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Parental Involvement and High School Dropout: Perspectives from Students, Parents, and Mathematics Teachers

Giang-Nguyen T. Nguyen* 
University of West Florida, USA

Byron Havard 
University of West Florida, USA

Barbara Otto 
Hochschule Fresenius, GERMANY

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Abstract: Students drop out of schools for many reasons, and it has negative effects on the individual and society. This paper reports a study using data published in 2015 from the Educational Longitudinal Study conducted by the National Center for Education Statistics to analyze the influence of parental involvement on low-achieving U.S. students' graduation rates from high school. Findings indicate that both students and parents share the same perspective on the need for parental involvement in their academic progress. For low-achieving high school students, parental involvement in academic work is a positive factor influencing students' graduation from high school.

Keywords: *Academic performance, mathematics teachers, parental involvement, high school dropout, Self-Determination Theory.*

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Introduction

There are many reasons why students drop out of school. Multiple research studies have tried to identify risks to prevent the dropout problem (Blondal & Adalbjarnardottir, 2014; Fall & Roberts, 2012). Fall and Roberts (2012) indicated supports from parents and teachers positively influence students' behaviors and academic achievement; their influence decreased student dropout rates. They also reported when students feel support from parents or teachers, they are more in control and more determined in school. Another study's results (Blondal & Adalbjarnardottir, 2014) indicate strong student engagement is directly linked to students staying in school through graduation.

Previous studies show parental involvement (PI) and student academic performance are positively related (Boonk et al., 2018; Hill et al., 2004; Murayama et al., 2013). To explore the relationship between PI and school dropout we examined multiple variables in the datasets of the Educational Longitudinal Study (ELS) from the National Center for Education Statistics (NCES) published in 2015. We focused on the following variables: (1) PI with homework, (2) PI with school-related discussions, and (3) PI in school activity. We provide background research to establish a rationale for our study, share the results, and offer practical implications for practice. The study was guided by the Self-Determination Theory framework (Deci & Ryan, 2013).

Literature Review

Self-Determination Theory (SDT) Framework

The SDT framework provides a solid foundation for connecting parent involvement and successful student outcomes (Ryan & Deci, 2000). Autonomy, competence, and relatedness are the three constructs of the SDT that describe parents' roles in terms of how they allocate resources to their children (Grolnick et al., 2014). According to Deci and Ryan (2002), parents are strong facilitators of their children's extrinsic and intrinsic motivation, and parents also assist in the development of the children's autonomy. Students with poor academic performance are at high risk of dropping out (Christle et al., 2007). Since SDT focuses on students' extrinsic and intrinsic motivation levels relative to goals and outcomes, it provides a strong framework for examining the roles of parents within the context of students' academic motivation (Vansteenkiste et al., 2006).

* Corresponding author:

Giang-Nguyen T. Nguyen, University of West Florida, Pensacola, USA. ✉ gnguyen@uwf.edu



Parental Involvement

Parental involvement is defined as the “dedication of resources by the parent to the child within a given domain” (Grolnick & Slowiaczek, 1994, p. 238). Involvement can be broken down into the following types: (1) Involvement with a child and the child’s education at school, (2) Personal involvement at school or at home, and (3) Cognitive/intellectual involvement related to making materials/resources that stimulate children’s learning (for more detail, review Grolnick et al., 1997). Similarly, Overstreet et al. (2005) classified PI as consisting of: *school involvement, cognitive-intellectual involvement, and personal involvement*. *School involvement* is comprised of school-related activities that take place at school or at home. *Cognitive-intellectual involvement* involves experiences parents provided for a child learning such as playing or asking a child to create a simple pattern with fork and spoon. *Personal involvement* is the awareness of child’s activities at school (Overstreet et al., 2005). Parents play an important role in children’s academic success from early grades through high school (Chen & Wong, 2013; Wilder, 2013). Parents are children’s first interactions; their influence cannot be underestimated (Hornby & Lafaele, 2011). Pek and Mee (2020) suggested parent involvement helps students plan for college and encourages them to do well in school. Parents could be involved in school activities by participating in events, committees, meetings, or volunteering (Child Trends, 2013). Desforges and Abouchaar (2003) emphasized other involvement, such as getting ready for school, developing school routines, and school extra-curricular activities. Simply maintaining good communication is a great way to be involved (Bakker et al., 2007).

According to Daniel (2015), parents’ level of involvement changes as children get older. Parents are more directly involved with preschoolers’ education (O’Toole, 2017), but they act as more of a supporter for secondary school children (Harris & Robinson, 2016). According to Hornby and Lafaele (2011), secondary students have the least involvement from parents, and parents may feel secondary schools are not welcoming to them (Eccles & Harold, 1993). Metso (2004) reported that family contacts with school decreased as children progressed to higher grades in the school system. The reason for decreased or less frequent involvement might be that children’s needs were misinterpreted as they get older. For example, parents might assume older children are more independent, but in reality, children might need and want their parents to be involved with their schooling (Deslandes & Cloutier, 2002; O’Toole, 2017). Parents may have various reasons for not participating in schools with their children, yet the connection between parental involvement and children academic performance remains strong (Durisic & Bunijevac, 2017). Particularly, those students with parents more involved in their schooling performed better than those whose parents were less involved (Pek & Mee, 2020).

PI, through stimulating children’s interest, influences children’s academic achievement (Lara & Saracostti, 2019). For example, Pong (1997) found reading and mathematics scores of children were influenced if their parents were involved with their schooling. PI and adolescents’ academic outcomes are associated (Hill et al., 2004) and PI significantly influences children’s academic performance (Jeynes, 2007). Patall et al. (2008) indicated parental “homework involvement has at best a slightly positive overall impact on achievement” (p. 1062). However, PI in schools is decreased when children move through grades due to the assumption that adolescents are more autonomous. Parents also assumed they cannot provide help to children with complex subjects in high school (Eccles & Harold, 1996). As a result, decreasing the level of PI could have an impact on high school student dropout rates.

School Dropout

School dropout is the inability of the learner to continue with school, usually due to the learner’s own capability (performance and behavior) or socioeconomic conditions (Lamb et al., 2011). As previously mentioned, multiple research efforts have focused on identifying risks and finding measures to reduce student drop out (Blondal & Adalbjarnardottir, 2014; Brown et al., 2019; Fall & Roberts, 2012; McDermott et al., 2019). Risk factors for dropout can arise from the individual, family, and school environment (Shannon & Bylsma, 2006; Tyler & Lofstrom, 2009). Students’ low achievement, academic engagement, and motivation levels are among the most significant predictors of early school withdrawal (Barry & Reschly, 2012; Blondal & Adalbjarnardottir, 2014; Christle et al., 2007).

“The high school graduation rate is a barometer of the health of American society and the skill level of its future workforce” (Heckman & LaFontaine, 2010, p. 244). According to Murnane (2013), decreasing the dropout rate is highly desirable in order to prepare students to enter the workforce. Laird et al. (2007) indicated there is a continuous positive trend in high school completion rates. The National Center for Education Statistics (NCES) (2018) indicated a new record of 84% completion rate for American high schools. However, the remaining 16% that did not graduate is still a concern (Orpinas et al., 2015). School dropout could be associated with lower levels of parental involvement. Afia et al. (2019) suggested most students who dropped out of school were from families that had poor communication with the school and the parents were not aware of their child’s performance at school. The authors believed that some parents did not pay attention to signals leading to dropout (Afia et al., 2019). Similarly, parents who did not strictly remind their children of the importance of school and sustained a good relationship with adolescents also stood a chance of increasing the dropout rate of their adolescent (Romo & Falbo, 1996). In examining students’ academic performance, such as dropout rates and PI, perspectives of teachers are also examined.

Teachers Perspectives on Parental Involvement

Students perform better when there is collaboration between parents and schools (Epstein, 1995). Izzo et al. (1999) found that teachers believe children's performance could be increased with greater support for learning at home from parents. Izzo et al. (1999) highlighted the need for further research exploring both the parents' and teachers' perspectives on how they can collaborate in supporting students' academic achievement.

There are different perspectives on what parental involvement means for teachers and parents (Kalaycı & Öz, 2018). From teachers' point of view, PI includes home activities such as helping children with homework; however, from parents' viewpoints, PI means being present and involved in educational decisions regarding their child (Göktürk & Dinçkal, 2018). Therefore, both parents and teachers must collaborate in processes to support children (Epstein & Sanders, 2002). Teachers' beliefs and attitudes towards PI have an influence on developing and sustaining parents' involvement in education (Kalaycı & Öz, 2018). Kalaycı and Öz (2018) noted what teachers believe about PI could influence parents' involvement in education. According to Silinskas and Kikas (2019), teachers expect parents to be involved with their children's schooling, such as helping them with homework. Their recent study reported parental involvement with mathematics homework was linked to students' mathematics performance and motivation.

Although high school dropout factors have been the focus of multiple studies, a limited number have explored PI and dropout relationships. Previous studies of PI focused on the student perspective and the administrator perspective (e.g., Doll et al., 2013), not the perspectives of students, parents, and teachers. There is limited research focused on PI described by Grolnick et al. (1997) or Overstreet et al. (2005), which prompted authors to check for an association as we did in our study. PI question items in the present study were selected from the data set and maintained all aspects described by these researchers (Review Appendix A for related-item list).

The present research investigates whether there is a difference in PI in school between *the low-achieving students who did not graduate* and those *low-achieving students who did graduate from school* based on their mathematics performance scores reported from the ELS Data of NCES (2015). Particularly, we are interested in the PI from students', parents', and teachers' perspectives regarding students' mathematics performance. The following variables were selected as being of interest for examination in the study: parental involvement with homework and parental involvement with schools. These variables were selected based on a strong Cronbach's alpha level with parental involvement. Specifically, the analysis addresses these questions:

Research Question 1 (RQ1): Is there a statistically significant difference in the mean scores of student-reported parental involvements (parental involvement with homework and parental involvement with school) between *low-achieving students who did not graduate from high school* and *low-achieving students who did graduate*?

Research Question 2 (RQ2): Is there a statistically significant difference in the mean scores on parents' self-reported involvement (parental involvement with school and parental activity in school) between *low-achieving students who did not graduate high school* and *low-achieving students who did graduate*?

Research Question 3 (RQ3): Is there a statistically significant difference in the mean scores on mathematics teachers reports on parental involvement between *low-achieving students who did not graduate from high school* and *low-achieving students who did graduate*?

Methodology

The current study focuses on the achievement-related lowest quartile of students in 10th grade. The variables of interest examined in the study related to parental involvement included: parental involvement with homework (Cronbach's alpha of 0.75); PI with school (Cronbach's alpha of 0.82); and PI with school activity (Cronbach's alpha of 0.69). The lowest quartile was selected to ensure the number of available research participants for the second measure by 12th grade. This study investigated how parental involvement may be associated with low-achieving students who did not graduate from high school, in particular, PI and low-achieving high-school students.

Data Set

The current paper's data analysis is based on data retrieved from the ELS: 2002 (NCES, 2015). ELS: 2002 served as a nationally representative study assessing approximately 15,000 students in 10th grade (first measurement in 2002) as well as 12th grade (second measurement in 2004) and followed the participants throughout postsecondary and work-life years to analyze how students' learning progressed since they entered high school. Figure 1 depicts the general longitudinal research design of ELS: 2002

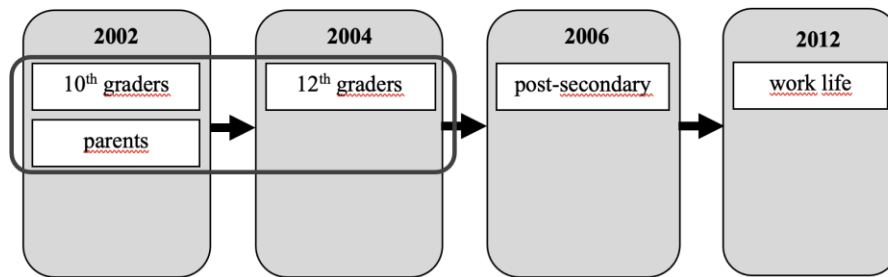


Figure 1. ELS: 2002 Research Design and Data Used in the Current Analysis

The original data set collected perspectives of students, parents, teachers of mathematics, and school administrators (see NCES website for more details, <https://nces.ed.gov/surveys/els2002/>). We chose to focus on mathematics because of the limited research in the area (e.g., Pong, 1997). The current paper's analyses included longitudinal data from three sources: the student questionnaire (first and second measurement), the parent questionnaire (first measurement), and the mathematics teachers' questionnaire (first measurement).

Data

The sample includes grade 10 students in the lowest quartile regarding their school achievement at the first measurement ($N = 2,938$); those students are at risk for dropping out. The lowest quartile was selected to ensure at least 10% of the students would still be included in the second measure. Of those students selected from the lowest quartile, 420 had dropped out of school by the second measurement in 2004. Successful graduation was used as the grouping variable to examine retrospectively if the degree of parental involvement differed between graduating and non-graduating students back in 10th grade.

Data were extracted using the Education Data Analysis Tool following Ingels et al.'s (2004) outlined procedures. Using SDT literature as a guideline, researchers purposely selected items for statistical analyses on parental involvement that they retrieved from participants at the first measurement in 2002. The following scales were used: (1) the *ELS: 2002 student questionnaire* addressed two factors related to PI: PI with homework, measured by two items ($\alpha = 0.75$), and parental involvement with school, measured by six items ($\alpha = 0.84$); (2) the *ELS: 2002 parent questionnaire* addressed parental involvement with two subscales: parental involvement with school, measured by eight items ($\alpha = 0.73$), and parental activity in school, measured by five items ($\alpha = 0.69$); and (3) the *ELS: 2002 mathematics teacher questionnaire* attempted to assess parental involvement measured by a single item (see Ingels et al., 2004 for more details on each questionnaire).

Statistical Package for the Social Sciences (SPSS) was used to analyze data. (Note: the response formats were not identical for all items between each instrument. As a result, standardized z-scores were calculated for the scale that had a non-matching answering format). Researchers conducted the Analysis of Variance (ANOVA) and the Multivariate Analysis of variance (MANOVA) procedures. For data with more than one dependent variable, RQ1 and RQ2 were analyzed with MANOVA because the analysis involved more than one dependent variable. The variables for RQ1 are PI with homework and PI with school. For RQ2, the variables are PI with school and parental activity in school. The results are displayed according to the research questions. The following checks for assumptions of normality and outliers were performed before the analysis.

Check for Normality Assumptions

We used the Shapiro-Wilk test, a more sensitive and powerful one as compared to other tests, to check for any deviation from normality (Razali & Wah, 2011; Yap & Sim, 2011). This test is assumed most suitable for use with samples less than 50 because the test is oversensitive as the sample size increases (Uttley, 2019). A large sample size as in the present study requires statistical tests of deviation from normality may indicate even very minor deviations as being significant (Uttley, 2019). The Shapiro-Wilk test for all five variables was significant and indicated the data significantly deviated from a normal distribution. Due to the oversensitivity, we also used a graphical analysis with Q-Q-diagrams, which fits normality as well. Moreover, it has been shown that analyses of variance are robust in terms of a violation of the assumption of normal distribution (e.g., Blanca Mena et al., 2017).

Boxplots for outliers

The box plots did not show any severe outliers for all analyzed variables. Furthermore, for four variables, no light outliers were found. Only with regard to the variable school involvement (assessed in the parent questionnaire) seven light outliers were identified showing significantly lower values than the remaining parent participants ($N > 2,500$).

Levene test for equal error variances

The Levene test checks for equality of error variances in the different groups (dropout vs. no dropout). For four out of the five variables, the Levene tests were not significant, indicating equal error variances for both groups. Only the scale of parental activity assessed in the parent questionnaire provided a significant Levene test.

Results

RQ1: The MANOVA from the student questionnaire revealed an overall significant effect of $F(2, 2409) = 16.56$ with an $\eta^2=0.014$, indicating that the parental involvement of the 10th graders who graduated was statistically significant different compared with the parental involvement of low-achievers who dropped out. Based on what students reported, Table 1 shows the parents of low-achievers who dropped out of school were less involved with their children's academic life.

Table 1. Results of the MANOVA Regarding Parental Involvement (Student Perspective)

Scale	M (s)	M (s)	df	F	η^2
	dropped out	graduated			
Parental involvement with homework	2.53 (0.92)	2.71 (0.92)	1/2410	9.88**	0.004
Parental involvement with school	1.84 (0.52)	2.02 (0.52)	1/2410	32.86***	0.013

Note: ** $p < 0.01$; *** $p < 0.001$

RQ2: The MANOVA utilizing data from the parent questionnaire is shown in Table 2. The overall effect of the MANOVA revealed a significant difference in PI between those low-achieving students who dropped out and those who graduated ($F(2, 2466) = 12.35$; $\eta^2=0.010$). The results are the same as the results from the analysis of the student questionnaire. The parents of low-achiever students who graduated also reported they were more involved with the schools of these students

Table 2. MANOVA Results Regarding Parental Involvement Parent Perspective)

Scale	M (s)	M (s)	df	F	η^2
	dropped out	graduated			
Parental involvement with school	-0.094 (0.59)	0.016 (0.59)	2/2467	9.95**	0.004
Parental activity in school	0.175 (.24)	.252 (.29)	2/2467	21.28***	0.009

^a Composites are based on z-standardized values; ** $p < .01$; *** $p < .001$

RQ3: The ANOVA procedure utilizing data from the teacher questionnaire is shown in Table 3. The results revealed a significant difference in PI between those low-achieving students who dropped out and those who graduated ($F(1, 1689) = 25.74$; $\eta^2=0.015$). In line with the results reported by students and parents, these findings indicate a lower level of parental involvement for students who dropped out as compared to those who graduated.

Table 3. Results of the ANOVA Regarding Parental Involvement (Mathematics Teacher Perspective).

Scale	M (s)	M (s)	df	F	η^2
	dropped out	graduated			
Parental involvement with school ^a	1.58 (.67)	1.83 (.71)	1/1689	25.74***	0.015

*** $p < .001$; ^a single item

Discussion

The study investigates whether there are differences in PI in school between *low-achieving students who dropped out of school* as compared with *low-achieving students who graduated from school* based on the mathematics performance scores reported from the NCEs (2015). The results confirm the importance of PI for *low-achieving students'* success academically: All three indicators of PI (students', parents', and mathematics teachers' perspectives) were rated significantly lower in 10th grade for those *students who did not graduate from high school* as compared with *students who did graduate*.

The current study results provide empirical evidence supporting the use of SDT as a pertinent foundation in examining the influences of PI as a contributing factor for the successful completion of high school in the U.S. (e.g., Gonzalez-DeHass et al., 2005). The results also provide evidence supporting the need for positive parental influence relative to

student achievement as advocated by SDT (Deci & Ryan, 2002). The evidence calls for a need to support low-achieving students' intrinsic motivation to enhance their chances for graduation.

Also, the analysis provides information for students, parents, and mathematics teachers about key components that may affect student enrollment (staying in school or dropping out). The results show a significant difference in PI between the two groups; parental involvement played a crucial factor in the dropout. When students perceive their parents are involved in their school (perhaps because of their parent levels of involvement), they are less likely to consider dropping out of school (Vallerand & Bissonnette, 1992). The present study is in line with a previous study on PI for students at risk (Krane & Klevan, 2019). According to Krane and Klevan (2019), upper level high school students are in high need of guidance and support from parents because they are in transition between "childhood and adulthood" and so PI is "crucial for them, especially for those students at risk of dropout" (p. 82). Additionally, it is important to identify when students decide to drop out from school, the "turning points" (McDermott et al., 2019).

Given the inconsistency in research on PI effects in previous research, the question arises: what could be the reasons for these results? If dropping out of school was not perceived as a parent-supported or socially acceptable event in a home structure, perhaps students would not pursue the action. According to the SDT framework, the structure is "the degree to which the environment is organized to facilitate competence" (Grolnick et al., 2014, p. 357). SDT research focused on parents advocates structure as an important factor. The current analyses revealed PI differences in 10th grade low-achieving students who completed high school and low-achieving students who dropped out. Specifically, PI plays a role in the learning success of low-achieving students and therefore may be considered as a protective factor. Therefore, exploring how to increase PI is important and how students should be supported. The evidence from the study shows the difference in PI of the two groups of students, suggesting PI should be increased (Erol & Turhan, 2018). PI could be increased in multiple ways; for example, in a study investigating which types of family participation in school effectively prevented student dropping out from school, García-Carrión et al. (2018) found family involvement (e.g., involvement in school decision-making processes) helped to reduce school dropout. In addition, PI is challenging for many immigrant families who have language barriers, such as those described in Cureton's (2020) study.

Conclusion

One might assert that the datasets ELS: 2002 from the NCE's longitudinal study seems dated. Readers should note that while these data became publicly available in 2015, it is difficult to say if anything has changed from 2002 to the present at the national level. The present study indicates there is a relationship between PI and high school dropout, suggesting PI is vitally important in preventing high school student dropout and should not be at the lowest level of involvement as found by previous research (Hornby & Lafaele, 2011). Even on a small scale (e.g., state level), Nwokedi (2020) found PI greatly influenced the academic success of students. It is not convincing to say that twenty years later, with a national representative sample, that parental involvement influences on high school student dropout have changed. As Afia et al. (2019) suggested, parents have an important role in promoting school perseverance for middle adolescence and parents have a key role in preventing high school dropout. The authors humbly suggest that parental involvement is both timely and relevant and should be considered to prevent student dropout.

Recommendations

The SDT places emphasis on the need for relatedness, competence, autonomy, and supportive learning contexts at home (Dumont et al., 2014) and in schools (Vansteenkiste et al., 2012). Therefore, future studies on dropouts should include potential determinants of the school context to assess the relative contribution of personal and contextual factors in early school withdrawal. Based on the evidence from the study, we would like to make the following recommendations for PI.

Effective Communication

Schools should engage parents in children's education through opportunities such as visiting students' home, parent nights, or conferences (Pek & Mee, 2020). Schools should communicate with parents regularly regarding their children's progress. (Durisic & Bunijevac, 2017). Since PI begins with meaningful relationships where parents trust their children's teachers (Sawyer, 2015), invitations from teachers regarding opportunities to support children would establish trust between parents and teachers (Grace & Gerdes, 2019; Whitaker & Hoover-Dempsey, 2013). Positive parental involvement with schools may be associated with positive outcomes on students' academic attitudes, presence, and behaviors in school (Campbell, 2011). Some engagement practices are provided below.

Increase communication between school and parents. One vital tool in increasing parental involvement is positive and clear communication between teachers and parents (Sawyer, 2015). Gillum (2017) posited the first step to involve parents is by making known to parents that they are always welcome to support staff and children's development. Moreover, parents should be given advance notice and several announcements about school programs and activities for them to adjust their schedules for such events (Gillum, 2017).

Schools can involve parents in school activities through effective communication. Epstein and Van Voorhis (2001) suggested schools could regularly send letters to students' homes. Alternately, other communication forms or devices

should be designed; Piper (2012) suggested a website could support those parents who might have barriers. Piper suggested all emails of teachers should provide links to personnel who are in charge of planning activities. Further, schools can use different communication procedures, such as posting on classroom bulletin boards or doors, text messages, newsletters, and sending frequent announcements to parents (Gillum, 2017). With the availability of the technology, we have observed many teachers who communicate with family through different mobile applications (e.g., *Remind* application).

Gillum (2017) argued that the procedures schools use to communicate might be ineffective, resulting in parents finding it difficult to plan their schedules, especially for those parents who may not have flexible work schedules. Therefore, schools should be flexible in scheduling activities. Also, parent participation in school activities may be limited due to other reasons, including caring for younger children and/or parents, health issues, or transportation (Gillum, 2017). Schools should organize teacher-parent conferences or meetings using current technologies (Gillum, 2017). Parents could participate both physically and virtually (Epstein, 1995). Participation could be by video or audio activities, such as sharing a story, playing music, demonstrating how to re-pot a plant, or contributing to curriculum themes (Gillum, 2017). The videos or audio used could also be made for children to listen or watch. Schools could ask parents' permission to post videos of children on social media. These activities may be something parents and children could do at home. Similarly, parents can also assist in developing a parent corner in schools where parents can contribute to the class/school (Gillum, 2017).

Interventions

In terms of practical implications, this nationally representative study suggests the need to determine different approaches for enhancing and increasing parental involvement, especially within the specific time of students' high school years. Another implication is interventions for parents of low-achieving students need to be developed and provided to address beneficial parental support strategies (e.g., workshops, counseling). Perhaps parents have the desire to participate and be involved, but they are unsure about how to offer such supports. To assess their effectiveness on students' school dropout, these interventions should be systematically evaluated. We would like to provide the following suggestions for school leaders to increase parental involvement levels for low-achieving students:

Teachers should increase communication to parents on students' academic performance, incomplete assignments, and student accomplishments. According to Campbell (2011), school leaders should make PI a priority in their improvement plans. Campbell (2011) also provided a toolkit of strategies to involve parents, including:

- (1) parenting workshops: parents could learn and share about involvement in school,
- (2) communication: teachers and administrators could increase the line of communication with parents,
- (3) volunteering: teachers and administrators could create events for network- building capacities. This could be something formal (e.g., parent-teacher association),
- (4) family learning: teachers could provide some fun activities for parents to come to school to network,
- (5) decision- making: teachers and administrators could invite parents to serve on committees,
- (6) partner with the community: teachers could encourage remote involvement by creating an online learning community for parents to be involved (See Campbell, 2011 for more details).

Lastly, we want to emphasize the importance of PI to children in all grades. Prior research has shown that family involvement for school activities is decreasing as children progress to high school, but PI contributes significantly to their children performance if their parents are engaged in their schooling in primary grades through high school (Simon, 2004). Simon (2004) asserted school outreach would maintain a positive relationship with families, which contributes to students' academic performance, an important factor to welcome and sustain partnerships with families.

Future Research

This study examined PI from three perspectives: students, parents, and mathematics teachers. The data collected for this study were analyzed quantitatively. Future research studies should consider mixed-methods designs to learn about PI from these perspectives. The study shows evidence of significant differences in PI with students who graduated from high school as compared with students who dropped out of high school. These findings indicate the importance of monitoring students for signs of dropping out of school early so any gaps in the support students may be experiencing regarding PI may be addressed. Identifying these signs early may present schools with an opportunity to intervene before students decide to end their academic careers before graduation. A mixed-methods design may be beneficial in exploring this issue more deeply to assist schools with this challenge. Interviewing (qualitative data) willing parents and students about their needs and challenges in addition to quantitative data is an essential next step in transitioning our schools towards being better prepared to support the needs of the communities they serve.

Limitations

We would like to address the limitations of this study. First, we used datasets from NCES Longitudinal study published in 2015; however, these data were collected before 2015, not recently. Data were analyzed from three perspectives: students, parents, and mathematics teachers, and the data show that parental involvement can influence students who *did not graduate from school and who did graduate from high school*. Second, the researchers used existing data, and some answering formats were not identical for all items within a sub-scale. As a result, standardized z-scores were calculated for the scales that had non-matching answering formats. Third, the same construct of parental involvement from the three perspectives (students, parents, and mathematics teacher) was examined, but the respective items were not aligned on each instrument. Future studies should consider using identical items for the different instruments. Fourth, the researchers primarily focused their analysis on the impact of behavioral aspects of parental involvement, so future studies should consider the impact of cognitive/intellectual and personal aspects of parental involvement on low-achievers' school success (Vallerand & Bissonnette, 1992). Additionally, data analysis did not include information about student performance in English, and English teachers' perspectives should be considered in future studies for a holistic view on parental involvement. Future studies may elaborate on whether PI varies between courses or consistent across all subject areas.

Authorship Contribution Statement

Nguyen: Conceptualization, design, analysis, writing, Critical Revision. Havard: Editing/reviewing, Data Analysis, Revision. Otto: Data Analysis, Draft Manuscript.

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Appendix A

Parental Involvement Questionnaire

Variable Name	Descriptions of Questions
	<i>parental involvement with homework</i>
BYS85A	How often parents check homework
BYS85B	How often parents help with homework
	<i>parental involvement in school (discussions)- Student perspective</i>
BYS86A	How often discussed school courses with parents
BYS86B	How often discussed school activities with parents
BYS86C	How often discuss things studied in class with parents
BYS86D	How often discussed grades with parents
BYS86F	How often discussed prep for ACT/SAT with parents
BYS86G	How often discussed going to college with parents
	<i>student perspective (F1) (C_F1S_pinvolvement_school)</i>
F1S64A	How often discussed school courses with parents
F1S64B	How often discussed school activities with parents
F1S64C	How often discuss things studied in class with parents
F1S64D	How often discussed grades with parents
F1S64G	How often discussed preparation for ACT/SAT with parents
F1S64H	How often discussed going to college with parents
	<i>parent perspective (C_BYP_pinvolvement_school)</i>
BYP55A	How often check that homework completed
BYP55B	How often discuss report card
BYP56A	Provide advice about selecting courses or programs
BYP56B	Provide advice about plans for college entrance exams
BYP56C	Provide advice about applying to college/school after hs
BYP56D	Provide advice about jobs to apply for after high school
BYP57A	Attended school activities with 10 th -grader
BYP57B	Worked on homework/school projects with 10 th -grader
	<i>Math Teacher Perspective</i>
BYTM09	Parents' level of involvement (math)
	<i>Parental activity in school (C_BYP_pactivity_school)</i>
BYP54A	Belong to parent-teacher organization
BYP54B	Attend parent-teacher organization meetings
BYP54C	Take part in parent-teach organization activities
BYP54D	Act as a volunteer at the school
BYP54E	Belong to other organization with parents from school
	<i>parental involvement (general)-student perspective</i>
BYS86H	How often discussed current events with parents
BYS86I	How often discussed troubling things with parents
	<i>student perspective (F1) (C_F1S_pinvolvement_general)</i>
F1S64I	How often discussed current events with parents
F1S64J	How often discussed troubling things with parents