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Parent and Teacher Warm Involvement and Student's Academic Engagement: The Mediating Role of Self-System Processes

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Parent and teacher warm involvement and student's academic engagement: The mediating role of self-system processes

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Background. Parents, teachers, and researchers all share the goal of optimizing students' academic engagement (Handbook of social influences in school contexts: Social-emotional, motivation, and cognitive outcomes, 2016, Routledge, New York, NY). While separate lines of research have demonstrated the importance of high-quality relationships and support from parents and teachers, few studies have examined the collective contributions of adults' warm involvement or the processes by which support from both parents and teachers shapes students' engagement. According to the self-system process model of motivational development, warm involvement from key social partners fosters students' sense of relatedness, competence, and autonomy, (Minnesota Symposium on Child Psychology, Vol. 23: Self processes in development, 1991, University of Chicago Press, Chicago, IL; *Theory and Research in Education*, 2009, **7**, 133), which subsequently fuels their engagement with academic tasks and challenges (*Journal of Educational Psychology*, 2003, **95**, 148).

Aims. The current study sought to examine whether a sense of relatedness, competence, or autonomy could explain the relation between parents' and teachers' warm involvement and changes in students' academic engagement across a school year.

Sample. Data was drawn from 1011 third, fourth, fifth, and sixth graders.

Method. Students reported on adult warm involvement, self-system processes, and engagement in the fall and spring of a single school year.

Results. Structural equation models demonstrated that parent and teacher warm involvement each uniquely, positively, and indirectly predicted changes in students' academic engagement through a combination of students' sense of relatedness, competence, and autonomy, though these patterns differed slightly across adults.

Conclusions. Implications for optimizing students' academic engagement are discussed, including the need for intervention efforts focused on both parents and teachers and students' self-system processes.

Parents, teachers, and researchers share the goal of optimizing students' classroom *engagement*, that is, their enthusiastic and constructive participation in learning activities (Wentzel, 1998; Wentzel & Ramani, 2016), based both on the intrinsic value of engagement itself and on the positive role it plays in students' subsequent achievement,

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retention, and resilience (Christenson, Reschly, & Wylie, 2012; Fredricks, Blumenfeld, & Paris, 2004; Wigfield et al., 2015). Among the social factors that contribute to academic engagement, separate lines of research have demonstrated the benefits of involvement from parents and teachers (Upadyaya & Salmela-Aro, 2013). *Involvement*, as a central component of high-quality parent-child and teacher-student relationships, refers to expressions of warm, affectionate support, interest, and caring.

Research indicates that when parents are emotionally supportive, responsive, and interested in children's academic activities, their offspring are more motivated and academically engaged (Bempechat & Shernoff, 2012; Grolnick, Friendly, & Bellas, 2009; Rowe, Ramani, & Pomerantz, 2016). Similarly, when teachers offer warmth, affection, interest, and support, studies show that students are more engaged in learning (Gregory & Korth, 2016; Pianta, Hamre, & Allen, 2012; Quin, 2017; Roorda, Koomen, Spilt, & Oort, 2011; Wentzel, 2016). However, in research attempting to solve the puzzle of how to optimize student engagement, two important pieces have largely been missing: (1) an examination of the contributions of *both* parents and teachers together in the same conceptual and statistical models; and (2) an understanding of the mechanisms through which the unique contributions of parent and teacher involvement support students' academic engagement.

Unique contributions of parent and teacher involvement

A few studies have begun to examine the contributions of parent and teacher involvement to students' behavioural and emotional engagement collectively, that is, in the same theoretical and statistical models. These studies are consistent with larger ecological or developmental systems frameworks (e.g., Bronfenbrenner & Morris, 2006; Spencer, 2006) which argue that the relationships students hold with a variety of social partners, such as parents and teachers, create 'multiple worlds' (Phelan, Davidson, & Yu, 1998), and to fully understand the complex social ecologies that shape student motivation and engagement, researchers may need to examine the contributions of different kinds of social partners in tandem (Wentzel, 1998). Common methods for examining unique, relative contributions are analytic strategies in which both parent variables and teacher variables are included simultaneously as predictors of students' academic outcomes, allowing researchers to determine, for example, whether parent involvement uniquely predicts student engagement while controlling for teacher involvement and vice versa (often through multiple regression or structural equation modelling).

To date, only three studies have investigated parent and teacher warm involvement as predictors of student engagement in the same statistical models. First, in a sample of 104 low income, urban (predominantly Latinx) sixth through eighth graders, Murray (2009) examined the contributions of multiple dimensions of parent and teacher relationships (including two facets similar to warm involvement, namely, closeness-trust and positive involvement) to students' overall engagement (a combination of behavioural engagement and adaptive coping) and perceived competence. Although these two facets of adult support were highly inter-correlated ($r = .60$ for parents and $r = .54$ for teachers, both $p < .001$), researchers included both along with multiple other aspects of parent and teacher support into a simultaneous multiple regression. Both parent and teacher support uniquely predicted student engagement. But only parent involvement and clear expectations contributed to perceived competence; no aspect of teacher support contributed to competence over and above the support of parents.

Second, working with a sample of 88 Australian seventh graders, Quin, Hemphill, and Heerde (2017) used markers of parent academic support and three dimensions of teacher support (involvement, structure, and autonomy support) as simultaneous predictors of students' behavioural, emotional, and cognitive engagement. Although zero-order correlations between student engagement and supports from both adults were relatively high (average r = .44), no aspect of parent or teacher support made a unique contribution to behavioural engagement; only parent support uniquely predicted cognitive engagement; and both parent support and teacher involvement made unique contributions to emotional engagement.

And third, from a large multi-state dataset, Brewster and Bowen (2004) selected 633 Latinx middle and high school students that school personnel or other community professionals had previously identified as at risk of school failure. Researchers examined the simultaneous contributions of parent support (positive and supportive communication about school) and teacher support (provision of care, encouragement, respect, and willingness to work with students) to indicators of student behavioural engagement (an index of problems in school) and emotional engagement (looking forward to and finding school exciting and fun). Although support from both parents and teachers showed statistically significant, negative zero-order correlations with behavioural problems, teacher support was the only unique (negative) predictor of that aspect of behavioural engagement. In contrast, both parent and teacher support made unique (positive) contributions to students' emotional engagement.

Taken together, these three studies suggest that it may be worthwhile to examine parents and teachers collectively in the same conceptual and statistical models. In all three studies, the zero-order correlations between engagement and support from each adult were statistically significant and positive. Only when parents and teachers were examined in the same regression equations could their relative contributions be discerned. Parents and teachers each made unique contributions to emotional engagement, but only parents made a unique contribution to cognitive engagement. And findings for behavioural engagement were not consistent: One study found that support from both parents and teachers were unique predictors (Murray, 2009), one found that only teachers made a unique contribution (Brewster & Bowen, 2004), and one (which included multiple, highly inter-correlated features of teacher support) found that no facet of support from either adult reached statistical significance (Quin et al., 2017). Finally, when perceived competence was the target outcome, only features of parent support were unique contributors.

These studies demonstrate that the relative contributions of parents and teachers can be *differentiated*, in which *only* parents or *only* teachers make a unique contribution to target outcomes, but they can also be *cumulative*, in which each social partner plays an important role in optimizing students' academic engagement, above and beyond the supports of the other. In addition to the paucity of research examining the unique contributions of parents and teachers, two design features of current studies made it difficult to draw unambiguous conclusions. Previous studies relied on cross-sectional data from a single time point, which made it difficult to distinguish the direction(s) of pathways. And two of the three studies included multiple facets of parent and/or teacher support, which made it problematic to determine the reasons for differentiated findings across parents and teachers. For example, the high inter-correlations among multiple facets of teacher support included in two studies (Murray, 2009; Quin et al., 2017, where bivariate correlations between facets ranged from r = .30 to .83) made it impossible to determine whether, when no aspect of teacher involvement made a unique contribution

to a target outcome, this was due to the inclusion of parent support in the equation or to multicollinearity among facets of teacher support. Hence, one goal of this study was to explore the unique contributions of a single core feature of parent and teacher involvement on *changes* in students' academic engagement from fall to spring within a single school year.

Self-system processes as mediators

While recent work examining the relative contributions of parents and teachers is promising, none of these studies have attempted to explain the pathways through which involvement from both social partners make their unique contributions to changes in students' engagement, and whether these mediators differ across the two social partners. This study drew on the self-system process model of motivational development (Connell & Wellborn, 1991; Niemiec & Ryan, 2009; see Figure 1), a mini-theory that is part of the larger umbrella provided by self-determination theory (SDT), which holds that social contexts can fuel engagement by fulfilling students' basic needs for relatedness, competence, and autonomy (Reeve, 2012; Ryan & Deci, 2017, 2020).

Relatedness, which concerns a sense of belonging and connection, refers to the desire 'to feel securely connected to the social surround and. . . to experience oneself as worthy and capable of love and respect' (Baumeister & Leary, 1995; Bowlby, 1979; Connell, 1990, p. 63; Ryan & Deci, 2017, 2020). *Competence,* which involves mastery and effectiveness, refers to the need to 'experience oneself as capable of producing desired outcomes and avoiding negative outcomes' (Connell, 1990, p. 62; Ryan & Deci, 2017, 2020). *Autonomy*, which concerns a sense of willingness and ownership in one's actions, refers to the need for the 'experience of choice in the initiation, maintenance and regulation of activity and
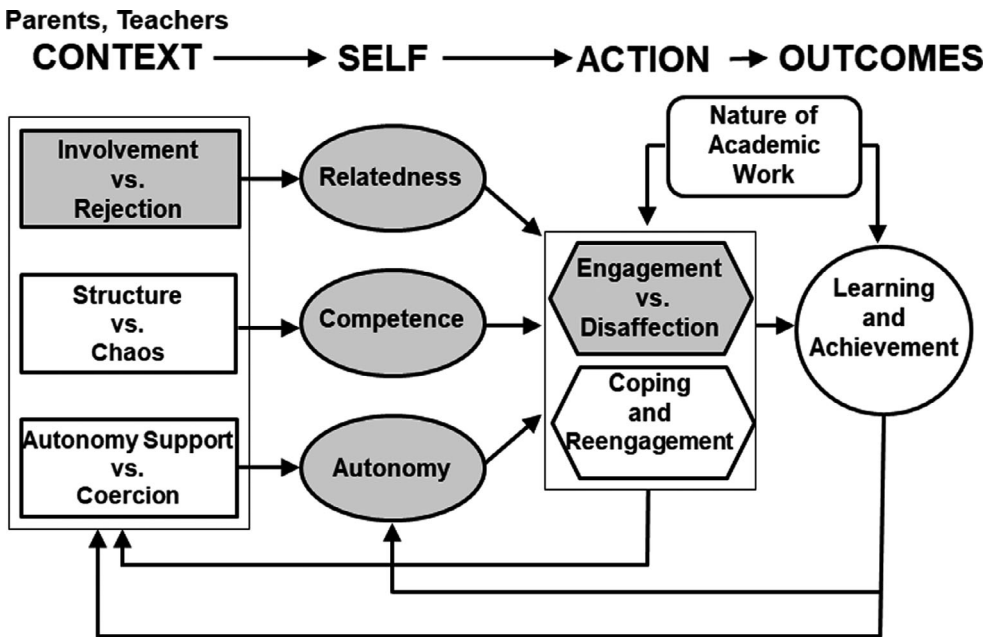

Figure 1. Process model account of involvement, self-determination needs, and academic engagement through the self-system process model of motivation (Connell & Wellborn, 1991).

the experience of connectedness between one's actions and personal goals and values' (Connell, 1990, pp. 62–63; Ryan & Deci, 2017, 2020).

Previous research has clearly linked the self-system processes arising from these needs to academic engagement. Consistent with the tenets of attachment theory (Bergin & Bergin, 2009), studies of relatedness suggest that, as parents and teachers provide affection and involvement, students are more likely to adopt the goals and values of these social partners and are more motivated to participate in the learning activities they endorse (Martin & Dowson, 2009; Wentzel, 2016). Students' perceptions of academic competence are also robust predictors of their subsequent enthusiasm, effort, and persistence in learning activities, as shown in reviews of studies of perceived competence and self-efficacy (Elliot, Dweck, & Yeager, 2017; Muenks, Wigfield, & Eccles, 2018; Schunk & DiBenedetto, 2016). Likewise, research on autonomous self-regulation and valuing of school indicates that students who personally endorse the importance of learning and achievement tend to work harder, take on more challenging tasks, and experience higher levels of positive academic emotions (Eccles & Wigfield, 2020; Reeve, 2012; Rosenzweig, Wigfield, & Eccles, 2019). Hence, all three self-systems may serve as mediators of warm involvement from parents and teachers.

While research within the SDT framework clearly shows that other need supportive contextual conditions, such as structure and autonomy support, are crucial (e.g., Jang, Reeve, & Deci, 2010; Vasquez, Patall, Fong, Corrigan, & Pine, 2016), and the motivational model typically links adults' involvement most closely with the need for relatedness (Figure 1), research suggests that close, warm, caring relationships may provide a foundation for students' experiences of the fulfilment of all three needs (Grolnick, 2009; Grolnick et al., 2009, 2014; Rowe et al., 2016; Wentzel, 2016). Care, affection, and support from parents and teachers communicates to children that they are competent (e.g., Pomerantz & Grolnick, 2017) and efficacious (e.g., Fan & Williams, 2010), and make it likely that they will more readily internalize values that will allow them to become autonomous learners (e.g., Grolnick, 2016).

Differential pathways for parents and teachers

Since research has mainly examined the contributions of parents and teachers separately, it is not yet known whether both adult social partners' involvement have the same unique association with students' self-system processes and subsequent academic engagement. The few previous studies of students in late elementary or early middle school provide somewhat contradictory evidence. For example, despite the preeminence of parents in theories of attachment, the one study that explicitly examined parents and teachers together found that parents' attachment quality was only indirectly related to seventh graders' academic motivation – through its connection to teacher support (Duchesne & Larose, 2007). This opens the possibility that teachers, as the social partners present in the educational context, may be a stronger predictor of students' sense of relatedness and subsequent engagement with academic tasks in the classroom.

In the same vein, the only study that tested both parent and teacher involvement simultaneously as predictors of perceived competence in late elementary or early middle school found that support from both social partners made unique contributions (Ma, Phelps, Lerner, & Lerner, 2009). However, research with older students was mixed. Of the 10 studies examining this question during late middle or high school (Chouinard, Karsenti, & Roy, 2007; Fall & Roberts, 2012; Fan, Lindt, Arroyo-Giner, & Wolters, 2009; Galand & Hospel, 2012; Murdock & Miller, 2003; Murray, 2009; Navarro, Flores, &

Worthington, 2007; Pan, Zaff, & Donlan, 2017; Sahil & Hashim, 2011; Yeung, McInerney, & Ali, 2014), all found that parents made a unique contribution over and above the support of teachers, but only six indicated that teachers also made unique contributions.

Similarly, of the six studies that examined the relative contributions of parent and teacher involvement to autonomy or school valuing during late middle or high school (Fall & Roberts, 2012; Ganotice & King, 2014; Guay, Denault, & Renauld, 2017; McInerney, 2008; Murdock & Miller, 2003; Wang & Eccles, 2012), all found unique contributions of teachers over and above that of parents, but only two indicated a unique contribution for parents. Hence, it is possible that parents may play a bigger part in their children's perceived competence and teachers may make bigger unique contributions (over and above that of the other social partner) to students' sense of autonomy. Thus, a second goal of this study was to examine whether parents' and teachers' warm involvement promotes students' academic engagement by fostering a sense of relatedness, competence, and autonomy, and whether such mediational pathways differ across these two social partners.

Current study

This study sought to examine the pathways through which parents' and teachers' warm involvement uniquely predict changes in students' classroom engagement across the school year for students in late elementary and early middle school (grades 3–6; ages 8–13). Based on previous research and the self-system process model of motivational development, it was hypothesized that parent and teacher involvement would each positively and uniquely predict changes in students' engagement as well as their sense of relatedness, competence, and autonomy. In other words, it was expected that the contributions of parent and teacher involvement would be cumulative, accruing in their support of students' self-systems and engagement. Further, it was anticipated that the positive relations between parent and teacher involvement and changes in students' engagement would be at least partially mediated through the pathway of these three self-system processes.

Method

Participants

Participants were 1011 third ($N = 137$) graders, ages 8 to 9 ($M = 8.36$); fourth graders ($N = 340$), ages 9 to 11 ($M = 10.69$); fifth graders ($N = 169$), ages 10 to 12 ($M = 11.66$); and sixth graders ($N = 365$), ages 11 to 13 ($M = 12.66$). Most participants were White (95%) and about half were female (52.7%). The most prominent minority group (fewer than 3%) was Latino. Participants were drawn from the only public elementary and middle schools in a rural/suburban school district in a small town in upstate New York. Students' socioeconomic status was primarily working and lower middle class, as measured by parents' occupational and educational attainment, with few students (less than 5%) qualifying for free or reduced lunch. Data collection was conducted as part of a district-wide assessment.

Design and procedure

To examine these research questions, secondary data from a longitudinal study of students in an entire school district in upstate New York were analysed. As part of a cohort-sequential design, this study focused on survey data from third through sixth grade students collected in the fall and spring of the second year of data collection. This study was approved by the Portland State University IRB (application #00032 for the project 'Factors Influencing Students' Academic Motivation').

Measures

All measures were rated on a 4-point scale (1 = *not at all true for me*, 4 = *very true for me*) and negative items were reverse-coded so higher scores represented higher levels of each construct. A global measurement model using confirmatory factor analysis was conducted to assess factor loadings of individual items and overall model fit for all constructs of interest in this study. The model demonstrated good fit ($\chi^2(329)$ = 1,236.64, $p < .001$, CFI = .91, TLI = .89, RMSEA = .05, SRMR = .05) and satisfactory factor loadings (see the ranges of factor loadings for each measure below).

Perceived parent warm involvement

Students rated their parents' supportive affection and attention in the fall across five items (Skinner, Johnson, & Snyder, 2005; Fall: ω = .70, CFA factor loadings ranged from .43 to 63), including 'My parents know a lot about what is important to me in school' and 'When I want to talk about school my parents take the time.'

Perceived teacher warm involvement

Students rated their teachers' warm support and interest in the fall across five items (Skinner & Belmont, 1993; Fall: ω = .79, CFA factor loadings ranged from .61 to .71), including 'My teacher spends time with me' and 'My teacher really cares about me.'

Sense of relatedness

Students rated their feelings of belonging and connectedness to their mothers, fathers, and teachers in the spring with the same four items (Furrer & Skinner, 2003; Spring: ω = .85, CFA factor loadings ranged from .74 to .81), such as 'When I'm with my ____, I feel accepted' and 'When I'm with my ____, I feel ignored' (reverse-coded).

Sense of competence

Students rated their feelings of competence and perceived control with regard to academic tasks in the spring with six items (Skinner, Wellborn, & Connell, 1990; Spring: ω = .72, CFA factor loadings ranged from .55 to .76), such as 'I can do well in school if I want to' and 'I can't get good grades no matter what I do' (reverse-coded).

Sense of autonomy

Students reported their feelings of autonomy or personal endorsement of the importance of learning in the spring with five items (Ryan & Connell, 1989; Spring: ω = .81, CFA factor

loadings ranged from .59 to .80). Example items included 'Why do I do my classwork? Because I want to learn new things.' and 'Why do I try to do well in school? Because I think classwork is important for my learning.'

Academic engagement

Students rated their active behavioural participation and their positive and negative academic emotions in the fall and spring with 15 items (six items for behavioural engagement, nine items for emotional engagement; Skinner, Kindermann, & Furrer, 2009; Fall: ω = .87, CFA factor loadings ranged from .82 to .83; Spring: ω = .89, CFA factor loadings ranged from .84 to .88). Example items included: 'I participate in class discussions', 'When we start something new, I practically fall asleep' (reverse-coded), 'When I'm in class, I feel happy,' and 'When I'm doing my work in class, I feel worried' (reverse-coded).

Analysis plan

To examine the research questions proposed for this study, three mediation structural equation models were conducted in R using lavaan. The primary model examined the unique contributions of initial parent and teacher warm involvement on changes in engagement across the school year. Indirect effects were computed (e.g., the indirect effect for parent involvement through a sense of relatedness to engagement was computed as $\beta_{\text{PInvolve-Relate}} * \beta_{\text{Relate-Eng}}$) and tested for statistical significance in each model. Initial models were run for behavioural and emotional engagement separately; patterns of findings did not differ, so only the findings for aggregate academic engagement are reported. In addition, two follow-up models examining parent and teacher involvement separately were analysed to determine the self-system processes mediators of their individual contribution to changes in students' academic engagement. These follow-up analyses served two purposes. First, they allowed a direct comparison with findings from the long traditions of research considering involvement from each adult separately. Second, they aided in the interpretation of the primary model, especially null findings. For example, if in the primary model, parent involvement did not predict changes in engagement, the follow-up models allowed us to determine whether that was because parents' unique contributions did not reach statistical significance over and above the contributions of teacher involvement, or because parent involvement did not predict changes in engagement, even when teacher involvement was not included in the model.

Model fit was assessed using standard estimators and accepted cut-off criteria (CFI and TLI >.90, RMSEA and SRMR <.08; Hu & Bentler, 1999). These path models allowed us to determine across all grades of students: (1) whether parent and teacher involvement in fall positively and uniquely predicted changes in students' academic engagement from fall to spring; (2) whether parent and teacher involvement in fall positively and uniquely predicted students' sense of relatedness, competence, and autonomy in spring; and (3) whether students' sense of relatedness, competence, and autonomy in spring mediated the paths from parent and teacher involvement in fall to changes in student engagement across the school year. Students' grade and sex were added in as covariates in all models to

control for the effects of grade level (e.g., third vs. fourth vs. fifth vs. sixth grades) and sex (male vs. female) on all pathways and processes.[1]

Results

Descriptive analyses

Data were screened for missing data patterns, skew, and kurtosis before the main analyses were conducted. Missing data patterns were analysed and ranged from 9.7% to 25.0% (Fall: 9.7%–14.8%; Spring: 17.9%–25.0%). All subsequent analyses used full information maximum likelihood estimation in R (Enders, 2013; Graham, 2009). Skew and kurtosis for all variables (see Table 1) were within acceptable boundaries, suggesting univariate normality for all constructs of interest.

Descriptive statistics and correlations between all variables are presented in Table 1. As expected, students' reports of parents' and teachers' involvement; their own sense of relatedness, competence, and autonomy; and their engagement with academic tasks were statistically significant and positively related in both fall and spring (effect sizes ranging from small to large). Students who reported higher levels of warm involvement from parents and teachers also had stronger feelings of relatedness, competence, autonomy, and saw themselves as more engaged in class.

Process structural equation models

Unique contributions of parent and teacher involvement

To explore the possible unique contributions of both parents and teachers, we examined these process pathways with both social partners simultaneously in the same model (model fit: $\chi^2(374) = 1,384.45$, $p < .001$, CFI = .90, TLI = .88, RMSEA = .04, SRMR = .06). As shown in Figure 2, when controlling for teachers' support, parents' warm involvement positively predicted changes in their children's academic engagement ($R^2 = .83$) through a sense of relatedness ($R^2 = .57$) and competence ($R^2 = .50$; medium to large effect sizes). Similarly, when controlling for support from parents, teachers' warm involvement positively predicted changes in students' classroom engagement through students' sense of relatedness and autonomy ($R^2 = .35$; medium effect sizes). While a sense of relatedness was a common mediator of the contributions of adult support on students' active participation and enthusiasm for academic tasks, competence and autonomy differentially explained the unique pathways between parents and teachers and academic engagement. Parents made their primary, unique contributions to engagement via their support for relatedness and competence, even when considering teachers; whereas teachers made their primary, unique contributions to student engagement via the self-systems of relatedness and autonomy, even after controlling for parents (indirect effects on engagement: $\beta_{\text{Parent Relatedness}} = .09$, $p < .01$, $\beta_{\text{Parent Competence}} = .12$, $p < .001$, $\beta_{\text{Parent Autonomy}} = .00$, $p = .86$, $\beta_{\text{Teacher Relatedness}} = .07$, $p < .01$, $\beta_{\text{Teacher Competence}} = .02$, $p = .51$, $\beta_{\text{Teacher Autonomy}} = .05$, $p < .01$). While evidence for unique effects is apparent in this model, two follow-up models examining the individual contributions of parents and teachers to changes in students' engagement were calculated

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[1] We originally tested models in which pathways and coefficients were constrained to be equal across grade and sex. These models showed no statistically significantly different patterns of unique and mediated pathways across grades or between sexes. Therefore, grade and sex were added into the models just as covariates.

Table 1. Descriptive statistics and correlations among variables

	1.	2.	3.	4.	5.	6.	7.	M (SD)	Skew (SE)	Kurtosis (SE)
1. Parent Involvement (Fall)	—							3.35 (.64)	−.97 (.08)	.48 (.16)
2. Teacher Involvement (Fall)	.58	—						3.05 (.62)	−.70 (.08)	.23 (.16)
3. Academic Engagement (Fall)	.68	.70	—					3.18 (.49)	−.43 (.08)	−.27 (.16)
4. Relatedness (Spring)	.68	.64	.62	—				3.38 (.57)	−.80 (.08)	−.02 (.17)
5. Competence (Spring)	.65	.53	.65	.64	—			3.61 (.58)	−.97 (.08)	1.07 (.16)
6. Autonomy (Spring)	.39	.52	.53	.55	.49	—		3.20 (.74)	−.85 (.08)	.14 (.16)
7. Academic Engagement (Spring)	.63	.58	.81	.70	.77	.68	—	3.17 (.55)	−.57 (.08)	−.15 (.16)

Note. All correlations statistically significant at $p < .001$ from the overall CFA measurement model. All variables were rated on a 4-point scale (1 = *not at all true for me*, 4 = *very true for me*).
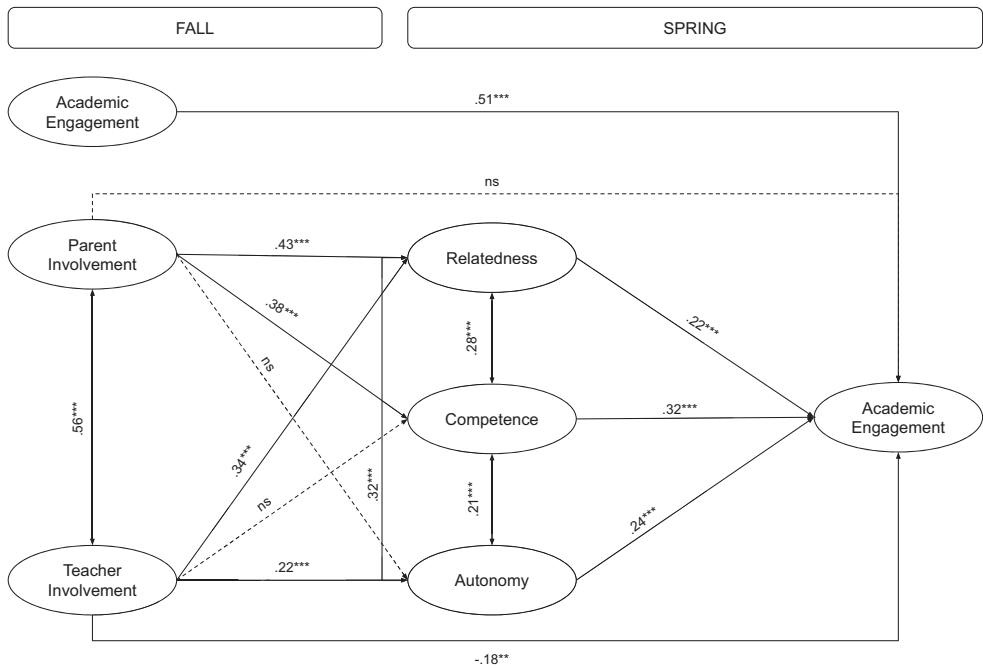
Figure 2. Parent and teacher coefficients mediation model. Not pictured are measurement models for latent variables; pathways from engagement in the fall to parent and teacher involvement in the fall and relatedness, competence, and autonomy in the spring; and the covariates grade and sex. All coefficients were standardized.

$**p < .01$, $***p < .001$.

to aid in interpretation of these findings and to replicate previous work that has examined these two social partners separately.

Individual contributions of parent involvement

Parent involvement exerted positive, indirect effects on changes in children's engagement through a sense of relatedness and competence (see Figure 3; model fit: $\chi^2(252) = 901.82$, $p < .001$, CFI = .92, TLI = .90, RMSEA = .04, SRMR = .05; indirect effects on engagement: $\beta_{\text{Parent Relatedness}} = .08$, $p < .01$, $\beta_{\text{Parent Competence}} = .13$, $p < .001$, $\beta_{\text{Parent Autonomy}} = .01$, $p = .42$). Warm involvement from parents contributed to their children's feeling of connectedness to others and confidence in their ability ($\beta = .39–.50$, medium to large effect sizes). Students' perceived relatedness ($R^2 = .52$) and competence ($R^2 = .50$) in turn predicted increases in academic engagement ($R^2 = .82$) across the school year ($\beta = .17–.33$, small to medium effects). However, parent involvement in fall did not positively predict youths' feelings of autonomy ($R^2 = .33$) in spring, even when teacher involvement was not included in the model. Hence, results from this follow-up replicated findings from previous studies examining parent involvement by itself, while aiding in interpretation of findings from the previous analysis: The lack of connection between parent involvement and student autonomy was not due to the inclusion of teacher involvement in the primary model.
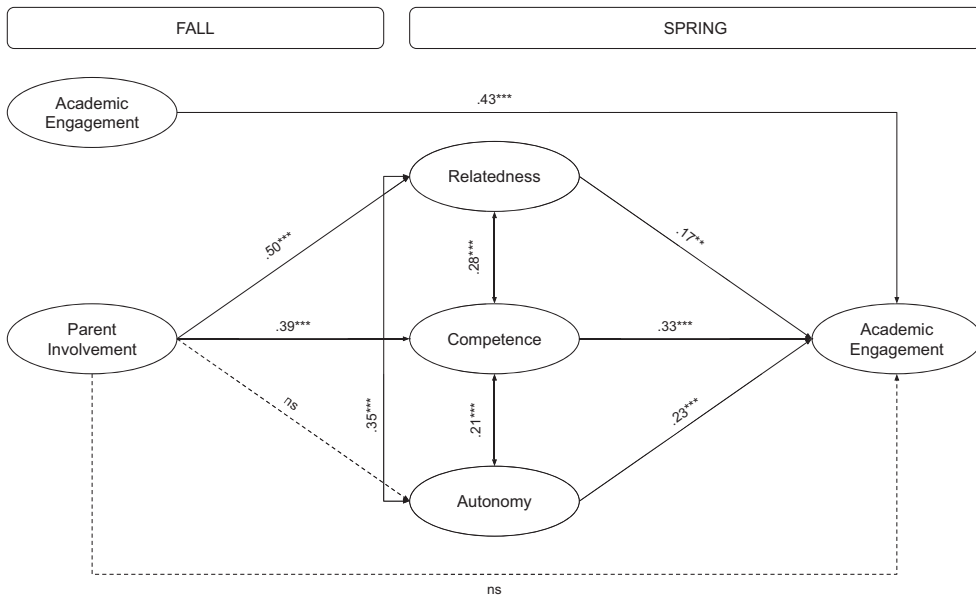
Figure 3. Parent-only coefficients mediation model. Not pictured are measurement models for all latent variables; pathways from engagement in the fall to parent involvement in the fall and relatedness, competence, and autonomy in the spring; and the covariates grade and sex. All coefficients were standardized.

**$p < .01$, ***$p < .001$.

Individual contributions of teacher involvement

Teacher involvement indirectly predicted engagement through students' sense of relatedness and autonomy (see Figure 4; model fit: $\chi^2(252) = 1,033.40$, $p < .001$, CFI $= .91$, TLI $= .89$, RMSEA $= .04$, SRMR $= .06$; indirect effects on engagement: $\beta_{Teacher\ Relatedness} = .09$, $p < .01$, $\beta_{Teacher\ Competence} = .04$, $p = .10$, $\beta_{Teacher\ Autonomy} = .06$, $p < .01$). Of note, teacher involvement still exerted a statistically significant direct effect on students' academic engagement ($R^2 = .83$), suggesting partial mediation through these self-system processes. Warm, supportive, emotional involvement from teachers predicted students' students' sense of belonging ($R^2 = .48$) and sense of autonomy in students ($R^2 = .35$; $\beta = .23–.43$, medium to large effects) which predicted increases in their enthusiastic participation with academic tasks across the year ($\beta = .20–24$, small to medium effects). Similar to the unique contributions model, teacher involvement in fall did not predict students' feelings of competence in spring, even when it was the sole predictor.

Discussion

This study adds to the growing body of research on the unique contributions of parent and teacher involvement by targeting _changes_ in students' engagement across the school year and by focusing on the processes through which parents and teachers support their children and students. In this study, analyses of parents and teachers separately and in the same models showed that both adults indirectly supported improvements in student engagement across third, fourth, fifth, and sixth grades. At the same time, the means through which engagement was supported differed across social partners. As expected,
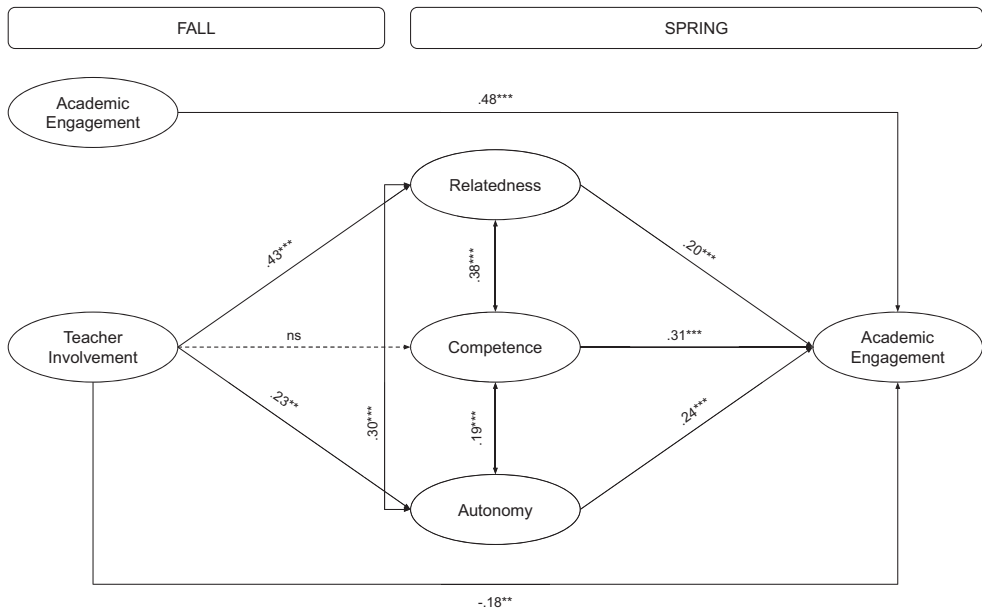
Figure 4. Teacher-only coefficients mediation model. Not pictured are measurement models for all latent variables; pathways from engagement in the fall to teacher involvement in the fall and relatedness, competence, and autonomy in the spring; and the covariates grade and sex. All coefficients were standardized.
**p < .01, ***p < .001.

relatedness was a mediator of the unique contributions of involvement from both partners, suggesting that the supports of parents and teachers are cumulative – each social partner provides support that the other cannot, and both fuel improvements in students' engagement via this pathway (Guay, Denault, et al., 2017). Consistent with some studies of older students (e.g., Ganotice & King, 2014; Guay, Denault, et al., 2017; McInerney, 2008; Murdock & Miller, 2003; Murray, 2009; Navarro et al., 2007; Sahil & Hashim, 2011; Yeung et al., 2014), parent involvement seemed to take the lead in shaping their offspring's sense of competence, whereas teacher support played the primary role in nurturing students' autonomy. Taken together, study results provide a more holistic understanding of how interpersonal relationships may optimize student engagement.

Although findings for the analysis of unique contributions (Figure 2) were similar to those examining parent and teacher involvement individually (Figures 3 and 4), this study revealed information about the unique, relative, and differentiated contributions of parents and teachers that could only be discerned by the examination of both social partners in the same statistical model. Specifically, analysis of unique pathways indicated that the contributions of parents and teachers documented individually are also *cumulative* – in that each persists even when the contributions of the other are taken into consideration, a conclusion that can only be reached when examining them together.

Interpretations, limitations, and future directions
As one of the few studies to explore the pathways through which the unique contributions of parents and teachers predict changes in students' academic engagement,

the current investigation provides some new insights, but also raises additional questions. First, to decades of research on the importance of parents and teachers to students' academic functioning, it adds the notion, explicit in bioecological and developmental systems models, that these supports are part of a more complex social ecology, and it is this entire system that shapes the motivational development of children and adolescents (Skinner, Kindermann, Vollet, & Rickert, in press). Second, it confirms the centrality of *both* parent and teacher involvement in fostering students' relatedness and engagement in the classroom. It extends this work to show that initial involvement from social partners predicts *changes* in classroom engagement across the school year, at least in part by nurturing a sense of belonging. Most importantly, findings show that each social partner contributes something that the other cannot. Hence, the contributions of parents and teachers are cumulative, a conclusion that can be reached only by examining them in the same statistical model.

Differential pathways for parents and teachers

Unexpectedly, study findings also suggest that the unique roles played by parents and teachers may differ somewhat depending on the specific self-system process. Students' identified self-regulation, an autonomous form of participation based on personal endorsement of the importance of learning (Ryan & Connell, 1989), mediated the unique contribution of teacher involvement but not parent involvement on changes in academic engagement. Although previous research with older students provides some support for this pattern of results, such findings are surprising, given the centrality of parents to the process of internalization of autonomous reasons for participating in school (e.g., Grolnick, 2009). Multiple interpretations are possible, but an important direction for future study entails the exploration of a more differentiated set of interpersonal motivational provisions from parents and teachers. Studies could examine additional facets of involvement (e.g., Grolnick & Slowiaczek, 1994) or, following up on the motivational model (Figure 1), systematically consider the potentially complementary roles of structure and autonomy support (e.g., Jang et al., 2010). Even if parental involvement does not uniquely contribute to children's autonomy over and above teacher involvement, it is possible that other features of parenting, most especially autonomy support, may nevertheless play a central role (Grolnick, 2009; Vasquez et al., 2016).

In a similar vein, results from this study suggesting that competence may not serve as a conduit from the unique contribution of teacher involvement to engagement, echo the mixed findings from studies of older students that examined parents and teachers in the same model. However, following up on theories and previous research documenting the supports of teachers separately, both of which suggest that teachers play an important role in the development of students' sense of competence and self-efficacy, future studies can explore the unique contributions of other motivational provisions, such as teacher autonomy support and especially teacher structure (e.g., Guay, Roy, & Valois, 2017).

Limitations of the present study

With regard to sample and design, future research can improve upon this study by drawing on a more diverse sample, multiple data sources, and more time points. While SDT would suggest that the needs for relatedness, competence, and autonomy are universal (Connell & Wellborn, 1991; Ryan & Deci, 2017), nonetheless, future studies should determine whether these patterns of findings are similar in samples of students

from more diverse backgrounds. For example, it is possible that the contributions of parent and teacher involvement might be more pronounced for students who have historically been marginalized from the educational process (e.g., Kumar, Zusho, & Bondie, 2018) or when students and teachers come from the same racial and ethnic background (Bingham & Okagaki, 2012). In addition, the results of this study might be biased by common method variance given that student reports were the source for all constructs. To offset this shortcoming, future studies could include multiple reporters, such as parent and teacher reports of their own involvement or observer reports of student engagement. Although the inclusion of two time points in this study was an improvement over studies utilizing cross-sectional designs, the mediation results of this study could be strengthened by the use of three time points across the school year (e.g., involvement at time 1, self-systems at time 2, and engagement at time 3) and by examining how these findings unfold across multiple school years (e.g., Jang, Kim, & Reeve, 2012, 2016). Finally, while the information from this study does give us insights into adult involvement and students' self-system pathways as predictors of changes in student engagement, its descriptive design does not allow causal conclusions to be inferred.

Future research

This study lays the groundwork for future investigations that could take multiple directions. First, researchers could consider additional self-processes that might act as mediators between social support and academic engagement, such as achievement goals, mindsets (e.g., Rodríguez-Fernández et al., 2016; Vedder-Weiss & Fortus, 2013), and, especially important for early adolescents, sense of purpose and academic identity (Damon, 2009; Wigfield et al., 2015; Yeager & Dweck, 2012). Some of these mediators might emerge or change in strength with development, in a way that the three self-systems examined in this study did not.

Second, to provide a fuller picture of the contributions of parents and teachers, future studies can consider additional characteristics of these relationships that may shape student engagement, especially, as mentioned previously, structure and autonomy support (Jang et al., 2010). Third, to better represent the complex social ecologies of students' academic lives, future research can consider additional social partners and explicitly examine interactions between contexts. For example, in addition to parents and teachers, other social partners such as peers, mentors, coaches, and siblings offer warm support to students and can help to optimize their sense of belonging, confidence, autonomy, and engagement with academic tasks (Holt, Bry, & Johnson, 2008; Hurd & Sellers, 2013; Juvonen, Espinoza, & Knifsend, 2012; Kindermann & Skinner, 2009; Tougas, Justras, & Bigras, 2016; Wentzel & Muenks, 2016). Moreover, the dynamic interactions *between* social partners may predict students' sense of self and continued engagement in school. As demonstrated in this study, the collective contribution of social partners can be differentiated or *cumulative*, where support from each partner makes its own positive and unique contribution (e.g., King, 2015). Future studies may also consider whether collective supports take other forms, such as *amplifying*, where involvement from parents could enable students to derive greater benefits from the supports provided by teachers, or *buffering*, where warm support from teachers might buffer against lack of parental involvement. Or researchers could use pattern-centred analyses to create or identify subgroups of students whose ecological niches or 'lifespaces' (Roeser & Peck, 2003) are characterized by different configurations of supports from parents and teachers (e.g., Furrer & Skinner, 2003). By more fully representing the complex, dynamic social

ecologies where students live, we can better understand how to optimize their continued academic engagement.

Educational implications

Findings from this study may help researchers refine interventions aimed at facilitating student engagement by not only targeting both parents and teachers but also by focusing on their warm involvement to ensure that they nurture in students a sense of relatedness, competence, and the autonomous desire to learn. In line with the general notion of multisystemic interventions, educators and interventionists can further expand outside of the classroom to recruit the support of parents, peers, mentors, coaches, and siblings in students' 'multiple worlds' (Phelan et al., 1998). Intervention programmes and researchers can provide instruction to social partners about how to meet students' motivational and developmental needs (e.g., Eccles & Roeser, 2009; Su & Reeve, 2011), and then test to see whether these relationships serve their intended purpose by examining corresponding changes in students' self-systems and engagement. By acknowledging and fostering support from multiple social partners in the complex social ecologies children and adolescents negotiate, we can more effectively optimize students' motivation, academic functioning, and development.

Conflicts of interest

All authors declare no conflict of interest.

Author contribution

Nicolette Paige Rickert: Conceptualization (equal); Formal analysis (equal); Visualization (equal); Writing – original draft (equal); Writing – review & editing (equal). **Ellen A. Skinner:** Conceptualization (equal); Supervision (equal); Writing – original draft (equal); Writing – review & editing (equal).

Data availability statement

Data available upon request from the authors.

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