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ORIGINAL PAPER

Maternal involvement and children's academic motivation and achievement: The roles of maternal autonomy support and children's affect

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Abstract
Parents' level of involvement in children's schooling is related to children's academic success; yet, few studies have considered factors that may play a role in this relation. This study examined an interactional model to determine whether children's affect toward maternal involvement and autonomy supportive versus controlling parenting moderated relations between three involvement types and children's academic motivation and achievement. Participants were 213 third through fifth-grade children, their mothers and teachers. Unexpectedly, interactions for perceived competence ($\beta = -.26$, $b = -0.34$) and grades ($\beta = -.14$, $b = -1.28$) indicated that when children's affect was negative, higher school involvement was associated with higher perceived competence ($p < .001$) and grades ($p = .038$). Another interaction ($\beta = .22$, $b = 2.28$) indicated that, as predicted, when mothers were autonomy supportive, higher personal involvement was associated with more autonomous self-regulation ($p = .003$). This interaction was not present for other outcomes. Findings suggest ways to optimally involve mothers in children's schooling.

Keywords Maternal involvement · Autonomy support · Child affect · Achievement · Academic motivation

Research demonstrates positive relations between parental involvement in children's schooling and children's academic motivation and achievement (Fan and Williams 2010; Gonzalez-DeHass et al. 2005; Hill and Tyson 2009; Powell et al. 2012). These findings hold true across many types of involvement, such as volunteering at school, communicating interest in and a value for school, and engaging children in school-relevant activities such as going to the library.

Although examining parents' involvement is critical, most researchers have investigated main effect models linking the quantity or level of involvement with academic outcomes, without considering whether parent and child factors may moderate relations between the level of involvement and children's academic outcomes. One important factor to consider is parenting style. Research suggests that parents' style of interacting with their children on the dimension of autonomy supportive versus controlling makes a difference for children (Núñez et al. 2015; Steinberg et al. 1992); thus, overall parenting style may play a role in the relation between level of involvement and children's academic outcomes. With regard to child effects, children's preference for, or affective attitude toward, parental involvement may be important. While there is evidence that children's affect toward parental involvement is associated with the degree to which parents get involved (Vyverman and Vettenburg 2009), it is unknown whether children's experience of involvement as positive or negative makes a difference in how level of parental involvement relates to children's academic outcomes.

The current study uses a self-determination theory (SDT) perspective to examine a model that considers the relations among involvement quantity, parenting style, children's affect toward involvement, and children's academic motivation and achievement. Given that mothers are more likely to be involved in their children's schooling than fathers (Coyl-Shepherd and Newland 2013), the current study focused on mothers. Identifying how aspects of children and mothers might moderate relations between maternal involvement and children's academics could provide information to help mothers be involved in ways that are optimal for children's

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academic success. It could also address the controversy over whether too much involvement, or overinvolvement, may be harmful to children's motivation (e.g., Robinson and Harris 2014). For example, it is possible that it is not too much involvement but the context in which the involvement occurs that makes a difference for children's academic outcomes. Similarly, such research could have implications for schools and policy makers in suggesting ways to more effectively involve mothers in their children's schooling.

A self-determination theory perspective on involvement

To consider the parenting context in which involvement is implemented (Darling and Steinberg 2017) and its importance to children's academic motivation, we used an SDT perspective (Deci and Ryan 1985; Ryan and Deci 2017). This theory explains what children need in order to be successful and what environments will foster that success. SDT suggests that, to function optimally, people require three psychological needs to be met: autonomy, competence, and relatedness. Within the academic context, competence needs are met when children believe that they can be successful. Such experiences can be indexed by children's reports of their competence in a particular domain (Harter 1982). Autonomy needs are met when children feel volitional or that they choicefully self-initiate actions. This can be indexed by children regulating their behavior more autonomously (e.g., doing homework because of its perceived importance; Ryan and Connell 1989), rather than being motivated by external contingencies, such as rewards and punishments. Finally, relatedness needs are met when children feel connected to other people (Deci and Ryan 1985; Ryan and Deci 2017).

According to SDT, to help children satisfy their needs, parents can create environments including involvement, which meets the need for relatedness, and autonomy support (versus control), which meets the need for autonomy. Involvement entails providing resources to the child, both tangible and intangible, and offers the tools that help children to be successful (Deci and Ryan 1985; Ryan and Deci 2017). One domain in which parents can be involved is children's schooling. Parental involvement in children's schooling is related to many indicators of academic success, such as children's grades and standardized test scores (Hill and Tyson 2009; Jeynes 2005, 2007). Similarly, studies looking specifically at maternal involvement have revealed positive correlations with children's academic achievement (Stright and Yeo 2014; Topor et al. 2010). There is also support for positive relations between general maternal and paternal involvement and children's motivational resources, such as children's perceived competence and autonomous self-regulation (Grolnick et al. 1991; Marchant et al. 2001). In a review synthesizing many studies, Gonzalez-DeHass et al. (2005) concluded that when parents are involved in their children's schooling, with parental involvement defined as parenting behaviors directed towards children's education, children report greater perceived competence and intrinsic motivation.

In addition to considering general parental involvement, researchers have examined specific ways in which parents get involved in their child's schooling, which is important given that research has shown differential relations with children's academic outcomes. Many researchers separate parental involvement into school-based involvement, which is involvement that takes place at the school (Epstein and Sanders 2002; Hill and Tyson 2009) and home-based involvement, which is involvement in educational activities or homework at home (Epstein and Sanders 2002; Gonida and Cortina 2014; Hill and Tyson 2009). Although school involvement has been shown to be positively related to children's school performance and grades (Hill and Taylor 2004; Hill and Tyson 2009; Shumow and Miller 2001), home involvement has been shown to be either negatively associated (Shumow and Miller 2001; Wilder 2014) or unrelated (Hill and Tyson 2009; Jeynes 2005) to grades and achievement. Given prior literature indicating that school-based and home-based involvement differentially relate to children's academic outcomes, it is important to distinguish between various ways in which parents can be involved in their children's schooling.

Grolnick and Slowiaczek (1994) defined parental involvement as the dedication of resources by the parent to the child within a given domain and developed a multi-dimensional conceptualization of involvement that includes school, personal, and cognitive/intellectual involvement. School involvement is that which occurs at the child's school, including attending open houses, volunteering at school, or talking to the child's teachers. Personal involvement involves communicating interest in and asking about school. Finally, cognitive/intellectual involvement involves engaging in cognitively stimulating activities outside of school, such as taking their child to museums or purchasing books for their child. Grolnick and Slowiaczek (1994) showed that the types of involvement could be reliably measured and found moderate correlations among the three. A key goal of the study was to evaluate a model in which levels of the three types of involvement were related to children's grades and motivational resources, including perceived competence, perceived control, and self-regulation. School, personal, and cognitive/intellectual involvement were positively associated with different aspects of children's motivation and school performance. Specifically, maternal school involvement predicted perceived competence and grades, while maternal personal involvement predicted autonomous self-regulation, and cognitive/intellectual involvement predicted perceived

competence. To achieve a more specific, multidimensional conceptualization of maternal involvement that not only considers school activities but also personal and emotional aspects, the current study measured school, personal, and cognitive/intellectual involvement.

A self-determination theory perspective on autonomy supportive versus controlling parenting

According to SDT, children have a need for autonomy; thus, in addition to parents' level of involvement, the parenting context in which involvement is implemented may be important to consider. Specifically, the extent to which mothers are autonomy supportive versus controlling may play a role in children's academic motivation and achievement. SDT states that parental autonomy support involves providing opportunities for children to act choicefully and can be expressed through parents taking children's perspectives, expressing empathy, solving problems together, and offering choices (Deci and Ryan 1985; Ryan and Deci 2017). By contrast, controlling parenting behavior places pressure on children, solves problems for them, and disregards their perspectives and opinions. Autonomy supportive parenting has been shown to be positively associated with children's academic achievement (Bindman et al. 2015; Grolnick 2009; Grolnick and Ryan 1989; Joussemet et al. 2005). Conversely, controlling parenting has been shown to be negatively associated with children's academic achievement (Bean et al. 2003; Grolnick et al. 2002; Xiang et al. 2017). Research has also linked autonomy supportive and controlling parenting to children's motivational resources, particularly to their autonomous self-regulation (Chirkov and Ryan 2001; Grolnick and Ryan 1989; Grolnick et al. 1991).

Although involvement and autonomy support are often examined independently, there is utility in examining them together. By considering the context in which involvement occurs, one can determine whether the effects of involvement are promoted in the context of autonomy support and undermined in the context of controlling parenting. Núñez et al. (2015) found that children's perceptions of controlling parental homework involvement (e.g., checking if the child does homework, punishing the child for incomplete homework) was negatively associated with academic achievement, while children's perceptions of supportive homework involvement (e.g., helping the child with homework when needed, solving homework problems together) was positively associated with academic achievement. Similarly, in an experimental study in which children completed a homework-like task with their mothers in the laboratory, across conditions, children whose parents used a more controlling style did not perform as well on a subsequent similar task when required to work independently (Grolnick et al. 2002). Based on the results from both of these studies, it is possible that when children perceive their parents as controlling it undermines their academic performance; conversely, it may be that children who have more problems academically evoke more control from their parents.

Further, few studies have considered the interaction between parental involvement and autonomy support on children's academic outcomes. One study examined authoritative parenting, characterized by both demandingness (akin to structure) and autonomy support, as a moderator of the relation between parental involvement and adolescent school performance and engagement (Steinberg et al. 1992). In this study, parental involvement was defined as how often parents helped with homework when asked, attended school programs, watched their child in extracurricular activities, helped their child select classes, and knew how their child was doing in school. Results indicated that parental involvement was more strongly associated with adolescent achievement when it occurred in an authoritative context.

The current study measured both maternal involvement and autonomy support as well as children's motivational resources, specifically children's perceived competence and autonomous self-regulation, as key outcomes. These resources have been shown to be positively associated with children's grades and standardized test scores (Froiland and Oros 2014; Grolnick et al. 1991; Grolnick and Slowiaczek 1994; Guay et al. 2010). We also included children's grades, a commonly used measures of academic performance. With regard to our moderation hypothesis, we suggest that when mothers are involved in a controlling context, children will experience their actions as determined by external forces and thus display less autonomous regulation (Grolnick 2009; Grolnick et al. 2002; Joussemet et al. 2008; Núñez et al. 2015). Similarly, involvement in such a context may make children believe that their mothers do not think they can successfully accomplish tasks on their own; as a result, they feel less competent (Pomerantz and Eaton 2000).

Children's affect toward maternal involvement

Although parenting style is a parenting factor that may moderate the relation between parental involvement and children's academic outcomes, it is important to also consider child emotional factors. Here, we examined whether children experience involvement positive or negatively. To our knowledge, only one study to date has looked at children's affective attitude toward parental involvement. Vyverman and Vettenburg (2009) used questionnaires to examine 10-year-olds' affective attitudes towards parents' participation in their schooling. Findings revealed that

children generally like when their parents are involved in their schooling. Further, children's affective attitude toward parental involvement was positively related to the frequency with which parents got involved. Thus, it is possible that when parents are more involved, children have a more positive attitude towards their parents' involvement; however, it is also possible that when parents see their children enjoying their involvement, they choose to get more involved. Similarly, Hoover-Dempsey and Sandler (1997) suggested that parents get involved in children's education for various reasons, one of which is a perceived desire from their children to be involved. Using Hoover-Dempsey and Sandler's model, Deslandes and Bertrand (2005) found that when parents perceive their children as wanting their involvement, they are more likely to become involved in their children's education at home. Finally, studies indicate that parents' affective tone when doing an educational task with their children is positively associated with children's motivational outcomes (Estrada et al. 1987; Hoover-Dempsey et al. 2001; Nolen-Hoeksema et al. 1995; Pomerantz et al. 2005). Though not measured through children's affective experience of involvement, these studies suggest that the presence of positive or negative affect during a mother–child educational related task may be important for children's academic outcomes. With regard to the moderation hypothesis, we suggest that when children have a negative affective attitude toward their mothers' involvement and do not want their mothers to be involved, they may disregard the beneficial messages and information communicated through the involvement. Thus, the involvement may be counterproductive to the children's motivation and academics.

One other interesting issue is the relation between autonomy support and children's affect toward involvement. Although no studies have investigated this relation, SDT would suggest that when parents are autonomy supportive, children are more likely to view their parents' involvement positively. Conversely, when parents are controlling, children may be more resistant and view their parents' involvement negatively. Thus, we expected a positive association between maternal autonomy support and children's positive affect toward maternal involvement.

Current study

Using an SDT framework, we built upon Grolnick and Slowiaczek's (1994) study by examining not only the main effects of maternal involvement on children's academic-related outcomes, but also the interactions between maternal involvement and maternal parenting style as well as maternal involvement and children's affect toward maternal involvement (see Fig. 1). Given previous findings suggesting differences in parental involvement and academic motivation and achievement as a function of child gender and socioeconomic status (SES; Fan and Chen 2001; Hill and Taylor 2004; Kenney-Benson et al. 2006; Sirin 2005), we controlled for child gender and a proxy of SES, maternal education. During the middle elementary school years there is a new emphasis on grades and learning, and achievement trajectories become more stable and less susceptible to change (Alexander et al. 2003; Kinlaw and Kurtz-Costes 2007; Stipek and Iver 1989). For these reasons, the current study focused on third through fifth grade children. Specifically, our model examined relations between three types of maternal involvement, school, personal, and cognitive/intellectual, and children's academic motivation and achievement. The

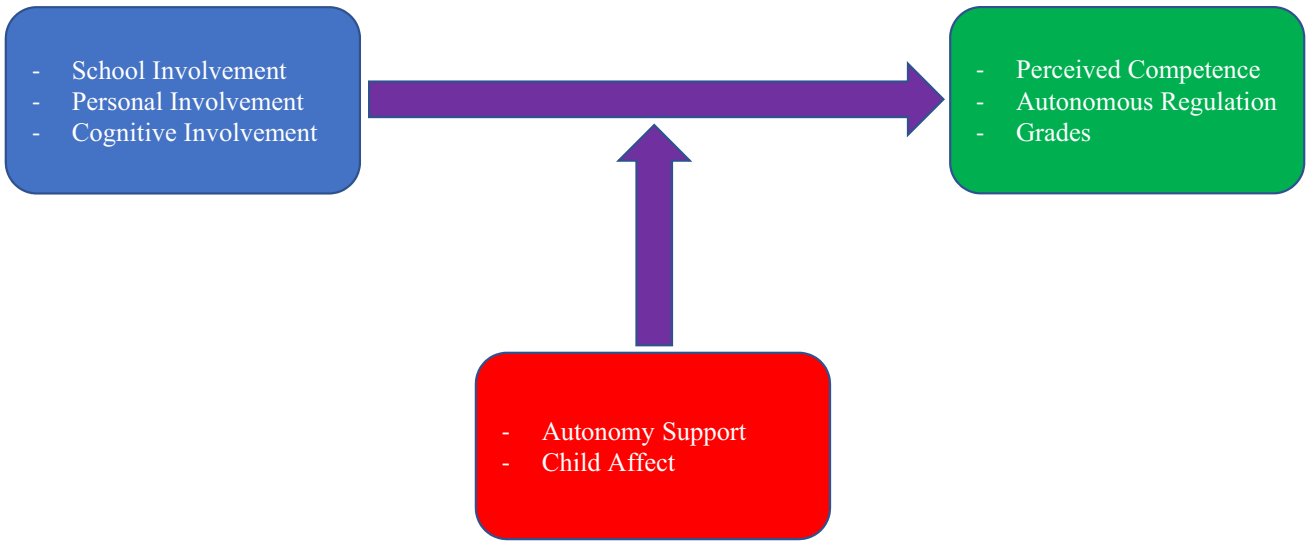

Fig. 1 Hypothesized model

model also investigated whether maternal parenting style, on the dimension of autonomy support to control, and children's affect toward maternal involvement interact with the level of involvement to predict children's achievement and motivation, as measured by children's perceived competence, autonomous motivation, and grades.

We hypothesized that all three involvement types would be positively related to academic motivation and achievement. We also hypothesized that the relations of maternal involvement and academic motivation and achievement would be moderated by maternal autonomy support and children's affect towards involvement. Specifically, we hypothesized that involvement would be positively related to perceived competence, autonomous motivation, and grades when autonomy support was high, but not when autonomy support was low. We also hypothesized that involvement would be positively related to these outcomes when children's affect was positive, but not when children's affect was negative. Finally, we hypothesized that autonomy support and children's affect toward their mothers' involvement would be positively related.

Method

Participants

Participants were 213 third (34.7%), fourth (32.9%), and fifth (32.4%) grade children recruited through four public elementary schools in the Northeast, their mothers, and 28 teachers. Of the children, 102 were male and 111 were female. Approximately 78.5% were European American, 7.7% were Hispanic, 3.1% were African American, 1.5% were Asian, 0.5% were Native American, and 8.7% were bi-ethnic/bi-racial. With regard to family structure, 68.9% of children came from two-parent families, 23.6% came from single-parent families, and 7.5% came from stepfamilies. Mothers had varying educational levels, with approximately 8% obtaining less than a high school education, 17% completing high school, 34% completing some college, 24% obtaining a college degree, and 17% obtaining an advanced degree.

Procedure

After receiving IRB approval from the researchers' university and the school district, children were given permission slips to take home to their parents, which described the project and asked for parental permission to participate. Mothers who agreed to participate were given the choice of meeting with a researcher at their homes or at the University laboratory. During this time, mothers provided background information and completed questionnaires. Mothers were also asked for their permission to have their children participate and for researchers to access their child's end-of-year grades. After completing questionnaires, mothers were given $20 for participating. Children completed questionnaires during school, and their teachers filled out ratings of mothers' school involvement and children's end-of-year reading and math grades for each participating child.

Measures

Maternal involvement indices

Utilizing a measure of parental involvement developed by Grolnick and Slowiaczek (1994), we assessed three types of maternal involvement: school, personal, and cognitive/intellectual. This questionnaire includes mothers', children's, and teachers' reports. All items from each reporter were entered into a confirmatory factor analysis (CFA) to determine summary scores for each type of involvement (see involvement composites section).

School involvement Children rated how often their mothers engaged in various school activities on five items (e.g., 'My mother goes to parent-teacher conferences,' 'My mother comes to open school nights') on a scale from 1 (*never*) to 3 (*a lot*). On a 16-item measure, mothers rated the number of times they had attended or engaged in school activities (e.g., 'I met my child's teacher,' 'Went to a school event or activity') on a scale from 1 (*never*) to 4 (*many times*). Teachers rated how often each child's mother was involved in seven different activities at school (e.g., attending parent-teacher conferences, attending school open house) on a scale from 1 (*never*) to 5 (*regularly*).

Personal involvement Children rated their mothers' knowledge about and interest in their school activities on six items (e.g., 'My mother knows what I am doing in school,' 'My mother wants to know about my school day'). Children indicated the accuracy of each statement on a scale from 1 (*not true at all*) to 4 (*very true*). Similar to the child report, mothers rated their personal involvement on five items assessing their knowledge about and interest in their child's school activities (e.g., 'I know what my child is currently doing in school'). Mothers indicated their agreement with each statement on a scale from 1 (*strongly disagree*) to 4 (*strongly agree*).

Cognitive/intellectual involvement Children rated how often, on a scale from 1 (*never*) to 4 (a *lot*), their mothers engaged in cognitive/intellectual activities with them (e.g., went to the library, talked about current events) on five items. Mothers rated the frequency to which they engaged in cognitively stimulating activities with their child (e.g.,

'Take my child to the museum,' 'Buy books for my child'). For each of the six items, mothers indicated how often in the current school year they engaged in these activities on a scale from 1 (*never*) to 5 (*daily*).

Involvement composites Based on CFA results (described in results section), composite scores for school, personal, and cognitive/intellectual involvement were created by averaging rater responses within each involvement domain. First, to account for differences in scale among raters for school and cognitive/intellectual involvement, scaled scores for each rater were converted into standard scores (z-scores). After standardizing the scores, child, mother, and teacher-rated school involvement were averaged to form a school involvement composite. Cronbach's alpha was .91. Child and mother personal involvement were averaged to create a personal involvement composite with a Cronbach's alpha of .66. Finally, a composite score was created for cognitive/intellectual involvement by averaging the standardized scores for child and mother reports of cognitive/intellectual involvement, which had a Cronbach's alpha of .70.

Moderators

Children's affect toward maternal involvement (Appendix) This six-item scale, developed for this study, measures children's positive and negative affect towards mothers' school-related involvement. Three of the items ask about positive feelings (e.g. 'I like to talk to my mother about school') and three ask about negative feelings (e.g. 'I don't like it when my mother comes to my classroom'). Children rated each item on a scale from 1 (*not true at all*) to 4 (*very true*).

Given that this was a new scale, we investigated its factor structure with an exploratory factor analysis (EFA) using a principal component procedure. A scree plot indicated a one factor solution. Thus, the EFA was rerun, constraining the solution to one factor. The factor accounted for 38.71% of the variance and had an eigenvalue of 2.71. All items loaded above .49 and were retained. Negative items were reversed and averaged with positive items to form a composite score. Cronbach's alpha was .72.

Maternal autonomy support Children's perceptions of their mothers' autonomy support were measured using the eight autonomy support items from the 40-item Parenting Context Questionnaire (Wellborn and Grolnick 1988). Items asked children to rate how autonomy supportive versus controlling their mothers are (e.g. 'My mother tries to control everything I do,' 'My mother allows me to decide things for myself') on a scale from 1 (*not true at all*) to 4 (*very true*). Controlling items were reverse coded and averaged with autonomy support items to form a score for autonomy support. The Cronbach's alpha was .72.

Outcomes

Perceived competence Children's perceptions of their academic competence were measured using the six academic items from the Self-Perception Profile for Children (SPPC; Harter 1982). Children are provided two vignettes, one indicating high perceived competence and one low; for example, 'Some kids feel that they are very good at their school work, but other kids worry about whether they can do the school work assigned to them.' Children choose which of the two vignettes is most like them and whether it is 'really true' for them (=1 or 4) or 'sort of true' for them (=2 or 3). The SPPC is scored on a 4-point scale and all items are averaged, with higher scores indicating stronger academic competence perceptions. Cronbach's alpha was .77.

Self-regulation Children's autonomous versus controlled regulation of their school behaviors were measured using the 23-item Self-Regulation Questionnaire (Ryan and Connell 1989). Children were asked why they engage in a school-related behavior (e.g., homework, classwork) followed by multiple reasons (e.g., 'Because I'll get in trouble if I don't,' 'Because it's fun'). Items are associated with four subscales characterized by less to more autonomous self-regulation, including external (6 items; e.g., to avoid punishments), introjected (5 items; e.g., to avoid negative affect, such as guilt), identified (5 items; e.g., due to its value or importance), and intrinsic (7 items; e.g., for fun or enjoyment). Children rated each reason on a scale from 1 (*not true at all*) to 4 (*very true*). Subscales were weighted (external by −2, introjected by −1, identified by +1, and intrinsic by +2) and summed to form the Relative Autonomy Index, a measure of autonomous motivation, which had a Cronbach's alpha of .78.

Grades Teachers provided students' end of year math and reading grades. These grades were converted into numbers, from 1 (F) to 13 (A+). Math and reading grades were highly correlated (r=.78), and summed to yield one score for grades.

Sample size estimation

A priori power analyses were performed in G*Power 3.1.9.2 (Faul et al. 2009) to determine the sample size required to conduct multivariate regression analyses. These analyses test the main and interactive effects of maternal involvement, maternal autonomy support, and child affect on children's academic motivation and achievement. A sample size of at least 166 participants is required to achieve a medium effect

size ($f^2 = 0.15$) in a model with 9 predictor variables, assuming alpha = .05 and power = .95. Thus, we aimed to recruit at least 166 participants and obtained a final sample size of 213.

Missing data

There was little missing data, less than 5% for most items. Among the 213 mother–child dyads in the study, 4.2% ($n = 9$) were missing all the child-reported measures and 4.2% ($n = 9$) were missing teacher reported grades. Little's MCAR was not significant, MCAR χ^2 [113] = 81.30, $p = 0.989$, which supports the hypothesis that the data were missing completely at random (MCAR). To ensure less bias when imputing data, we used the expectation maximization method in SPSS version 24 rather than other methods, such as listwise deletion or mean substitution. This method uses all available information to impute missing data with the best fitting values.

Results

Preliminary analyses of maternal involvement

Before examining correlations among all study variables, a second-order CFA was conducted to determine whether involvement could be measured as three separate constructs. There were multiple indicators for each type of involvement, which included school, personal, and cognitive/intellectual involvement, and all three involvement types were modeled as loading onto a single higher order involvement factor. Full-information maximum likelihood estimation using AMOS version 24 (Arbuckle 2016) was applied. Multiple fit statistics, including chi square, confidence fit index (CFI), and root-mean square error of approximation (RMSEA) were used to assess model fit. A CFI value of .90 or better indicates a good fit (Bentler and Dudgeon 1996; Byrne 2001; Kline 2015), while an RMSEA value of .05 or less indicates a good fit and a value between .06 and .08 indicates an adequate fit (Hoyle 1995; Raykov and Marcoulides 2006).

Given that a large number of indicators poses problems for structural equation modeling, we aggregated items into parcels (Little et al. 2002). Specifically, parceling minimizes the effects of bias on factors at the item level and reduces model complexity. Items were divided into parcel groupings through an item-to-construct balance method. This method develops parcels by averaging items based on factor loadings from an EFA. Specifically, items with higher factor loadings and items with lower factor loadings are averaged together to ensure that parcels are equally balanced both in terms of difficulty and discrimination, and thus, their intercepts and slopes (Little et al. 2002). It is recommended that each factor have three or four parcels (Hau and Marsh 2004; Little et al. 2002; Marsh et al. 1998); thus, the 16-item mother-report of school involvement, was reduced to four parcels by distributing the four items with the highest factor loadings across four parcels followed by the next four items with the highest factor loadings. Similarly, the teacher report of school involvement, the child report of personal involvement, and the parent report of cognitive/intellectual involvement all included 6 items and were each reduced to three parcels using the item-to-construct balance method.

After running the CFA, two items, one from the child report of school involvement and one from the parent report of personal involvement, were removed from the model due to low factor loadings (below .30). Examination of fit indices suggested that the hypothesized model did not adequately fit the data; χ^2 (340) = 622.77, $p < .001$, CFI = .85, RMSEA = .063. We speculated that the lack of fit was due to common method variance—that attributable to the measurement method. For this reason and because dyadic data does not meet the assumption of independence of observations, we allowed correlated errors between measures that were given to both mothers and children. After making this modification, the model showed good fit, χ^2 (278) = 469.53, $p < .001$, CFI = .90, RMSEA = .057. All loadings for each involvement construct were above .47. The second-order CFA is depicted in Fig. 2. Guided by the CFA, unweighted scores were used to form composites for each type of involvement (Trauer and Mackinnon 2001).

Descriptive analyses for mother and child variables

Means, standard deviations, actual ranges, and possible ranges for the demographic and study variables can be seen in Table 1. School and cognitive/intellectual involvement are presented as z-scores to account for differences in scale. On average, mothers displayed levels of all involvement types and of autonomy support above the midpoint of the scales. Similarly, children viewed maternal involvement more positively than negatively, had perceptions of competence above the midpoint of the scale, and reported more controlled than autonomous regulation of school behaviors. The average grade among students was a B+. As can be seen in Table 1, all variables displayed sufficient variability.

Relations of demographic variables with maternal involvement indices and children's academic outcomes were considered to determine whether maternal education, child gender (1 = male, 2 = female), and child grade should be controlled in further analyses. Correlations (see Table 2) revealed that higher levels of maternal education were related to higher perceived competence ($r = .36$, $p < .001$) and grades ($r = .42$, $p < .001$). Higher levels of maternal education were also related to higher school ($r = .38$, $p < .001$), personal ($r = .27$, $p < .001$), and cognitive/intellectual

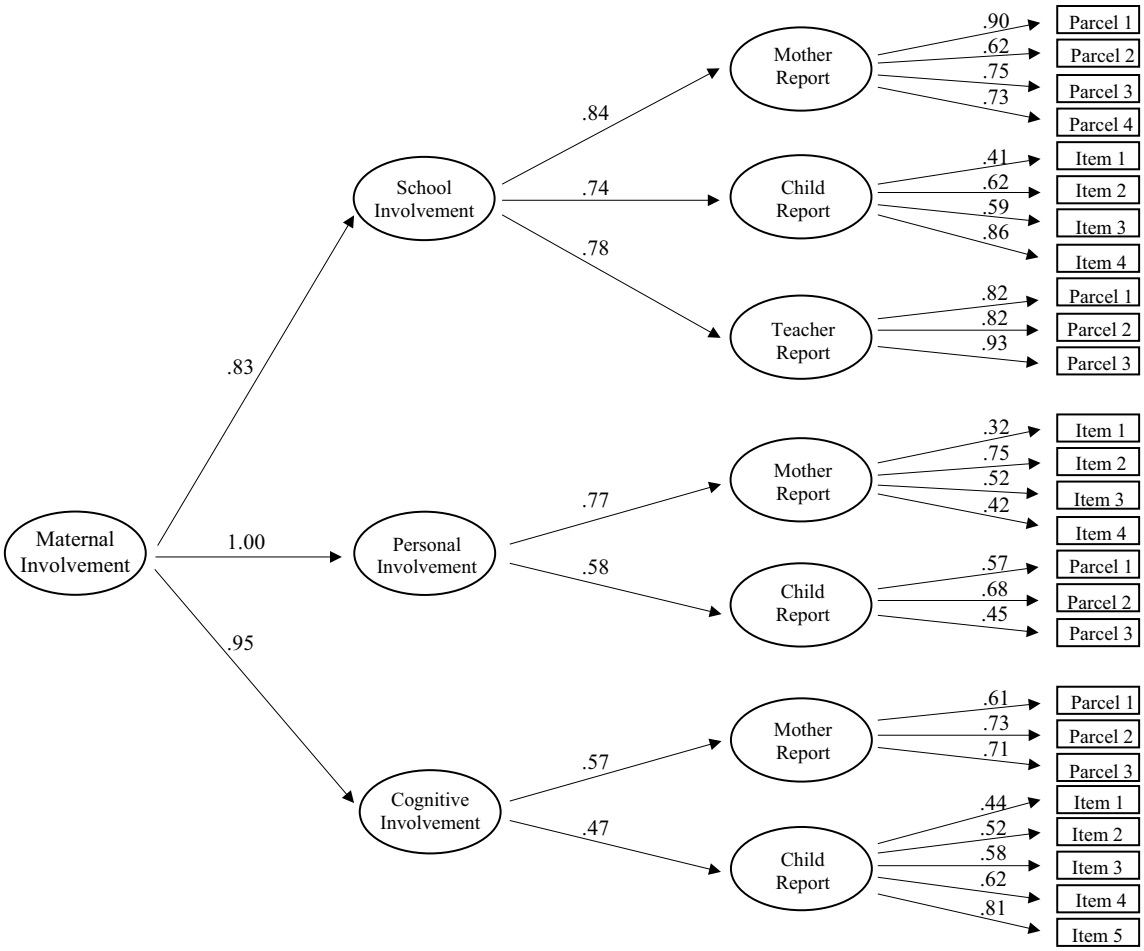

Fig. 2 Confirmatory factor analysis model of maternal involvement. All factor loadings are significant at $p < .05$

Table 1 Descriptive statistics

	M (%)	*SD*	Actual range	Possible range
Involvement types				
School	0.00	0.81	−2.09 to 2.59	–
Personal	3.42	0.38	2.00 to 4.00	1.00 to 4.00
Cognitive/intellectual	0.00	0.78	−2.18 to 2.23	–
Moderators				
Autonomy support	2.78	0.59	1.38 to 4.00	1.00 to 4.00
Child affect	3.05	0.63	1.43 to 4.00	1.00 to 4.00
Outcomes				
Perceived competence	2.99	0.71	1.00 to 4.00	1.00 to 4.00
Autonomous regulation	−0.59	2.26	−5.34 to 6.01	−9.00 to 9.00
Grades	19.36	4.89	2.00 to 26.00	2.00 to 26.00

Values are *M* for continuous variables and % for categorical variables. School and cognitive/intellectual involvement variables are z-scores

involvement ($r = .33$, $p < .001$). ANOVA results indicated that none of the major study variables differed significantly by grade, but t-tests indicated that girls were more positive toward maternal involvement ($M = 3.15$, $SD = 0.60$) than boys ($M = 2.95$, $SD = 0.65$), $t(211) = -2.28$, $p = .024$. Given these results, we controlled for maternal education and children's gender in subsequent analyses.

Children's perceptions of maternal autonomy support and their affect toward maternal involvement were correlated to examine whether autonomy support may partially account for why children welcome their mothers' involvement. Autonomy support and children's affect towards their mothers' involvement were positively related ($r = .14$, $p = .040$). Further, the three types of maternal involvement were positively and moderately correlated ($rs = .41$ to $.46$). All maternal involvement types, maternal autonomy support, and children's affect were positively related to one another with the exception of personal involvement and autonomy support, which were not significantly related. Higher levels of school involvement, cognitive/intellectual involvement, and autonomy support were associated with higher

Table 2 Correlations among major variables

Variable	1	2	3	4	5	6	7	8	9
1. Maternal education	–	.38*	.27*	.33*	.13	.04	.36*	.12	.42*
2. School involvement		–	.46*	.43*	.16*	.24*	.24*	.19*	.38*
3. Personal involvement			–	.41*	.08	.26*	.29*	.08	.34*
4. Cognitive/intellectual involvement				–	.13	.22*	.22*	.28*	.33*
5. Autonomy support					–	.14*	.19*	.13	.17*
6. Child affect						–	.14*	.26*	.11
7. Perceived competence							–	.27*	.49*
8. Autonomous regulation								–	.13
9. Grades									–

*$p < .05$

perceived competence, autonomous regulation, and grades ($rs = .19$ to .38). Although personal involvement and children's affect displayed similar patterns, personal involvement was not significantly related to children's autonomous regulation and children's affect was not significantly related to children's grades.

Analyses considering maternal autonomy support and child affect as moderators

To test for the main and interactive effects of maternal involvement quantity, maternal parenting style (on the dimension of autonomy support versus control), and children's affect toward maternal involvement on children's self-regulation, perceived competence, and grades, two multivariate multiple regressions were conducted using AMOS version 24. Multivariate multiple regression analyses were used to examine predicted relations for all outcome variables simultaneously. Independently examining outcomes that are correlated leads to inaccurate estimates, standard errors, and confidence intervals (Baldwin et al. 2014). Multivariate multiple regression models are saturated; thus, fit indices cannot be used to evaluate model fit. Specifically, we examined whether the relations between maternal involvement quantity and children's academic outcomes were moderated by children's affect toward maternal involvement and maternal autonomy support. Based on correlations and t-tests, maternal education and child gender were included as control variables in both models. The independent and moderator variables were centered in order to reduce multicollinearity. All main and interactive effects are displayed in Tables 3 and 4. Beta coefficients and unstandardized regression coefficients, which represent standardized and simple effect sizes, respectively (Acock 2014) are included. Both are metrics of effect size and each provides useful but different information (Baguley 2009).

Table 3 Multivariate multiple regression analysis summary for child academic motivation and achievement as a function of maternal involvement and child affect

Variable	Perceived competence				Autonomous regulation				Grades			
	β	*b*	SE(*b*)	*p*	β	*b*	SE(*b*)	*p*	β	*b*	SE(*b*)	*p*
Main effects												
School involvement (SI)	.01	0.01	0.07	.917	.10	0.28	0.22	.208	.15	0.92	0.44	.035
Personal involvement (PI)	.20	0.37	0.14	.006	−.14	−0.91	0.46	.050	.18	2.32	0.91	.010
Cognitive/intellectual involvement (CI)	.05	0.04	0.07	.510	.24	0.69	0.22	.002	.10	0.63	0.43	.148
Child affect (CA)	.04	0.05	0.07	.506	.21	0.74	0.25	.003	−.01	−0.07	0.48	.887
Interactions												
SI×CA	−.26	−0.34	0.09	< .001	.05	0.20	0.31	.535	−.14	−1.28	0.62	.038
PI×CA	.07	0.19	0.21	.368	−.09	−0.76	0.70	.283	.12	2.25	1.38	.104
CI×CA	−.03	−0.04	0.10	.672	.08	0.36	0.32	.264	−.11	−1.03	0.63	.104

All multivariate multiple regressions controlled for maternal education and child gender

Table 4 Multivariate multiple regression analysis summary for child academic motivation and achievement as a function of maternal involvement and autonomy support

Variable	Perceived competence				Autonomous regulation				Grades			
	β	*b*	SE(*b*)	*p*	β	*b*	SE(*b*)	*p*	β	*b*	SE(*b*)	*p*
Main effects												
School involvement (SI)	.01	0.01	0.07	.859	.10	0.28	0.23	.226	.18	1.07	0.45	.018
Personal involvement (PI)	.18	0.33	0.14	.016	−.11	−0.69	0.45	.127	.14	1.87	0.90	.037
Cognitive/intellectual involvement (CI)	.02	0.01	0.07	.844	.27	0.78	0.22	< .001	.11	0.70	0.44	.109
Autonomy support (AS)	.12	0.15	0.08	.055	.09	0.35	0.25	.166	.09	0.78	0.50	.115
Interactions												
SI × AS	−.01	−0.01	0.11	.915	.07	0.31	0.36	.383	−.07	−0.71	0.71	.319
PI × AS	−.02	−0.06	0.24	.808	.22	2.28	0.78	.003	.07	1.50	1.54	.333
CI × AS	−.07	−0.09	0.11	.406	−.14	−0.65	0.37	.078	.07	0.69	0.73	.345

All multivariate multiple regressions controlled for maternal education and child gender

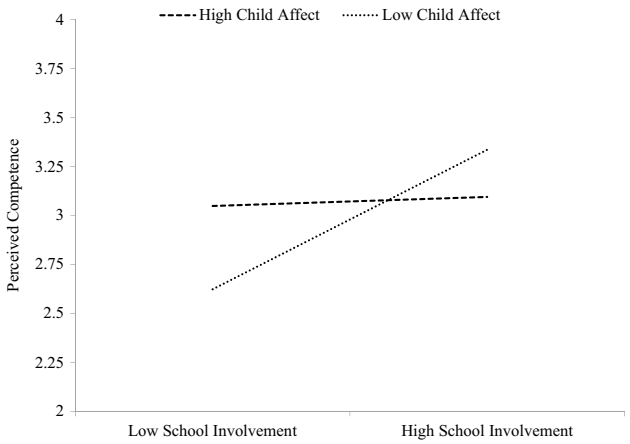

Fig. 3 Moderating role of children's affect toward maternal involvement on the relation between school involvement and perceived competence

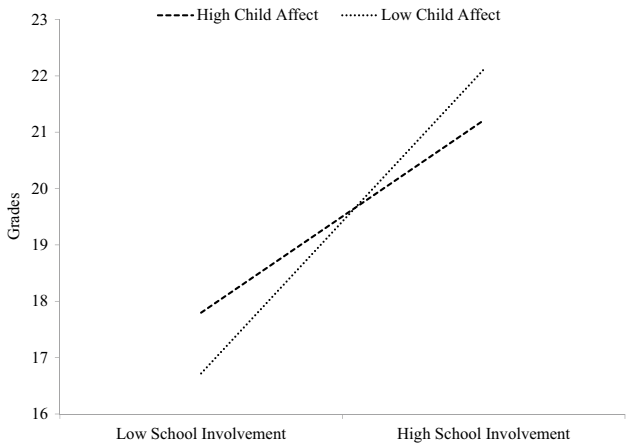

Fig. 4 Moderating role of children's affect toward maternal involvement on the relation between school involvement and grades

Children's affect toward maternal involvement

The multivariate multiple regression model including children's affect toward maternal involvement accounted for 23.5% of the variance in perceived competence, 29.7% of the variance in autonomous regulation, and 14.8% of the variance in grades. For perceived competence, there was a main effect of personal involvement, with higher levels of personal involvement associated with higher perceived competence. There was also a significant interaction between maternal school involvement and children's affect toward involvement. Using the simple slopes equations recommended by Aiken and West (1991), regression lines were calculated for the mean, one standard deviation above the mean, and one standard deviation below the mean. The calculated and graphed simple slopes can be seen in Fig. 3. Results indicated that school involvement was positively associated with children's perceived competence when children had more negative affect toward their mothers' involvement ($\beta = .54$, $p < .001$), but not when children had more positive affect toward their mothers' involvement ($\beta = -.09$, $p = .449$).

For autonomous regulation, there was a main effect of cognitive/intellectual involvement, such that higher levels of cognitive/intellectual involvement were related to higher levels of autonomous regulation. Children's affect also predicted autonomous regulation, such that the more positively children viewed their mothers' involvement, the more autonomous was children's self-regulation. There were no significant interactions for autonomous regulation.

For children's grades, there was a main effect of personal involvement, such that higher personal involvement was associated with higher grades, as well as a main effect of

school involvement, such that higher school involvement was associated with higher grades. There was also a significant interaction between maternal school involvement and children's affect. The simple slopes equations (Fig. 4) revealed a positive association between school involvement and children's grades at all levels of children's affect, but links were stronger when children had more negative affect toward their mothers' involvement ($\beta = .52$, $p < .001$) than when they had more positive affect toward their mothers' involvement ($\beta = .25$, $p = .031$).

Standardized coefficients for significant effects ranged from .14 to .26, indicating small to moderate effect sizes for children's perceived competence, autonomous regulation, and grades.

Maternal autonomy support

The multivariate multiple regression model including maternal autonomy support accounted for 19.5% of the variance in perceived competence, 28.6% of the variance in autonomous regulation, and 14.9% of the variance in grades. For perceived competence, there was a main effect of personal involvement, with higher levels of personal involvement associated with higher perceived competence. There were no significant interactions for perceived competence.

For autonomous regulation, there was a positive effect of cognitive/intellectual involvement. Results also revealed a significant interaction between maternal personal involvement and autonomy support. Simple slopes analyses (Aiken and West 1991; Fig. 5) showed a positive association between personal involvement and children's autonomous regulation when mothers were perceived as more autonomy supportive ($\beta = .20$, $p = .038$), but not when mothers were perceived as more controlling ($\beta = -.07$, $p = .456$).

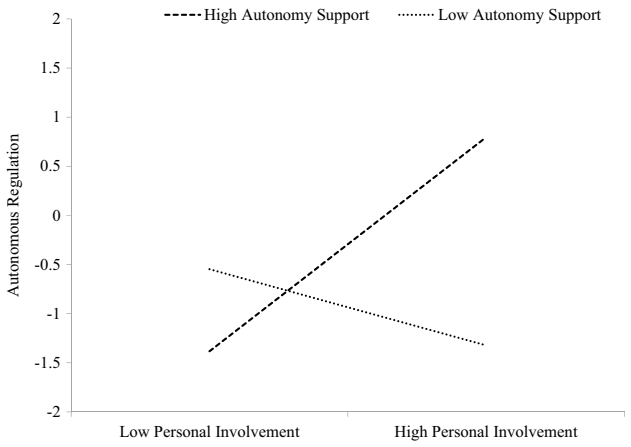

Fig. 5 Moderating role of maternal autonomy support on the relation between personal involvement and autonomous regulation

With grades as the outcome, there was a main effect of personal involvement, such that higher levels of personal involvement were associated with higher grades, as well as a main effect of school involvement, such that higher levels of school involvement were associated with higher grades. There were no significant interactions for grades.

Standardized coefficients indicated that significant effect sizes ranged from .14 to .27; indicating small to moderate effect sizes for children's perceived competence, autonomous motivation, and grades.

Discussion

The goals of this study were two-fold: (a) to determine whether maternal autonomy support was associated with children's affect toward maternal involvement and, (b) to examine the main and interactive effects of maternal involvement, maternal autonomy support, and children's affect toward maternal involvement on children's academic motivation and achievement. The results provided some support for the hypotheses, though only some of the predicted interactions between child and parent factors and level of involvement were significant and some were in a direction that was unpredicted.

Before investigating relations among variables, a second-order CFA was conducted which supported the three-component model of involvement—school, personal, and cognitive/intellectual. This is consistent with previous studies indicating a three-dimensional model of parental involvement (Grolnick and Slowiaczek 1994). After confirming the factor structure of maternal involvement, we found significant associations within the three maternal involvement types and among maternal involvement, maternal autonomy support, and children's affect toward maternal involvement.

With regard to the first goal, as expected, maternal autonomy support was positively related to children's affect toward maternal involvement. From an SDT perspective, autonomy support allows children to feel understood, choiceful, and able to self-initiate behaviors, rather than feeling pressured and forced to comply (Deci and Ryan 1985; Ryan and Deci 2017). This may foster a positive experience of affect when mothers are involved. Conversely, when mothers are controlling, children may feel pressured, and thus, have more negative affect toward maternal involvement. Although maternal autonomy support and children's affect were significantly correlated, the correlation was modest; thus, there are likely other factors in addition to autonomy support that contribute to children's affect toward their mothers' involvement. Also, due to the correlational nature of the data, it is possible that children who welcome their mothers' involvement are easier to interact with, which may help mothers to be autonomy

supportive. When children resist their mothers' involvement, mothers may become more controlling.

In addition, with regard to the second goal of our study, we found that school, personal, and cognitive/intellectual involvement were each positively associated with perceived competence, autonomous self-regulation, and grades. These results are consistent with prior findings (Grolnick and Ryan 1989; Grolnick and Slowiaczek 1994; Hill and Tyson 2009) and suggest the important role that maternal involvement may play in children's school success. However, when these involvement types were pitted against one another in multivariate multiple regression analyses, there were some interesting specific relations. Personal involvement predicted children's perceived competence. This suggests that when children have maternal support and encouragement at home, they may feel more capable of being successful in school. Similarly, there were effects of maternal personal and school involvement on children's grades; thus, when mothers communicate interest in their children's schooling and are actively involved within their children's school, it may also facilitate children's performance in school. Specifically, it is possible that when parents are involved at their children's school, they may have the opportunity to get better acquainted with their children's teacher. Through these interactions, the teacher may have a greater understanding of the child, enabling the teacher to better help the child do well in school. By contrast, cognitive/intellectual involvement predicted children's autonomous self-regulation. When mothers engage in cognitively stimulating activities with their children outside of school it can help fuel children's interests and intrinsic motivation for school and perhaps to see the importance of learning, which may result in more autonomous regulation of learning activities. These findings indicate that various types of involvement differentially relate to children's academic and motivational outcomes; thus, there are ways mothers can be involved in their children's schooling that are important for children's academics aside from involvement solely at school.

Also consistent with the literature (Bindman et al. 2015; Grolnick and Ryan 1989; Joussemet et al. 2005), maternal autonomy support was related to all the child outcomes. In our multivariate multiple regression analyses, however, maternal autonomy support only predicted children's perceived competence. By setting up an autonomy supportive environment that provides children with more choice, mothers may enable their children to feel competent and master academic material. A controlling environment may communicate to children that they are not competent, and thus, suppress their perceived competence (Pomerantz and Eaton 2000). Additionally, children's affect toward maternal involvement predicted more autonomous self-regulation in children. It is possible that when children like their mothers' involvement and enjoy engaging in academic activities with their mothers, they are more likely to become autonomously interested in the activity itself than when children do not like their mothers' involvement. However, it is also possible that when children are autonomously interested in academic activities, they make the interaction more enjoyable and welcome their mothers' involvement.

Further, we explored the interactive effects of maternal involvement, maternal autonomy support, and children's affect toward maternal involvement on children's academic outcomes. All significant interactions for children's affect toward maternal involvement were in evidence for school involvement. In all cases, as well, the interaction was in the opposite pattern than predicted. In particular, when children had more negative affect toward their mothers' involvement, higher levels of school involvement were more facilitative of children's perceived competence and grades. In interpreting this unexpected finding, we suggest that children who do not feel good about having their mothers involved, perhaps because they anticipate some negative or critical feedback being communicated between their teacher and mother, may still benefit from their mothers interacting with the school—meeting the teacher, attending conferences and events, etc. This finding suggests that even though mothers may feel discouraged when their children do not want them to be involved, it is still crucial that mothers stay involved at school. A related explanation involves a child-to-mother effect, such that children who are struggling the most academically and perhaps do not want their mothers to hear about their difficulties really need and benefit most from their mothers working with the teacher and finding out what is going on at school. These interactions also provide some evidence that for children who view parental involvement positively, the level of school involvement may not matter as much. This finding may provide some reassurance to mothers who cannot be involved at the school due to other obligations and lack of resources.

Additionally, we predicted interactions between maternal involvement and autonomy support on children's self-regulation, perceived competence, and grades; however, there was only one significant interaction. Consistent with our hypothesis, when mothers were autonomy supportive, high levels of personal involvement were associated with more autonomous self-regulation, but when mothers were more controlling, personal involvement and self-regulation were unrelated. It is interesting that this interaction occurred

only for our outcome directly connected to autonomy and for personal involvement specifically. Given that personal involvement is the most interactive type, this finding suggests that the way mothers interact with children plays a key role in their motivation. This finding also addresses the controversy of whether overinvolvement negatively impacts children by suggesting that children can benefit motivationally from high levels of involvement as long as it occurs within an autonomy supportive context. Thus, it may not be that too much involvement is harmful to children's academic motivation, but rather it is when involvement is implemented in a controlling, pressured context that it is disadvantageous to children. While the interaction for self-regulation was significant, the predicted interactions between maternal involvement and maternal autonomy support were not in evidence for children's grades or perceived competence.

We acknowledge several limitations of our study. First, due to its correlational nature we cannot determine the directionality of the results. Future studies using longitudinal designs could allow researchers to determine how relations among maternal involvement, maternal autonomy support, and children's affect toward involvement change and are bidirectionally connected. Another limitation involves the study sample, which was predominately European American and included only mothers. This makes the findings less generalizable and ultimately does not take into consideration how fathers may play a role in children's academic outcomes. It is likely that when fathers are involved in their children's schooling, the affect displayed by their children as well as their degree of autonomy support may not function in the same way as that of mothers. Also, with the exception of children's grades, the study involved self-report data. Although this is a limitation, including multiple informants for some measures helped to mitigate possible response bias. Further, while we focused on children's affect toward their mothers' involvement and maternal autonomy support as moderators of the relation between level of maternal involvement and children's academic outcomes, these are not the only possible factors. Studies should consider other parent (both mother and father) and child factors, such as parents' attitudes and reasons for their involvement (Grolnick 2015). Finally, this study focused on mothers' general autonomy support rather than maternal autonomy support in the context of each type of involvement. Future studies should focus specifically on how mothers implement autonomy support for each type of involvement so that researchers can consider the quality of maternal involvement.

In sum, this study, as well as others (Grolnick and Slowiaczek 1994; Hill and Tyson 2009; Marchant et al. 2001), suggests that maternal involvement in children's schooling has positive connections with aspects of children's motivation and performance in school. Unlike previous studies, the current study provides some evidence that children's experience of their mothers' involvement, specifically whether they view it positively or negatively and whether mothers are perceived as autonomy supportive or controlling, can make a difference beyond simply the level of involvement. This information supports schools taking active roles in disseminating information to mothers and helping to facilitate maternal involvement. Consistent with the United States' reauthorized Elementary and Secondary Education Act (Every Student Succeeds Act of 2015, 2015–2016), schools should continue to encourage parental involvement in children's schooling. However, schools also need to emphasize the context and children's experience of school-related parent–child interactions. This can be done through conducting school workshops or sending home pamphlets with children that provide suggestions on how parents can be autonomy supportive rather than controlling and how they can help create a positive academic experience for children.

Compliance with ethical standards

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

Appendix

1. I feel good when my mother talks with my teacher.

   Very true Sort of true Not very true Not true at all

2. I like to talk with my mother about school.

   Very true Sort of true Not very true Not true at all

3. I don't like it when my mother comes to my classroom.

   Very true Sort of true Not very true Not true at all

4. I don't like to talk about what happens at school with my mother.

   Very true Sort of true Not very true Not true at all

5. I'd like to have homework that asks me to work with my mother.

   Very true Sort of true Not very true Not true at all

6. If I don't understand how to do my homework, I don't like to ask my mother to help me.

   Very true Sort of true Not very true Not true at all

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