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Abstract

The purpose of this study was to examine whether seventh grade positive peer affiliation and conduct problems mediated the relationship between sixth grade parental monitoring of behavior and eighth grade school participation and grades among students with elevated behavior ratings (EBR; n = 821) and students with unelevated behavior ratings (UBR; n = 3,779). Conduct problems and peer affiliation mediated the relationship between parental monitoring and school participation as well as grades in the overall sample (n = 4,600). A multiple-group mediation model suggested that these effects did not significantly differ across students with EBR and UBR, though the mediation estimates were smaller in magnitude and not statistically significant among students with EBR. Implications for the role of parental monitoring as an intervention target within a multi-tiered system of support for social and behavioral skills in middle school, as well as limitations and future directions are discussed.

Keywords: Family-school involvement, behavior risk, peer affiliation, conduct problems, school engagement

Impact statement

Conduct problems and peer affiliation in seventh grade mediated the relationship between student-reported parental monitoring in sixth grade and eighth grade academic engagement variables (student-reported grades and school participation). These effects did not vary significantly across students with elevated and unelevated behavior ratings, suggesting that parental monitoring may be a meaningful factor to target for prevention of behavioral difficulties at the universal level.

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Early adolescence represents a period of significant development with implications for long-term outcomes. Peer relationships and conduct problems in early adolescence consistently emerge as indicators of elevated behavior risk (Chen et al., 2015; Gardner et al, 2012), which schools might define as a meaningful difference from peers on teacher-report measures (e.g., one standard deviation above the mean). A cascade model (e.g., Masten & Cicchetti, 2010) suggests that, left unabated, negative peer influences and conduct problems may compound throughout adolescence and contribute to poor educational and social outcomes (Dishion et al., 2010; Dodge et al., 2008). Empirical work demonstrates the necessity of identifying prevention and intervention targets to mitigate these long-term trends (Dishion et al., 2010; Dodge et al., 2008; Stormshak et al., 2005; Stormshak et al., 2009; Stormshak et al., 2011). Multi-tiered systems of support (MTSS) in middle school can support prevention, identification, and intervention for social and behavioral difficulties in early adolescence through an ecological approach (Burns, 2011; Sheridan & Gutkin, 2000; Stormshak et al., 2011).

Ecological Systems Theory (Bronfenbrenner, 1979) and an MTSS framework (Burns, 2011; Stormshak et al., 2005) suggest that linking family involvement with behavioral and academic supports leverages the relevant stakeholders in an adolescent's development, offering efficient cross-setting support to the student. Family involvement typically consists of communication and collaboration between families and schools, as well as family, home, and community involvement to promote children's academic and behavioral functioning within and across settings (Manz et al., 2004; U.S. Department of Education, 2004). Meta-analyses of family-school interventions suggest that family involvement relates to positive academic

outcomes (Smith et al., 2020), as well as social, emotional, and behavioral outcomes (Sheridan et al., 2019; Smith et al., 2020). Middle school is a critical context for developing academic skills and social, emotional, and behavioral competencies, and families can have a direct role through MTSS in supporting these skills and competencies. Moreover, Smith et al. (2020) found in their meta-analysis that student age moderated the effect of support of academic behaviors in family-school involvement, such that students at higher grade levels appeared to benefit more from these supports. Nevertheless, the mediators through which family involvement may relate to academic success remain less clear.

It is important to identify potential mechanisms through which family involvement practices may relate to academic functioning to implement effective prevention practices, particularly for students exhibiting exhibiting social, academic, and behavioral difficulties (Smolkowski et al., 2017; Stormshak et al., 2011). The direct link of family involvement to behavior points towards key social and behavioral processes as the mediators between family involvement and academic functioning (Stormshak et al., 2005). Specifically, family involvement in education is often linked to behavioral concerns. When these concerns are ameliorated through aligned home and school intervention, students may be better equipped to focus on academic work in the classroom or engage in academic tasks alone or with peers. These behaviors then serve as a positive replacement for disruptive behaviors or disengagement. Parental monitoring in middle school is one potentially meaningful family involvement practice that is associated with decreases in problem behavior (Véronneau & Dishion, 2010). Parental monitoring also relates to increased positive peer affiliation (i.e., the extent to which youth are socially connected with peers in prosocial activities; Garbacz et al., 2018) in middle school. Considering that peer affiliation and conduct problems covary over middle school (e.g., Wang &

Dishion, 2012), parental monitoring may thus be a meaningful factor to leverage in middle school ecological MTSS to promote more adaptive behaviors and positive peer relationships, thereby leading to greater academic success. The purpose of the current study is to examine the indirect longitudinal relationships of family involvement. Specifically, we examine the extent to which conduct problems and positive peer affiliation mediate the relationship of student-reported parental monitoring relates to academic functioning (school participation and grades). We also examine the extent to which these indirect effects vary by behavior risk status (based on elevated or unelevated behavior ratings), including school compliance, participation in extracurricular activities, school identification, and reported valuing of learning.

The Role of Families in Middle School Students' Functioning

Families support their children in myriad and dynamic ways. Parents' support of their children through activities such as helping with schoolwork and promoting positive behavior is one of the most important aspects of family involvement. Many individuals might be involved in these supportive parenting roles, including non-familial individuals or other relatives (Hirano & Rowe, 2016). These supportive parenting behaviors play an important role in social and behavioral development during early adolescence, particularly in terms of peer affiliation and positive, adaptive behavior. Peer dynamics as well as parenting practices relate to the onset of conduct difficulties in adolescence (Dishion & Patterson, 2016). Increases in positive parenting practices in early to mid-adolescence relate to decreased growth rates of antisocial behavior, the effect of which may in part depend on parental warmth (Wang et al., 2012). Findings also suggest that higher student-reported parent knowledge of school activities predicts higher student-reported engagement (Im et al., 2016). Student-reported expectations from peers and parents predict higher academic engagement and performance, both effects being further

moderated by peer and parent support, respectively (Wentzel et al., 2015). Together these findings point towards conduct problems and peer affiliation as crucial risk factors in the onset of school difficulties in early adolescence, and family involvement may have a crucial role in preventing compounding behavior difficulties and maladaptive peer relationships.

Findings from randomized controlled trials examining family-school interventions in early adolescence also suggest that parental involvement can mitigate these adverse trajectories in middle school (Dishion et al., 1991; Smolkowski et al., 2017; Stormshak et al., 2005; Stormshak et al., 2009; Stormshak et al., 2011). Intervention trials have shown that integrating families in middle school service delivery models to support students' development can prevent the escalation of problem behavior (Stormshak et al., 2005). For example, Stormshak et al. (2009) detail a large-scale efficacy trial of the EcoFIT multi-tiered intervention (i.e., universal and selected support levels), which embedded the Family Check-Up (FCU; Dishion & Kavanaugh, 2003) at the selected level. Stormshak et al.'s (2009) study showed that EcoFIT positively impacted both attendance and academic achievement (grade point average). The EcoFIT model also leads to desirable reductions in substance use and antisocial behavior (Stormshak et al., 2011). Treatment effects in both studies were focused on those families who elected to receive the FCU intervention within the EcoFIT model at the selected level. These findings suggest that multi-tiered strategies that route families and their children into evidence-based intervention programs prevent adverse trajectories at a critical time. Importantly, FCU implementation via the EcoFIT model showed impacts on both academic (Stormshak et al., 2009) and behavioral outcomes (Stormshak et al., 2011). However, these studies did not address specific behaviors to promote within family involvement nor how these behaviors would promote more prosocial behaviors and academic success. Understanding these mechanisms is a

critical aspect of identifying relevant components to more effectively implement family involvement programs within a tiered framework in middle schools.

Prior work has suggested that parental monitoring of student behaviors may be a particularly meaningful element within family involvement (Véronneau & Dishion, 2010; Garbacz et al., 2018). Parental monitoring of student behaviors is defined as parents' awareness of their child's daily activities, which could include activities in the community, at school, and with peers (Dishion & McMahon, 1998; Garbacz et al., 2018; Kerr & Statin, 2000). Examples of this might include monitoring peer affiliation, daily routines, and academic tasks like homework (Metzler et al., 1998). For example, Garbacz et al. (2018) showed that student reports of parental educational involvement in sixth grade, including monitoring of schoolwork, were predictive of positive and deviant peer affiliation in grades seven and eight. Relatedly, Véronneau and Dishion (2010) found that the interacting effects of peer acceptance and rejection (e.g., peer acceptance at higher rates of rejection or vice versa) at grade six were lower for students that reported higher parental monitoring. Furthermore, parental monitoring is a key mechanism of the FCU among early adolescents exhibiting riskier behaviors (Dishion et al., 2003). In sum, family involvement with schools is a mesosystemic element of intervention that can improve both behavior (Sheridan et al., 2003) and academic functioning (Smith et al., 2020). However, parental monitoring in middle school may hold distinct relationships by proximally predicting important social and behavioral domains in early adolescent development.

Peer Relationships and Conduct in Adolescence

Multiple studies show the influence of peer relationships during middle school on youth behavior throughout adolescence. Adolescents' affiliation with peers exhibiting conduct difficulties is linked to the escalation of maladaptive behaviors (Gardner et al, 2008). Increases in

peer support during middle and high school relate to multiple dimensions of school engagement (Wang & Eccles, 2012). Affiliation with more academically engaged peers (Im et al., 2016) and socially supportive (Malecki & Demaray, 2006) peers also relate to increased school engagement and academic outcomes. Wang and Dishion (2012) found that both Grade 6 problem behavior and affiliation with peers who engage in conduct difficulties were positively correlated, as were changes in these constructs through Grade 8. The same study found that Grade 6 levels as well as changes over time in peer support were negatively correlated with Grade 6 problem behavior and growth rate through Grade 8. The emergence of conduct difficulties in adolescence may also be mediated by relationships with deviant peers or rejection from peers, factors that themselves may be related to early onset conduct difficulties (Chen et al., 2015). Together, these findings suggest more positive peer interactions could deflect cascading relationships with other problem behaviors (e.g., conduct). This corroborates both Wang and Dishion's (2012) and Wang and Eccles' (2012) findings that positive elements of peer relationships relate to decreased problem behaviors in middle school but also that concurrent peer support and problem behaviors are correlated (Wang & Dishion, 2012).

Affiliation with supportive and positive peers, thus, may be a unique leverage point in adolescents' behavior development, as such affiliation tends to concurrently relate with existing problem behaviors, and both problem behaviors and negative peer affiliation may compound over time in the absence of intervention. This may be particularly the case for students predisposed to riskier trajectories of behavior development (Chen et al., 2015). For example, deviant peer affiliation at age 17 predicts antisocial behaviors at age 19 among youth with lower levels of self-regulation (Gardner et al., 2008). These results suggest the cascading effects of negative peer relationships with conduct problems could be stronger among students exhibiting

more at-risk behaviors. Conversely, increases in positive peer involvement among behaviorally at-risk 12 to 14 year-olds relates to increased school engagement and achievement at age 15 (Im et al., 2016).

Since middle school is a crucial time to adapt to the educational environment, relationships of parental monitoring to student functioning need to be measured with attention to mediating associations to better understand how these relationships transmit over time. Family involvement can have influences on both social and behavioral processes (Stormshak et al., 2005) as well as academic outcomes (Stormshak et al., 2009). Although social and behavioral changes may follow most directly from family involvement in some cases (particularly when the family's involvement is focused on these outcomes, e.g., Dishion & McMahon, 1998), these social and behavioral improvements may also transmit into positive academic functioning. For example, dimensions of parenting include rule-making, setting routines, and monitoring of children's time spent at home, at school, and with peers (Metzler et al., 1998). These areas of parenting may facilitate positive and adaptive behavior and peer relationships, which are thought to mutually increase over early adolescence (Wang & Dishion, 2012; Chen et al., 2015). Improvements to social and behavioral functioning may transmit to academic outcomes through providing consistency and structure to the home setting as well as promoting more positive child behavior and affiliation with peers who are academically engaged and demonstrating adaptive behaviors (Dishion & McMahon, 1998). Prevention and intervention in these areas may then buffer students against the notable declines in academic functioning throughout middle school and into high school (e.g., Rockoff & Lockwood, 2010; Schwerdt & West, 2013), which may be more pronounced for students with initially higher behavior risk.

Peer affiliations, parental monitoring, conduct problems, and academic functioning are frequently studied with students who have higher behavior risk. A developmental cascade model has been applied to understand the influence of internalizing and externalizing behavior concerns on later academic functioning and mental and behavioral health (Masten et al., 2005). In addition, these models and related models have examined the influence of behavior concerns that emerge later in childhood, during the transition to middle school (Moilanen et al., 2010). However, there is a need to better understand how peer affiliations, parental monitoring, conduct problems, and academic functioning occur for students with and without behavior risk. Such studies could uncover the role of peer relationships and conduct problems as key proximal targets of parental monitoring, which may then carry the effect of parental monitoring into improved academic functioning.

Present Study

The goal in the present study is to examine the extent to which positive peer affiliation and conduct problems mediate the relationship between parental monitoring and academic functioning. We were particularly interested in the extent to which these relationships might be stronger for students with higher behavior risk at the beginning of middle school. First, we sought to test if conduct problems and positive peer affiliation in grade seven uniquely mediated relationships between grade six student-reported parental monitoring and grade eight grades and school participation. Second, we examined whether these mediating relationships varied between students with elevated behavior ratings (EBR) or unelevated behavior ratings (UBR). By testing whether behavior risk moderates these mediating effects, we examine whether these mediators may be more or less potent in potential tier 1 (universal) or tier 2+ (selected, indicated) contexts. Two research questions guided the present study:

1. Are there significant, unique indirect effects of parental monitoring on academic functioning outcomes via positive peer affiliation and conduct problems?

Based on prior work (Garbacz et al., 2018; Stormshak et al., 2005; Véronneau & Dishion, 2010; Wang & Dishion, 2012; Wang & Eccles, 2012; Im et al., 2016) indicating behavior is proximal to family involvement while academic functioning is distal, we hypothesized that positive peer affiliation and conduct problems would significantly mediate relationships between parental monitoring and school participation as well as grades. We predicted that more parental monitoring would predict more positive peer affiliation, in turn associating with better grades and greater school participation. We predicted that parental monitoring would relate to fewer conduct problems, which would be associated with greater school participation and better grades.

2. Do the mediating effects of conduct problems and positive peer affiliation differ between students across levels of behavior risk (elevated or unelevated risk)?

We predicted that these mediation effects will be stronger among students with EBR, given that conduct problems and peer affiliation are frequently targeted areas of behavioral difficulty in early adolescence (Dishion et al., 1991; Dishion et al., 2010; Stormshak et al., 2005; Gardner et al., 2008; Smolkowski et al., 2017; Im et al., 2016).

Method

Participants

Data from the present study were collected as part of a larger cluster randomized controlled effectiveness trial of a scaled-up version of the EcoFIT family-school intervention, Positive Family Support (PFS; Smolkowski et al., 2017). The study was conducted in 41 public middle schools (21 = treatment, 20 = control) with Grades 6 to 8 in the Northwest region of the U.S. within rural, suburban, and urban locales. School enrollment ranged from 151 to 1,037

students. Among the 41 schools, between 29% to 94% of students were eligible for free or reduced-priced lunch (median 58%). Participants in the current study consisted of students with EBR (n = 821) and withUBR (n = 3,779) as rated by teachers in sixth grade. We defined students as exhibiting EBR if they scored 15 or higher on the Teacher Risk Assessment (TRISK; Soberman, 1994) based on Smolkowski et al.'s (2017) risk criterion. The TRISK assesses teachers' concern of students' classroom behavior related to mood, on-task behavior, and peer relationships across six items on a 1 (*no concern*) to 4 *(very serious concern*) scale. Table 1 presents the demographic characteristics of our current sample. In the full sample, 50% reported their gender as male in Grade 6. Most students reported their race/ethnicity as White (61%) in Grade 6 with Hispanic/Latino students comprising the next largest racial/ethnic group (21%). Forty-six percent of students reported their family as having "just enough money to get by" in Grade 6. Descriptively, there was not significant variability in demographic composition across risk groups with the exception of self-reported gender (higher percent male in EBR group) and some aspects of perceived financial security (e.g., EBR students generally reported less financial security).

Measures

Below we describe the measures used in the current study and report reliability coefficients (Cronbach's α) for the measures. For each measure, α estimates are provided for the grade at which each measure is used as a primary predictor or outcome. Unless otherwise noted, we calculated composite scores to use in our analysis by taking the average score of all items on the measure. We completed this after multiple imputation of missing data at the item level (Gottschall et al., 2012), which we describe more in the "Missing Data" section of the Method.

Elevated Behavior Ratings

We defined elevated behavior ratings using teacher-reported scores on the Teacher Risk Assessment (TRISK; Soberman, 1994) in Grade 6. Teachers rated their level of concern about students' behavior on six items on a 1 (*no concern*) to 4 (*serious concern*) scale (α = .89 for our subsample), totaling 24 possible points on the scale (sample items: "Depressed, anxious, or irritable", "follows classroom rules"). Soberman (1994) indicated convergence of TRISK-generated risk levels with scores on teacher- and parent-reported Child Behavior Checklist (Achenbach & Edelbrock, 1983) scores. We further investigated the factor structure as well as the concurrent and predictive validity of the adapted six-item TRISK among the full sample of cohort 1 (n = 6,890). We provide more detail on this in the supplemental materials. A one-factor structure adequately fit the data ($\chi^2[df]$ = 733.422[9]; comparative fit index [CFI] = 0.980, Tucker-Lewis fit index [TFI] = .967, root mean squared error of approximation [RMSEA] = .108). In Grade 6, the TRISK correlated with student-report grades (ρ = -.45), student-report Strengths and Difficulties Questionnaire (SDQ; Goodman et al., 1998) conduct problems subscale (r = -.31), and student-report school participation (r = -.38). Grade 6 TRISK had correlations of -.29 and -.32 with Grade 8 SDQ conduct problems and school participation, respectively.

As described previously, Smolkowski et al. (2017) used the TRISK as a moderator of intervention effects of the PFS intervention. Their findings indicated that, generally, PFS was most effective for students with TRISK scores of around 15 or above. We use a cutoff of 15 or above as our criterion for defining elevated behavior ratings, as the effects of the EcoFIT trial at this criterion may indicate meaningful differences in distinguishing elevated from unelevated behavior risk in the school setting. We did not impute TRISK scores. A minimum of four items were necessary to compute a TRISK sum score (allowing a maximum score of 16), and students

without any responses to TRISK items were not included in the analyses (n = 2,228). Out of the 4,653 teachers who completed out at least one item on the TRISK for each student, 97.2% completed all items, and 2.6% completed at least four items.

Conduct Problems

Students reported their level of conduct problems on the Strengths and Difficulties Questionnaire Conduct Problems subscale (SDQ; Goodman et al., 1998). Students rated characteristics of their conduct-related behavior on a five-item, 1 (*not true*) to 3 (*certainly true*), scale (Cronbach's α = .64; sample items: "I get very angry and often lose my temper" and "I am often accused of lying or cheating"). We reversed the scaling of this measure such that higher values indicate fewer conduct problems. Self-reported SDQ conduct problems correlated moderately with parent- and teacher-reported SDQ conduct problems (Goodman et al., 1998; Goodman, 2001). Goodman (2001) found that SDQ conduct problems correlated moderately with other SDQ self-report SDQ subscales (emotional symptoms and hyperactivity/inattention; r = .33-.53) and that self-reported conduct problems uniquely explained 8.5% of the total variance in a five-factor SDQ factor model.

Parental Monitoring

Students reported the extent to which their parents monitor their behaviors related to social (e.g., spending time with friends) and school activities (e.g., homework completion) using items modified from a student-report measure of parenting practices (Metzler et al., 1998). On 13 items, students rated the frequency of parental monitoring of their behavior on a 1 (*never or almost never*) to 4 (*always or almost always*) scale (Cronbach's α = .90; sample items: "How often does at least one of your parents know who you hang out with during your free time?" and "How often does at least one of your parents check that you have everything you need for

school?"). The Monitoring Scale was developed from Metzler et al. (1998), as well as a series of clinical and research projects on parenting (Dishion et al., 1991; Patterson & Dishion, 1985) grounded in Ecological Systems Theory (Bronfenbrenner, 1979) and parental monitoring (Dishion & McMahon, 1998; Kerr & Stattin, 2000; Stattin & Kerr, 200). Metzler et al. (1998) established student-reported parental monitoring as well as rule-making and rule-enforcement as three separate lower-order factors that loaded on a general parenting construct across fifth to seventh grade (in addition to lower-order factors of parent-child conflict, family relations, and positive reinforcement). Monitoring, rule-making, and rule enforcement , which most closely align to the present measure, correlated at r = -.47, -.33, and -.24, respectively, with a measure of deviant peer affiliation. Antisocial behavior correlated with monitoring (r = -.91), rule-making (r = -.46), and rule enforcement (r = -.39), and substance use also related to monitoring (r = -.50), rule-making (r = -.31), and rule enforcement (r = -.30). In Grades 6, 7, and 8, the present monitoring scale was concurrently correlated with conduct problems (r = .35-.42) and peer affiliation (r = .42-.55). Grade 6 monitoring was correlated .24 with Grade 8 conduct problems and .29 with positive peer affiliation. These correlations were based on multiply-imputed data (discussed below and in supplemental materials).

Positive Peer Affiliations

We assessed positive peer affiliation using the Positive Peers scale (Dishion et al., 2014). Prior work has established the validity of peer affiliation is a key factor in adolescents' social and behavioral development (Dishion et al., 2014; Garbacz et al., 2018; Véronneau and Dishion, 2010). Dishion et al. (2014) found that peer affiliation among 12-13 year olds was one factor of a multi-trait multi-method model of peer and social acceptance. They also found that multi-informant peer affiliation among 12-13 year olds predicted deviant peer clustering one year later.

In the current study, students reported their affiliations with positive peers on a the Positive Peers scale with 3 items rated on a 1 (*none or very few*) to 5 (*most or all*) scale (Cronbach's α = .78; sample items: "How many of your friends are well-behaved at school?"and "How many of your friends are involved in positive school or community activities?").

School Participation

We assessed students' participation in school-based activities using the School Success Scale (SSS; Smolkowski et al., 2017). Students reported their participation in activities using four items on a 1 (*not at all*) to 5 (*very often*) scale (Cronbach's α = .55; sample items: "How often do you get along with teachers and other school staff?" and "How often do you complete assignments or homework on time?"). To examine concurrent and predictive validity of the SSS, we conducted correlations between Grade 6 to 8 SSS and Grade 6 to 8 student-report SDQ conduct problems. We found small to moderate correlations between the SSS and the SDQ conduct problems subscale across and within grades, ranging from .31 to .51. Grade 6 TRISK scores correlated with SSS in Grades 6 to 8 between -.33 and -.39. Together, these correlations suggest convergence between student-reported school participation, conduct problems, and teacher-reported concern.

Grades

Students reported their grades on a one item, "During the most recent grading period, how were your grades?" on a 1 (*mostly As*) to 5 (*Mostly Fs*) scale (Smolkowski et al., 2017). We reversed the scaling of this measure such that higher values represented better grades. This measure also had a response option for "not in school," which was originally coded as a value of 6. We removed students from the data who endorsed "not in school" at any time point (n = 36).

Procedure

All procedures were approved by the appropriate institutional review board. Further information on the procedure of the larger study can be found in the online supplemental materials and Smolkowski et al. (2017). Students completed measures in the winter. Teachers completed measures in the spring. Data collection occurred across six years, with three waves. Wave A schools participated in data collection in Years 1 to 5, Wave B schools participated in Years 2 to 6, and Wave C schools participated in Years 3 to 6.

We did not include the treatment condition variable in our current study, as we were only interested in the longitudinal associations of our measures across middle school regardless of the impact of treatment condition. Moreover, our modeling strategy controls for lagged prior levels of each variable, which may reduce confounding in estimates that may arise from treatment assignment as well as baseline differences between EBR and UBR groups. We describe our strategy in greater detail below. We are only able to include students from cohort 1 of the larger study. The TRISK measure was administered only among cohort 1 students in the pre-intervention (baseline) assessment year per the study's planned missing data design (see Smolkowski et al., 2017 for more information).

Analysis Plan

Path analysis

To assess our primary research questions, we conducted path analysis using composite variables constructed from the student-report scales. We used an autoregressive cross-lagged panel model (AR-CLPM) in which autoregressions for each variable at each wave are simultaneously estimated to control for preceding levels of each variable while mediating paths are cross-lagged across time and constructs (Mitchell & Maxwell, 2013). We used a single-group AR-CLPM model on the full sample (EBR and UBR groups combined) to assess the mediating

paths of interest in the full sample of students. We were also interested in how our mediation effects of interest varied across EBR status (research question 2). Figure displays the full AR-CLPM. We use the "lower-triangle" model (Mitchell & Maxwell, 2013) rather than the full AR-CLPM since we were interested in a more limited range of grades for some variables. To assess the moderated mediation hypothesis of research question two, we expanded the single-group AR-CLPM into a multiple-group model. The bolded paths in Figure 1 indicate the paths that correspond to our hypotheses that Grade 7 conduct problems and peer affiliation would mediate the effect of Grade 6 parental monitoring on Grade 8 school participation and grades. Unbolded paths were constrained to equality across groups in the multiple-group model, which controls for the effects of these variables across groups. We constrained these paths to help isolate the unique mediating paths that corresponded to our hypotheses (see the Figure 1 note for more detail on which parameters were constrained or freed). We also assess the overall relative model fit of the single versus multiple-group models based on information criteria (the Aikake's Information Criterion [AIC] and the Bayesian Information Criterion [BIC]).

Our data is from a large school-based sample, so it was necessary to assess the extent of intra-class correlations (ICCs) due to school-level clustering. Following imputations, ICCs in the full sample of 4,600 students ranged from .03 to .08 across waves and variables with a median of .045. Because we were interested solely in student-level effects, we employed single-level path analysis. Many options to account for clustering exist (Huang, 2018), but the complexity of our model precluded the use of many of these procedures. Simpler mediation models allowed more flexibility with respect to modeling the clustering; however, we prioritized the AR-CLPM to test our longitudinal mediation hypotheses as opposed to more basic sequential mediation models (see Mitchell & Maxwell, 2013). We performed all path analyses in *Mplus* Version 8.5 (Múthen

& Múthen, 1998-2020) with robust maximum likelihood estimation (MLR). MLR corrects standard errors for nonnormality and heteroskedasticity using a sandwich estimator (Múthen & Múthen, 1998-2020). We constructed 95% asymmetric confidence intervals (CIs) for each indirect effect and indirect effect difference tests in our path model using Preacher and Selig's (2012) Monte Carlo simulation method. We used 100,000 random draws in all simulations. We report results from models without cluster-robust standard errors; results with cluster-robust standard errors were nearly identical and did not alter our conclusions (see online supplemental materials for more information).

Missing Data

The larger study design included planned missingness across both of the two cohorts (Smolkowski et al., 2017). As aforementioned, we included students with baseline TRISK scores, which limited our sample to students only in cohort 1 of the larger study. Remaining missingness was due to nonresponse to the surveys or attrition. One school in cohort 1 did not provide any TRISK data (precluding a calculation of EBR at baseline), so our sample is limited to 40 of the 41 schools in the study. Consistent with the larger study, we considered the majority of missing data to be missing at-random (MAR; Enders, 2010). We imputed missingness using predictive mean matching (PMM; Rubin, 1987). Please see the online supplemental materials for more information on our imputation method.

Results

We first estimated a single group model with covariances among all variables at each time point (Grade 6 covariances are not model parameters since these variables are considered exogenous). To address research question 1, we assessed the mediation paths of primary interest in this single-group model (the relationship between parental monitoring in Grade 6 with grades

and school participation in Grade 8 through Grade 7positive peer affiliation and conduct problems). We represent unstandardized path estimates as *b* and standardized estimates as β. Standard errors are based on unstandardized estimates.

All mediating paths of interest in the single-group model were statistically significant at the $p < .05$ level (using the Benjamini-Hochberg correction did not alter our inferences). Path estimates of this model are presented in Figure 2. Conduct problems significantly mediated the effect of parental monitoring on school participation ($b = 0.010$, $\beta = 0.010$, $SE = 0.003$, $p = .001$), as did positive peer affiliation ($b = 0.017$, $\beta = 0.017$, $SE = 0.003$, $p < .001$). Similarly, conduct problems mediated the effect of parental monitoring on grades ($b = 0.020$, $\beta = 0.013$, $SE = 0.005$, $p < .001$), and positive peer affiliation evidenced a similar significant effect ($b = 0.016$, $\beta = 0.010$, $SE = 0.005$, $p = .001$). All effects were significant using Monte Carlo 95% asymmetric CIs. Parental monitoring had a significant direct effect only on school participation ($b = 0.058$, $\beta = 0.059$, $SE = 0.019$, $p = .002$), suggesting that both the mediators as well as parent monitoring relate significantly to grade eight school participation. On the other hand, the only significant effect of parental monitoring on grades occurred indirectly through each mediator. In practical terms, these effects are small. For example, we observed that a one standard deviation (SD) increase in parental monitoring predicts only a .01 *SD* increase in school participation via conduct problems. For grades, a one *SD* increase in parental monitoring predicts only a very small (.02-unit) increase in student-report grade considering the scale of the measure (ordered discrete categories ranging from 1-5; the grades *SD* was 1.1, so the unstandardized and standardized units are approximately the same). Thus, although these effects are significant, parental monitoring's transmission through peer affiliation or conduct remains small given that the direct paths are small in absolute magnitude (e.g., $|\beta| = .07$-$.13$). Across all direct and indirect

effects, cluster-robust standard errors were at maximum .002 higher than unclustered errors, resulting in negligibly higher or identical *p*-values.

This single-group model also serves as a baseline against which we then compare our model for assessing group differences in mediation effects (i.e., moderated mediation). For model comparison with the multiple-group model described below, we also report the AIC and BIC values for this single-group model (BIC =53,247.903, AIC =53,035.587), which we use as benchmark values against which we compare the fit of subsequent multiple-group models. Smaller AIC/BIC values for the multiple-group model than those reported above for the single-group model suggest better fit of the multiple-group model.

To address research question 2, we extend the single-group model into a multiple-group model to assess the extent to which these mediation effects vary significantly across students with EBR or UBR (moderated mediation). In our multiple-group models, we constrain all autoregressive parameters to equality across groups, thereby adjusting for between-group differences in autoregressive effects. We free only the paths that compose our mediation and direct effects and residual variances (however, residual covariances are constrained to equality across groups). Our hypothesized paths are then the unique cross-lagged effects, adjusted for within- and between-group autoregressive effects. This model showed significantly improved fit from the single-group model as indicated by reduction in AIC and BIC values (ΔAIC = -928.801, ΔBIC = -800.125), suggesting that the multiple-group model more adequately models the data structure. We focus on individual path estimates for tests of our hypotheses for research question 2. Path estimates from this mediation model are presented in Table 2 and Figure 3. In Table 2, we present all regression paths from the full multiple-group AR-CLPM. Figure 3 displays the path estimates for hypothesized mediation paths within each group

We first focus on the direct paths estimated within each group in Table 2 and Figure 3. Among students with UBR, estimated direct paths were significant and generally small in standardized magnitude ($\beta = 0.10 – 0.13$). The exceptions to this are the paths of parental monitoring on Grade 8 grades (very small magnitude and nonsignificant) and school participation (very small magnitude but significant). Among the EBR group, the only significant path was the effect of parental monitoring on positive peer affiliation. The residual correlations at Grade 7 and Grade 8 remained significant and moderate in size considering the autoregressive and cross-lagged paths, suggesting there are meaningful residual cross-sectional relationships across constructs within time periods. We constrain these parameters across groups, removing between-groups differences in cross-sectional, cross-construct correlations, which may help isolate unique within-group effects. We do not constrain individual residual variances across groups, however.

We next turn to the indirect effects of conduct problems and positive peer affiliation within each group. Table 2 displays these indirect effects. All indirect effects are statistically significant among students with UBR, and no indirect effects are significant among students with EBR. Difference tests of the mediation coefficients indicate no statistically significant group differences in mediating effects. Monte Carlo asymmetric CIs show the same pattern of significant and nonsignificant results. We cannot conclude that the mediating effects vary significantly in size. This could be due to the significantly higher statistical power to detect mediation effects among students with UBR (Aguinis & Gottfredson, 2010). Although the mediating effects are significant and precise among studenst with UBR, standard errors in the EBR group are large enough to inhibit detection of meaningful between-group differences in these effects. Nevertheless, the significant improvement to model fit relative to the single-group

model suggests that jointly freeing these paths of interest (as well as residual variances) substantially improves the multiple-group model fit relative to the single-group. The results from the multiple-group AR-CLPM generally do not support our primary hypothesis for research question 2 that the mediating effects of peer affiliation and conduct problems would be stronger in the EBR group.

Discussion

Family involvement and behavioral functioning in middle school are both malleable factors that can deflect potentially adverse trajectories of behavior and school success (Dishion et al., 2003; Stormshak et al., 2009; Stormshak et al., 2011). In the current study, we tested how parental monitoring practices during middle school may relate to later academic outcomes (school participation and grades) through decreased conduct problems and increased positive peer affiliation and whether elevated behavior risk moderated these indirect effects. Based on prior work (e.g. Garbacz et al., 2018; Verroneau & Dishion, 2010), we hypothesized that peer affiliation and conduct problems would simultaneously mediate the relationship of parental monitoring to our outcomes in the full sample. We also predicted that these mediating effects would be stronger among students with EBR given the potentially increased role of peer affiliation and conduct problems in promoting academic success among at-risk adolescents (e.g., Stormshak et al., 2009; Dishion et al., 2010). We found evidence for these mediating effects in the full sample and only among students with UBR; the effects were smaller and, for the most part, nonsignificant in the EBR group. However, differences in mediating effects between groups were not significant; we conclude that with the present findings there is no detectable moderated mediation of these effects in the current sample. Moreover, the only statistically significant direct effect of parental monitoring occurred among students with UBR on later school participation.

Although we did not find that the mediation effects varied significantly across groups. we found evidence that the two-group model generally fit the data better based on the AIC and BIC. This improved fit suggests there is systematic variability in the covariance structure of these variables across EBR and UBR groups. Although not equivalent to moderated mediation, the multiple-group structure of the data suggests that collectively freeing the paths (and residual variances) improves fit, though this does not entail detectable differences in mediation estimates between groups. For example, multiple paths may vary in magnitude across groups yet the multiplicative mediating relationships could be equal (e.g., a mediation estimate of .25 could be formed from two paths with estimates of 0.5 and 0.5 or of 2.5 and .1). Although our goal was not to test whether every individual path varied (we were focused on the mediating paths), highlighting these elements in the individual paths helps understand where between-group patterns arise and how they may inform future research in this area. More specific attention to individual paths may help inform future research and identification of potentially feasible intervention targets.

Importantly, our current model does not sufficiently establish the assumptions necessary to warrant a clear causal interpretation. Although there is sound theoretical and empirical evidence to believe that increases in parental monitoring may causally lead to decreases in behavioral difficulties (e.g., Dishion et al., 2003) and thereby improvements to academic functioning, our results are subject to a variety of alternative explanations. Panel methods such as AR-CLPM require particular attention to the assumptions necessary to establish causal pathways (Mitchell & Maxwell, 2013; Zyphur et al., 2020a; 2020b). Our current models provide evidence of how variables sequentially relate across middle school (while removing differences in prior levels of variables via autoregressive effects) and account for sequential relationships between

time lags, yet there may be other unmeasured confounders that could affect the internal validity of our inferences (Foster, 2010).

Implications

Implications for Research

We extend prior work (Garbacz et al., 2018; Véronneau & Dishion, 2010) to show that, in the general student population and among students without elevated behavior ratings, parental monitoring continues to exhibit a significant role in predicting more positive peers and fewer conduct problems. Our primary novel finding, though perhaps not surprising, is that improvements in these behavioral outcomes then carry the association of parental monitoring into eighth-grade academic functioning, specifically higher participation in school and better grades. More surprising, however, is that not only were the differences in mediating effects across behavior rating levels nonsignificant, but none of the mediating effects were significant among students with EBR. Again, this could be a result of the comparatively smaller sample and proportionally more missing data among students with elevated behavior ratings, resulting in a loss of precision in our estimates. That said, our models suggest that parental monitoring continues to hold a robust relationship to positive peer affiliation among students with elevated behavior ratings, consistent with prior work (Garbacz et al., 2018). The primary implication for research of these findings is that the link between parental monitoring and academic outcomes among students with elevated behavior is not as clear as it may be for the general student population. Parental monitoring and peer affiliation continue to evidence a meaningful, unique relationship among students with EBR, yet the variable(s) through which this association might translate to later academic functioning remains unclear and requires further empirical work and theoretical refinement.

Additionally, these results have implications for students with UBR. Although school participation is not a direct measure of academic achievement, it taps into engagement-related behaviors that are adaptive for achievement at the end of middle school. Prior family involvement interventions in middle school have focused more narrowly on peer affiliation and problem behaviors (Stormshak et al., 2005), GPA and attendance (Stormshak et al., 2009), or substance use (Stormshak et al., 2011) among higher-risk students identified within the EcoFIT framework. Our findings suggest that more positive peer affiliation and fewer conduct problems may simultaneously carry the effect of parental monitoring to multiple areas of academic functioning, even among students with UBR. Our current results may also align with Smith et al.'s (2020) findings from a large-scale meta-analysis showing that older students benefited more from family involvement practices around supporting academic behaviors than younger students. The simultaneous indirect effect of parental monitoring on school participation through conduct problems and peer affiliation suggests that for the overall student population (and those with UBR), parental monitoring early in middle school may hold important implications for developing social, behavioral, and academic functioning in early adolescence. However, to meet the potentially heightened needs of students evidencing higher behavior ratings, it is important to further examine how parental monitoring's relationship to peer affiliation may transmit to academic functioning. Our findings among students with EBR suggest a need to target key proximal outcomes of family involvement—such as social, behavioral, and emotional functioning (Stormshak et al., 2005)—that may then relate to academic success through other mediators not addressed here or transmit over a longer course of time.

These findings with the novel early adolescent sample indicate that the associations between parental monitoring and student outcomes holds for older youth in similar ways to the

more widely researched elementary years. The context of middle school in general poses many challenges for students' academic and social development, and these issues may be more pronounced for students already evidencing EBR (Im et al., 2016). In particular, middle school entails a number of social and behavioral features, such as the emergence of peer influence (Dishion et al., 2014) and problem behaviors (Wang & Dishion, 2014), that can amplify maladaptive functioning through late adolescence (Dishion et al., 2010). Our findings suggest that, for many students, student-reported parental monitoring may be an important indicator of the emergence of fewer conduct difficulties and more positive peer affiliation, and consistent with prior work (Im et al., 2016; Wang et al., 2012), improvements in these social and behavioral dimensions can extend to academic functioning. Family involvement, then, continues to show potential as an efficient, ecologically-focused prevention target that may buffer middle school students against the emergence of maladaptive behaviors and peer relationships. Other developmental factors that intersect with social processes of early adolescence, such as social belonging and identity development (e.g., Borman et al., 2019), may have incremental value in promoting academic success alongside enhanced family involvement practices.

Implications for Practice

Relationships among Grade 6 parental monitoring, Grade 7 peer affiliation and conduct, and grade eight academic outcomes are generally stronger (based on magnitude) and estimated with more precision among students without EBR. This has a number of important implications for practice. First, this may point to parental monitoring, conduct problems, and peer affiliation as potentially more robust (at the very least more precise based on the smaller standard errors) targets for ecological intervention to promote academic functioning at the universal level of support. Prior studies have established the positive relationship between parental monitoring and

decreased problem behaviors (Garbacz et al., 2018; Veronneau & Dishion, 2010). The precision with which these paths are estimated suggests that if parental monitoring may be an important leverage point for intervention among middle schoolers, positive effects might be more likely to be observed at the universal level. In a number of cases (specifically with respect to conduct problems), the paths among students with UBR are somewhat stronger in effect size as well. Promoting parental monitoring of behaviors may be an efficient ecological approach at the tier 1 level to reduce widespread conduct and peer difficulties (Stormshak et al., 2005; Stormshak et al., 2009; Stormshak et al., 2011; Smolkowski et al., 2017). For example, schools can create systems to support parents in monitoring their children (e.g., sharing about effective parenting strategies through social media posts). In addition to specific support for parental monitoring focused on knowledge of, attention to, and tracking child behavior (Dishion & McMahon, 1998), this support may benefit from the following features. First, it would be helpful to couple systems-level support with strengthening family-school ties (e.g., through more positive interactions and consistent interactions). Strengthened family-school ties may facilitate parents' implementation of monitoring strategies greater consistency and integrity (Froiland, 2021). These positive family-school interactions might then accumulate over time and yield greater benefits for both family-school partnership and students' positive academic and behavioral development. In addition, a focus on parent-child relationship building from a strengths-based orientation may be helpful. This focus may support parental monitoring that facilitates appropriate autonomy during early adolescence while maintaining close connections to child behavior which is vital during this period (Garbacz et al., 2018)

The greater imprecision of path estimates among students with EBR suggests that other variables may better explain these sequential relationships from parental monitoring to academic

functioning. Among students with EBR, the effect of parental monitoring on positive peer affiliation may suggest that parental monitoring continues to be a robust predictor of positive peer affiliation (Dishion et al., 1991; Dishion et al., 2003), though how that relates to other academic outcomes is less clear. These results suggest that schools might continue to target parental monitoring as an efficient mechanism that may relate to reductions in social and behavioral difficulties, yet more supports for students with higher risk may be necessary for those relationships to generalize to academic outcomes as they do in the more general population (Im et al., 2016; Malecki & Demaray, 2006). For example, family-school communication and collaboration as well as family use of positive behavior support strategies (Smith et al., 2020) may help generalize social and behavioral improvements to academic functioning.

Limitations and Future Research Directions

Several limitations of these results must be considered. The amount of missing data (nearly 50% for some measures in Grade 8 among the elevated rating group) likely reduces the efficiency of estimates (i.e., increases the standard errors). However, recent work has shown that bias due to missingness may be minimal if data are missing at-random and all relevant variables are included in the imputation model, even with high rates of missingness (Madley-Dowd et al., 2019). The item-level imputation and large set of items included in the imputation help make the imputation model more tenable and may help recover some estimation efficiency that would have been lost had we imputed prorated scale scores (Gottschall et al., 2011).

Moreover, the imbalance in sample sizes may also relate to a loss of power to detect group differences in mediation effects. The mediation effects are substantially more powered in the UBR group (and in the overall sample), so it is easier to observe the hypothesized effects only in the overall sample or UBR group. A larger sample of students with EBR in future studies

would increase the power to detect mediation effects within the EBR group and group differences in mediation effects (moderated mediation). For moderation analysis in general, Aguinis and Gottfredson (2010) recommend attaining balanced sample sizes across subgroups targeted for examining moderation effects. The substantial missing data also relates to these group imbalances, given that the missing data combined with smaller EBR sample size compounds the loss of power. That said, our sample reflects an uncontrived situation that many schools would face wherein the number of students being served in universal (UBR) versus selected/indicated supports (EBR) will likely be imbalanced. Future research focusing on differences between students with EBR and UBR should attend more closely to these methodological limitations and how they impact practice-relevant inferences. All considered, we are unable to conclusively state whether differences in mediation do or do not exist, although we can be more certain about the existence of mediation within the UBR group or in the overall sample.

We used single-level models given the complexity of including a multilevel structure into the AR-CLPM model with the number of parameters we estimated. Overall, our model balances the robustness of the AR-CLPM in terms of statistical control (Mitchell & Maxwell, 2013) with the structure of the data (e.g., results are similar with cluster-robust errors), though alternative models might explore how these paths sysematiclaly vary across multilevel structures.
We also used a more parsimonious approach using traditional composite scores of our measures (compared to latent variables), though alternative methods that account for measurement error in composite scores should be considered (Zhang & Wang, 2020). Future studies applying AR-CLPMs should attend to issues of measurement error and longitudinal factor structure.

We use only student-report measures, which limits the data sources on longitudinal relationships. Parent- and teacher-reports of parental monitoring and behavior would provide further evidence about how parental monitoring longitudinally relates to social and behavioral outcomes. With respect to academic outcomes, prior literature suggests that self-reported GPA and actual GPA are highly correlated (Zimmerman et al., 2002); however, some students may over-report their GPA, particularly students with lower grades (e.g., Dobbins et al., 1993).

Our dichotomization of behavior ratings aligns with prior work using these data (Smolkowski et at al., 2017) that shows the most detectable effects of EcoFIT were among students with generally elevated ratings (i.e., 15 or above). This also mirrors how schools may identify students for additional follow-up screening or increased behavior supports. Nevertheless, our dichotomization of behavior ratings likely does not capture the subtleties across the range of ratings and provides a very limited classification scheme for behavior ratings. For example, arbitrary differences in TRISK scores (e.g., scoring a 14 versus a 15) might result in actually at-risk students being considered as having unelevated behavior difficulties or vice-versa. Future work might focus on examining mediation effects in these domains as moderated by a continuous measure of risk or combining risk indices into a more comprehensive latent indicator that has more clearly-established classification accuracy. Another approach would be to use multiple indicators of risk to form theory-driven latent profiles of risk, and profile membership could then be used as the group indicator to examine multiple-group mediation.

These classification issues relate to another important limitation, which is that the TRISK measure itself could relate to the observed lack of differences between groups. It is possible that conduct and peer variables do mediate relationships between parental moninotiring and academic functioning among students with EBR, but the TRISK does not capture the necessary elements

of EBR to observe this effect in our current sample. The TRISK is short (six items) and captures clearly observable dimensions of student risk, such as mood, task completion, and peer relations. Many other dimensions of teacher-reported risk are possible, however, including different subdimensions of mood, peer affiliation, and school success. Another limitation of the TRISK is that we were unable to include all teachers' ratings in the sample. To be able to obtain a minimum score of 15, we included only students whose teachers reported on at least four of the six TRISK items. This may further bias the sample if the students with four or more TRISK item responses systematically differed from students without three or fewer TRISK item responses. However, cross-tabulatons of TRISK item responses indicates that teachers responded to at least four items, or they did not complete the survey at all. Thus, the source of bias from missing data would come from missing the entire measure, rather than missing specific items, and this would likely reflect very different missing data mechanisms (e.g., forgetting to complete the survey versus systematic non-response to specific items).

Last, grades were self-reported on a single-item, five-point scale. This variable may be better estimated as an ordinal outcome. However, treating this variable as ordinal introduces other modeling complexities, some of which are disadvantageous to the goals of our current study (e.g., weighted least-square mean and variance adjusted [WLSMV] estimation, which is one option for accounting for ordinal data, does not produce AIC and BIC values and changes the estimates of other paths in the model besides the ordinal regression paths). MLR estimation may somewhat help adjust standard error estimation for the nonnormality of this measure, and given that there are 5 categories of the item, assuming linearity might be tenable. Regardless, it is important to recognize the limitation of treating our grades variable as continuous and linear.

Conclusion

The potential compounding effects of behavior difficulties in middle school necessitates identifying how areas of behavioral and academic functioning relate across early adolescence. Our findings align with prior work outlining the relationships between parents, conduct, and peers in adolescence while extending these results to show conduct and peer affiliation in part account for the relationship between early parental monitoring and academic functioning at the end of middle school. Ecological factors such as parental involvement thus may be a key factor in early adolescence in preventing the escalation of behavior difficulties and the subsequent relationships with academic functioning at the universal level.

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Table 1

Grade Six Demographic Characteristics

Demographic Variable	*M* (*SD*)		
	EBR	UBR	Overall
American Indian or Native American	21%	14%	15%
White	57%	62%	61%
Black or African American	5%	4%	4%
Asian	3%	5%	5%
Hispanic or Latino	21%	21%	21%
Native Hawaiian or Pacific Islander	2%	2%	2%
Reported Multiple Races/Ethnicities	13%	13%	8%
Other Race/Ethnicity	10%	8%	13%
Reported Sex: Male	66%	47%	50%
Reported "Not enough money to get by"	9%	5%	6%
Reported "Just enough money to get by"	53%	44%	46%
Reported "Only have to worry about money for fun/extras"	24%	35%	33%
Reported "Never have to worry about money"	14%	16%	15%
Age in years	11.78 (0.55)	11.71 (0.54)	11.72 (0.54)

Note. EBR = Elevated behavior ratings, UBR = Unelevated behavior ratings. *SD*s not reported for binary variables. Only available data used for demographic characteristics. At least 80% of the full sample (n = 4,600) reported demographic characteristics in grade six. Race/ethnicity categories are not mutually exclusive and sum to greater than 1.

Table 2

Multiple-Group Autoregressive Cross-Lagged Panel Model Unstandardized Path Estimates, Standard Errors, and p-Values

	Unstandardized Path Estimates (*SE*)							
	Constrained Parameters	*p*	UBR	*p*	EBR	*p*	Difference Tests	*p*
Autoregressive Paths								
SP Gr. 6 ⟶ SP Gr. 7	0.385 (0.015)	<.001						
SP Gr. 7 ⟶ SP Gr. 8	0.423 (0.018)	<.001						
Grades Gr. 6 ⟶ Grades Gr. 7	0.452 (0.019)	<.001						
Grades Gr. 7 ⟶ Grades Gr. 8	0.485 (0.017)	<.001						
CP Gr. 6 ⟶ CP Gr. 7	0.375 (0.021)	<.001						
PP Gr. 6 ⟶ PP Gr. 7	0.300 (0.017)	<.001						
Cross-Lagged Paths								
PM Gr. 6 ⟶ PP Gr. 7			0.196 (0.028)	<.001	0.163 (0.074)	.027		
PM Gr. 6 ⟶ CP Gr. 7			0.052 (0.011)	<.001	0.038 (0.027)	.156		
CP Gr. 7 ⟶ SP Gr. 8			0.186 (0.039)	<.001	0.037 (0.090)	.679		
PP Gr. 7 ⟶ SP Gr. 8			0.087 (0.013)	<.001	0.067 (0.035)	.052		
CP Gr. 7 ⟶ Grades Gr. 8			0.331 (0.063)	<.001	0.240 (0.164)	.144		
PP Gr. 7 ⟶ Grades Gr. 8			0.083 (0.019)	<.001	0.036 (0.067)	.590		

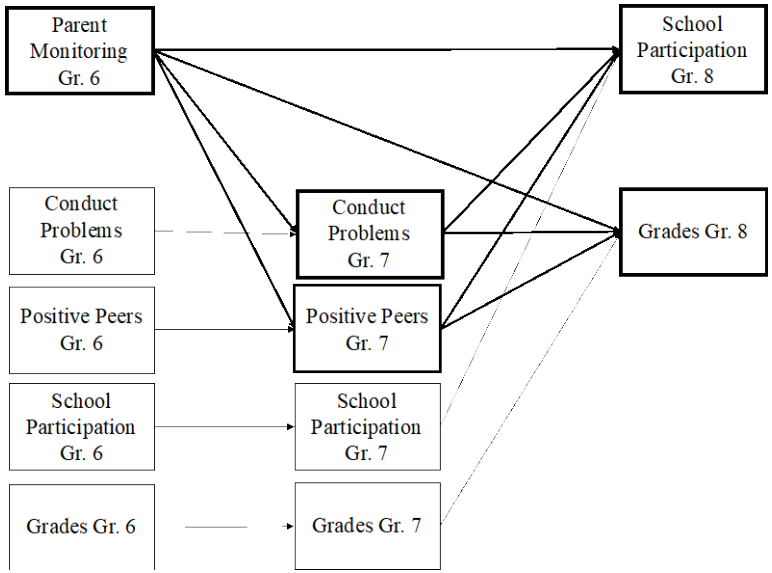
PM Gr. 6 ⟶ SP Gr. 8	0.047 (0.018)	.010	0.074 (0.051)	.145		
PM Gr. 6 ⟶ Grades Gr. 8	-0.012 (0.030)	.689	0.059 (0.079)	.459		
Indirect Effects						
PM Gr. 6 ⟶ PP Gr. 7 ⟶ SP Gr. 8	0.017 (0.003)	<.001	0.011 (0.008)	.172	0.006 (0.009)	.513
PM Gr. 6 ⟶ CP Gr. 7 ⟶ SP Gr. 8	0.010 (0.003)	<.001	0.001 (0.004)	.755	0.008 (0.005)	.076
PM Gr. 6 ⟶ PP Gr. 7 ⟶ Grades Gr. 8	0.016 (0.004)	<.001	0.007 (0.012)	.602	0.010 (0.013)	.463
PM Gr. 6 ⟶ CP Gr. 7 ⟶ Grades Gr. 8	0.017 (0.004)	<.001	0.008 (0.009)	.361	0.009 (0.010)	.398

Variable	R^2	R^2
CP Gr. 7	0.171	0.160
PP Gr. 7	0.151	0.132
SP Gr. 8	0.295	0.240
Grades Gr. 8	0.324	0.285

Note. All covariances constrained to equality across groups. *SE* = Standard error, PP = Positive Peer Affiliation, CP = Conduct Problems, SP = School Participation, PM = Parent Monitoring, EBR = Elevated behavior ratings, UBR = Unelevated behavior ratings.

Figure 1

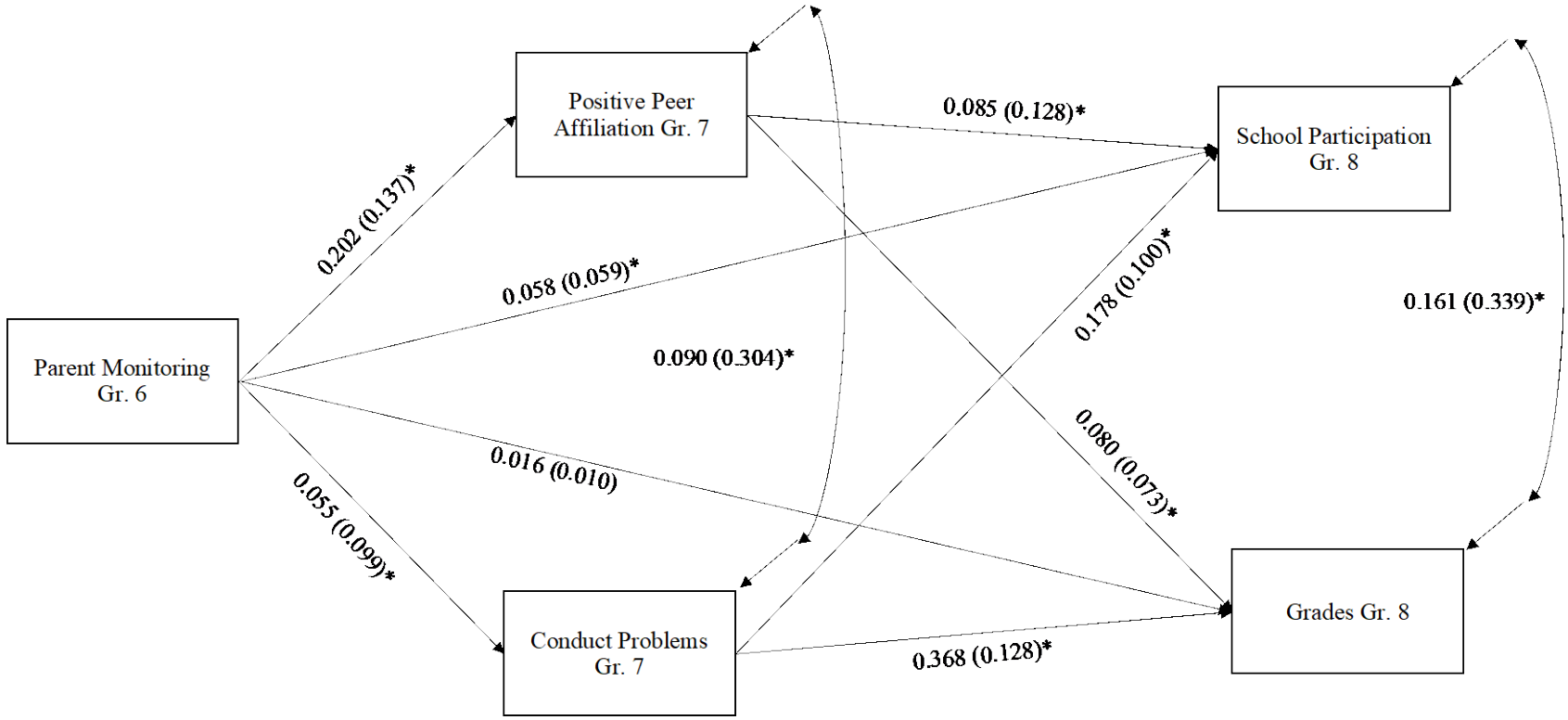
Autoregresive Cross-Lagged Panel Model used for Single- and Multiple-Group Analysis



Note. Bolded paths indicate the estimates we let vary across groups in the multiple-group model. Covariances, residuals, and residual covariances not displayed. We freed residuals for Grade 7 conduct problems and positive peers and Grade 8 school participation and grades across groups in the multiple-group model. However, we constrained residual covariances at Grade 7 and Grade 8 to equality across groups. We only test the invariance of indirect effects within the bolded paths.

Figure 2

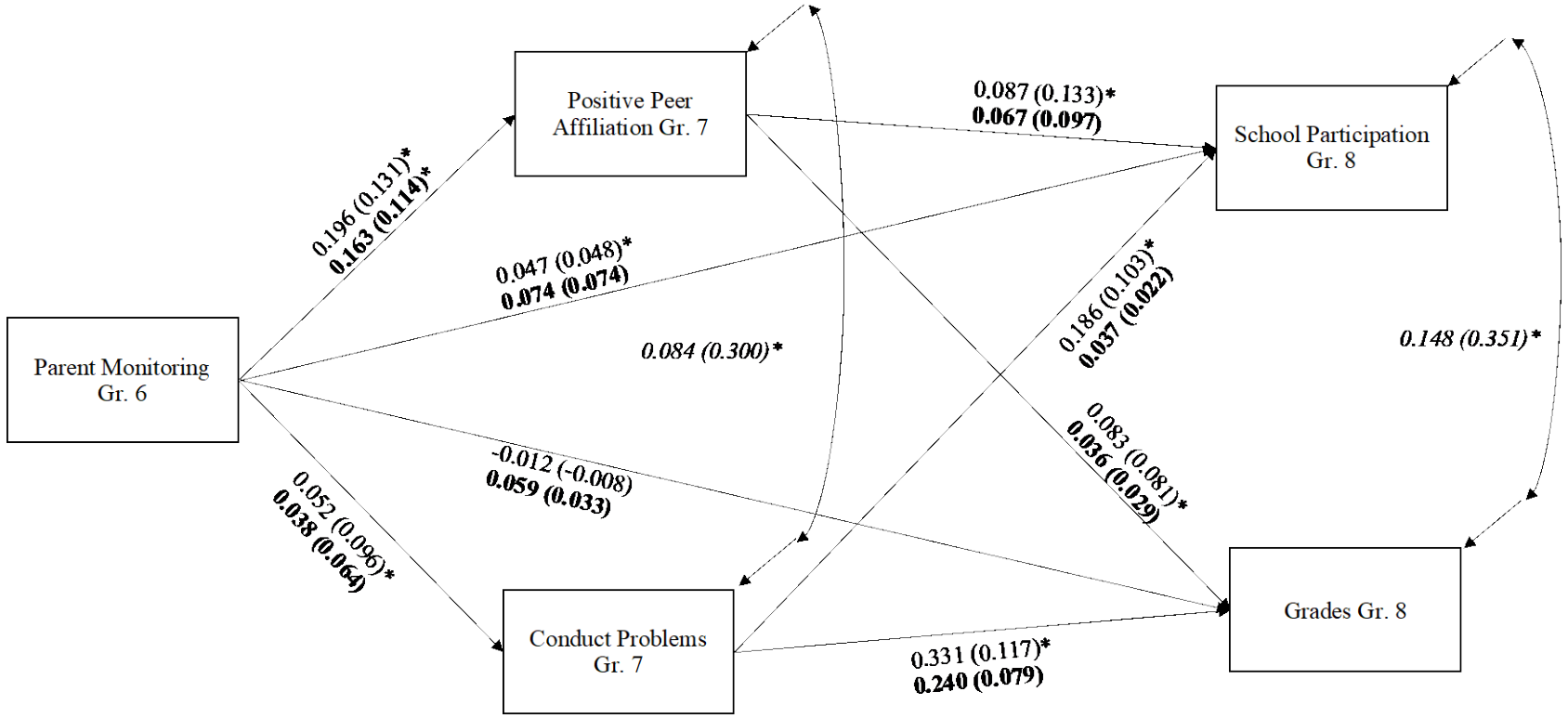
Cross-Lagged Unstandardized and Standardized Path and Covariance Estimates from Single-Group Autoregresive Cross-Lagged Panel Model



Note. Standardized estimates in parentheses.
*$p < .05$

Figure 3

Cross-Lagged Unstandardized and Standardized Path and Covariance Estimates from Multiple-Group Autoregresive Cross-Lagged Panel Model



Note. Standardized coefficients in parentheses. Elevated Behavior Ratings group coefficients are in bold. Italicized text indicates coefficients constrained to equality across groups. Residuals for the variables displayed here not constrained across groups (see Table 2 for R^2 values). Standardized coefficients in parentheses.
*$p < .05$.

Supplemental Material

Examining Links Between Parental Monitoring and School Engagement Among Middle School Students with and without Elevated Behavior Ratings

Within this supplemental material document, we provide greater detail for information presented in the main text regarding the larger study from which the data for the current study were derived, our missing data imputation model, and issues regarding the multilevel nesting structure in our path analysis.

Information from the larger study

In the larger study, 41 middle schools in the Pacific Northwest region were randomized to either delayed control (n = 20) or treatment (n = 21) conditions across two cohorts of sixth graders. Implementation of condition activities for each cohort occurred across three waves. Student-, parent-, and teacher report data were collected in the winter of each school year during the school day. Both paper-and-pencil and electronic versions (via a secure, web-based platform) of the surveys were available, and Spanish versions of the materials were available upon request.

Additional information on psychometric analyses of the study measures

We conducted a number of construct, concurrent, and predictive validity analyses of the TRISK (Soberman, 1994) and the School Success Scale (Smolkowski et al., 2017) to provide further detail on the psychometric basis of these measures. Because of substantial missing data at the item-level, we used multiple imputation in R (R Core Team, 2020) using the *mice* package (van Buuren, & Groothuis-Oudshoorn, 2011) to impute item-level missingness on the TRISK, Strengths and Difficulties Questionnaire total score, School Success Scale, student-report parental monitoring, peer affiliation, and grades across Grades 6 to 8. We used 20 imputations with 100 iterations each with schools as fixed effects to account for the nesting to impute

missingness among 6,890 students in Cohort 1 (students who reported "not in school" on the grades at any time point measure were not included in these analyses; $n = 51$).

We conducted correlations among these measures to examine concurrent and predictive validity. We also conducted a confirmatory factor analysis (CFA) of the six-item TRISK to investigate its factor structure. The TRISK's ordered categorical items (on a scale of 1-4) necessitated the use of weighted least squares mean and variance adjusted (WLSMV) estimation in order to obtain standard chi-square based fit indices to assess the model fit for the CFA. We used the TYPE=COMPLEX option in Mplus version 8.5 (Muthén & Muthén, 1998-2020) to correct standard error and chi-square estimation for nesting within schools.

Additional information on multiple imputation for the main analysis

We used multiple imputation in R (R Core Team, 2020) using the *mice* package (van Buuren, & Groothuis-Oudshoorn, 2011). To account for the nesting of students within schools, we used school fixed effects within imputation (imputation with a multilevel model encountered convergence problems). We imputed scale items and created composite scales following imputation (Gottschall et al., 2012). We included all items at grades six, seven, and eight for all measures of interest, though we did not use data from all grades for each measure in our analysis model (e.g., we only used grade six parent monitoring in our analysis model, though grades six through eight were included in the imputation model).[1] We imputed separately within groups of behavior ratings to account for the multiple-group structure of our analysis model (Enders &

[1]We considered multiple modeling approaches, so we included grade six gender and student-reported financial security (across all grades) into the imputation model as these were potential candidates for covariates in early model formulations (prior to imputing grade six gender, we filled in missing grade six gender values with reported values from grade seven or eight). TRISK scores were also used as predictors in our imputation models within each risk group. Because we used school fixed effects in the imputation, school indicator and treatment condition were highly multicollinear, so we did not include treatment condition in the imputation model. Some schools were automatically removed from the imputation procedure due to multicollinearity.

Gottschall, 2011). We generated 20 imputed datasets (100 iterations each) within each risk group. Missingness rates on each item increased over the grades, indicative of sample attrition. Additionally, missingness rates were higher among students with unelevated behavior ratings (UBR): the average item missingness proportion for all measures across all grades was .352 for students with elevated risk and .223 for students with unelevated risk. Among only the items included in our AR-CLPM, the average missingness was .271 and .172 for EBR and non-EBR groups, respectively.

Additional information on path model estimation

Given the number of parameters in the model, we were unable to use cluster-robust standard errors using the TYPE = COMPLEX command without creating different sets of clusters for each behavior rating group (TYPE = COMPLEX is not equivalent to multilevel modeling [Huang, 2018]; however, it corrects the bias in standard errors that may occur due to nonindependence of observations). This was not a barrier for the single-group model, and the single-group results with cluster-robust errors were nearly identical. For the multiple-group model, we tested our model using cluster-robust errors (with different clusters for each rating group), and this model produced highly similar standard errors.

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