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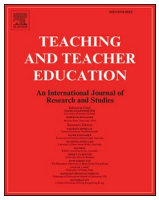

Research paper

Teacher support for students' psychological needs and student engagement: Differences across school levels based on a national teacher survey☆

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ABSTRACT

Student engagement typically declines across development. Corresponding school level declines in teachers' use of need supportive practices is suspected to contribute. However, research has rarely examined this supposition. Using survey data collected in 2022 from a national sample of 954 full-time U.S. public-school teachers, results from structural equation modeling analyses suggested that secondary teachers reported using need supportive practices less than elementary teachers, which partly explained school level differences in teachers' perceptions of students' engagement. Relationships were consistent across teachers serving students of varying racial, income, and linguistic backgrounds. Results suggest that motivation support programs should target the secondary level.

1. Introduction

Engagement in schoolwork is critical to students' learning and academic success (e.g., Reschly & Christenson, 2022). Students' engagement at the elementary and secondary school levels has been tied to a variety of immediate and long-term outcomes, including higher academic achievement (e.g., Lei et al., 2018), increased odds of high school graduation (e.g., Archambault et al., 2009; Wang & Fredericks, 2014), greater psychosocial adjustment (e.g., Li & Lerner, 2011; Olivier et al., 2020), and higher educational obtainment and career success (e.g., Abbott-Chapman et al., 2014; Fraysier et al., 2020). Notwithstanding its important role in learning, teachers report concerns about student engagement in schoolwork (Guthrie et al., 2012), a concern that only increased since 2020 in the wake of the COVID-19 global pandemic (EdWeek Research Center, 2021; U.S. Department of Education, 2021).

However, concerns about student engagement are not uniform across school levels. Researchers and educators have long noted an *engagement cliff* as students transition into adolescence and secondary school. A pattern of decreasing student engagement across school levels has been well-documented (e.g., Eccles et al., 1993; Wang & Eccles, 2012a). While many factors contribute to declines in students' engagement, researchers have routinely pointed to the school environment and a lack of fit between students' psychological needs and teachers' instructional and motivational strategies (e.g., Eccles et al., 1993; Wang et al., 2019). Extensive evidence supports this claim, documenting that engagement is responsive to context and a variety of practices intended to support students' motivation and psychological needs (for autonomy, competence, and relatedness) that underly optimal functioning (e.g., Patall et al., 2022).

The purpose of the current study was to examine the extent to which U.S. teachers' reported use of need supportive practices differ across elementary to high school levels and whether such differences in practices predict differences in teachers' perceptions of students' engagement across school levels. In contrast to prior research which has mainly focused on student perceptions, select grade levels, and geographically narrow samples, we sought to understand variation in an assortment of specific motivating practices and student engagement from the perspective of kindergarten through high school teachers using data from a national teacher survey. Moreover, given a complex history of racism, segregation, discrimination, bias, and unequal schooling that has typically disadvantaged low income students, immigrant students, and students of color relative to counterparts (Darling-Hammond, 2006; Dixson & Rousseau, 2005; Starck, Riddle, Sinclair, & Warikoo, 2020), as well as persistent disparities in measures of academic success by student race and income (e.g., Reardon, 2013; Reardon et al., 2015), we also explored possible inequities. That is, a second purpose of the current

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study was to explore whether relationships between school level, need supportive teacher practices, and teacher perceived student engagement varied across classrooms with a greater percentage of students of color, students receiving free or reduced lunch, or students who speak a language other than English at home.

2. Literature review

2.1. Student engagement and supportive classroom practices

Student engagement is a psychological construct that can be broadly defined as the quality of students' involvement in school activities (Skinner et al., 2009). Engagement is multidimensional (e.g., Wang et al., 2019), including behavioral (e.g., participation, attention, effort), emotional (e.g., positive emotion, interest), cognitive (e.g., use of learning strategies), and agentic components (e.g., offering input and collaborating to shape instruction). Engagement is a critical mechanism through which students accomplish academic goals (Wang et al., 2019). As such, the consistent observation that motivation and engagement decline across development for many students represents a major concern for educators (e.g., Eccles et al., 1993; Wang & Eccles, 2012a, 2012b). For example, one longitudinal study (Wang & Eccles, 2012a) found that three dimensions of engagement (behavioral, emotional, and cognitive) all declined from 7th to 11th grade among Black and white American adolescents. Moreover, these declines in engagement, in turn, explained within-student declines in grade point average and educational aspirations among Black and white American adolescents.

Numerous factors contribute to the dynamics and development of engagement (see Wang et al., 2019 for review). Engagement is highly malleable and context-dependent. As such, the motivational quality of teachers' instructional practices plays a critical role in students' engagement (e.g., Eccles et al., 1993; Michou, Altan, Mouratidis, Reeve, & Malmberg, 2023; Skinner, Kindermann, & Furrer, 2009). Motivation and developmental theorists drawing on self-determination theory (Ryan & Deci, 2017; Skinner et al., 2009) and stage-environment fit theory (e.g., Eccles et al., 1993; Eccles & Wigfield, 2020) both argue that motivation and engagement is optimized when the school and classroom environment support students' in meeting psychological and developmental needs for autonomy (e.g., a sense that behavior emanates from an understanding of self), competence (e.g., a sense that one is successful in interacting with the environment), and relatedness (e.g., experience of having mutually caring relationships). A massive body of diverse evidence has supported the link between teachers' supportive practices and students' engagement (e.g., see Patall et al., 2022 for a review). Research indicates that students are more engaged when teachers support their motivation with autonomy supportive strategies, such as providing choices, highlighting the relevance of content, incorporating students' preferences and interests into activities, and integrating students' cultural backgrounds into instruction (e.g., Byrd, 2016; Patall et al., 2018; Reeve & Cheon, 2021; Wang & Eccles, 2013) and with competence supportive practices, like organizing the classroom with predictable routines, clearly expressing specific, high expectations, regularly providing informational feedback, and creating individualized challenges (Aelterman et al., 2019; Lekwa et al., 2019). Likewise, students are also more engaged when teachers support their relatedness and sense of belonging, including building respectful caring relationships, creating opportunities for peer support and collaboration, and encouraging a sense of community within the classroom (e.g., Kiefer et al., 2015; Roorda et al., 2011; Wang & Eccles, 2013). These practices (and additional ones) can be tied to the satisfaction of multiple needs and forms of motivation (e.g., Patall et al., 2022).

Building on these patterns, stage-environment fit researchers have suggested that declines in engagement can be tied to mismatched secondary school environments and declines in the use of motivating and need supportive practices across school levels. Research conducted over 30 years ago provided evidence that declines in students' motivation and engagement coincided with transitions to secondary schools where teachers typically foster fewer personal connections, provide fewer choices, and emphasize discipline and competition to a greater extent compared to elementary school teachers, even as students demand greater autonomy and interpersonal connection (Eccles et al., 1993) and need more support of this nature for healthy identity development (e.g., Assor, 2018). More recent research, though limited, has also supported this explanation. For example, Malmberg et al. (2010) provided evidence that teachers' emotional support (e.g., support for a positive climate and regard for student perspectives) declined from 7th to 12th grade levels, as did student engagement, based on classroom observations. Likewise, Katz et al. (2009) found that student perceptions that teachers provided less support for their psychological needs mediated the negative relationship between school level (elementary versus middle school) and autonomous motivation for doing homework.

2.2. Race, income, and language background and need supportive classroom practices

The decline in engagement is modest for many students; some even experience an increase in engagement as they transition to secondary school (Eccles & Roeser, 2011). However, a substantial portion of students become less engaged as they progress through secondary school, with some evidence suggesting that this has particularly dire consequences for the academic success and school completion for students of color, low income students, and immigrant students (Rumberger & Lim, 2008). In fact, indicative of a broader systematic problem of racism and stratification that plays out in classrooms, numerous studies have demonstrated persistent racial-ethnic and income disparities in access to a variety of high-quality education inputs (e.g., Darling-Hammond, 2005; Goldhaber et al., 2015; Nye, Konstantopoulos, & Hedges, 2004; Starck, Riddle, Sinclair, & Warikoo, 2020). Particularly as they enter adolescence, students of color, low income students, and immigrant students experience less supportive climates relative to their white, higher-income, and non-immigrant counterparts (e.g., Gray et al., 2018; Harber et al., 2012; Murdock, 1999). Moreover, these differences in environment have been found to partially explain racial and income disparities in student outcomes (e.g., Murdock, 1999).

Given evidence of pervasive declines in students' engagement and racial/ethnic and income achievement gaps that *widen* across grade levels (e.g., Reardon et al., 2015), it seems possible that practices that support needs, motivation, and engagement may especially decline across school levels among teachers serving students of color, low income students, and immigrant students. This hypothesis of steeper declines in supportive practices across school levels among teachers serving more diverse students is bolstered by evidence suggesting that white U.S. educators hold more negative racial stereotypes toward adolescent students of color, particularly Black students, compared to younger students of color (Priest et al., 2018).

Going further, some evidence suggests that practices that support needs and motivation serve particularly protective roles in the success of students of color and low income students (e.g., Eccles et al., 1993; Kenny et al., 2010; Parker et al., 2020; Roorda et al., 2011; Wallace & Sung, 2017). This may be in part because effective motivation support often necessitates teachers facilitating classroom interactions and educational experiences that are developmentally supportive of students' social identities (Alim & Paris, 2017; Boykin & Noguera, 2011), making it particularly important for students of color, low income students, and immigrant students whose identities, cultures, and values are often overshadowed by a dominant, middle class, white culture (Gray et al., 2018; Ladson-Billings & Tate, 1995). Taken together, this evidence suggests that declines in supportive practices across school levels might have a particularly pronounced impact on the engagement of more diverse students compared to counterparts.

2.3. The current study

In sum, the attribution of declines in engagement to mismatched secondary school environments has been a consistent refrain among education researchers. Concerns about low levels of student engagement, particularly among adolescents, have only grown in the wake of COVID-19 (Styck et al., 2020). However, few studies have investigated variation in teachers reported use of specific need supportive and engagement-relevant practices across K-12 school levels in a national sample of teachers. Moreover, studies have yet to examine whether school level differences in the use of need supportive practices might vary depending on the student population that teachers serve. The current study focused on a national survey of U.S. K-12 teachers' use of various need supportive practices and perceptions of their students' engagement during spring of 2022 in order to fill that gap. We asked the following two research questions. First, to what extent does school level predict teachers' self-reported use of need supportive practices, and in turn, variation in perceptions of students' behavioral and agentic engagement? Given the increased emphasis on identity development, autonomy, and relatedness as students transition into adolescence and the prior research suggesting that practices intended to support autonomy and relatedness needs were particularly discrepant across school levels (Eccles et al., 1993), in this analysis, we focus on practices conceptualized as supportive primarily of autonomy and relatedness (e.g., Ahmadi et al., 2023), as well as select competence supportive practices that overlap with support for autonomy (e.g., individualized challenges). However, we note that many need supportive teacher behaviors are linked with multiple needs (e.g., Ahmadi et al., 2023; Patall et al., 2022). Moreover, we focused on perceptions of students' behavioral and agentic engagement rather than other types of engagement, given that behavioral and agentic engagement are more easily observed by teachers (e.g., Appleton et al., 2006). Second, to what extent does the mediational path from school level to student engagement via need supportive practices vary across classrooms with a greater percentage of students of color, students receiving free or reduced lunch, or students who speak a language other than English at home?

3. Methods

3.1. Participants and procedures

The current study focused on a cross-sectional analysis of a single national survey of U.S. K-12 teachers' use of various need supportive practices and perceptions of their students' engagement. Participants included a convenience sample of U.S. elementary and secondary teachers who were recruited through communications (e.g., emails, newsletters, social media, and digital application messaging) sent by educational technology company, GoGuardian. Participants completed surveys during the spring of 2022. Among many measures, the survey included questions to assess teachers' use of eight need supportive practices and perceptions of their students' engagement, as well as descriptive questions about the teachers, their students, and the school setting. Participants who completed an online survey were entered into a drawing to win a $150 gift card. If a respondent also referred a teacher who completed the survey, they were also entered into a drawing to win $50. Teachers completed surveys online using Qualtrics, and were asked to think about the past few months when responding to survey questions. The data used in this study is part of a larger survey study (more information on the sample, procedures, and measures, including a complete list of all survey items can be found in the State of Engagement 2022–2023 report; Patall et al., 2023).

For this analysis, only data from full-time, public school teachers who taught one or more core academic subjects (English language arts, mathematics, science, and history or social studies) at a single school level (elementary, middle, or high school) were included in the analysis. After authenticating responses and excluding teachers who did not meet inclusion criteria, the final analysis sample of teachers (80% female) included 954 total responses. This final sample included respondents from all 50 states and the District of Columbia. Across 887 schools, teachers taught at the elementary (30.8%), middle (41.3%), and high (27.9%) school level. Forty-five percent of teachers reported on their experiences with a class section that was greater than 50% students of color. Sixty-six percent of teachers reported on their experiences with a class section that was greater than 50% students receiving free or reduced lunch. Twenty-two percent of teachers reported on their experiences with a class section that was greater than 50% students who speak a language other than English at home. This sample was similar to nationally representative data of full-time teachers from the National Center for Education Statistics (NCES) across key demographic characteristics (see Patall et al., 2023 for details).

4. Measures

4.1. Autonomy and relatedness supportive practices

We assessed teachers' reported use of five autonomy supportive practices and three relatedness supportive practices with a measure designed explicitly for use in this study. Three items were adapted from prior measures (Belmont et al., 1988; Patall et al., 2013, 2017; Spanierman et al., 2011) to assess each of the following autonomy and competence supportive practices: a) provision of choices ($\alpha = 0.65$), b) incorporating student interests and goals ($\alpha = 0.79$), c) provision of personally relevant rationales ($\alpha = 0.74$), d) culturally relevant teaching ($\alpha = 0.86$), and e) provision of individualized challenge ($\alpha = 0.67$). Likewise, three items were adapted from prior measures (Johnson & Johnson, 1983; Lüftenegger, Tran, Bardach, Schober, & Spiel, 2017; Malecki, Demaray, & Elliott, 2000; Pianta, 2001; Rovai, 2002) to assess each of the following relatedness supportive practices: a) teacher caring and relationship building ($\alpha = 0.67$), b) opportunities for student collaboration ($\alpha = 0.84$), and c) community building ($\alpha = 0.77$). Teachers rated the extent to which they engaged in each behavior on a 5-point Likert scale ranging from rarely (1) to very often/always (5).

Invariance analyses using confirmatory factor analysis (CFA) conducted in *Mplus* v.8 (Muthén & Muthén, 2017) with robust standard errors (MLR) confirmed that the autonomy support items loaded well on five separate factors and were invariant across school level and classes differing by the percentage of the class (less than versus more than 50%) that were students of color, students who received free or reduced lunch, or students who speak a language other than English at home using the criteria that the CFI difference between models was less than 0.01 (Chen, 2007; Tables S1 and S2 in online supplemental materials [OSM]). Likewise, CFA invariance analyses confirmed that relatedness support items loaded well on three separate factors and were invariant across school level and classes differing by the three student demographic factors (see Tables S1 and S2). In addition, an additional CFA confirmed that a hierarchical model with all eight supportive practice factors loading on a single higher order factor, need support, also fit the data well ($\chi 2 = 806.83$, $df = 243$, CFI = 0.93, RMSEA = 0.05).

4.2. Student engagement

Three items from the Rochester Assessment Package for Schools were used to measure teachers' perceptions of their students' behavioral engagement in class ($\alpha = 0.67$; Institute for Research and Reform in Education, 1998) and three adapted items from the Agentic Engagement Scale were used to measure teacher perceptions of students' agentic engagement ($\alpha = 0.73$; Reeve, 2013). An example item for behavioral engagement includes "In my class, students seem tuned in". An example item for the agentic engagement scale includes, "During this class, students expressed their preferences and opinions". Teachers responded to questions on a 5-point Likert scale from 1 (rarely) to 5 (very often/always). CFA invariance analyses confirmed that items loaded well on two

separate engagement factors and were invariant across school level and class level demographic factors using the criteria that the CFI difference between models was less than 0.01 (Chen, 2007; see Tables S1 and S2 in OSM).

4.3. Analysis

Prior to data analyses, the study was pre-registered at https://aspredicted.org/J3R_3Q6. Preliminary analyses included examining bivariate correlations across variables. Next, we conducted a structural equation model (SEM) analysis in *M*Plus using maximum likelihood with robust standard errors (MLR) to examine the extent to which grade level predicted need support, with a single higher order latent factor that included all practices, and in turn, perceptions of students behavioral and agentic engagement. Need support and perceptions of students' collective behavioral and agentic engagement were included in the model as latent variables. School level was included as an observed variable using elementary school as the reference group in two dummy coded variables. The following covariates were included as observed variables: class subject, teacher age, teacher degree, teaching experience in years, teacher gender, teacher race, % students of color in class, % students eligible for free or reduced-price lunch in class, % students who speak a home language other than English in class, urbanicity, and region. This SEM was followed-up with eight additional parallel SEMs that examined each practice (as a latent variable) separately. Finally, as an extension of these eight models, we conducted a series of multigroup SEMs to examine whether the structural paths from school level to each need supportive practice and students' collective behavioral and agentic engagement varied across classes with a) greater versus less than 50% students of color, b) greater versus less than 50% students receiving free or reduced lunch, or c) greater versus less than 50% students who speak a language other than English at home. Each practice was examined in a separate model. Likewise, classroom characteristics were examined in separate multigroup SEMs. These analyses involved comparing a model in which all structural paths were unconstrained across the two groups to one in which the structural paths from school level to the practice and engagement outcomes, as well as the paths from the practice to engagement, were all constrained to be equal across groups. For model comparisons, a CFI difference between two models of less than .01 generally indicates a negligible change in overall fit and support for the more parsimonious model, in this case the constrained model (Chen, 2007; Cheung & Rensvold, 2002). We also conducted Satorra-Bentler scaled chi-square difference tests to compare models, which adjusted for the use of MLR.

5. Results

First, we calculated bivariate correlations among school level, each supportive practice, behavioral and agentic engagement, and all covariates (see Table 1). As expected, school level (secondary versus elementary) was statistically significantly negatively associated with teachers' perceptions of both behavioral and agentic student engagement, as well as all supportive practices. Moreover, there were statistically significant positive associations between agentic engagement and all supportive practices and statistically significant positive associations between behavioral engagement and all supportive practices except culturally relevant teaching.

5.1. Differences in Supportive Practice Use and students' engagement across school levels

Next, we ran a SEM to examine the relationships between school level, need supportive practices, and engagement. We found statistically significant direct paths from both the comparison of middle school to elementary school and the comparison of high school to elementary school to teachers' reported use of need supportive practices, suggesting that teachers' use of need supportive practices was lower at the middle and high school level compared to elementary. In addition, the direct paths from both school level comparisons to teacher perceptions of students' agentic engagement and behavioral engagement were significant and negative, suggesting that middle school and high school teachers perceived their students to be less behaviorally and agentically engaged than elementary school teachers. Further, there were statistically significant positive direct paths from need support to both agentic and behavioral student engagement, suggesting that teachers' reported use of need supportive practices predicted greater perceived student engagement in class. The indirect paths from school level to student engagement through need support were all also statistically significant ($p < .001$). Fit indices suggested that this model fit the data well ($\chi 2 = 1793.53$, df = 877, $p < .001$, CFI/TLI: 0.91/.90, RMSEA: 0.03 and SRMR: 0.04). Standardized estimates for this model are presented in Fig. 1 and Table 2.

We followed this main model with separate SEMs for each individual supportive practice. We found statistically significant negative direct paths from both the comparison of middle school to elementary school and the comparison of high school to elementary school to teachers' reported use of 1) incorporating student interests and goals, 2) culturally relevant teaching, 3) student collaboration opportunities, and 4) community building. We found a statistically significant negative direct path from the comparison of middle school to elementary school only to teachers' reported use of 5) caring and relationship building and we found statistically significant negative direct paths from the comparison of high school to elementary school only to teachers' reported use of 6) personally relevant rationales and 7) provision of individualized challenge. There were no differences in the provision of choices by school level. There were significant negative direct paths from both school level comparisons to teacher perceptions of students' agentic engagement and behavioral engagement. Further, there were statistically significant positive direct paths from every need supportive practice to students' agentic and behavioral engagement. Indirect paths from school level to student engagement through each practice were all also statistically significant ($p < .001$, see Table 2) for all practices except for the provision of choice. Fit indices suggested that models fit the data well ($\chi 2 = 194.13$ to 253.36, df = 131 to 132, $p < .001$, CFI: 0.94 to 0.97, RMSEA: 0.02 to 0.03, and SRMR: 0.02). Standardized estimates for these models are presented in Fig. 2 and Table 2. Results suggest that the use of seven of eight need supportive practices (all but the provision of choice) was lower at the secondary level compared to elementary level in 2022 and this lower use of need supportive practices predicted lower levels of behavioral and agentic engagement among secondary compared to elementary students.

Variation in Relationships among School Level, Supportive Practice Use, and Students' Engagement Depending on Characteristics of Students in the Class.

Next, we conducted a series of multigroup SEMs to examine whether the structural paths from school level to each need supportive practice and students' collective behavioral and agentic engagement varied across classes with a) greater versus less than 50% students of color, b) greater versus less than 50% students receiving free or reduced lunch, or c) greater versus less than 50% students who speak a language other than English at home. Across all classroom characteristics and practices, the fit of the models in which structural paths from school level to the practice and engagement outcomes, as well as the paths from the practice to engagement, were constrained to be equal across groups was not statistically significantly different from the fully unconstrained model (see Table S3 in OSM), suggesting that there were no statistically significant differences in the relationships among school level, need supportive practices, and students engagement across classrooms with varying student demographics.

Table 1
Bivariate correlation matrix for all study variables.

Variable		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	Secondary	–															
2	SBE	−.18**	–														
3	SAE	−.23**	.46**	–													
4	CHC	−.11**	.11**	.22**	–												
5	INT	−.20**	.16**	.32**	.56**	–											
6	RUV	−.11**	.13**	.25**	.40**	.46**	–										
7	CRE	−.12**	.06	.15**	.24**	.37**	.29**	–									
8	ICA	−.14**	.15**	.24**	.33**	.44**	.48**	.17**	–								
9	TCR	−.21**	.12**	.31**	.36**	.45**	.43**	.26**	.39**	–							
10	SCO	−.13**	.18**	.21**	.33**	.36**	.32**	.14**	.27**	.29**	–						
11	COM	−.15**	.17**	.24**	.36**	.36**	.37**	.16**	.30**	.38**	.56**	–					
12	ELA	.15**	−.07*	.02	.04	.12**	.05	.12**	.01	.06	−.03	−.01	–				
13	Math	.16**	−.03	−.03	−.03	−.18**	−.16**	−.22**	−.01	−.12**	−.06	−.07*	−.35**	–			
14	Science	.25**	.00	−.14**	−.09**	−.11**	−.03	−.11**	−.11**	−.12**	.06	.02	−.23**	−.26**	–		
15	History	.17**	−.02	−.03	−.02	−.01	.04	.14**	−.04	−.05	−.04	−.01	−.17**	−.19**	−.12**	–	
16	White	.03	−.03	−.02	−.08*	−.12**	−.05	−.10**	−.01	.01	−.08*	−.05	.03	.00	.00	−.01	–
17	Man	.14**	.00	−.14**	−.05	−.13**	−.12**	−.07*	−.16**	−.15**	−.11**	−.09**	−.14**	.07*	.12**	.10**	.02
18	Age	.09**	.03	.00	−.07*	−.09**	.04	−.06	.00	−.08*	−.07*	−.04	.03	−.01	.01	−.04	.08*
19	TGD	.08*	.00	−.03	.01	−.01	.05	.06	.05	.00	.00	−.01	.05	−.02	.02	.03	−.04
20	TEXP	.05	.05	−.06	−.10**	−.10**	.01	−.03	.03	−.06	−.08*	−.02	.03	−.02	−.03	.03	.10**
21	BIPOC	−.04	.03	−.03	.00	.02	−.01	.03	.00	.04	−.03	.04	.01	.01	.01	−.11**	.00
22	OTLG	−.03	.02	−.01	.01	.02	.01	.02	.02	.05	−.02	.06	.02	.02	−.04	−.07*	.00
23	FRL	−.03	.01	−.05	.00	−.02	.01	.01	.00	.01	−.07*	.02	−.02	.02	−.04	−.03	.05
24	Urban	.02	.01	.02	−.04	−.07*	−.02	−.01	−.02	−.06	.06	.03	.03	−.03	.03	.02	.01
25	West	−.07*	−.001	−.09**	.03	.002	−.07	−.003	−.10**	−.04	−.03	−.01	−.11**	−.07*	.02	.03	−.19**
26	Midwest	−.01	.02	.07*	−.01	.004	−.01	−.01	.04	.06	−.03	.01	.07*	−.002	−.03	−.01	.13
27	South	.03	−.03	.01	−.04	−.03	.07*	.02	.02	−.004	.04	.01	.04	.06	.01	−.01	.01
28	North	.06	.02	.03	.02	.03	.02	.00	.05	−.01	.01	−.02	.01	.03	.05	−.01	.08*

Variable		17	18	19	20	21	22	23	24
17	Man	–							
18	Age	.03	–						
19	TGD	−.01	.07*	–					
20	TEXP	.02	.43**	.17**	–				
21	BIPOC	.02	.23**	−.03	.02	–			
22	OTLG	.02	.15**	−.03	−.01	.71**	–		
23	FRL	.03	.08*	−.03	−.03	.41**	.58**	–	
24	Urban	.03	.00	−.04	.00	.01	.00	−.01	–
25	West	.10**	.08*	−.02	.01	.07*	.05	.03	−.02
26	Midwest	−.02	−.04	−.04	.05	−.01	.01	−.03	.03
27	South	−.10**	.01	.09**	−.07*	.01	−.03	−.004	−.003
28	North	.02	−.06*	.18**	.02	−.08*	−.04	−.005	−.01

Notes. Secondary (Middle or High school = 1, Elementary = 0). SBE = Student behavioral engagement. SAE = Student agentic engagement. CHC = Provision of choice. INT = incorporating student interests and goals. RUV = provision of personally relevant rationales. CRE = culturally relevant teaching. ICA = provision of individualized challenge. TCR = teaching caring and relationship building. SCO = opportunities for student collaboration. COM = community building. ELA (English language arts subject domain = 1, other subject domains = 0). Math (Mathematics subjects = 1, other subject domains = 0). Science (Science subject domain = 1, other subject domains = 0). History (History/Social Studies = 1, other subject domains = 0). White (Teacher race is white = 1, Teacher race is non-white = 0). Man (Teacher gender is man = 1, teacher gender is not a man = 0). Age = teacher age. TGD (teacher has a graduate degree = 1, teacher does not have a graduate degree = 0). TEXP = teacher experience in years. BIPOC (>50% of students in class are students of color [Black, Indigenous, People of Color] = 1, <50% of students in class are students of color = 0). OTLG (>50% of students in class speak a language other than English at home = 1, <50% of students in class speak a language other than English at home = 0). FRL (>50% of students in class are eligible for free/reduced price lunch = 1, <50% of students in class are eligible for free/reduced price lunch = 0). Urban (school is in urban community = 1, school is not in urban community = 0). West (teacher/school located in West region of U.S. = 1, teacher located in another region = 0). Midwest (teacher/school located in Midwest region of U.S. = 1, teacher located in another region = 0). South (teacher/school located in South region of U.S. = 1, teacher located in another region = 0). North (teacher/school located in Northeast region of U.S. = 1, teacher located in another region = 0).
*$p < .05$. **$p < .01$.

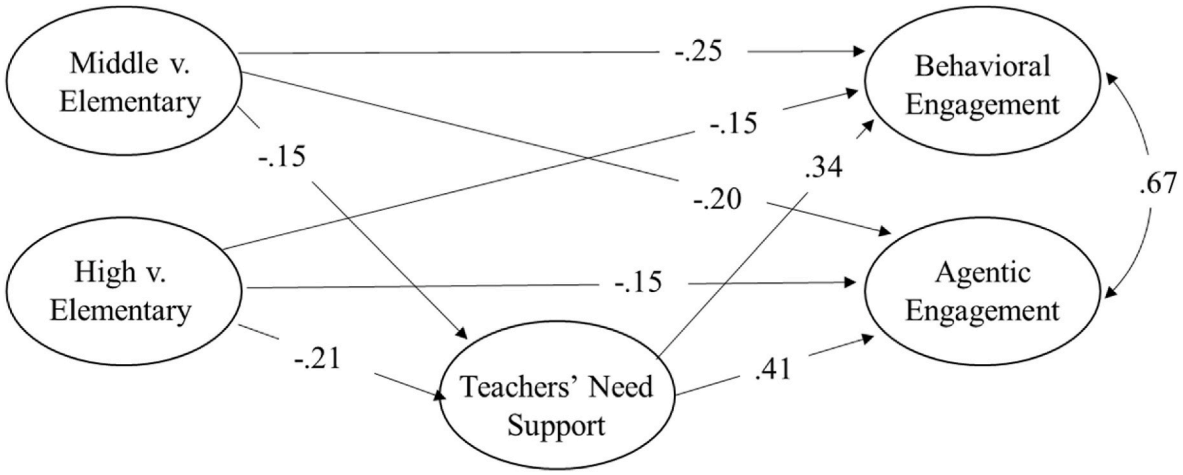

Fig. 1. Standardized Path Coefficients for Overall Need Support Structural Equation Model
Notes. All coefficients are statistically significant at $p < .01$. Covariates are not included in the figure.

6. Discussion

The present investigation examined the extent to which differences in teacher perceptions of U.S. students' engagement across school level could be predicted by school level differences in teachers' use of need supportive practices. We also examined whether relationships among school level, teachers' reported use of need supportive practices, and teachers' perceptions of their students' engagement varied depending on the demographic characteristics of the students in their classrooms.

Consistency of Findings with Hypotheses and Theory.

Consistent with our hypotheses and claims posited by stage-environment fit theory researchers (e.g., Eccles et al., 1993), we found that U.S. teachers reported using need supportive practices, as a whole, significantly less often at both the middle school and high school level compared to at the elementary school level controlling for a wide assortment of covariates. In examining the eight need supportive practices individually, we found that secondary teachers reported using seven of eight practices to a lesser extent compared to elementary school teachers. Differences were found for all practices except teachers' provision of choice. School level differences were found in the extent to which teachers reported incorporating student interests and goals into learning activities, providing personally relevant rationales, using culturally relevant teaching, providing of individualized challenge, expressing caring and relationship building, providing opportunities for student collaboration, and encouraging community building. However, for some practices, differences were only found for one of the two levels of secondary school. Specifically, lower levels of teacher reported caring and relationship building was only found among middle school teachers compared to elementary school teachers. Likewise, lower use of personally relevant rationales and individualized challenges were only found among high school teachers compared to elementary school teachers.

Consistent with self-determination theory's claim that students' optimal functioning and engagement are sustained by classroom environments that support psychological needs (e.g., Ryan & Deci, 2017), teachers' reported use of all eight practices predicted perceptions of students behavioral and agentic engagement, controlling for a wide assortment of covariates. Altogether, the indirect effects from school level to perceived student engagement via practices supported our hypothesis that school level differences in U.S. students' engagement may be explained, at least in part, by differences in the motivation support they receive, that is, by differences in support for students' psychological needs. These results are consistent with observations from early stage-environment fit research conducted in the 1980s and 1990s (Eccles et al., 1993), as well as more recent research that has found differences across school levels in need support, student engagement, and students' autonomous motivation (e.g., Katz et al., 2009; Malmberg et al., 2010). However, this study is the first to provide evidence of this engagement cliff, that is, evidence of the school level decline in a variety of teachers' need supportive practices and corresponding student experience, using a large national sample of U.S. teachers or based on teachers' own reports of their practice and observations of their students' engagement.

Inconsistent with our hypotheses, we did not find that school level differences in teachers' reported use of need supportive practices or perceived student engagement, or relationships between practices and perceived student engagement varied depending on the racial, income, or immigrant background of the majority of students' in teachers' classes. This was a surprise to us. Given that prior research has routinely identified disparities in access to a variety of high-quality education inputs and motivationally supportive school climates (e.g., Gray et al., 2018; Murdock, 1999) and disparities in educational outcomes by race and income that widen across grade levels (Reardon et al., 2015), we expected to find that school level differences in need supportive practices and perceptions of engagement would be particularly steep among teachers serving more low income, immigrant, and BIPOC students. In contrast, the current evidence suggests that school level differences in the use of motivating practices are widely found across teachers, regardless of the student populations that they serve. Moreover, teachers' reported use of need supportive practices is consistently predictive of perceptions of students' engagement across classrooms of varying demographic characteristics. There are several possible explanations for why we did not observe variation depending on the characteristics of the students that teachers serve. One possibility is that there truly is not consistent variation in the school level differences in the use of practices depending on racial, income, and linguistic characteristics of students that teachers serve. That is, the *same level* of decline in supportive practices across school levels occurs regardless of the particular student population and school level differences in teachers' practices have more to do with the broader cultures and organization structures of elementary and secondary schools in the U.S. than the specific characteristics of students that teachers interact with. Notably, this could be true even if mean level differences in teachers' use of supportive practices by students' characteristics exist within each school level. Another possibility is the methods used in the current research, namely, teacher reports and class level student demographic variables, limited the ability to detect variation in the differential use of supportive practices across school levels or different relationships between practices and engagement. We discuss this possibility more later.

Table 2
Standardized coefficients (and standard errors) for school level, need supportive practices, and engagement structural equation models.

Predictor	Overall NS Model			CHC Model			INT Model		
	NS	SBE	SAE	CHC	SBE	SAE	INT	SBE	SAE
Middle v. Elem.	−0.15** (.05)	−0.25*** (.05)	−0.15** (.05)	−0.09 (.06)	−0.28*** (.05)	−0.19*** (.05)	−0.14** (.05)	−0.27*** (.05)	−0.16*** (.05)
High v. Elem.	−0.21*** (.05)	−0.20*** (.06)	−0.15** (.05)	−0.08 (.06)	−0.25*** (.06)	−0.21*** (.05)	−0.18*** (.05)	−0.22*** (.06)	−0.17*** (.05)
Practice(s)	–	0.34*** (.05)	0.41*** (.04)	–	0.23*** (.06)	0.26*** (.05)	–	0.25*** (.05)	0.33*** (.04)
ELA	0.02 (.05)	−0.01 (0.05)	−0.04 (.05)	0.03 (.06)	−0.01 (.05)	−0.04 (.05)	0.08 (.06)	−0.02 (.05)	−0.06 (.05)
Math	−0.21*** (.05)	0.12* (.05)	0.06 (.05)	−0.04 (.06)	0.07 (.06)	−.01 (.05)	−0.17** (.05)	0.10 (.06)	0.03 (.05)
Science	−0.14* (.05)	0.13* (.05)	−0.05 (.05)	−0.11 (.06)	0.11* (.05)	−0.07 (.05)	−0.09 (.05)	0.11* (.05)	−0.07 (.05)
History	0.02 (.04)	0.03 (.05)	−0.01 (.04)	−0.02 (.05)	0.04 (.05)	−0.001 (.04)	0.002 (.04)	0.04 (.05)	−0.01 (.04)
White	−0.09* (.04)	−0.07 (.04)	−0.03 (.04)	−0.07 (.04)	−0.08 (.04)	−0.04 (.04)	−0.12*** (.04)	−0.06 (.04)	−0.02 (.04)
Man	−0.11*** (.04)	0.05 (.04)	−0.06 (.04)	−0.02 (.04)	0.01 (.04)	−0.10** (.04)	−0.08 (.04)	0.03 (.04)	−0.08 (.04)
Age	−0.02 (.05)	0.01 (.06)	−0.07 (.05)	0.004 (.06)	0.01 (.06)	−0.07 (.05)	−0.09* (.05)	0.03 (.06)	−0.04 (.05)
TGD	0.04 (.03)	−0.02 (.04)	−0.02 (0.04)	0.04 (.04)	−0.01 (.04)	−0.01 (.04)	0.01 (.04)	−0.01 (.04)	−0.004 (.04)
TEXP	−0.07 (.05)	0.07 (.06)	0.02 (.05)	−0.15* (.06)	0.08 (.06)	0.03 (.05)	−0.06 (.05)	0.06 (.06)	0.01 (.04)
BIPOC	−0.01 (.04)	−0.06 (.05)	−0.05 (.05)	−0.03 (.05)	−0.06 (.05)	−0.04 (.05)	−0.002 (.05)	−0.07 (.05)	−0.05 (.05)
OTLG	0.07 (.04)	−0.02 (.05)	−0.03 (.04)	0.06 (.05)	−0.01 (.05)	−0.02 (.04)	0.05 (.04)	−0.01 (.05)	−0.02 (.04)
FRL	0.04 (.04)	−0.18*** (.04)	−0.06 (.04)	0.03 (.05)	−0.18*** (.04)	−0.05 (.04)	0.02 (.04)	−0.17*** (.04)	−0.05 (.04)
Urban	0.06 (.04)	−0.01 (.04)	0.03 (.04)	0.07 (.05)	−0.003 (.04)	0.03 (.04)	0.03 (.04)	0.004 (.04)	0.04 (.04)
Midwest	0.07 (.04)	−0.02 (.05)	0.09 (.04)	0.01 (.05)	0.00 (.05)	0.12** (.04)	0.06 (.04)	−0.01 (.05)	0.10 (.04)
South	0.08 (.04)	−0.03 (.05)	0.05 (.04)	−0.03 (.05)	.004 (.05)	0.08 (.04)	0.03 (.04)	−0.01 (.05)	0.07 (.04)
North	0.09* (.04)	−0.004 (.04)	0.08 (.04)	0.03 (.05)	.02 (.04)	0.11* (.04)	0.09* (.04)	0.01 (.04)	0.09 (.04)
SBE-SAE cor.	–	–	0.67*** (.04)	–	–	0.69*** (.04)	–	–	0.69*** (.04)
Model fit	χ^2 (df) = 1793.53 (877), $p < .001$ CFI = 0.91 RMSEA [90% CI] = 0.034 [.031/.036] SRMR = 0.04			χ^2 (df) = 253.36 (132), $p < .001$ CFI = 0.94 RMSEA [90% CI] = 0.031 [.026/.037] SRMR = 0.02			χ^2 (df) = 196.74 (132), $p < .001$ CFI = 0.97 RMSEA [90% CI] = 0.023 [.016/.029] SRMR = 0.02		
Indirect Effects									
Middle v. Elem		−0.05** (.02)	−0.06** (.02)		−0.02 (.02)	0.02 (.02)		−0.03* (.02)	−0.05* (.02)
High v. Elem		−0.07*** (.02)	−0.08*** (.02)		−0.02 (.02)	−0.02 (.02)		−0.05** (.02)	−0.06** (.02)
		RUV Model			**CRE Model**			**ICA Model**	
Predictor	**RUV**	**SBE**	**SAE**	**CRE**	**SBE**	**SAE**	**ICA**	**SBE**	**SAE**
Middle v. Elem.	−0.05 (.05)	−0.29*** (.05)	−0.19*** (.05)	−0.13** (.04)	−0.27*** (.05)	−0.17*** (.05)	−0.07 (.06)	−0.28*** (.05)	−0.19*** (.05)
High v. Elem.	−0.14** (.05)	−0.24*** (.06)	−0.19*** (.05)	−0.20*** (.05)	−0.22*** (.06)	−0.17*** (.05)	−0.16** (.06)	−0.23*** (.06)	−0.19*** (.05)
Practice(s)	–	0.23*** (.05)	0.28*** (.04)	–	0.25*** (.06)	0.28*** (.05)	–	0.26*** (.05)	0.26*** (.05)
ELA	−0.03 (.05)	0.01 (.05)	−0.02 (.05)	0.06 (.04)	−0.01 (.05)	−0.05 (.05)	−0.07 (.06)	0.02 (.05)	−0.01 (.05)
Math	−0.20*** (.05)	0.10 (.06)	0.03 (.05)	−0.35*** (.04)	0.14* (.06)	0.07 (.05)	−0.06 (.06)	0.07 (.06)	−0.01 (.05)
Science	−0.05 (.05)	0.10 (.05)	−0.09 (.05)	−0.20*** (.04)	0.14** (.05)	−0.04 (.05)	−0.13* (.06)	0.12* (.05)	−0.07 (.05)
History	0.03 (.05)	0.03 (.05)	−0.02 (.04)	0.18*** (.04)	−0.01 (.05)	−0.06 (.04)	−0.06 (.05)	0.05 (.05)	0.01 (.04)
White	−0.06 (.04)	−0.08* (.04)	−0.05 (.04)	−0.08* (.03)	−0.07 (.04)	−0.04 (.04)	−0.02 (.04)	−0.09* (.04)	−0.06 (.04)
Man	−0.08* (.04)	0.03 (.04)	−0.08* (.04)	−0.07* (.03)	0.02 (.04)	−0.09* (.04)	−0.13** (.04)	0.04 (.04)	−0.07* (.04)
Age	0.14** (.05)	−0.03 (.06)	−0.11* (.05)	−0.04 (.04)	0.02 (.06)	−0.06 (.05)	0.02 (.05)	0.00 (.06)	−0.08 (.05)
TGD	0.05 (.04)	−0.02 (.04)	−0.01 (.04)	0.04 (.03)	−0.01 (.04)	−0.01 (.04)	0.06 (.04)	−0.02 (.04)	−0.02 (.04)
TEXP	−0.05 (.05)	0.06 (.06)	0.01 (.05)	−0.01 (.04)	0.05 (.06)	−0.004 (.05)	0.004 (.06)	0.05 (.06)	−0.01 (.05)
BIPOC	−0.08 (.04)	−0.05 (.05)	−0.03 (.05)	0.06 (.04)	−0.08 (.05)	−0.06 (.05)	−0.03 (.05)	−0.06 (.05)	−0.04 (.04)
OTLG	0.09* (.04)	−0.02 (.05)	−0.03 (.04)	0.07 (.03)	−0.02 (.05)	−0.02 (.04)	0.05 (.05)	−0.01 (.05)	−0.02 (.04)
FRL	0.05 (.04)	−0.18*** (.04)	−0.06 (.04)	0.02 (.04)	−0.17*** (.04	−0.05 (.04)	0.01 (.04)	−0.17*** (.04)	−0.05 (.04)
Urban	0.08* (.04)	−0.01 (.04)	0.03 (.04)	0.11** (.04)	−0.01 (.04)	0.02 (.04)	0.03 (.04)	0.004 (.04)	0.04 (.04)
Midwest	0.08 (.04)	−0.02 (.05)	0.10* (.04)	0.00 (.04)	−0.002 (.05)	0.12** (.04)	0.11* (.05)	−0.03 (.05)	0.09* (.04)
South	0.15*** (.04)	−0.04 (.05)	0.03 (.04)	0.05 (.04)	−0.02 (.05)	0.06 (.04)	0.11* (.05)	−0.03 (.05)	0.05 (.04)
North	0.11* (.04)	0.004 (.04)	0.08 (.04)	0.04 (.04)	0.02 (.04)	0.10* (.04)	0.13 (.05)	−0.01 (.04)	0.08 (.04)
SBE-SAE cor.	–	–	0.69*** (.04)	–	–	0.69*** (.04)	–	–	0.69*** (.04)
Model fit	χ^2 (df) = 204.99 (132), $p < .001$ CFI = 0.97 RMSEA [90% CI] = 0.024 [.018/.031] SRMR = 0.02			χ^2 (df) = 240.38 (132), $p < .001$ CFI = 0.97 RMSEA [90% CI] = 0.031 [.024/.036] SRMR = 0.02			χ^2 (df) = 194.13 (132), $p < .001$ CFI = 0.97 RMSEA [90% CI] = 0.022 [.015/.029] SRMR = 0.02		
Indirect Effects									
Middle v. Elem		−0.01 (.01)	−0.02 (.02)		−0.03* (.01)	−0.04** (.01)		−0.02 (.02)	−0.02 (.02)
High v. Elem		−0.03* (.01)	−0.04* (.02)		−0.05*** (.02)	−0.05*** (.02)		−0.04* (.02)	−0.04* (.02)
		TCR Model			**SCO Model**		**COM Model**		
Predictor	**TCR**	**SBE**	**SAE**	**SCO**	**SBE**	**SAE**	**COM**	**SBE**	**SAE**
Middle v. Elem.	−0.13* (.05)	−0.27*** (.05)	−0.16*** (.05)	−0.14** (.05)	−0.26*** (.05)	−0.18*** (.05)	−0.19** (.06)	−0.25*** (.05)	−0.15** (.05)

(*continued on next page*)

Table 2 (*continued*)

Predictor	Overall NS Model				CHC Model			INT Model	
	NS	SBE	SAE	CHC	SBE	SAE	INT	SBE	SAE
High v. Elem.	−0.10 (.05)	−0.25*** (.06)	−0.19*** (.05)	−0.18*** (.06)	−0.22*** (.06)	−0.19*** (.05)	−0.19*** (.06)	−0.22*** (.06)	−0.17*** (.05)
Practice(s)	–	0.23*** (.05)	0.36*** (.05)	–	0.26*** (.04)	0.19*** (.04)	–	0.28*** (.05)	0.30*** (.05)
ELA	−0.06 (.05)	0.02 (.05)	−0.01 (.05)	−0.01 (.05)	0.01 (.05)	−0.03 (.05)	0.004 (.06)	0.001 (.05)	−0.03 (.05)
Math	−0.21*** (.06)	0.11 (.06)	0.05 (.05)	−0.01 (.06)	0.06 (.06)	−0.02 (.05)	−0.02 (.06)	0.06 (.06)	−0.02 (.050
Science	−0.19*** (.06)	0.13* (.05)	−0.03 (.05)	0.09 (.06)	0.06 (.05)	−0.12* (.05)	0.03 (.06)	0.08 (.05)	−0.11* (.05)
History	−0.10* (.05)	0.06 (.05)	−0.03 (.05)	−0.01 (.05)	0.04 (.05)	−0.01 (.04)	0.02 (.05)	0.03 (.05)	−0.01 (.04
White	0.05 (.04)	−0.10** (.04	−0.08* (.04)	−0.10** (.04)	−0.07 (.04)	−0.04 (.04)	−0.03 (.04)	−0.09* (.04)	−0.05 (.04)
Man	−0.12** (.04)	0.03 (.04)	−0.07 (.04)	−0.11** (.04)	0.04 (.04)	−0.08* (.04)	−0.14** (.04)	0.04 (.04)	−0.07 (.04)
Age	−0.07 (.06)	0.02 (.06)	−0.05 (.05)	−0.04 (.06)	0.02 (.06)	−0.06 (.05)	0.02 (.06)	0.002 (.05)	−0.08 (.05)
TGD	0.04 (.04)	−0.01 (.04)	−0.02 (.04)	0.02 (.04)	−0.01 (.04)	−0.004 (.04)	0.03 (.04)	−0.01 (.04)	−0.01 (.04)
TEXP	−0.06 (.06)	0.06 (.06)	0.01 (0.05)	−0.05 (.06)	0.06 (.05)	0.001 (.05)	−0.04 (.06)	0.06 (.06)	0.003 (.05)
BIPOC	0.05 (.05)	−0.08 (.05)	−0.07 (.05)	−0.01 (.05)	−0.06 (.05)	−0.05 (.05)	−0.02 (.05)	−0.06 (.05)	−0.04 (.05)
OTLG	0.02 (.04)	−0.01 (.05)	−0.01 (.04)	0.04 (.04)	−0.01 (.05)	−0.01 (.04)	0.07 (.04)	−0.02 (.05)	−0.02 (.04)
FRL	0.08 (.04)	−0.19*** (.04)	−0.07 (.04)	−0.05 (.06)	−0.16*** (.04)	−0.04 (.04)	0.07 (.04)	−0.19*** (.04)	−0.06 (.04)
Urban	0.02 (.04)	0.01 (.04)	0.04 (.04)	−0.02 (.04)	0.02 (.04)	0.06 (.04)	−0.02 (.04)	0.02 (.04)	0.06 (.04)
Midwest	0.12* (.05)	−0.03 (.05)	0.08 (.04)	0.01 (.04)	−0.001 (.05)	0.12** (.04)	0.02 (.05)	−0.003 (.05)	0.11** (.04)
South	0.07 (.05)	−0.02 (.05)	0.05 (.04)	0.06 (.04)	−0.02 (.05)	0.06 (.04)	0.01 (.05)	−0.005 (.05)	0.07 (.04)
North	0.06 (.05)	0.02 (.05)	0.09* (.04)	0.05 (.04	0.02 (.04)	0.10 (.04)	0.04 (.04)	0.02 (.04)	0.10* (.04)
SBE-SAE cor.	–	–	0.70*** (.04)	–	–	0.70*** (.04)	–	–	0.68*** (.04)
Model fit	χ^2 (df) = 218.53 (132), $p < .001$ CFI = 0.96 RMSEA [90% CI] = 0.027 [.020/.033] SRMR = 0.02			χ^2 (df) = 248.28 (131), $p < .001$ CFI = 0.96 RMSEA [90% CI] = 0.031 [.025/.037] SRMR = 0.02			χ^2 (df) = 216.05 (131), $p < .001$ CFI = 0.97 RMSEA [90% CI] = 0.026 [.020/.033] SRMR = 0.02		
Indirect Effects									
Middle v. Elem		−0.03* (.01)	−0.05* (.02)		−0.04* (.02)	−0.03* (.01)		−0.05* (.02)	−0.06** (.02)
High v. Elem		−0.02 (.01)	−0.04 (.02)		−0.05** (.02)	−0.04** (.01)		−0.05** (.02)	−0.06** (.02)

Notes. Middle v. Elem. Dummy (Elementary school = 0, Middle school = 1, High school = 0). High v. Elem. Dummy (Elementary school = 0, Middle school = 0, High school = 1). NS = Need supportive teacher practice. SBE = Student behavioral engagement. SAE = Student agentic engagement. CHC = Provision of choice. INT = incorporating student interests and goals. RUV = provision of personally relevant rationales. CRE = culturally relevant teaching. ICA = provision of individualized challenge. TCR = teaching caring and relationship building. SCO = opportunities for student collaboration. COM = community building. ELA dummy (Multiple subjects = 0, English language arts subject domain = 1, All other subject domains = 0). Math (Multiple subjects = 0, Mathematics subjects = 1, All other subject domains = 0). Science (Multiple subjects = 0, Science subject domain = 1, All other subject domains = 0). History (Multiple subjects = 0, History/Social Studies = 1, All other subject domains = 0). White (Teacher race is white = 1, Teacher race is non-white = 0). Man (Teacher gender is man = 1, teacher gender is not a man = 0). Age = teacher age. TGD (teacher has a graduate degree = 1, teacher does not have a graduate degree = 0). TEXP = teacher experience in years. BIPOC (>50% of students in class are students of color [Black, Indigenous, People of Color] = 1, <50% of students in class are students of color = 0). OTLG (>50% of students in class speak a language other than English at home = 1, <50% of students in class speak a language other than English at home = 0). FRL (>50% of students in class are eligible for free/reduced price lunch = 1, <50% of students in class are eligible for free/reduced price lunch = 0). Urban (school is in urban community = 1, school is not in urban community = 0). Midwest (teacher/school located in Midwest region of U.S. = 1, teacher/school located in West region of U.S. = 0, teacher located in another region = 0). South (teacher/school located in South region of U.S. = 1, teacher/school located in West region of U.S. = 0, teacher located in another region = 0). North (teacher/school located in Northeast region of U.S. = 1, teacher/school located in West region of U.S. = 0, teacher located in another region = 0). Cor = Correlation. $^{\dagger}p < .10$. $^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$.

7. Limitations and directions for future research

This investigation makes an important contribution by being the first to explore relationships among U.S. teachers' reported use of specific motivating practices and perceived student engagement based on a national sample of U.S. teachers. It provides insight into how teachers' themselves perceive their practice and its' relationship with their perceptions of students' engagement. However, some of the unique features of this investigation are also limitations that should be addressed in future research.

Particular limitations that need to be addressed in future research include the exclusive reliance on teacher reports and the cross-sectional design, given concerns about socially desirable and acquiescent responding (Paulhus, 1991), shared-method variance (Podsokoff et al., 2003), and the inability to draw conclusions about directionality and causality based on this research. Integrating data from various respondents is particularly important as we continue to consider whether declines in motivating practices and students' corresponding engagement across school levels is consistent across schools and students of varying demographics. Our observation that school level differences were consistent across teachers regardless of the racial, income, and immigrant backgrounds of students they serve may have emerged because of the reliance on teachers' reports and class level demographic variables. Future research should triangulate teacher reports, observations, and student reports in longitudinal research with large regional and national samples as we seek to better understand trajectories of teachers' motivating practices and corresponding student motivation and engagement.

Beyond this main recommendation, we recommend that future research broaden the scope of practices assessed and focus on understanding contexts that facilitate or hinder their use, particularly at the secondary level. The shifts from elementary to middle school in the culture (lesser to greater emphasis on evaluation, college preparation, and individual accountability) and organization (a shift from the majority of instruction occurring with a single, primary teacher to instruction occurring in multiple courses with multiple subject-specific teachers) is likely contributing to school level differences in supportive practices. It is imperative that future research identify the most salient contributors to the lower level of supportive practices at the secondary level. The current study is reflective of the U.S. public school context. However, given global concern about declines in students' engagement and cross-cultural evidence on the importance of motivation support (e.g., Lam et al., 2016), we think it is important to explore the extent to which trends observed in this study generalize to other countries.

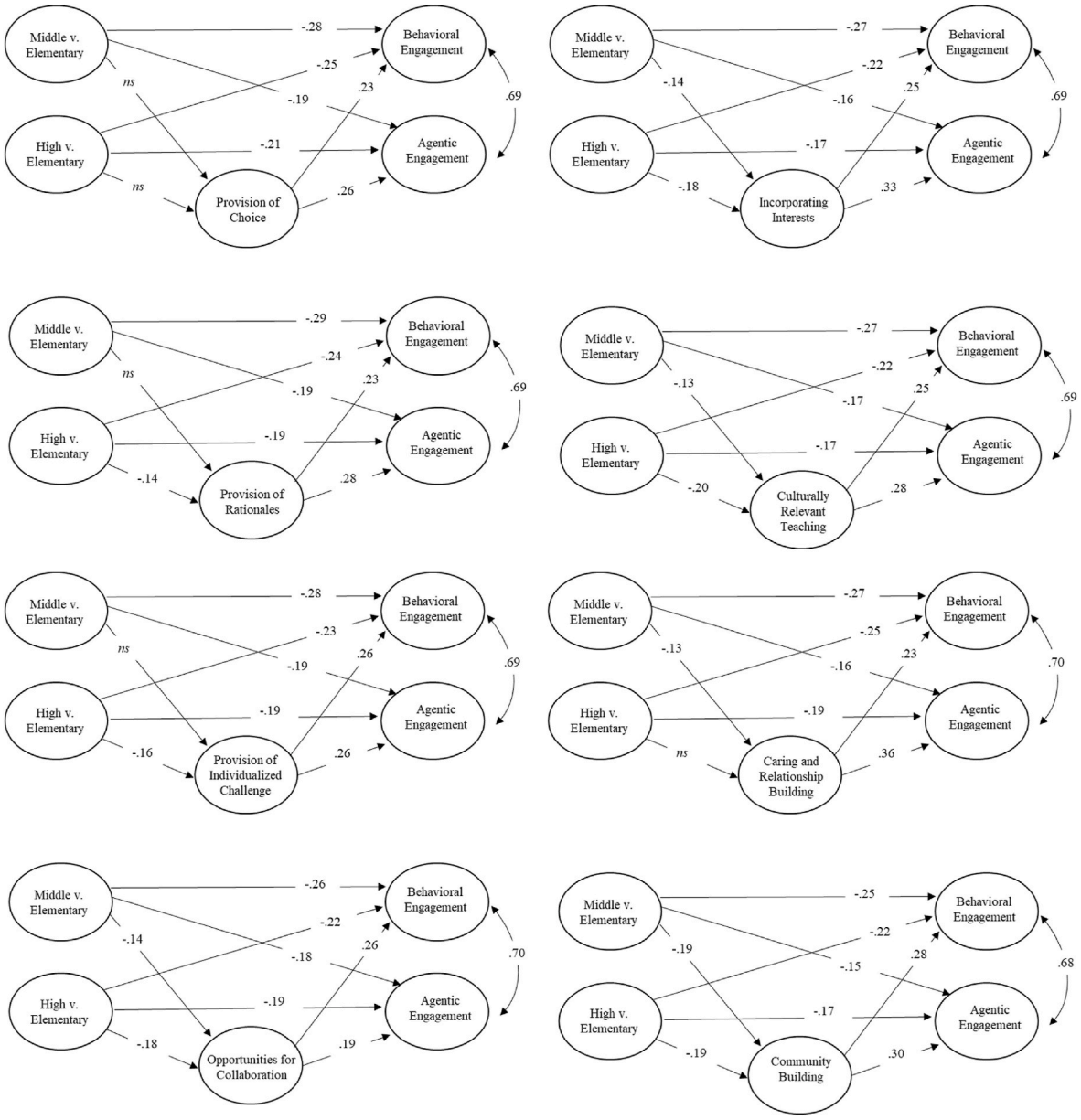

Fig. 2. Standardized Path Coefficients for All Need Supportive Practice Structural Equation Models
Notes. Ns = not significant. All other coefficients are statistically significant at $p < .05$. Covariates are not included in the figure.

Moreover, it is important to explore whether the patterns revealed in the current study generalize to more specialized school contexts (e.g., private schools, vocational schools).

8. Implications and conclusions

It has been more than 30 years since educational and psychological researchers first sounded the alarm that teachers may be providing less motivation support for older students (Eccles et al., 1993). Researchers have long speculated that the most likely explanation for the routinely observed declines in student engagement across school levels was corresponding declines in motivationally supportive practices that were misaligned with adolescent students' increased need for autonomy, relatedness, and identity support across development (e.g., Assor, 2018; Eccles et al., 1993; Wang & Eccles, 2012a). However, efforts to address the lower levels of motivation support provided in U.S. secondary schools have been limited. This remains the case even despite growing concerns about increased stress, burnout, and disengagement in the wake of struggles associated with COVID-19 and extensive use of online and digital instruction, particularly among secondary and post-secondary students (EdWeek, 2021; Samela-Aro et al., 2021; Styck et al., 2020; Wester et al., 2021). This study provides new evidence that declines in student engagement across grade levels seems undoubtedly tied to decreased use of motivating practices at the secondary level that continue to persist. This evidence suggests that secondary teachers, by their own accounts of their experiences during the spring of 2022, are providing fewer supports for student motivation and engagement across a wide variety of practices, including fewer learning activities that incorporate students' interests or cultural backgrounds, fewer meaningful rationales providing reasons for learning, less caring relationship-building, fewer individualized challenges, and fewer opportunities for collaboration and community building. Moreover, this evidence suggests that teachers are perceiving consequences for their students' engagement. The psychological, economic, and health challenges of COVID-19 for educators and students alike have been justifiably positioned at the center of recent concerns about students'

engagement. However, this study highlights the importance of also focusing on some of the most proximal predictors of students' engagement as we move into a post-COVID context, namely, teachers' motivating classroom practices.

Taken together with the extensive longitudinal and experimental evidence base on the effectiveness of teachers' need supportive practices (e.g., Patall et al., 2022), we believe that it is imperative that researchers, administrators, policy-makers, and teacher educators seek to prepare, encourage, and support U.S. secondary teachers to better integrate motivationally supportive approaches to instruction in their routine practice. We encourage researchers and teacher educators to develop and better disseminate interventions and teacher preparation training that explicitly informs and prepares secondary teachers on the use of motivating strategies and troubleshoots challenges. This includes incorporating motivation theory and research on specific strategies that support student motivation and engagement into the curriculum of teacher preparation programs and professional development training for secondary level teachers. We also encourage curriculum and education technology developers to consider how principles of motivation support can be incorporated into educational materials and tools to better facilitate this kind of support in classrooms. In addition, it is critical that policy-makers and administrators both endorse educator use of motivating strategies in their communications and create the structural conditions that facilitate motivation support, including by increasing support for educators' psychological needs and opportunities for meaningful interpersonal connections in school communities (e.g., Moè et al., 2022), as well as by reducing the emphasis on high stakes testing, accountability, and various forms of contextual pressure and control that discourage teachers' motivation support and students' motivation and learning (e.g., Pelletier et al., 2002; Ullucci & Spencer, 2009).

CRediT authorship contribution statement

Erika A. Patall: Conceptualization, Methodology, Formal analysis, Funding acquisition, Investigation, Project administration, Supervision, Writing – original draft. **Amanda Vite:** Methodology, Investigation, Data curation, Writing – review & editing. **Diane J. Lee:** Methodology, Investigation, Data curation, Writing – review & editing. **Jeanette Zambrano:** Methodology, Investigation, Data curation, Writing – review & editing.

Declaration of competing interest

The authors have no competing interests of conflicts of interest to declare related to the current research.

Data availability

The authors do not have permission to share data.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.tate.2023.104400.

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