysis to recommend that a CFI close to 0.95 and RMSEA close to 0.06 suggest good fit of the model in question.

To test for consistency of factor structure across groups of students, we examined the mean and covariance structure (MACS) of the survey scales to test for invariance by gender, race, and grade level. To perform these tests, we first estimated the configural

confirmatory factor analysis model, where both factor loadings and intercepts were allowed to vary among groups. We then applied tests of measurement invariance in accordance with definitions explicated by Dimitrov (2010). First, we applied a test of weak measurement invariance, which required that metric invariance (equal factor loadings) between groups be in place. We then applied a test of strong measurement invariance, requiring that both metric and scalar invariance (equal item intercepts) be in place. Finally, we included a test of strict measurement invariance, requiring that uniqueness invariance be met (items are measured with the same precision in each group) in addition to metric and scalar invariance.

By assessing the magnitude in reduction of model fit for each subsequent model based on chi-squared, CFI, RMSEA, and Bayesian information criteria (BIC) fit statistics, we determined whether the factor structure of scales was consistent across gender, race, and grade level categories. We used Hu and Bentler's (1999) guidelines for assessing CFI and RMSEA described above. However, when judging the adequacy of model fit across several modified models, Schreiber, Nora, Stage, Barlow, and King (2006) suggested using indices such as BIC for adjudicating among models. Raftery (1995) provided the following guidelines for adjudicating between models with different BIC scores: in any given dyad of comparable models, a model with a 2–6 point lower BIC score is positively preferred, a model with a 6–10 point lower score is strongly preferred, and a model with a score > 10 points lower is very strongly preferred. Finally, we tested the internal consistency of scales using Cronbach's alpha. We used the convention of $\alpha = 0.70$ for values and beliefs (Peterson, 1994) as a guideline for assessing the adequacy of internal consistency reliability across scales, in addition to the indices we describe above.

Following psychometric evaluation of the scales, we analyzed observed variation in the MSPAA scales based on grade level, school context, race, and gender to understand attitudinal differences across groups of students in middle schools. First, we measured scales by grade level, and then within each grade level we tested for differences due to gender, racial group, and school context. Unlike the prior analyses described above, we used observed mean scores across items within each scale, using unpaired *t*-tests with unequal variances for two-category comparisons and *F*-tests for mean comparisons in categories of three or more.

3. Results

3.1. Factor analyses

3.1.1. Exploratory factor analysis

An unrestricted exploratory factor analysis identified six factors with eigenvalues near or greater than one. These six factors explained 68% of the variance in item responses, and additional factors explained negligible variance. A parallel analysis, in which the observed eigenvalues were compared to eigenvalues derived from simulated uncorrelated data, revealed that six factors had eigenvalues greater than each simulated factor's eigenvalues (see Zwick & Velicer, 1986 for a discussion of these standards). Together, these criteria supported the a priori hypothesized factor structure above. Eighteen of nineteen items loaded onto six factors in accordance with our expectations based on previous studies, with acceptable model fit in accordance with criteria by Hu and Bentler (1999) outlined above (CFI = 0.93; RMSEA = 0.052). Unexpectedly, the self-confidence item loaded highly onto the Social Belonging factor instead of the Evaluation Anxiety factor. Factor loadings ranged from 0.48–0.88 for *School Trust* (ST), from 0.56–0.77 for *Social Belonging* (SB), from 0.67–0.78 for *Evaluation Anxiety* (EA), from 0.62–0.84 for *Self-Complexity* (SC), from 0.78–0.83 for *External Locus of Control* (ELOC), and were 0.79 for the two items loading onto *Identification with School* (IWS). Scale items and factor loadings of 0.40 or higher for sixth- and seventh-grade students are presented in bold in Table 3.

3.1.2. Confirmatory factor analysis

To verify the factor structure of the 19-item model, we used confirmatory factor analysis with the randomly-selected second half of the pooled sixth- and seventh-grade sample ($N = 1084$). Because self-confidence loaded onto the Social Belonging factor in the EFA analysis above, we restricted self-confidence to load on that factor in the CFA. A one-factor model had inadequate fit ($\chi^2 = 1883$ [$df = 119$], CFI = 0.37, RMSEA = 0.11 [$p < .001$]). However, the six-factor model exhibited acceptable model fit based on comparative fit indices ($\chi^2 = 469.66$ [$df = 137$], CFI = 0.93, RMSEA = 0.05 [$p = .83$]), in accordance with the fit criteria offered by Hu and Bentler (1999) above. Additionally, each item estimate in the six-factor model was statistically significant ($p < .001$ in every case). Results from the six-factor restricted model test for the pooled sixth- and seventh-grade student sample, as well as factor correlation matrix results, are presented in Table 4.

3.1.3. Tests of measurement invariance

Table 5 displays results from the MACS analyses based on gender, race, and grade level. As mentioned above, when comparing goodness-of-fit across model specifications, comparing indices like BIC are preferable to comparing changes in typical indices such as CFI and RMSEA (Schreiber et al., 2006). Model 1 for each group displays the baseline fit statistics, whereas Models 2, 3, and 4 for each group display the change in the fit statistic when weak, strong, and strict invariance restrictions were imposed, respectively. Changes in fit statistics across models (denoted in parentheses) are changes relative to the preceding model (change from M1 to M2, from M2 to M3, and so forth). Turning first to gender results, although the chi-squared statistic increased slightly with each restriction, comparative fit indices (CFI and RMSEA) were acceptable based on the criteria by Hu and Bentler (1999) outlined above and changed very little across models. The BIC statistics showed a very strong preference for the most restrictive model (Model 4) in accordance with criteria for comparing models by Raftery (1995) described above. With the race results, the comparative fit statistics remained similarly acceptable

Table 3
Exploratory Factor Analysis Loadings.

Item	Factor												h ²	u ²	com
	School trust		Social belonging		Evaluation anxiety		Self-complexity		External locus of control		Identification with school				
	β	r _s	β	r _s	β	r _s	β	r _s	β	r _s	β	r _s			
11. Teachers are fair	0.65	0.71	0.06	0.47	0.03	-0.14	-0.06	-0.10	-0.06	-0.13	0.02	0.38	0.51	0.49	1.1
13. Adults at school care	0.88	0.85	-0.04	0.48	0.00	-0.18	0.03	-0.06	0.02	-0.10	-0.01	0.40	0.73	0.27	1.0
15. Students supported	0.48	0.65	0.26	0.56	-0.05	-0.23	0.01	-0.05	0.02	-0.13	0.02	0.37	0.47	0.53	1.6
1. People like accept me	-0.07	0.28	0.69	0.59	0.04	-0.17	0.01	-0.03	0.01	-0.11	-0.10	0.19	0.36	0.64	1.1
3. Comfortable in my school	0.05	0.48	0.71	0.74	0.01	-0.22	0.01	-0.05	0.04	-0.14	0.04	0.39	0.56	0.44	1.0
4. I feel self-confident	0.00	0.33	0.56	0.55	0.06	-0.12	0.03	-0.01	0.01	-0.13	0.04	0.30	0.31	0.69	1.0
6. Belong in my school	0.02	0.46	0.77	0.75	0.02	-0.21	-0.01	-0.09	0.08	-0.09	-0.02	0.34	0.57	0.43	1.0
18. Feel like outsider	-0.14	0.29	0.60	0.62	-0.14	-0.35	0.03	0.00	-0.14	-0.33	0.06	0.30	0.45	0.55	1.4
2. Want to do well	0.01	-0.07	0.10	-0.11	0.70	0.66	-0.07	-0.17	-0.04	0.19	-0.03	0.03	0.46	0.54	1.1
12. Test: look down on me	0.02	-0.14	0.05	-0.21	0.78	0.75	-0.05	-0.16	-0.04	0.23	-0.08	-0.04	0.57	0.43	1.0
16. Others question ability	-0.01	-0.19	-0.07	-0.29	0.70	0.72	0.06	-0.05	0.01	0.21	0.04	-0.01	0.52	0.48	1.0
17. Think less of my ability	-0.04	-0.20	-0.07	-0.29	0.67	0.71	0.07	-0.06	0.05	0.23	0.08	0.01	0.51	0.49	1.1
5. Count on one hand	0.06	-0.06	-0.06	-0.08	-0.02	-0.12	0.62	0.62	0.00	-0.27	-0.05	-0.08	0.39	0.61	1.1
8. Small number of words	0.00	-0.04	0.05	0.01	0.01	-0.16	0.84	0.85	-0.04	-0.44	0.02	0.01	0.72	0.28	1.0
7. Grades a matter of luck	0.01	-0.07	0.02	-0.13	-0.06	0.19	-0.09	-0.45	0.78	0.80	-0.02	-0.17	0.66	0.34	1.0
14. Good grades are luck	0.01	-0.12	0.02	-0.18	-0.01	0.24	0.02	-0.37	0.83	0.83	-0.06	-0.23	0.69	0.31	1.0
19. Luck to be outstanding	-0.02	-0.08	0.03	0.14	0.05	0.28	0.03	-0.35	0.80	0.78	0.08	-0.10	0.61	0.39	1.0
9. Important to do well	0.00	0.39	0.03	0.38	0.02	0.01	0.04	-0.01	0.05	-0.15	0.79	0.79	0.62	0.38	1.0
10. Want to do well	0.01	0.41	0.00	0.40	-0.03	-0.05	-0.04	-0.04	-0.06	-0.23	0.79	0.81	0.65	0.35	1.0

Note. Pattern coefficients (β) and structure coefficients (r_s) are shown; a priori target factor loadings are shaded in gray. Parameter estimates are from a promax-rotated solution. Factor loadings above 0.40 are in bold. CFI = 0.95; RMSEA = 0.052 (90% CI = 0.045–0.058). h² = communality, u² = uniqueness.

and largely unchanged through Model 3. However, model fit for strict invariance (Model 4) worsened considerably by all comparative fit measures.⁴ BIC statistics strongly favored the strong invariance model for race (Model 3). By grade level, although CFI and RMSEA were acceptable and very similar across models, BIC statistics strongly favored the strong invariance model (Model 3) here as well. Given these results, it is reasonable to assume that the measure loadings and item intercepts did not vary by gender, race, or grade level in this sample but the precision with which items are measured might vary between racial groups and grade levels.

3.1.4. Internal consistency: Reliability of scales

As a final assessment of internal consistency reliability, we assessed the Cronbach's alpha coefficient for all six scales, using the guideline of α = 0.70 reported by Peterson (1994) to determine acceptable internal consistency for individuals' values and beliefs. Although the internal consistency reliability for Self-Complexity was marginally lower (α = 0.69), School Trust (α = 0.74), Social Belonging (α = 0.76), Evaluation Anxiety (α = 0.79), External Locus of Control (α = 0.83), and Identification with School (α = 0.73) met the 0.70 threshold.

3.2. Correlations between scales

Scale correlations for sixth-grade students (Table 6) indicate moderate-to-strong correlations between Social Belonging and School Trust (r = 0.52), Identification with School and School Trust (r = 0.40), and moderate correlations between Social Belonging and Identification with School (r = 0.32), Social Belonging and Evaluation Anxiety (r = -0.28), External Locus of Control and Evaluation Anxiety (r = 0.27), and External Locus of Control and Self-Complexity (r = -0.28).

Scale correlations for seventh-grade students indicated moderate-to-strong correlations between Social Belonging and School Trust (r = 0.44), and External Locus of Control and Self-Complexity (r = -0.44). Moderate correlations were found between School Trust and Identification with School (r = 0.34), Social Belonging and Identification with School (r = 0.33), Evaluation Anxiety and Social Belonging (r = -0.30), Evaluation Anxiety and External Locus of Control (r = 0.29), and External Locus of Control and Identification with School (r = -0.29).

3.3. MSPAA scale variation across groups

Table 7 displays the observed means, standard deviations, effect sizes, and test statistics for potential variation in MSPAA scale

⁴ Poor fit for Model 4 might be due to the difference in sample sizes between different racial groups in our sample, as that could lead to differences in the error term for each racial group, which is important in this test of invariance.

Table 4
Restricted Six-Factor Model Results.

Item	Factor											
	School trust		Social belonging		Evaluation anxiety		Self-complexity		External locus of control		Identification with school	
	β	r_s	β	r_s	β	r_s	β	r_s	β	r_s	β	r_s
11. Teachers are fair	0.61	<i>0.61</i>	0.00	<i>0.37</i>	0.00	<i>-0.10</i>	0.00	<i>-0.08</i>	0.00	<i>-0.09</i>	0.00	<i>0.29</i>
13. Adults at school care	0.70	<i>0.70</i>	0.00	<i>0.43</i>	0.00	<i>-0.12</i>	0.00	<i>-0.09</i>	0.00	<i>-0.11</i>	0.00	<i>0.33</i>
15. Students supported	0.75	<i>0.75</i>	0.00	<i>0.46</i>	0.00	<i>-0.13</i>	0.00	<i>-0.10</i>	0.00	<i>-0.11</i>	0.00	<i>0.35</i>
1. People accept me	0.00	<i>0.33</i>	0.54	<i>0.54</i>	0.00	<i>-0.19</i>	0.00	<i>-0.06</i>	0.00	<i>-0.14</i>	0.00	<i>0.21</i>
3. Comfortable in my school	0.00	<i>0.45</i>	0.73	<i>0.73</i>	0.00	<i>-0.26</i>	0.00	<i>-0.09</i>	0.00	<i>-0.19</i>	0.00	<i>0.28</i>
6. Belong in my school	0.00	<i>0.40</i>	0.66	<i>0.66</i>	0.00	<i>-0.24</i>	0.00	<i>-0.08</i>	0.00	<i>-0.17</i>	0.00	<i>0.26</i>
18. Feel like an outsider	0.00	<i>0.39</i>	0.64	<i>0.64</i>	0.00	<i>-0.23</i>	0.00	<i>-0.08</i>	0.00	<i>-0.17</i>	0.00	<i>0.25</i>
4. I feel self-confident	0.00	<i>0.34</i>	0.56	<i>0.56</i>	0.00	<i>-0.20</i>	0.00	<i>-0.07</i>	0.00	<i>-0.15</i>	0.00	<i>0.22</i>
2. Want to do well	0.00	<i>-0.10</i>	0.00	<i>-0.21</i>	0.57	<i>0.57</i>	0.00	<i>0.02</i>	0.00	<i>0.22</i>	0.00	<i>0.00</i>
12. Test: look down on me	0.00	<i>-0.12</i>	0.00	<i>-0.26</i>	0.72	<i>0.72</i>	0.00	<i>0.03</i>	0.00	<i>0.28</i>	0.00	<i>0.00</i>
16. Others question ability	0.00	<i>-0.13</i>	0.00	<i>-0.27</i>	0.74	<i>0.74</i>	0.00	<i>0.03</i>	0.00	<i>0.29</i>	0.00	<i>0.00</i>
17. Think less of my ability	0.00	<i>-0.13</i>	0.00	<i>-0.28</i>	0.78	<i>0.78</i>	0.00	<i>0.03</i>	0.00	<i>0.30</i>	0.00	<i>0.00</i>
8. Small number of words	0.00	<i>-0.12</i>	0.00	<i>-0.11</i>	0.00	<i>-0.12</i>	0.93	<i>0.93</i>	0.00	<i>-0.38</i>	0.00	<i>0.02</i>
5. Count on one hand	0.00	<i>-0.08</i>	0.00	<i>-0.07</i>	0.00	<i>-0.08</i>	0.58	<i>0.58</i>	0.00	<i>-0.24</i>	0.00	<i>0.01</i>
7. Grades a matter of luck	0.00	<i>-0.12</i>	0.00	<i>-0.22</i>	0.00	<i>0.32</i>	0.00	<i>-0.34</i>	0.83	<i>0.83</i>	0.00	<i>-0.25</i>
14. Good grades are luck	0.00	<i>-0.12</i>	0.00	<i>-0.21</i>	0.00	<i>0.31</i>	0.00	<i>-0.33</i>	0.80	<i>0.80</i>	0.00	<i>-0.24</i>
19. Luck to be outstanding	0.00	<i>-0.12</i>	0.00	<i>-0.20</i>	0.00	<i>0.30</i>	0.00	<i>-0.32</i>	0.78	<i>0.78</i>	0.00	<i>-0.23</i>
9. Important to do well	0.00	<i>0.32</i>	0.00	<i>0.27</i>	0.00	<i>0.00</i>	0.00	<i>0.01</i>	0.00	<i>-0.21</i>	0.69	<i>0.69</i>
10. Want to do well	0.00	<i>0.34</i>	0.00	<i>0.28</i>	0.00	<i>0.00</i>	0.00	<i>0.01</i>	0.00	<i>-0.22</i>	0.73	<i>0.73</i>

Factor correlations matrix

Factor	ST	SB	EA	SC	ELOC	IWS
School trust	–					
Social belonging	0.61	–				
Evaluation anxiety	-0.17	-0.36	–			
Self-complexity	-0.13	-0.12	-0.13	–		
External locus of control	-0.15	-0.26	0.39	-0.41	–	
Identification with school	0.47	0.39	0.00	0.02	-0.30	–

Note. Chi-square ($df = 137$) = 469.66; CFI = 0.93; RMSEA = 0.044 (90% CI = 0.039–0.049). ST = School trust, SB = Social belonging, EA = Evaluation anxiety, SC = Self-complexity, ELOC = External locus of control, IWS = Identification with school. Restricted standardized pattern coefficients (β) are in bold. Standardized structure coefficients (r_s) are in italics.

Table 5
Quality of Fit for Subgroup Models.

Subgroup	$\chi^2(\Delta\chi^2)$	df(Δdf)	p(Δp)	CFI(ΔCFI)	RMSEA(Δ)	BIC(ΔBIC)
Gender						
M1: Configural	1177.5	274	< 0.001	0.934	0.055	97,314
M2: Weak invariance	(13.9)	(13)	(< 0.001)	(0.000)	(-0.001)	(-86)
M3: Strong invariance	(28.8)	(13)	(< 0.001)	(-0.001)	(-0.001)	(-71)
M4: Strict invariance	(97.2)	(19)	(< 0.001)	(0.000)	(0.000)	(-49)
Race						
M1: Configural	1571.2	548	< 0.001	0.924	0.059	97,072
M2: Weak invariance	(106.5)	(39)	(< 0.001)	(-0.004)	(0.000)	(-195)
M3: Strong invariance	(117.9)	(39)	(< 0.001)	(-0.006)	(-0.001)	(-180)
M4: Strict invariance	(566.3)	(57)	(< 0.001)	(-0.038)	(0.010)	(128)
Grade						
M1: Configural	1195.6	274	< 0.001	0.933	0.056	97,038
M2: Weak invariance	(99.1)	(13)	(< 0.001)	(-0.006)	(0.001)	(-1)
M3: Strong invariance	(42.7)	(13)	(< 0.001)	(-0.002)	(0.002)	(-57)
M4: Strict invariance	(197.3)	(19)	(< 0.001)	(-0.013)	(0.000)	(51)

Note: Changes in fit statistics across models (denoted in parentheses) are changes from model-to-model. For example, the estimate in parentheses for M4 is the change in the statistic relative to M3.

means. Because the single-item relating to self-confidence did not fit with its hypothesized scale (Evaluation Anxiety) in the factor analyses, we separated this item into its own column when calculating mean differences. Test statistics that are significant at the $p < .05$ level are displayed in bold in both tables.

Table 6
Scale Correlations by Grade.

	ST	SB	EA	SC	ELOC	IWS
School trust	–	<i>0.52</i>	<i>–0.18</i>	<i>–0.09</i>	<i>–0.13</i>	<i>0.40</i>
Social belonging	0.44	–	<i>–0.28</i>	<i>–0.06</i>	<i>–0.17</i>	<i>0.32</i>
Evaluation anxiety	–0.12	–0.30	–	<i>–0.11</i>	<i>0.27</i>	<i>0.04</i>
Self-complexity	–0.05	–0.02	–0.12	–	<i>–0.28</i>	<i>–0.08</i>
External locus of control	–0.11	–0.25	0.29	–0.44	–	<i>–0.12</i>
Identification with school	0.34	0.33	–0.05	0.07	–0.29	–

Note. Numbers in bold are 7th grade scale correlations. Numbers in italics are 6th grade scale correlations.
ST = School trust, SB = Social belonging, EA = Evaluation anxiety, SC = Self-complexity, ELOC = External locus of control.
IWS = Identification with school.

Table 7
Mean Differences in Attitude Scales by Grade, Gender, Race, and School Context.

Group	School trust				Social belonging				Evaluation anxiety				Self-confidence			
	Mean	SD	<i>d</i> ¹	Test	Mean	SD	<i>d</i> ¹	Test	Mean	SD	<i>d</i> ¹	Test	Mean	SD	<i>d</i> ¹	Test
Between grades																
6th grade	4.23	0.64		9.83	4.04	0.65		1.47	2.75	0.83		–2.07	4.12	0.89		–1.59
7th grade	3.96	0.61	<i>–0.43</i>		4.00	0.66	<i>–0.06</i>		2.82	0.81	<i>0.09</i>		4.06	0.79	<i>–0.07</i>	
Within 6th grade																
Male	4.22	0.64		<i>–0.75</i>	4.07	0.64		1.90	2.79	0.85		1.54	4.19	0.81		2.40
Female	4.25	0.58	<i>0.05</i>		4.00	0.67	<i>–0.11</i>		2.71	0.80	<i>–0.10</i>		4.06	0.95	<i>–0.15</i>	
White	4.24	0.58		2.84	4.06	0.66		0.60	2.66	0.77		4.59	4.12	0.88		0.57
African-Amer.	4.13	0.68	<i>–0.18</i>		4.00	0.68	<i>–0.09</i>		2.84	0.91	<i>0.22</i>		4.19	0.95	<i>0.08</i>	
Hispanic	4.28	0.62	<i>0.07</i>		4.05	0.63	<i>–0.02</i>		2.84	0.88	<i>0.22</i>		4.11	0.85	<i>–0.01</i>	
Asian	4.28	0.56	<i>0.07</i>		4.00	0.62	<i>–0.09</i>		2.81	0.79	<i>0.19</i>		4.07	0.88	<i>–0.06</i>	
School	–	–	–	2.56	–	–	–	4.40	–	–	–	3.36	–	–	–	3.00
Within 7th grade																
Male	3.93	0.66		–2.12	4.04	0.62		2.08	2.82	0.80		0.02	4.14	0.73		2.96
Female	4.01	0.61	<i>0.13</i>		3.96	0.68	<i>–0.12</i>		2.82	0.81	<i>0.00</i>		3.99	0.84	<i>–0.19</i>	
White	3.93	0.60		4.31	3.98	0.68		0.43	2.79	0.77		1.47	4.04	0.79		3.79
African-Amer.	3.90	0.74	<i>–0.05</i>		4.05	0.64	<i>0.11</i>		2.78	0.89	<i>–0.01</i>		4.18	0.84	<i>0.18</i>	
Hispanic	4.11	0.59	<i>0.29</i>		4.03	0.60	<i>0.08</i>		2.89	0.76	<i>0.13</i>		4.13	0.76	<i>0.11</i>	
Asian	4.02	0.63	<i>0.15</i>		3.96	0.65	<i>–0.03</i>		2.91	0.83	<i>0.15</i>		3.93	0.74	<i>–0.14</i>	
School	–	–	–	5.54	–	–	–	3.17	–	–	–	0.98	–	–	–	0.52
Self-complexity																
External LOC																
Identify with school																
Group	Mean	SD	<i>d</i> ¹	Test	Mean	SD	<i>d</i> ¹	Test	Mean	SD	<i>d</i> ¹	Test	Mean	SD	<i>d</i> ¹	Test
Between grades																
6th grade	2.94	1.07		<i>–1.31</i>	2.24	1.07		1.71	4.71	0.49		2.92				
7th grade	2.99	1.04	<i>0.05</i>		2.17	1.01	<i>–0.07</i>		4.64	0.52	<i>–0.14</i>					
Within 6th grade																
Male	2.94	0.44		<i>0.10</i>	2.21	1.11		<i>–0.91</i>	4.68	0.52		–2.00				
Female	2.93	0.45	<i>–0.01</i>		2.27	1.04	<i>0.06</i>		4.74	0.46	<i>0.12</i>					
White	3.18	1.06		21.8	1.82	0.84		70.6	4.71	0.48		0.95				
African-Amer.	2.65	1.06	<i>–0.49</i>		2.70	1.12	<i>0.82</i>		4.66	0.56	<i>–0.10</i>					
Hispanic	2.64	1.02	<i>–0.51</i>		2.75	1.12	<i>0.92</i>		4.74	0.45	<i>0.06</i>					
Asian	2.92	0.92	<i>–0.25</i>		2.38	1.08	<i>0.55</i>		4.71	0.47	<i>0.00</i>					
School	–	–	–	4.38	–	–	–	8.53	–	–	–	1.19				
Within 7th grade																
Male	2.97	1.01		<i>–0.89</i>	2.11	0.96		<i>–1.86</i>	4.60	0.53		–2.48				
Female	3.02	1.08	<i>0.05</i>		2.22	1.05	<i>0.11</i>		4.68	0.51	<i>0.15</i>					
White	3.32	1.01		36.5	1.88	0.88		31.4	4.62	0.54		1.00				
African-Amer.	2.70	1.09	<i>–0.58</i>		2.54	1.02	<i>0.67</i>		4.64	0.54	<i>0.04</i>					
Hispanic	2.53	0.92	<i>–0.76</i>		2.48	1.03	<i>0.63</i>		4.66	0.50	<i>0.07</i>					
Asian	2.86	0.85	<i>–0.45</i>		2.25	1.06	<i>0.38</i>		4.69	0.46	<i>0.12</i>					
School	–	–	–	2.97	–	–	–	5.35	–	–	–	3.21				

Note. Two-category comparisons use t-tests and three-or-more category comparisons use F-tests. F-tests for schools are across 11 middle schools. Bolded test statistics indicate that the test is significant at the $p < .05$ level. ¹For race/ethnicity, effect size is calculated in reference to white students.

Note. Two-category observed comparisons use t-tests and three-or-more category comparisons use F-tests. F-tests for schools are across 11 middle schools. Bolded test statistics indicate that the test is significant at the $p < .05$ level. ¹For race/ethnicity, effect size is calculated in reference to white students.

First, we tested for differences between grade levels. In our samples, seventh-graders had statistically significantly higher levels of Evaluation Anxiety than sixth-graders ($d = 0.09$), and statistically significantly lower levels of School Trust ($d = -0.43$) and Identification with School ($d = -0.14$) than sixth-graders, consistent with the decline in positive attitudes about school predicted by Eccles' stage-fit theory. No other measures were statistically different between the grade levels. Next, we tested for differences based on gender, race, and school context within each grade level, starting with sixth graders. Among sixth-graders, the only statistically significant differences by gender were seen in lower levels of Self-Confidence for girls than boys ($d = -0.15$) and higher levels of Identification with School for girls compared to boys ($d = 0.12$).

There were racial differences on several scales. African American sixth-graders had lower levels of School Trust than other racial groups (White-African American gap: $d = 0.18$). African American and Hispanic sixth-graders had lower levels of Self-Complexity than White and Asian sixth-graders (White-African American: $d = 0.49$, White-Hispanic: $d = 0.51$), and higher levels of External Locus of Control than White and Asian sixth-graders (White-African American: $d = -0.82$, White-Hispanic: $d = -0.92$). African American and Hispanic sixth-graders also had higher levels of Evaluation Anxiety than White sixth-graders (White-African American: $d = -0.22$, White-Hispanic: $d = -0.22$). All measures except for Identification with School also varied by school context for sixth-graders, indicating substantial across-school variability in these constructs.

Among seventh-graders, girls had statistically-significantly higher levels of School Trust ($d = 0.13$) and Identification with School ($d = 0.15$) than boys but significantly lower levels of Social Belonging ($d = -0.12$) and Self-Confidence ($d = -0.19$) than boys. By race, African American seventh-graders had the lowest and Hispanic seventh-graders had the highest levels of School Trust, whereas African American and Hispanic seventh-graders had lower levels of Self-Complexity (White-African American: $d = 0.58$, White-Hispanic: $d = 0.76$) and higher levels of Self-Confidence (White-African American: $d = -0.18$) and External Locus of Control (White-African American: $d = -0.67$, White-Hispanic: $d = -0.63$) than White and Asian seventh-graders. All scales except Evaluation Anxiety and Self-Confidence varied by school context for seventh-graders, which indicates substantial across-school variability for this age group as well.⁵

4. Discussion

Recent intervention research in schools has identified a group of particularly important student attitudes that are malleable to intervention (e.g., Beilock et al., 2017; Lazowski & Hulleman, 2016; Yeager & Walton, 2011) but are lacking reliable measures for early adolescents in school contexts. We designed the brief MSPAA survey to assess early adolescents' school trust, social belonging, evaluation anxiety, self-complexity, locus of control, and identification with school. These constructs are a diverse collection of student academic attitudes that expand and refine the measurement of noncognitive factors in education research. The MSPAA scales include a set of academic attitudes that might be useful as predictors of academic outcomes. However, we argue that these academic attitudes are important stand-alone student well-being outcomes that are shaped by school contexts and potentially open to universal intervention by school personnel. Although studies previously assessed reliability of measures of these constructs in older groups of students or in other contexts, our results demonstrate acceptable factor structure (CFA: CFI = 0.95; RMSEA = 0.04), internal consistency reliability ($\alpha \sim 0.70$ or higher for each scale), and invariance across groups of brief measures of these constructs in students as young as sixth graders. In the following subsections, we review key features of the MSPAA survey, discuss the implications of mean differences based on age and demographic group, and highlight the significance of considering academic attitudes as important educational outcomes.

4.1. Implications of key features of the MSPAA survey

In our study, we examined this group of academic attitudes together in a brief survey. Since they are usually studied in isolation, little research has been done to examine categories of academic attitudes together to understand how they might theoretically or empirically be related to (or different from) one another. Certain scale inter-correlations in the present study suggest patterns that are consistent with educational and psychological theories. For example, meaningful correlations between social belonging and school trust (positive) and social belonging and evaluation anxiety (negative) are in keeping with the explanations for why students begin to disengage from school due to a lack of fit with the middle school environment (Walton & Brady, 2017). As these scales all measure different attitudes based on interactions with others in school, we can think of their associations with each other as markers for how one type of relationship with others in school can correspond to feelings about other types of school relationships. Similarly, meaningful correlations between external locus of control, identification with school, and self-complexity suggest that students' perceptions about themselves in the school context rely on an intricate interplay of internal resources that support one another.

The length of the survey also has implications for schools and researchers. The MSPAA survey is 19 items long and reliably measures six different constructs, which makes it an effective tool for schools and districts that are understandably conservative about using class time to administer instruments to students. Additionally, given that scales range from two to five items, the MSPAA can

⁵ To determine whether statistically significant mean differences were the result of measurement error in the survey items, in results not shown, we tested latent mean differences by gender and race. These differences were largely consistent with their corresponding observed mean differences. There were a few exceptions, however. In terms of statistical significance, discrepancies between latent and observed mean differences suggest measurement error might be a factor in observed results for (1) social belonging by grade level, (2) social belonging by seventh grade gender and (3) identification with school by sixth grade gender.

potentially be included by researchers as a collection of rigorously measured and brief scales that can be incorporated into cross-sectional and longitudinal studies of middle-school-aged students, where items compete for highly valued space to maximize the amount of collected variables. According to Moore et al. (2015), such brief measures repeated over time are desirable for assessing the impact of academic attitudes and have been shown to be more predictive of important outcomes than single, long-form scales measuring the same constructs.

4.2. Differences in academic attitudes by age and demographic group

Mean differences on the MSPAA survey scales showed that these academic attitudes differed depending on students' school context, as well as grade level, gender, and racial and ethnic group. Grade-level attitudinal differences we observed support *stage-environment fit* theory (Eccles & Midgley, 1989). Consistent with prior research on academic declines in middle school, our results suggest that students might enter middle school with relatively less worry about evaluation than older students and more positive attitudes about school in general and about the adults in school in particular. However, over time they might begin to develop negative attitudes as they note their lack of fit in their new environment. Students moving from elementary school to middle school might be uncertain about their attitudes in school during this transition. Depending on the student-school fit, this uncertainty could solidify into negative attitudes in school once they become seventh-graders, resulting in lower trust, belonging, and identification with school as well as higher anxiety about performing well in school. Additionally, given that we see statistically significant mean differences across schools on most measures, school context likely plays an important role in shaping the academic attitudes of students. All of this suggests the structural transition to middle school is a potentially impactful point for universal intervention to allow for improved attitudes, which is prior to when these attitudes begin their shift in a negative direction.

Other mean differences on several MSPAA scales show there might also be important racial and gender gaps in students' attitudes about school, and schools that identify these gaps might consider addressing disparities. There were consistent and large Black-White and Hispanic-White racial gaps on two attitudes: external locus of control and self-complexity. Negatively stereotyped racial minority group students, specifically African American and Hispanic students, reported higher levels of external locus of control and lower levels of self-complexity in school than their White peers, suggesting that the MSPAA survey can identify racial well-being gaps in schools. Further, additional research could show how interventions might reduce these gaps, and schools could track students' progress longitudinally to assess progress in reducing gaps.

Gender differences in academic attitudes might also point to areas for future study and intervention. For boys, attachment to school can give way to the opposing tension of an emerging masculine identity (Diprete & Buchmann, 2013; Morris, 2012). Consistent with this literature, we provide evidence in this study that sixth- and seventh-grade boys reported lower identification with school than girls, and seventh-grade boys reported lower school trust compared to seventh-grade girls. Mean differences on identification with school show up in both grades, which suggests that improved upstream interventions in elementary school or earlier might help boys enter middle school with a stronger attachment to school. Gender differences on school trust only start to show up in seventh grade, which suggests middle school culture could be an important factor determining how boys think they should orient themselves in school over time.

These meaningful differences based on grade, school context, race, and gender suggest that academic attitudes could potentially be used as predictors and outcomes to address problems posed in future education research. As predictors, theory posits they might be useful as explanatory mechanisms through which social disadvantages affect educational achievement. For example, stereotype threat is the idea that negatively stereotyped students feel pressure to perform well because of the negative stereotypes about their group, such as their race or gender (Steele & Aronson, 1995). Multiple studies have concluded that this psychological threat underlies part of the racial achievement gap in academic performance (see Walton & Spencer, 2009) and likely has a series of consequences on students' psychological well-being that propagate over time (Cohen et al., 2009). Measures on the MSPAA survey could serve to clarify key explanatory mechanisms in the effect of stereotype threat on school-related outcomes in future studies. Additionally, these scales might be helpful for determining the effects of self-complexity, identification with school, or evaluation anxiety on academic performance, of social belonging on disciplinary referral rates, or of external locus of control on post-secondary expectations.

4.3. Academic attitudes as educational outcomes

Though the MSPAA survey measures a subset of academic attitudes that might be useful as predictors of academic outcomes, we note that these academic attitudes are important stand-alone student well-being outcomes that are shaped by school contexts and potentially open to universal intervention in schools. For example, external stressors – from the subtle and seemingly imperceptible phenomenon of stereotype threat to more overt phenomena of bullying, poverty, exclusion, and discrimination – can affect students' perceptions of themselves and how they relate to others in school. The constructs found in the MSPAA survey could be used to simultaneously capture the effects of school pressure to perform well on students' attitudes about themselves in relation to others at school (e.g., increased evaluation anxiety) as well as downstream effects on students' attributions (e.g., increased external locus of control).

There are also practical uses for the MSPAA measures as outcomes. Our results show that student reports on academic attitudes differ by school, which suggests that school districts could administer this survey to students across schools and grade levels to uncover group-level patterns of student perceptions of school climate, either cross-sectionally or longitudinally. Group, grade- or school-level information could potentially be used by teachers, school counselors, school psychologists, and education researchers by,

for example, addressing trends in relative negative student academic attitudes with school policies and universal interventions like those we describe in [Table 1](#).

4.4. Limitations and future directions

Despite demonstrating that the MSPAA scales are practical and reliable measures of student academic attitudes that vary among groups of early adolescents, there are several limitations to this study that can be addressed by future research. Primarily, future studies should add support by doing additional validation of various aspects of these measures. Although we find the measures to be reliable, we do not directly assess many indices of validity in this study. The items in our measures are typically based on prior research for each underlying construct, adapted for this age group and for the school context. Since the prior research that validated the measures for other age groups or contexts likely applies to our measures, we assume here that our measures are valid as well. Because validating the measures in accordance with prior research is beyond the scope of this paper, additional investigations for these specific adapted measures need to definitively confirm that assumption among middle school students. Furthermore, although academic attitudes are important standalone outcomes, future correlational studies may also examine the relationships between the MSPAA survey scales and other school-related outcomes such as academic motivation, perseverance, performance, school attendance, and disciplinary problems.

Additionally, our study is cross-sectional, and future studies should use other types of study designs to assess various aspects of the scales. Longitudinal designs would allow for better evidence that these scales measure students' declining attitudes throughout middle school. Experimental studies, like those described in [Table 1](#), when joined with the MSPAA survey can test for the causal effect of universal educational interventions on the survey's scales. Prior research indicates that relevant interventions discussed above should affect MSPAA measures, but again, those studies were often conducted with older age groups with measures adapted for those age groups. Therefore, future research should confirm similar relationships between the interventions and these specific measures. For example, [Cricher and Dunning \(2015\)](#) showed that self-affirmation improves self-complexity, but that study was done with college students, and even though it may follow that self-affirmation should also improve self-complexity for middle school students, future research should explicitly demonstrate this effect. It will also be important for the MSPAA survey to be tested in additional age groups (e.g., high school and college students) in order to establish the reliability of these particular scales in those populations. Finally, the MSPAA relies on a brief self-report questionnaire, which, while practically useful for implementation in schools, might not be as all-encompassing as other alternative and more in-depth methods of measuring student attitudes.

Future studies should also carefully consider how to use the Self-Confidence item in the MSPAA. We expected the item to fit within the Evaluation Anxiety scale based on prior research, but it instead fit better within the Social Belonging scale in these data. Because of this discrepancy between our hypothesized scale fit for this item and the empirical fit, we kept the Self-Confidence item separate as its own single-item measure of self-confidence. This is consistent with other research, which has shown that similar single-item measures of self-confidence are as reliable and valid as multi-item measures ([Robins, Hendin, & Trzesniewski, 2001](#)). The behavior of the Self-Confidence item is noteworthy for two reasons. First, it reinforces our suggestion that context plays an important role in shaping attitudes. The Evaluation Anxiety scale used in the MSPAA survey came from a laboratory experiment in which participants did not interact socially with other participants ([Spencer et al., 1999](#)), but we implemented the MSPAA survey within the social context of classrooms and schools. These different contexts could explain why Self-Confidence fit with Evaluation Anxiety in the former study, which involved a performance context, but fit with Social Belonging in the current study, which involved more of a social context. Second, it exemplifies the need for research that measures many academic attitudes simultaneously to understand their relationships between one another. In this case, if we had not measured Social Belonging alongside of Evaluation Anxiety, we would have been unaware that in a social context, Self-Confidence fit with a construct other than Evaluation Anxiety.

4.5. Implications for interventions with students

One advantage of using the scales represented in the MSPAA survey is that there are evidence-based universal interventions that have been linked to each construct. As demonstrated in the intervention studies referenced in [Table 1](#), schools have a variety of cost-effective tools available for use to potentially reduce group disparities in MSPAA measures. Future studies may suggest when patterns of student scores are problematic and associated with various student outcomes, which could indicate when scores are sufficiently high or low and when interventions may be most useful to improve well-being within groups, grades, or schools. With continued study of the MSPAA scales and their responsiveness to interventions, schools could potentially respond to aggregate student scores with evidence-based universal interventions in efforts to improve students' well-being in school. Together, these measures could serve not only as an important index of aggregate student well-being but also as indicators of whether interventions like the ones mentioned above could be useful for students in certain school contexts.

4.6. Conclusion

This study demonstrated that the six MSPAA survey scales have acceptable factor structure, internal consistency reliability, and measurement invariance to assess academic attitudes across two adolescent age groups as well as across different racial and gender subgroups. Although the individual constructs within the MSPAA survey were conceptualized in prior studies, our brief survey builds upon previous literature by measuring and comparing a range of academic attitudes together and showing that these measures are properly calibrated for students as young as early adolescents in a middle school context. When measured together within a novel

population and domain, results showed that the scales differentiated largely as predicted. Mean differences based on age, school context, race, and gender revealed attitudinal patterns that can be useful when thinking about student well-being and disengagement in middle school, prompting future research directions in this area.

Numerous studies have underlined the importance of noncognitive factors like these academic attitudes, and recent studies have suggested the potential for school-based interventions to improve these factors. The specific academic attitudes in the MSPAA survey are important factors to be able to measure in adolescence since it may be a sensitive period when students start adopting more negative attitudes about themselves and school (Yeager et al., 2018). These academic attitudes are linked to the kinds of mindsets that promote a variety of positive life outcomes, but they are also important standalone outcome variables that are shaped by academic environments. In conclusion, the Malleable Social-Psychological Academic Attitudes survey meets the need for a brief, reliable assessment of a particular group of academic attitudes that may be open to intervention and improvement in schools.

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