

The effects of parental involvement on students' academic self-efficacy, engagement and intrinsic motivation

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This research examined whether various dimensions of parental involvement predicted 10th-grade students' motivation (engagement, self-efficacy towards maths and English, intrinsic motivation towards maths and English) using data from the Educational Longitudinal Study of 2002 (ELS 2002). Results showed that both parents' educational aspiration for their children and school-initiated contact with parents on benign school issues had strong positive effects on all five motivational outcomes. On the contrary, parent-school contact concerning students' school problems was negatively related to all five motivational outcomes investigated in the study. Additionally, parental advising positively predicted students' academic self-efficacy in English as well as intrinsic motivation towards English, and family rules for watching television were positively linked to students' engagement and intrinsic motivation towards both English and maths.

Keywords: academic self-efficacy; engagement; intrinsic motivation; parental involvement

Introduction

It has been increasingly recognised in the fields of education and psychology that parents have significant impacts on students' learning and developmental processes. Recognition of the valuable roles parents play is reflected in educational policies and current legislation, including No Child Left Behind Act, 2102(4) (2001) and the reauthorisation of Title I. These policies mandate that schools implement procedures that actively involve parents in the educational process (Fishel & Ramirez, 2005). It is likely that these policies are based on the large body of research that has documented the substantial influence of parental involvement on students' academic achievement (Desimone, 1999; Domina, 2005; Fan, 2001; Sheldon & Epstein, 2005; Sirvani, 2007b) and academic behaviours (Epstein, 2005; Epstein et al., 2002; Rumberger, 1995; Rumberger, Ghatak, Poulos, Ritter, & Dornbusch, 1990; Trusty, 1996).

More recently, research in this area has expanded to examine the associations of parental involvement with student achievement motivation. The empirical research originates from a pervading theme in various developmental and social psychological theories that environmental influences shape individuals' achievement motivation. For example, social cognitive theory of human behaviour and learning emphasises the view that individuals' functioning has its foundation in social systems (Bandura,

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2005) and that environmental factors affect not only what individuals think but also what they do (Schunk & Zimmerman, 2006). Bandura (1997) points out that the social environment can affect an adolescent's behaviour and sense of self-efficacy through vicarious learning experiences and supportive communication. Because adolescents exist within social systems and are continuously interacting with their caretakers, parents not only influence the development of self-efficacy but also provide observational models that guide adolescents' adjustment of their self-efficacy. When adolescents are encouraged and affirmed of their capability, they are more likely to experience less self-doubt, exercise greater effort and persist when facing difficulties.

In their cognitive evaluation theory, Deci and Ryan (1980, 1985) have also proposed that environments impact the development of intrinsic motivation. Within this framework, the importance of social environments is also recognised, as they can either enhance or hinder intrinsic motivation (Ryan & Deci, 2000b) based upon the interpersonal context in which rewards are delivered (Deci, Koestner, & Ryan, 2001). When the environment conveys meaningful feedback in the context of self-determination, it is perceived as informational and enhances intrinsic motivation. On the other hand, aspects of the environment that are perceived as controlling, such as externally controlled rewards, controlling communication, deadlines and surveillance, pressure individuals towards specified outcomes and undermine intrinsic motivation (Ginsburg & Bronstein, 1993).

Recent research examining the associations between parent-child relationship and achievement motivation has provided empirical support for the motivational theories described above (e.g. Bong, 2008; Furrer & Skinner, 2003; Lynch & Cicchetti, 1997; Wentzel, 1998) and has redirected educational psychologists' attention back to parents. However, few studies have examined parental involvement, a primary socialising agent, as direct predictor(s) of adolescents' senses of self-efficacy, engagement and intrinsic motivation. Although it has generally been suggested that parents have positive influences on their children's educational outcomes, much of the research has not fully considered the differential effects of various aspects of parental involvement on different elements of achievement motivation (Gonzalez-DeHass, Willems, & Doan Holbein, 2005). Therefore, more specific information is needed to understand which parental activities and behaviours contribute to promoting and shaping the development of adolescents' senses of self-efficacy, engagement and intrinsic motivation.

Parental involvement

Parental involvement and student school performance

Parental involvement has been documented as positively impacting students' maths proficiency and achievement (Sheldon & Epstein, 2005; Sirvani, 2007b), gains in reading performance (Powell-Smith, Stoner, Shinn, & Good, 2000), as well as performance on standardised tests and academic assessments (Desimone, 1999; Domina, 2005; Jeynes, 2005). In addition, parental involvement was found to be related to fewer behaviour problems in school (Domina, 2005), better attendance and class preparation (Simon, 2001), better course completion (Simon, 2001) and lower dropout rates (Rumberger, 1995).

Given the recognition of parental involvement as part of a remedy for school education, it might be surprising to note that various aspects of parental involvement

have differential effects on students' academic outcomes (Domina, 2005; Fan, 2001; Fan & Chen, 2001; Jeynes, 2005). For example, while quality of parent–teacher interactions has predicted improvements in student behaviour and achievement, quantity of interactions has predicted the contrary (Izzo, Weissberg, Kasprow, & Fendrich, 1999). Fan (2001) showed that parental academic aspirations for their children had greater effect on students' academic growth while communication and volunteering in school had lesser effects, and contact with schools had negative effect. Moreover, Domina (2005) found that attending conferences and parent organisation meetings, volunteering and checking homework were positively related to students' academic achievement. However, when examining achievement over time, these factors demonstrated negative relationships.

Dimensions of parental involvement

Although much research attests to the positive effects of parental involvement on student academic success, the effects of parental involvement on student academic outcomes have been differential depending on which aspects of parental involvement were investigated and which academic outcomes were studied. These mixed findings might be due in part to the lack of a clear operational definition of parental involvement (Fan & Chen, 2001), as this construct is often defined in a non-specific manner (Powell-Smith et al., 2000). Parental involvement is generally referred to as parents' participation in their children's education with the purpose of promoting their academic and social success (Fishel & Ramirez, 2005). Considering that a broad definition of parental involvement represents a wide variety of parental behaviours and practices, researchers have supported the use of a multidimensional definition and have argued against a unidimensional understanding of parental involvement (Epstein, 1995; Grolnick & Slowiaczek, 1994).

This approach has been adopted in several empirical studies (Domina, 2005; Fan, 2001). Researchers have incorporated the multidimensional conceptualisation of parental involvement by identifying and studying specific components of this construct. For example, Grolnick and Slowiaczek (1994) assessed a hypothesised three-dimensional view of parental involvement consisting of behavioural, intellectual/cognitive and personal aspects. Epstein (1995) provided a multidimensional definition by describing six types of parental involvement activities: parenting, communicating, learning at home, volunteering, decision-making and community connections. Similarly, Fan (2001) empirically identified a seven-component solution for parental involvement: television rules, communication, contact with school, parent–teacher association, volunteering, supervision and education aspiration.

It has been suggested in the literature that special attention be given to the operational definition and measurement of parental involvement and that different dimensions of parental involvement be measured separately (Fan & Chen, 2001). To this date, however, the definition and measurement of parental involvement in research examining student achievement motivation has been fragmented referring to a range of variables, including school-to-home communication (Ames, Khoju, & Watkins, 1993; Sirvani, 2007a, 2007b), parental values and parental involvement in school functions (Marchant, Paulson, & Rothlisberg, 2001), as well as surveillance of homework and reactions towards grades (Ginsburg & Bronstein, 1993). More motivational

studies employing the multidimensional approach of parental involvement are warranted.

Parental involvement and student motivation

Despite the research support for the impacts of parental involvement on academic success, research addressing the relationship between parental involvement and student achievement motivation has been conducted less frequently. Generally speaking, research has indicated a positive link between parental involvement and students' achievement motivation and attitudes (Gonzalez-DeHass et al., 2005). However, evidence also suggests that different aspects of parental involvement have differential or even opposite effects on different elements of student achievement motivation. For example, students were found to be more engaged with school activities when their parents participated more frequently in school functions; however, they reported less engagement in school when parents initiated contact with school personnel more frequently (Izzo et al., 1999). Grolnick and Slowiaczek (1994) discovered that not all aspects of parental involvement predicted student achievement motivation and called for further studies investigating various aspects of parental involvement and different elements of student achievement motivation. Similarly, Marchant et al. (2001) raised the point that parental involvement at home and at school differentially related to student motivation and suggested investigations of more relational aspects such as parental involvement in academic and non-academic activities. Gonzalez-DeHass et al. (2005) also suggested in their review that a wider range of parental involvement practices on student motivation should be investigated.

Academic self-efficacy

Self-efficacy refers to individuals' beliefs in their ability to produce desired results (Wigfield, Byrnes, & Eccles, 2006) as well as to learn and perform (Bandura, 1997). Bandura emphasises in social cognitive theory the construct of self-efficacy and its impact on learning, as this belief in one's own ability influences choice of activities and effort (Schunk & Zimmerman, 2006), engagement in the behaviours that are necessary to attain goals (Thomas, 2005), academic interest and motivation (Bandura, 1986, 1997), as well as growth of cognitive competencies and accomplished achievement (Pajares, 1996; Pintrich & DeGroot, 1990; Zimmerman, 2000). Self-efficacy consistently predicts academic achievement (Bong, 2008) due to its effects on effort and persistence, because students who demonstrate greater senses of self-efficacy are more likely to put forth the necessary effort and persist longer when facing academic challenges (Schunk & Zimmerman, 2006).

Both theories and empirical research studies argue the existence of a relationship between parental involvement and self-efficacy. Confirming the social environmental influences addressed in Bandura's (1997) social cognitive theory, empirical research has shown that children perceived a greater sense of competence when their parents were more involved in their education (Grolnick & Slowiaczek, 1994), were more involved in school functions (Marchant et al., 2001) and had higher values for their children's education (Marchant et al., 2001). Additionally, perceived parenting practices predicted students' academic perceptions of control (Fulton & Turner, 2008). However, all identified studies focused on younger adolescent populations, no older

than eighth grade. Thus, one goal of our study was to continue this line of research and extend the literature by studying older adolescents in 10th grade and more aspects of parental involvement.

Engagement

Engagement has been defined differently in the literature by various researchers. It has been categorised into three types: behavioural, emotional and cognitive engagement (for review, see Fredricks, Blumenfeld, & Paris, 2004). However, research most often refers to behavioural engagement and emphasises factors such as effort, persistence, concentration and attention (Birch & Ladd, 1998; Fredricks et al., 2004). Student engagement in school activities promotes academic achievement (Skinner, Zimmer-Gembeck, & Connell, 1998), increases graduation rates (Connell, Spencer, & Aber, 1994), decreases students' decisions to drop out of school (Alexander, Entwisle, & Horsey, 1997), improves student performance and increases positive expectations about academic abilities (Skinner et al., 1998).

Several studies have reported an association between parent–child relationship and student engagement (Furrer & Skinner, 2003; Hughes & Kwok, 2007). However, direct examinations of the effects of parental involvement on student engagement are few, as only a couple of studies were identified. Steinberg, Lamborn, Dornbusch, and Darling (1992) indicated that as parents demonstrated greater involvement in schooling and encouragement, high school students were more engaged across subject areas. Marchant et al. (2001) also suggested that parental values were associated with scores on a student motivation scale that assessed effort and persistence. In order to expand upon these findings, more research is certainly desired to assess a wider range of parental involvement on student behavioural engagement.

Intrinsic motivation

Intrinsic motivation, which exists within and drives the spontaneous behaviours of individuals, has been argued to be very important for adolescents' cognitive development (Ryan & Deci, 2000a). Those who demonstrate intrinsic motivation engage in academic tasks due to the enjoyment of the tasks and the desire to learn. Studies have indicated that intrinsic motivation has positive associations with children's achievement (Renninger, Ewan, & Lasher, 2002), persistence and effort (Renninger et al., 2002), self-efficacy (Hannover, 1998) and achievement motivation (Deci, 1992; Schiefele, 2001).

The effects of parental involvement on intrinsic motivation are two-sided. According to cognitive evaluation theory, parental involvement can be informational or controlling. The informative aspect enhances students' intrinsic motivation, while the controlling aspect undermines students' intrinsic motivation (Amabile, DeJong, & Lepper, 1976; Greene, Sternberg, & Lepper, 1976; Plant & Ryan, 1985). For example, children's intrinsic motivation increased when parents received weekly information regarding their children's progress and how to help their children at home (Ames, de Stefano, Watkins, & Sheldon, 1995; Ames et al., 1993) and when parents encouraged and provided positive reactions to the grades their children received. In contrast, students' motivational orientations were negatively associated with parental surveillance of homework, as this was considered to be excessively controlling (Ginsburg & Bronstein, 1993). It is important to note that the effects of other aspects of parental

involvement, such as parental aspirations and parents' participation in extracurricular activities with their children, on student intrinsic motivation have not been assessed, warranting the need for further research.

Research goals

An understanding of the impact of parental involvement on any single aspect of achievement motivation is not sufficient for understanding how parents can promote this within their children. Therefore, the purpose of this investigation is to provide an integrative view by examining the effects of eight aspects of parental involvement on adolescents' academic self-efficacy in maths and English, engagement and intrinsic motivation in maths and English. Our study takes a closer look at how various dimensions of parental involvement predict adolescents' academic self-efficacy in maths and English, engagement and intrinsic motivation in maths and English, and explores specific ways in which various dimensions of parental involvement might be differentially related to each of the five motivational outcomes.

Following the recommendations for a multidimensional conceptualisation of parental involvement (Ames et al., 1995; Domina, 2005; Fan, 2001; Fan & Chen, 2001; Izzo et al., 1999), our investigation focused on eight dimensions of this construct: parental aspiration for students' postsecondary education, parents' participation in school functions, family rules reflecting parental home supervision, parental advising, parental participation in extracurricular activities, parent-school communication concerning students' school problems, school-initiated contact with parents and parent-initiated contact with schools on benign school issues. In order to explain the unexpected negative relationships found between school-parent communication and student academic outcomes (e.g. Fan, 2001; Izzo et al., 1999), we separated parent-school communications concerning students' school problems from parent-school communications regarding benign school-related issues. We also examined separately school- and parent-initiated contacts regarding other benign school-related issues in order to differentiate their effects in response to researchers' suggestions (e.g. Ames et al., 1995). Moreover, we sought to examine the less-studied dimensions of parental involvement, such as parental advising capturing parent-student communication and parents' participation in extracurricular activities, which we believe contribute to the development of parent-child relationship through which student academic and cognitive outcomes can be affected.

Method

Data source

We used data from the Educational Longitudinal Study of 2002 (ELS 2002), the fourth and the most recent in a series of school-based longitudinal studies conducted by the National Center for Education Statistics (NCES). The ELS 2002 documents the educational status and progress of a nationally representative sample cohort of 10th-grade students, focusing on the critical transitions they experience as they proceed through high school and into postsecondary education or their chosen careers. One reason that we chose this data source is that this population of 10th-grade students is inherently interesting and under-researched. These learners were in their final years of their secondary education and were soon to become legally independent young adults

to take charge of their own lives and to make important decisions about their futures. In addition, this data source provides measures that allow us to sort out the relationships between parental involvement and adolescents' academic self-efficacy in maths and English, engagement and intrinsic motivation in maths and English.

The ELS 2002 employed a two-stage sample selection process, first selecting schools and then selecting approximately 26 10th-grade students within each school. In response to the complex sampling design, we applied stratum, cluster and weight along with the Taylor-series approximation technique in the analyses. This procedure allowed us to correct non-responses, adjust unequal probabilities of selection of students and make inferences to the specific, or even general, population being studied such as an estimation of the total number of 10th graders in the USA who attended Catholic, private or public schools.

A potentially problematic issue for all large-scale data studies concerns missing data, especially when the amount of missing data exceeds 5% (Graham & Hoffer, 2000). With the reduction in sample size that might occur during listwise deletion, the analytic sample might become less representative of the population of 2002 10th-grade students in the USA and result in less stable and accurate statistical analyses when the tendency of cases to be missing is not taken into account. A growing body of research has examined the performance of various approaches for addressing missing data such as traditional pairwise, listwise and means substitution approaches (Rubin, 1987). Many recommend multiple imputation (MI), which introduces appropriate random error in the process for less-biased estimates and obtains good estimates of the standard errors through repeated imputation (King, Honaker, Joseph, & Scheve, 2001). Therefore, we employed the MI Markov Chain Monte Carlo approach through the procedure of PROC MI using SAS 9.2 to handle the missing cases in our study. Three sets of imputed data were generated and each of our analytic samples included a weighted sample size of 15,325 adolescents and parents who participated in the data collection. Of these participants, 50.2% were female and 49.8% were male; 57.0% were White students, 14.5% were Hispanic students, 13.2% were African-American students, 9.6% were Asian students and 0.9% was American Indian students.

Measures

Measures of parental involvement as well as the subscales of student beliefs and opinions regarding academic self-efficacy, intrinsic motivation and engagement that are included in the ELS 2002 dataset were used for the analyses. Survey items assessing parental involvement that are similar to those seen in various empirical studies and that demonstrate good reliability and validity (e.g. Fan, 2001; Hill & Craft, 2003; Yan & Lin, 2005) are included in this dataset. The academic self-efficacy scale, which is adapted and adjusted from the Motivated Strategies for Learning Questionnaire (Pintrich & DeGroot, 1990), measures students' perceptions of their ability to perform successfully in certain subject areas. The intrinsic motivation scale, which is adapted and adjusted from the self-report Scale of Intrinsic Versus Extrinsic Orientation (Harter, 1981), measures students' interest in certain educational activities or topics for their own curiosity and enjoyment. Finally, the student engagement scale, which is adapted from a behavioural scale (e.g. Furrer & Skinner, 2003; Hughes & Kwok, 2007) in existing literature, taps into students' effort and persistence in schoolwork.

Student academic self-efficacy

Students' academic self-efficacy towards both maths and English served as our dependent variables, and each was measured by five items: (1) I'm confident that I can do an excellent job on my maths/English tests, (2) I'm certain I can understand the most difficult material presented in maths/English texts, (3) I'm confident I can understand the most complex material presented in maths/English texts, (4) I'm certain I can master the skills being taught in my maths/English class, and (5) I'm confident I can do an excellent job presented by my maths/English teacher. On a four-point scale ('almost never', 'sometimes', 'often' and 'almost always'), students were asked to indicate how often they experience the feelings described in the five items. The five items were found to create a scale with excellent internal consistency with a Cronbach's alpha of .93 for both measures.

Intrinsic motivation

Student intrinsic motivation towards English was measured by three items. On a four-point scale ('strongly agree', 'agree', 'disagree' and 'strongly disagree'), students were asked to indicate how the following statements apply to them: (1) think reading is fun, (2) get totally absorbed in reading, and (3) read in spare time. Student intrinsic motivation in maths was measured by two items that were reverse coded to properly reflect the construct. On the same four-point scale, students were asked to indicate how the following statements apply to them: (1) get totally absorbed in maths, and (2) think maths is fun. The scales indicated satisfactory internal consistency with a Cronbach's alpha of .87 for student intrinsic motivation towards English and acceptable internal consistency with a Cronbach's alpha of .67 for student intrinsic motivation towards maths.

Engagement

On a four-point scale ('almost never', 'sometimes', 'often' and 'almost always'), students were asked to indicate how the following statements apply to them: (1) works as hard as possible when studies, (2) puts forth best effort when studying, and (3) keeps studying even if material is difficult. The three items were found to create a scale with satisfactory internal consistency with a Cronbach's alpha of .84.

Parental advising

This measure was assessed by six items that addressed the communications between parents and students. On a three-point scale ('never', 'sometimes' and 'often'), parents were asked to indicate how often they have provided advice or information about the following topics to their 10th-grade child in the first semester or term of that school year: (1) selecting courses or programmes at school, (2) plans and preparation for college entrance exams such as ACT, (3) applying to college or other schools after high school, (4) specific jobs the 10th grader might apply for after high school, (5) community, national and world events, and (6) things that are troubling your 10th grader. Internal consistency of the scale was satisfactory with a Cronbach's alpha of .77.

Parent participation in extracurricular activities with children

This construct was measured by seven items asking how frequently parents spent time participating in extracurricular activities with their child. On a four-point scale ('never', 'rarely', 'sometimes' and 'frequently'), parents were asked to indicate how frequently they and their 10th-grade child participated in the following activities together over the past year: (1) attending concerts, plays or movies outside of school, (2) attending sporting events outside of school, (3) attending family social functions (party, wedding), (4) taking day trips or vacations, (5) working on a hobby or playing sports, (6) going to restaurants with child, and (7) doing something else fun together. Internal consistency of the scale was satisfactory with a Cronbach's alpha of .76.

Parent-school communication concerning students' school problems

This construct was measured by four items and captured the frequencies of parent and school communications concerning students' school problems. On a four-point scale ('none', 'once or twice', 'three or four times' and 'more than four times'), parents reported the frequencies that (1) schools contacted parent about poor performance, (2) parent contacted school about poor performance, (3) school contacted parent about behaviour problem, and (4) parent contacted school about behaviour problem. The scale reported satisfactory internal consistency with a Cronbach's alpha of .76.

School- and parent-initiated contacts

The measure of school-initiated contact with parents was obtained by examining the frequency of parent contacts by the school. Similarly, the measure of parent-initiated contact with school was obtained by examining the frequency of school contact by parents. Both measures addressed parent-school contacts regarding more benign issues of the students' schooling. On a four-point scale ('none', 'once or twice', 'three or four times' and 'more than four times'), parents responded to two sets of four items soliciting the frequencies of their initiated or school-initiated contacts concerning the following topics: (1) school programme for the year, (2) 10th grader's plans after high school, (3) course selection, and (4) helping with homework. Internal consistency of the scale indicated Cronbach's alphas of .65 for school-initiated contact and .71 for parent-initiated contact.

Parent participation in school functions

This measure was assessed by five items that captured the frequency that parents attended school functions and organisational activities. Parents were asked to indicate whether they were involved in the following activities during the school year: (1) belong to parent-teacher organisation, (2) attend parent-teacher organisation meetings, (3) take part in parent-teacher organisation activities, (4) act as a volunteer at the school, and (5) belong to other organisation with parents from school. Internal consistency of the scale was satisfactory with a Cronbach's alpha of .72 for the present sample.

Parental aspiration for students' postsecondary education

This composite surveyed what level of education the parents would like their 10th-grade child to achieve. On a seven-point scale with '1' representing the lowest level

to '7' representing the highest level, parents indicated which of the following levels of education they would like their child to attain: (1) less than high school graduation, (2) high school graduation only, (3) attend or complete a two-year school course in a community or vocational school, (4) attend college but not complete a four-year degree, (5) graduate from college, (6) obtain a master's degree or equivalent, and (7) to obtain a Ph.D., MD or other advanced degree. This composite was created and imputed statistically using a weighted sequential hot deck procedure by ELS 2002.

Family rules

Four items were used to assess family rules. Parents were asked to indicate whether there were family rules enforced for their 10th-grade child regarding the following: (1) maintaining a certain grade average, (2) doing homework, (3) doing household chores, and (4) watching television. The internal consistency of the scale yielded a Cronbach's alpha of .59. Because the low Cronbach's alpha value indicated unsatisfactory internal consistency, we therefore treated the four variables individually in the analyses.

Socio-economic status and gender

Socio-economic status (SES), serving as a control variable in the study, is a standardised composite constructed by averaging five standardised scores: students' father's/guardian's education, mother's/guardian's education, family income, father's/guardian's occupation and mother's/guardian's occupation. This composite variable was computed based on parent reports by ELS 2002. When parent reports were missing, the variable was based on student reports, and, if still missing, the variable was imputed (NCES, 2004). Gender is included as a dummy variable with male coded as 1 and female coded as 0.

Plan of analysis

First, we employed the MI Markov Chain Monte Carlo approach to generate three sets of imputed data using SAS 9.2. All of the following statistical analyses to obtain descriptive statistics and regression results were conducted on each of the imputed data with a sample size of 15,325 adolescents. The final results reported were averaged parameter statistical estimates and results across the three analyses on the three imputed data to further reduce bias. Next, the study conducted a series of multiple regression analyses employing Taylor-series approximation technique to examine the associations between eight dimensions of parental involvement and five elements of student achievement motivation: academic self-efficacy towards English and maths, engagement and intrinsic interest towards English and maths. The eight aspects of parental involvement include (1) parent participation in extracurricular activities with kids, (2) parental advising, (3) parent-school communication concerning students' school problems, (4) school-initiated contact with parents, (5) parent-initiated contact with school, (6) parent participation in school functions, (7) parental aspiration for students' postsecondary education, and (8) family rules.

The descriptive and regression analyses presented in the results section were conducted using the statistical software of AM software (version 0.06.03 beta) developed by the American Institutes of Research (2002). The AM software excels in its

ability to handle complex large-scale sampling survey data involving stratification, unequal probability sampling (weights) and clustering. It estimates regression models by marginal maximum likelihood to show students' proficiency as probability distributions and provides more appropriate standard errors using Taylor-series approximation. To account for effects of non-response and unequal probability of selection, we applied weights of the stratum, cluster and student weight provided by ELS in the analyses (NCES, 2004).

Results

Description of sample

Table 1 presents the summaries of the averaged means and standard deviations across the three imputed datasets for all variables. Descriptive statistics show that students reported higher English self-efficacy ($M = 2.73$, $SD = 0.79$) than maths self-efficacy ($M = 2.51$, $SD = 0.83$), and higher English intrinsic motivation ($M = 2.56$, $SD = 0.81$) than maths intrinsic motivation ($M = 2.34$, $SD = 0.72$). In addition, a mean of 2.70 and a standard deviation of 0.76 were found for students' academic engagement on a four-point scale. Although the differences seem to be small, it is noteworthy that students on average felt more interested and more confident about their ability in English than in maths.

Four parent variables were rated on a four-point scale: parent participation in extracurricular activities with children, parent-school communication concerning students' school problems, school-initiated contact with parents and parent-initiated contact with school. Parents reported the highest averages for participation in extracurricular activities with their children ($M = 3.08$, $SD = 0.56$), indicating that they

Table 1. Mean and standard deviation of variables.

Variable	<i>M</i>	<i>SD</i>
1. Maths self-efficacy	2.51	0.83
2. English self-efficacy	2.73	0.79
3. Engagement	2.70	0.76
4. English intrinsic motivation	2.56	0.81
5. Maths intrinsic motivation	2.34	0.72
6. Parent participating in extracurricular activities with kids	3.08	0.56
7. Parental advising	2.28	0.48
8. Parent-school communication concerning student's school problems	1.30	0.50
9. School-initiated contact with parents	1.32	0.44
10. Parent-initiated contact with school	1.36	0.47
11. Parent participation in school functions	0.28	0.31
12. Parental aspiration for students' postsecondary education	5.32	1.29
13. Family rules for maintaining grade	0.82	0.38
14. Family rules for doing homework	0.93	0.26
15. Family rules for doing household chores	0.89	0.32
16. Family rules for watching television	0.64	0.48
17. SES	0.13	0.60
18. Gender	0.50	0.50

Note: All values presented are averaged estimates from three imputed datasets.

were on average ‘sometimes’ involved. The other three parent–school communication variables all had averages ranging from 1.30 to 1.36, indicating that communications did not take place often. On the basis of the three-point scale, parents reported that the average that they provided advice to their children was 2.28. In addition, on average parents reported that they expected their children to at least attend a four-year college for education ($M = 5.32$). However, the aspiration for the children’s postsecondary education seemed to have a greater variance ($SD = 1.29$) among parents than other aspects of parental involvement. In terms of family rules, the majority of the families reported certain types of family rules. Ninety-three per cent of parents reported family rules for doing homework, 89% reported family rules for doing household chores, 82% reported family rules for maintaining grades and 64% reported family rules for watching television.

Intercorrelations among variables

Correlations among the parental involvement predictors and motivation outcome variables are presented in Table 2. All five motivational outcomes were positively related with each other. Engagement had the strongest correlations with maths and English self-efficacy with coefficients of .49 and .54, respectively. Self-efficacy across subject areas positively correlated with each other, with a coefficient of .38, as did the intrinsic motivation across subject areas, with coefficient of .20. Interestingly, motivational outcomes pertaining to the same subject correlated with each other quite strongly, such that maths self-efficacy positively correlated with maths intrinsic motivation with a coefficient of .47, and English self-efficacy correlated with English intrinsic motivation with a coefficient of .34. On the contrary, the correlations between self-efficacy and intrinsic motivation towards different subjects were weak with correlation coefficients less than .10. Most of the parental involvement predictors significantly correlated with the motivational outcomes, presenting the initial evidence in support of the link between parental involvement and adolescents’ academic self-efficacy in maths and English, engagement and intrinsic motivation in maths and English. The correlations among the parental involvement predictors were no larger than .50, showing a low likelihood of multicollinearity problem.

Prediction of motivational outcomes

A series of five multiple regression analyses were conducted on each imputed dataset to explore the effects of different dimensions of parental involvement on students’ academic self-efficacy in maths and English, engagement and intrinsic motivation in maths and English, while controlling SES and gender. Seven composites of parental involvement, four variables of family rules and the controlling variable of SES and gender were included in the estimation of the regression models. In other words, each regression analysis was conducted three times with AM software (version 0.06.03 beta) on each of the three imputed datasets. All statistics presented below were averaged results across the three imputed datasets.

Academic self-efficacy

Both regression models predicting students’ academic self-efficacy in maths and English were significant with $F(12, 379) = 72.31, p < .001$ for students’ maths

Table 2. Intercorrelations among variables.

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1. Maths self-efficacy	—																	
2. English self-efficacy	.38**	—																
3. Engagement	.49**	.54**	—															
4. English intrinsic interest	.07**	.34**	.21**	—														
5. Maths intrinsic interest	.47**	.04	.26**	.20**	—													
6. Parent participating in extracurricular activities	.06**	.08**	.10**	-.01	.02	—												
7. Parental advising	.05**	.12**	.09**	.09**	.01	.42**	—											
8. Parent-school communication concerning school problems	-.15**	-.13**	-.21**	-.08**	-.07**	-.05**	.01	—										
9. School-initiated contact	.03**	.03**	.02*	.04**	.02*	.12**	.14**	.17**	—									
10. Parent-initiated contact	-.02*	.01**	-.02	.00	-.02	.19**	.24**	.36**	.47**	—								
11. Parent participation in school functions	.07**	.07**	.07**	.02	.01	.33**	.24**	-.02*	.23**	.28**	—							
12. Parental aspiration for students' postsecondary education	.18**	.20**	.20**	.14**	.11**	.12**	.19**	-.16**	.00	.14**	—							
13. Family rules for maintaining grade	-.02	-1	.00	-.06**	.01	.13**	.13**	.04**	.02	.06**	.06**	.05**	—					
14. Family rules for doing homework	-.02	.01	.01	-.01	.02*	.13**	.13**	.02*	.04**	.05**	.06**	.01	.43**	—				
15. Family rules for doing household chores	-.03**	-.01**	-.01	.01	.00	.14**	.11**	.06**	.05**	.07**	.04**	-.02*	.22**	.28**	—			
16. Family rules for watching television	.00	.01	.03*	.06**	.02*	.17**	.16**	.06**	.07**	.10**	.10**	.03**	.23**	.24**	.28**	—		
17. SES	.12**	.13**	.09**	.09	.02*	.12**	.13**	-.06**	.09**	.09**	.22**	.19**	-.03**	-.01	-.04**	.00	—	
18. Gender	.10**	-.03**	-.09**	-.13**	.04**	.01	-.02	.13**	.02	.04**	-.02	-.08**	.01	.00	.01	.01	.01	—

* $p < .05$; ** $p < .01$.
 Note: All values presented are averaged estimates from three imputed datasets.

self-efficacy, and $F(12, 379) = 58.32, p < .001$ for students' English self-efficacy. The results demonstrated that 8% of variance in students' maths self-efficacy as well as 7% of variance in students' English self-efficacy was explained by various aspects of parental involvement, SES and gender, as indicated in Table 3. Three aspects of parental involvement, SES and gender showed significant effects on both students' maths and English self-efficacy: parent-school communication concerning students' school problems, school-initiated contact and parental aspiration for students' postsecondary education. More specifically, the results showed that parental aspiration for students' postsecondary education and school-initiated contact with parents both positively predicted students' maths self-efficacy ($\beta = .16, p < .001$; $\beta = .04, p < .001$, respectively) and English self-efficacy ($\beta = .15, p < .001$; $\beta = .02, p = .03$, respectively). Parent-school communication concerning students' school problems was shown to be a strong negative predictor for both maths self-efficacy ($\beta = -.14, p < .001$) and English self-efficacy ($\beta = -.11, p < .001$). In addition, parents' participation in extracurricular activities with children was a positive predictor for students' maths self-efficacy ($\beta = .02, p = .03$), while parental advising significantly predicted students' English self-efficacy ($\beta = .07, p < .001$), as shown in Table 3. In addition, parents' participation in school functions had a positive effect on students' maths self-efficacy ($\beta = .02, p = .03$). The results also showed that male students demonstrated significantly higher academic self-efficacy in maths than female students ($\beta = .13, p < .001$), while no differences between male and female students in terms of academic self-efficacy in English were detected.

Engagement

The regression model investigating the effects of parental involvement on student engagement was significant with $F(12, 379) = 74.95, p < .001$, explaining 9% of the variance in student engagement, as indicated in Table 3. Five composites of parental involvement, one family rules predictor, SES and gender all had significant effects on student engagement. Parent participation in extracurricular activities with their children ($\beta = .05, p < .001$), school-initiated contact with parents ($\beta = .03, p = .01$), parental aspiration for students' postsecondary education ($\beta = .16, p < .001$) and family rules for watching television ($\beta = .02, p = .04$) all positively predicted student engagement. On the contrary, parent-school communication concerning students' school problems again resulted as a strong negative predictor ($\beta = -.18, p < .001$). SES was also positively related to student behavioural engagement ($\beta = .03, p < .001$). Additionally, female students showed higher levels of behavioural engagement than male students ($\beta = -.05, p < .001$).

Intrinsic motivation

The regression models analysing the effects of parental involvement were significant in predicting both students' maths intrinsic motivation ($F(12, 379) = 15.23, p < .001$) and students' English intrinsic motivation ($F(12, 379) = 52.92, p < .001$). Seven out of the 11 parental involvement predictors as well as SES and gender showed significant effects on students' English intrinsic motivation. Four out of these seven predictors showed positive influence on students' English intrinsic motivation: parental advising ($\beta = .08, p < .001$), school-initiated contact with parents ($\beta = .04, p < .001$),

Table 3. Results of multiple regressions on motivation outcomes.

Path	Maths self-efficacy	English self-efficacy	Engagement	Maths intrinsic motivation	English intrinsic motivation
Parent participating in extracurricular activities with kids	0.02*	0.01	0.05***	0.01	-0.07***
Parental advising	0.00	0.07***	0.02	-0.02	0.08***
Parent-school communication concerning poor performance	-0.14***	-0.11***	-0.18***	-0.07***	-0.06***
School-initiated contact with parents	0.04***	0.02*	0.03**	0.03**	0.04***
Parent-initiated contact with school	0.00	0.02	0.02	0.00	0.02
Parent participation in school functions	0.02*	0.01	0.02	0.00	-0.02
Parental aspiration for students' postsecondary education	0.16***	0.15***	0.16***	0.10***	0.11***
Family rules for maintaining grade	-0.01	-0.02	-0.02	-0.02	-0.08***
Family rules for doing homework	-0.03	-0.01	-0.01	0.01	-0.01
Family rules for doing household chores	-0.02	0.00	0.00	-0.01	0.02
Family rules for watching television	0.01	0.01	0.02*	0.03**	0.07***
SES	0.07***	0.08***	0.03***	0.00	0.07***
Gender	0.13***	0.00	-0.05***	0.06***	-0.11***
R ²	0.08	0.07	0.09	0.02	0.06

* $p < .05$; ** $p < .01$; *** $p \leq .001$.

Note: All values presented are averaged estimates from three imputed datasets. Standardised coefficients are presented.

parental aspiration for students' postsecondary education ($\beta = .11, p < .001$) and family rules for watching television ($\beta = .07, p < .001$). The other three predictors showed negative effects on students' English intrinsic motivation: parent participation in extracurricular activities with children ($\beta = -.07, p < .001$), parent-school communication concerning students' school problems ($\beta = -.06, p < .001$) and family rules for maintaining grade average ($\beta = -.08, p < .001$). Results also showed that female students had greater intrinsic motivation in English than male students ($\beta = -.11, p < .001$).

Only four components of parental involvement were significant in predicting students' maths intrinsic motivation. Three out of the four predictors, school-initiated contact with parents ($\beta = .03, p = .01$), parental aspiration for students' postsecondary education ($\beta = .10, p < .001$) and family rules for watching television ($\beta = .03, p = .01$), showed positive effects. Parent-school communication concerning students' school problems showed a negative influence ($\beta = -.07, p < .001$). These effects on students' maths intrinsic motivation were consistent with the effects found on students' English intrinsic motivation. However, contrary to the finding on intrinsic motivation towards English, male students showed greater intrinsic interest towards maths ($\beta = .06, p < .001$).

Discussion

In this study, we addressed several limitations to prior research by conceptualising parental involvement as a multidimensional construct and assessing five elements of achievement motivation in concert as recommended (Fan & Chen, 2001; Grolnick & Slowiaczek, 1994). As a result, the findings fill important gaps in the literature by clarifying many under-researched links between parental involvement and adolescents' academic self-efficacy in maths and English, engagement and intrinsic motivation in maths and English. We also addressed prior researchers' concerns that confounding variables might interfere with the analysis of parental involvement by controlling for both students' SES and gender. Finally, we examined the less-studied population of 10th-grade students (Gonzalez-DeHass et al., 2005) using a nationally representative sample that allows us to generalise the results to a larger population. Overall, our findings lead to the conclusion that various dimensions of parental involvement differentially linked to students' engagement in academic activities, senses of self-efficacy and intrinsic motivation in maths and English.

This study makes an important contribution to the literature by demonstrating that a key feature of school-parent contact, namely the content of the communication, made a significant difference in the associations between school-parent contact and adolescents' academic self-efficacy in maths and English, engagement and intrinsic motivation in maths and English. Our study is the first to separate parent-school communication concerning student school problems from communication regarding other benign school issues in order to distinguish their differential effects on student school motivation. Specifically, our findings provide the first evidence that parent-school communication concerning students' poor performance and behaviour problems had fairly strong negative associations with all five motivational outcomes. On the contrary, school-initiated contacts with parents regarding more benign school matters, such as academic programming, future educational plans and helping students at home, had positive associations with all five motivational outcomes. Past research has indicated that parent-school communication was negatively related to student

academic success (Fan, 2001; Izzo et al., 1999) and engagement (Izzo et al., 1999), contrary to the hypotheses of previous researchers. By examining three specific aspects of parent–school communication, our results extend the literature by providing the first clarifying evidence that different content of parent–school communication leads to potentially differential associations with adolescents’ academic self-efficacy in maths and English, engagement and intrinsic motivation in maths and English.

We subscribe to the view that the consequential reactions and behaviours of parents after conversing with teachers are likely to be associated with adolescents’ academic self-efficacy in maths and English, engagement and intrinsic motivation in maths and English. Parent–school communications concerning students’ school problems can easily lead to certain discouraging conversations, criticisms or punishments from parents, which decrease students’ confidence, interest and engagement in learning. On the contrary, parent–school communications regarding other school issues, such as academic programming and future educational plans, can assist parents by providing resourceful and useful information (Domina, 2005) that help their children to succeed. Parents are more likely to communicate with and provide guidance to their children in a positive manner following these informational contacts with teachers and, as a result, benefit students’ perceived competence, engagement and intrinsic motivation. These results, therefore, emphasise the importance of how parents communicate and intervene with their children, especially when their children are struggling at school. The results of this study also confirm the importance of schools’ engagement in efforts to communicate with parents, which has been noted in previous studies as benefitting both students (Ames et al., 1993, 1995; Sirvani, 2007a, 2007b) and parents (Bowen, 1999; Sanford, 1987; Seitsinger, Felner, Brand, & Burns, 2008).

Another key finding of this study is that parents’ educational aspirations for their children stood out as a strong positive predictor for adolescents’ academic self-efficacy in maths and English, engagement and intrinsic motivation in maths and English. The findings indicate that students who perceived that their parents valued their education and had high expectations for their academic success were likely to feel interested and engaged and confident towards their academic endeavours. This implies that parents’ educational values and aspirations are conveyed and communicated through parental involvement in shaping their children’s motivation to achieve academically. The results not only confirm a previous finding that parents’ values have strong positive relationships with students’ senses of self-competence (Marchant et al., 2001), but they also provide new evidence that parents’ educational aspirations for their children also have strong positive associations with their children’s academic engagement and intrinsic motivation in both English and maths. It is possible that as parents’ educational values and aspirations transform into their children’s own values and decisions, students are more likely to become interested and engaged in pursuing the goal as their own. The findings are also indirectly consistent with documented evidence of the strong association between parental values and improved academic achievement (Fan, 2001), as achievement motivation often serves as a pathway to mediate students’ academic performance.

The findings pertaining to parents’ involvement at home and at school are mixed. First, our findings indicate that parental advice at home was positively associated with improved senses of self-efficacy towards English, intrinsic motivation in English and academic engagement. However, no significant links between parental advice and maths self-efficacy or maths intrinsic motivation were found. One reason for this result might be that the items measuring parental advice assessed general issues in

students' lives rather than items that specifically addressed academic subject areas. Future research investigating parental advice on specific academic subject areas will be helpful in providing further information. Second, parents' participation in extracurricular activities with their children was positively linked to students' sense of self-efficacy in maths and academic engagement. This finding is consistent with the view that parents' participation in extracurricular activities with their children helps build the relationship between parents and students, which facilitates students' academic self-efficacy. Conversely, parents' participation with their children in extracurricular activities was a negative predictor for their children's intrinsic motivation in English. Though the finding seems surprising at first, it might be explained by considering the characteristics of the 10th-grade population. Growing more psychologically and emotionally independent from parents, adolescents want to spend more time on their own or with their peers. Parents' excessive participation in extracurricular activities with their adolescent children might be viewed as controlling and, therefore, have a negative relationship with student intrinsic motivation.

Third, family rules at home were also found to be both positive and negative predictor(s). Rules for watching television positively predicted students' academic engagement and intrinsic motivation in both English and maths. As parents limit their children's access to television, it is possible that children will spend more time engaging in constructive learning activities that they enjoy and thus enhance their intrinsic motivation and engagement towards academics. This might also lead to the development of mastery goal orientations that propel students to engage in further learning activities. On the contrary, parental enforcement of rules for maintaining grade point averages was negatively linked to intrinsic motivation in English. This finding is consistent with the view of cognitive evaluation theory (Deci & Ryan, 1980, 1985) and other empirical studies (Ginsburg & Bronstein, 1993), indicating that environmental factors that are perceived as controlling, such as the pressure to obtain certain grade point averages, undermine student intrinsic motivation. When parents convey the importance of grades, it is possible that they contribute to the development of performance goal orientations that are negatively related to intrinsic motivation (Wentzel, 1998).

Finally, the results indicate that parent participation in school functions was positively associated with students' maths self-efficacy. This is consistent with a previous finding that students' senses of competence were greater when their parents were more involved in school functions (Marchant et al., 2001). When parents are engaged with school-related activities, they can strengthen the bond between home and school and demonstrate that they value their children's education. A possible consequence of this involvement might be that children will set higher academic goals and feel more confident about their ability to achieve these goals. Although previous findings on younger children suggested that increased parental involvement in school activities may benefit intrinsic motivation (Grolnick & Slowiaczek, 1994), our study failed to find an association between parent participation in school functions and adolescents' intrinsic motivation. It is possible that adolescents might assume that while their parents are participating in school functions they will be questioning teachers and other parents to obtain information about their academic performance. As a result, the adolescents might feel pressure to perform better than or avoid being inferior to their classmates, thus eliciting forms of achievement motivation that are extrinsic rather than intrinsic (Gonzalez & Wolters, 2006). Additionally, as adolescents desire more independence and autonomy, it is possible that they will feel as if their actions are

being scrutinised and restricted when their parents obtain information from teachers or other parents. From this perspective, parents' participation in school functions may be perceived as controlling by adolescents and hinder the relationship between parental involvement in school activities and intrinsic motivation.

Limitations

First, we acknowledge the limitation that causality cannot be claimed based on correlational patterns among the variables. Although the analyses imply that parental involvement significantly predicts the motivational outcomes, it is also possible that students who are more motivated elicit more involvement from parents. Second, we conducted a cross-sectional study using data at one point in time rather than a longitudinal study due to the availability of the data. As such, we cannot draw conclusions regarding the possible changing relations between different dimensions of parental involvement and adolescents' academic self-efficacy in maths and English, engagement and intrinsic motivation in maths and English throughout the adolescent years. Although research has begun to examine the effects of parents on student motivation and found that these effects gradually decrease as children grow older (Gottfried, Marcoulides, Gottfried, Oliver, & Guerin, 2007), more longitudinal research is needed to assess how relationships with certain dimensions of parental involvement may strengthen or weaken their effects on student motivation as students grow. Third, despite our efforts to capture the multidimensional nature of parental involvement, we might have neglected some other important dimensions due to the wide scope of parental involvement, the numerous aspects of students' lives that can be examined and the limited data available in the ELS 2002 data. Consequently, future research providing clearer theoretical definition of parental involvement is needed.

References

- Alexander, K.L., Entwisle, D.R., & Horsey, C.S. (1997). From first grade forward: Early foundations of high school dropout. *Sociology of Education*, 70, 87–107.
- Amabile, T.M., DeJong, W., & Lepper, M.R. (1976). Effects of externally imposed deadlines on subsequent intrinsic motivation. *Journal of Personality and Social Psychology*, 34, 92–98.
- Ames, C., de Stefano, L., Watkins, T., & Sheldon, S. (1995). *Teachers' school-to-home communications and parent involvement: The role of parent perceptions and beliefs* (Rep. No. 28). East Lansing, MI: ERIC Document Service No. ED383451, Center on Families, Communities, Schools, and Children's Learning, Michigan State University.
- Ames, C., Khoju, M., & Watkins, T. (1993). *Parent involvement: The relationship between school-to-home communication and parents' perceptions and beliefs* (Rep. No. 15). Urbana, IL: ERIC Document Service No. ED362271, Center on Families, Communities, Schools, and Children's Learning, Illinois University.
- Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Englewood Cliffs, NJ: Prentice Hall.
- Bandura, A. (1997). Self-efficacy. *Harvard Mental Health Letter*, 13(9), 4–7.
- Bandura, A. (2005). The evolution of social cognitive theory. In K.G. Smith & M.A. Hitt (Eds.), *Great minds in management* (pp. 9–35). Oxford: Oxford University Press.
- Birch, S.H., & Ladd, G.W. (1998). Children's interpersonal behaviors and the teacher-child relationship. *Developmental Psychology*, 34, 934–946.
- Bong, M. (2008). Effects of parent-child relationships and classroom goal structures on motivation, help-seeking avoidance, and cheating. *Journal of Experimental Education*, 76(2), 191–217.

- Bowen, N.K. (1999). A role for school social workers in promoting student success through school–family partnerships. *Social Work in Education, 21*, 34–47.
- Connell, J.P., Spencer, M.B., & Aber, J.L. (1994). Educational risk and resilience in African-American youth: Context, self, action, and outcomes in school. *Child Development, 65*, 493–506.
- Deci, E.L. (1992). The relation of interest to the motivation of behavior: A self-determination theory perspective. In K.A. Renninger, S. Hidi, & A. Krapp (Eds.), *The role of interest in learning and development* (pp. 43–70). Hillsdale, NJ: Erlbaum.
- Deci, E.L., Koestner, R., & Ryan, R.M. (2001). Extrinsic rewards and intrinsic motivation in education: Reconsidered once again. *Review of Educational Research, 71*, 1–27.
- Deci, E.L., & Ryan, R.M. (1980). The empirical exploration of intrinsic motivational processes. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (pp. 40–80). New York: Academic Press.
- Deci, E.L., & Ryan, R.M. (1985). *Intrinsic motivation and self determination in human behavior*. New York: Plenum.
- Desimone, L. (1999). Linking parent involvement with student achievement: Do race and income matter? *Journal of Educational Research, 93*, 11–30.
- Domina, T. (2005). Leveling the home advantage: Assessing the effectiveness of parental involvement in elementary school. *Sociology of Education, 78*, 233–249.
- Epstein, J.L. (1995). School/family/community partnerships. *Phi Delta Kappan, 76*, 701–712.
- Epstein, J.L. (2005). School-initiated family and community partnerships. In T. Erb (Ed.), *This we believe in action: Implementing successful middle level schools* (pp. 77–96). Westerville, OH: National Middle School Association.
- Epstein, J.L., Sanders, M.G., Simon, B.S., Salinas, K.C., Jansorn, N.R., & Van Voorhis, F.L. (2002). *School, community, and community partnerships: Your handbook for action* (2nd ed.). Thousand Oaks, CA: Corwin Press.
- Fan, X. (2001). Parental involvement and students' academic achievement: A growth modeling analysis. *Journal of Experimental Education, 70*(1), 27–61.
- Fan, X., & Chen, M. (2001). Parental involvement and students' academic achievement: A meta-analysis. *Educational Psychology Review, 13*, 1–22.
- Fishel, M., & Ramirez, L. (2005). Evidence-based parent involvement interventions with school-aged children. *School Psychology Quarterly, 20*, 371–402.
- Fredricks, J.A., Blumenfeld, P.C., & Paris, A.H. (2004). School engagement: Potential of the concept, state of the evidence. *Review of Educational Research, 74*, 59–109.
- Fulton, E., & Turner, L.A. (2008). Students' academic motivation: Relations with parental warmth, autonomy granting, and supervision. *Educational Psychology, 28*(5), 521–534.
- Furrer, C., & Skinner, E. (2003). Sense of relatedness as a factor in children's academic engagement and performance. *Journal of Educational Psychology, 95*, 148–162.
- Ginsburg, G.S., & Bronstein, P. (1993). Family factors related to children's intrinsic/extrinsic motivational orientation and academic performance. *Child Development, 64*, 1461–1474.
- Gonzalez, A., & Wolters, C. (2006). The relation between perceived parenting practices and achievement motivation in mathematics. *Journal of Research in Childhood Education, 21*, 203–217.
- Gonzalez-DeHass, A.R., Willems, P.P., & Doan Holbein, M.F. (2005). Examining the relationship between parental involvement and student motivation. *Educational Psychology Review, 17*, 99–123.
- Gottfried, A.E., Marcoulides, G.E., Gottfried, A.W., Oliver, P.H., & Guerin, D.W. (2007). Multivariate latent change modeling of developmental decline in academic intrinsic motivation and achievement. *Childhood through Adolescence, 31*(4), 317–327.
- Graham, J.W., & Hoffer, S.M. (2000). Multiple imputation in multivariate research. In T.D. Little, K.U. Schnable, & J. Baumert (Eds.), *Modeling longitudinal and multilevel data: Practical issues, applied approaches, and specific examples* (pp. 201–218). Mahwah, NJ: Erlbaum.
- Greene, D., Sternberg, B., & Lepper, M.L. (1976). Overjustification in a token economy. *Journal of Personality and Social Psychology, 34*, 1219–1234.
- Grolnick, W.S., & Slowiaczek, M.L. (1994). Parents' involvement in children's schooling: A multidimensional conceptualization and motivational model. *Child Development, 65*, 237–252.

- Hannover, B. (1998). The development of self-concept and interests. In L. Hoffman, A. Krapp, K.A. Renninger, & L. Baumert (Eds.), *Interest and learning: Proceeding of the secon conference on interest and gender* (pp. 105–125). Kiel: IPN.
- Harter, S. (1981). A new self-report scale of intrinsic versus extrinsic orientation: Motivation and informational components. *Developmental Psychology, 17*, 300–312.
- Hill, N.E., & Craft, S.A. (2003). Parent–school involvement and school performance: Mediated pathways among socioeconomically comparable African American and Euro-American families. *Journal of Educational Psychology, 95*, 74–83.
- Hughes, J., & Kwok, O. (2007). Influence of student–teacher and parent–teacher relationship on lower achieving readers’ engagement and achievement in the primary grades. *Journal of Educational Psychology, 99*(1), 39–51.
- Izzo, C.V., Weissberg, R.P., Kasprow, W.J., & Fendrich, M. (1999). A longitudinal assessment of teacher perceptions of parent involvement in children’s education and school performance. *American Journal of Community Psychology, 27*(6), 817–839.
- Jeynes, W.H. (2005). A meta-analysis of the relation of parental involvement to urban elementary school student academic achievement. *Urban Education, 40*, 237–269.
- King, G., Honaker, J., Joseph, A., & Scheve, K. (2001). Analyzing incomplete political science data: An alternative algorithm for multiple imputation. *American Political Science Review, 95*(1), 49–69.
- Lynch, M., & Cicchetti, D. (1997). Children’s relationships with adults and peers: An examination of elementary and junior high school students. *Journal of School Psychology, 35*, 81–99.
- Marchant, G.J., Paulson, S.E., & Rothlisberg, B.A. (2001). Relations of middle school students’ perceptions of family and school contexts with academic achievement. *Psychology in the Schools, 38*(6), 505–519.
- Miedel, W.T., & Reynolds, A.J. (1999). Parent involvement in early intervention for disadvantaged children: Does it matter? *Journal of School Psychology, 37*(4), 379–402.
- National Center for Education Statistics (NCES). (2004). *Education longitudinal study of 2002: Base year data file user’s manual*. Washington, DC: Author.
- Pajares, F. (1996). Self-efficacy beliefs in academic settings. *Review of Educational Research, 66*(4), 543–578.
- Pintrich, P.R., & DeGroot, E.V. (1990). Motivational and self-regulated learning components of classroom academic performance. *Journal of Educational Psychology, 82*, 33–40.
- Plant, R., & Ryan, R.M. (1985). Intrinsic motivation and the effects of self-consciousness, self-awareness, and ego-involvement: An investigation of internally controlling styles. *Journal of Personality, 53*, 435–449.
- Powell-Smith, K.A., Stoner, G., Shinn, M.R., & Good, R.H. (2000). Parent tutoring in reading using literature and curriculum materials: Impact on student reading achievement. *School Psychology Review, 29*, 5–27.
- Renninger, K.A., Ewan, L., & Lasher, A.K. (2002). Individual interest as context in exploratory text and mathematical word problems. *Learning and Instruction, 12*, 467–491.
- Rubin, D.B. (1987). *Multiple imputation for nonresponse in surveys*. New York: Wiley.
- Rumberger, R.W. (1995). Dropping out of middle school: A multilevel analysis of students and schools. *American Educational Research Journal, 32*, 583–625.
- Rumberger, R.W., Ghatak, R., Poulos, G., Ritter, P.L., & Dornbusch, S.M. (1990). Family influences on dropout behavior in one California high school. *Sociology of Education, 63*, 283–299.
- Ryan, R.M., & Deci, E.L. (2000a). Intrinsic and extrinsic motivations: Classic definitions and new directions. *Contemporary Educational Psychology, 25*, 54–67.
- Ryan, R.M., & Deci, E.L. (2000b). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist, 55*, 68–78.
- Sanford, J. (1987). Management of science classroom tasks and effects on students’ learning opportunities. *Journal of Research in Science Teaching, 24*, 249–265.
- Schiefele, U. (2001). The role of interest in motivation and learning. In J.M. Collis & S. Messick (Eds.), *Intelligence and personality: Bridging the gap in theory and measurement* (pp. 163–194). Mahwah, NJ: Erlbaum.

- Schunk, D.H., & Zimmerman, B.J. (2006). Competence and control beliefs: Distinguishing the means and ends. In P.A. Alexander & P.H. Winne (Eds.), *Handbook of educational psychology* (2nd ed.) (pp. 349–367). Mahwah, NJ: Erlbaum.
- Seitsinger, A.M., Felner, R.D., Brand, S., & Burns, A. (2008). A large-scale examination of the nature and efficacy of teachers' practices to engage parents: Assessment, parental contact, and student-level impact. *Journal of School Psychology, 46*, 477–505.
- Sheldon, S.B., & Epstein, J.L. (2005). Involvement counts: Family and community partnerships and mathematics achievement. *Journal of Educational Research, 98*, 196–206.
- Simon, B.S. (2001). Family involvement in high school: Predictors and effects. *NASSP Bulletin, 85*, 8–19.
- Sirvani, H. (2007a). Effects of teacher communication on parents' attitudes and their children's behaviors at schools. *Education, 128*, 34–47.
- Sirvani, H. (2007b). The effect of teacher communication with parents on students' mathematics achievement. *American Secondary Education, 36*, 31–46.
- Skinner, E.A., Zimmer-Gembeck, M.J., & Connell, J.P. (1998). Individual differences and the development of perceived control. *Monographs of the Society for Research in Child Development, 63*(2–3), Whole No.204.
- Steinberg, L., Lamborn, S.D., Dornbusch, S.M., & Darling, N. (1992). Impact of parenting practices on adolescent achievement: Authoritative parenting, school involvement, and encouragement to succeed. *Child Development, 63*, 1266–1281.
- Thomas, R.M. (2005). *Comparing theories of child development* (6th ed.). Belmont, CA: Thomson-Wadsworth.
- Trusty, J. (1996). Relationship of parental involvement in teens' career development to teens' attitudes, perceptions and behavior. *Journal of Research and Development in Education, 30*(1), 63–69.
- Wentzel, K.R. (1998). Social relationships and motivation in middle school: The role of parents, teachers and peers. *Journal of Educational Psychology, 90*, 202–209.
- Wigfield, A., Byrnes, J.P., & Eddles, J.S. (2006). Development during early and middle adolescence. In P.A. Alexander & P.H. Winne (Eds.), *Handbook of educational psychology* (2nd ed.) (pp. 87–113). Mahwah, NJ: Erlbaum.
- Yan, W., & Lin, Q. (2005). Parent involvement and mathematics achievement: Contrast across racial and ethnic groups. *Journal of Educational Research, 99*, 116–127.
- Zimmerman, B. (2000). Self-efficacy: An essential motive to learn. *Contemporary Educational Psychology, 25*, 82–91.

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