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Abstract

This action research project examined the relationship between parenting styles and mathematics achievement for middle school students at a small Christian school in the Midwestern United States. The participants were 22 fifth through eighth grade students and their parents. Students and their parents completed surveys measuring the parenting dimensions of demandingness and responsiveness, which were used to determine the overall parenting style in the home. Parenting styles determined by the surveys were compared to mathematics scores from the students' most recent achievement test. The study results indicate that an authoritative parenting style does not necessarily correlate with higher mathematics achievement for middle school students.

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Action Research Report Submitted in Partial Fulfillment of the Requirements for the Degree of Master of Education

The Relationship Between Parenting Styles and Mathematics Achievement

by

Laura Kramer

B.A. Dordt College, 2003

Action Research Report
Submitted in Partial Fulfillment
of the Requirements for the
Degree of Master of Education

Department of Education
Dordt College
Sioux Center, Iowa
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The Relationship Between Parenting Styles and Mathematics Achievement

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Abstract

This action research project examined the relationship between parenting styles and mathematics achievement for middle school students at a small Christian school in the Midwestern United States. The participants were 22 fifth through eighth grade students and their parents. Students and their parents completed surveys measuring the parenting dimensions of demandingness and responsiveness, which were used to determine the overall parenting style in the home. Parenting styles determined by the surveys were compared to mathematics scores from the students' most recent achievement test. The study results indicate that an authoritative parenting style does not necessarily correlate with higher mathematics achievement for middle school students.

Student achievement in mathematics is a hot topic among parents, educators, policymakers, and other stakeholders in the United States with good reason. According to the 2011 report of the Trends and International Mathematics and Science Study (TIMSS), conducted by the International Association for the Evaluation of Educational Achievement (IEA), although United States' mathematics assessment scores continue to improve at both the fourth and eighth grade levels, they still rank well below average scores of several East Asian countries, including Singapore, Korea, Hong Kong SAR, Chinese Taipei, and Japan (Mullis, Martin, Foy, & Arora, 2012). In an increasingly global and technological world, many educators and policymakers view science and mathematics achievement as a major contributor to keeping the United States competitive economically. As a result, increasing mathematical achievement of students in the United States is a top priority (Ramirez, Xiaowei, Schofer, & Meyer, 2006).

In TIMSS 2011, the IEA also examined contextual factors that contribute to student success in mathematics. The first two factors that were identified as having a strong positive relationship to high achievement scores involve parents: early exposure of children to mathematical concepts and access to academic resources in the home, such as parental support and books (Mullis et al., 2012). The concept that parents have a significant impact on student achievement is not new. Parents and other primary caregivers represent a child's first teacher and greatly affect a child's self-efficacy, self-esteem, identity development, and motivation—all factors that have been found to relate positively to student academic achievement (Bandura, 1997).

Many research studies have examined the relationships between parents, students, and academic achievement, including the effect of parenting style on student achievement (Aunola & Nurmi, 2004; Dornbusch, Ritter, Leiderman, Roberts & Fraleigh, 1987; Lamborn, Mounts,

Steinberg & Dornbusch, 1991; Leung, Lau & Lam, 1998; Paulson, 1994; Rivers, Mullis, Fortner & Mullis, 2012; Steinberg, Elmen & Mounts, 1989). Several of these studies point to a positive relationship between authoritative parenting, characterized by high levels of both warmth (responsiveness) and parental control (demandingness), and student academic achievement. (Baumrind, 1967; Maccoby & Martin, 1983; Lamborn et al., 1991). Less research, however, focuses on the impact of parenting style specifically on mathematics achievement. The purpose of this study was to determine if the research regarding parenting style and student achievement also applies to parenting style and mathematics achievement.

Interestingly, some researchers have found that not only do parents and students have varying perceptions of the levels of responsiveness and demandingness in the home, but it is the student's perception of parenting style that is more strongly related to student achievement than the parents' perception of parenting style (Paulson, 1994; Paulson & Sputa, 1996). Thus, this researcher also examined and compared how students and parents identify parenting style within their personal family context.

Hypotheses

Based on numerous studies (Baumrind, 1967, 1971, 1978; Dornbusch et al., 1987; Lamborn et al., 1991; Maccoby & Martin, 1983; Paulson, 1994; Rivers et al., 2012; Steinberg et al., 1989), the researcher made the following hypotheses.

- Of the four parenting styles, most parents will self-identify as possessing an authoritative parenting style, characterized by high levels of responsiveness and demandingness.
- Fewer students than parents will identify their parent's style of parenting as authoritative.

- Students that identify their parents as possessing relatively high levels of responsiveness and demandingness will have higher mathematics test scores than those who identify their parents as possessing lower levels of these dimensions.
- A student's indication of high demandingness and responsiveness will correlate more strongly to higher mathematics achievement than a parent's indication of high demandingness and responsiveness.

Definitions

For the purpose of this research, the following definitions were used.

Authoritarian: parenting style characterized by parents that maintain firm control but lack warmth and support (Lamborn et al., 1991).

Authoritative: parenting style characterized by parents that are both firm and supportive. (Lamborn et al., 1991).

Parenting style: “parents’ behaviors and characteristics that describe their interaction with their children over a wide range of situations and so create the interactional climate for parent-child relations” (Aunola & Nurmi, 2004, p. 965).

Permissive-indulgent: parenting style characterized by parents that maintain high levels of warmth and support but lack firm control (Lamborn et al., 1991).

Permissive-neglectful: parenting style characterized by parents that lack both warmth and control (Lamborn et al., 1991).

Summary

Due to the high interest in increased mathematics achievement for students in the United States, research regarding the factors that contribute to student mathematical success is extremely relevant. Thus, the purpose of this study was to examine the relationship between

parenting style and mathematics achievement as it pertains to parents and middle-school students in a small city in the Midwestern United States.

Literature Review

In the 1960s and 1970s, D. Baumrind, a clinical and developmental psychologist, conducted several studies examining parenting styles. From these studies, she defined three general parenting styles: authoritarian, authoritative, and permissive (Baumrind, 1967, 1971, 1978). An authoritarian parenting style is characterized by high levels of parental demand and control with relatively lower levels of warmth and communication. An authoritative parenting style is characterized by high levels of parental demand and control, as well as high levels of warmth and communication. A permissive parenting style is characterized by low levels of parental demand and control, and varying levels of warmth and communication (Baumrind, 1978).

Since Baumrind developed her parenting style typology, researchers have refined her definitions. In 1983, Maccoby and Martin defined these parenting styles in terms of demandingness (levels of demand and behavioral control) and responsiveness (levels of warmth and communication). In addition, they split the permissive parenting style into two groups, indulgent and neglectful, which results in the four generally-accepted parenting styles of authoritarian, authoritative, permissive-indulgent and permissive-neglectful. A permissive-indulgent parenting style is characterized by low levels of demandingness and relatively high levels of responsiveness, while a permissive-neglectful parenting style is characterized by low levels of both demandingness and responsiveness.

These and other studies have examined the effect of the different parenting styles on achievement of children of all ages. The results of these studies predominantly indicate that an

authoritative parenting style, with high parental responsiveness and demandingness, is associated with higher student achievement than the other parenting styles (Baumrind, 1967, 1971, 1978; Dornbusch et al., 1987; Lamborn et al., 1991; Maccoby & Martin, 1983; Masud, Thurasamy, & Ahmad, 2014; Paulson, 1994; Pinquart, 2015; Steinberg, Elmen, & Mounts, 1989). According to Lamborn et al. (1991), adolescent students from authoritative households were found to be “better adjusted and more competent; they are confident about their abilities, competent in areas of achievement, and less likely than their peers to get into trouble” (p. 1062). A 2014 meta-analysis of 39 studies confirmed these results and suggested that authoritative parenting is positively associated with academic performance and that it has a greater impact on academic performance than other parenting styles (Masud et al., 2014).

These results, however, are not consistent across culture or socio-economic status. Several studies have shown conflicting results between parenting style and student achievement, indicating that other dimensions, such as ethnicity, parent education, parental socialization goals, and family demographics, should also be considered as important factors of student achievement (Darling & Steinberg, 1993; Leung, Lau, & Lam, 1998; Masud et al., 2014; Pong, Johnston, & Chen, 2009; Spera, 2005). For example, Leung, et al. (1998) surveyed high school students from Hong Kong, the United States, and Australia and found that although American and Australian students were positively impacted by authoritative households, there existed a positive relationship between authoritarian households and student achievement for Chinese students. Pong et al. (2009) found that both European-American and Asian-American students were negatively affected by authoritarian parenting. However, they also found that “having more highly educated parents, higher family income, or living with two parents tended to matter more

to students' educational success than the impact of parenting style" (p. 10). Masud et al. (2014) suggested that western parents seem to place the most focus on authoritative parenting.

In 2015, M. Pinquart completed a meta-analysis of 308 studies, conducted between 1974 and 2015 and providing data on 362,155 students with a mean age of 13.19 years, which examined the relationships between parenting and student achievement. Pinquart found positive correlations between several parenting factors, including an authoritative parenting style, and student achievement. However, statistically, these relationships were weak or very weak and moderated by other factors such as ethnicity and age of the child. He suggested that although other factors may account for the relationship between parenting and student achievement, increasing the dimensions of demandingness and responsiveness at home may be effective in increasing academic achievement in school.

Research studies also show that the student's perception of parenting style is often different than the parent's perception, and because of respondent bias, it may be difficult to determine which perception is more accurate (Brown & Iyengar, 2008; Feldman, Wentzel, & Gehring, 1989; Paulson, 1994; Paulson & Sputa, 1996). In comparing parent and child reports of parental style with actual family observations, one study found that male adolescents were the most accurate in their reports of parenting styles and mothers were the least accurate (Feldman et al., 1989). In another study, mothers and daughters had the most agreement in their reports of parenting style (Paulson, 1994). Researchers agree that parents may perceive their parenting more positively than their children (Paulson, 1994; Paulson & Sputa, 1996) and may be more prone to giving socially desirable answers on parenting questionnaires (Feldman et al., 1989; Pinquart, 2016). Furthermore, Paulson's research (1994) found that a student's perception of parenting style was more predictive of their achievement than a parent's, claiming that

“authoritative parenting (high demandingness and high responsiveness) and high levels of parental involvement may not translate into higher achievement if adolescents do not perceive the behavior as being authoritative and achievement oriented” (p. 264).

Considering previous research, the purpose of this study was to examine the relationship between parenting styles and student achievement and to determine if authoritative parenting results in higher mathematics achievement for adolescent students of a small, predominantly Caucasian, Christian school. The researcher also assessed the level of agreement between parents and their children regarding parenting style within the home, as well as investigated whether parent or student perception of parenting style had more of an impact on student achievement.

Methods

Participants

The research participants included Grade 5 through Grade 8 students (and their parents) that attend a Christian school in Midwestern United States. Of the potential thirty-eight students in these grade levels at the school, twenty-two received parental consent to participate. Exactly half of the participants are in Grade 5, seven students in Grade 7, and two students each in Grades 6 and 8, resulting in a mean age of 11.68. The participants are primarily middle class and Caucasian, with 36% male and 64% female.

Materials

In this correlational study, the independent variables included two dimensions of parenting—responsiveness and demandingness--as determined by the results of surveys completed by the participants and their parents. These independent variables were analyzed within the population, as well as between the populations of students and their parents. The

dependent variable was student achievement in mathematics, as determined by each participant's achievement level on the mathematics portion of their most recent achievement test.

To determine parenting style, students completed two sections of the Parenting Style and Parental Involvement (PSPI) questionnaire, developed by Paulson (1994) (See Appendix A). The questionnaire was originally designed to be completed by ninth grade students and their parents. It measures responsiveness, demandingness, and parental involvement using a 5-point Likert-type scale. The responsiveness and demandingness scales are each comprised of 15 items. Cronbach's alphas for student reports of parental demandingness range between .78 and .84, and for student reports of parental responsiveness range between .84 and .87. Cronbach's alphas for parent reports of parental demandingness range between .71 and .78, and for parent reports of parental responsiveness range between .74 and .79 (Paulson, 1994). The demandingness and responsiveness scales of the PSPI were confirmed using a principal components factor analysis with Varimax rotation, with validity coefficients ranging from .50 to .80 (Paulson & Sputa, 1996).

All student participants belong to two-parent homes, thus each participant completed two questionnaires—one for their primary female caregiver and one for their primary male caregiver. Of the twenty-two student participants, twenty-one identified their mother as their primary female caregiver, and one student did not identify their primary female caregiver. Twenty students identified their father as their primary male caregiver, one student identified their stepfather as their primary male caregiver, and one student did not identify their primary male caregiver.

Parents of participants completed an adapted version of the student questionnaire, with questions reworded to reflect a parent's perspective (See Appendix B). For example, "My

mother takes an interest in my activities” was written as “I take an interest in my child’s activities.” Parents were instructed that the questionnaire should be completed by the primary caregiver, and parents of more than one participant were asked to complete just one questionnaire, answering the questions with respect to their general parenting style of their children in this age group. In calculating dimension scores for both the student and parent forms, some items were stated in a negative direction and reverse scored, as described in the scoring instructions for the PSPI. Thus, higher scores of demandingness or responsiveness indicate higher levels of that dimension.

Mathematics achievement levels on the South Dakota Smarter Balanced Assessment were used to determine student achievement in mathematics. Participants already completed this assessment in March, 2016. Students that did not meet the achievement standards earned a Level 1; students that nearly met the achievement standards earned a Level 2; students that met the achievement standards earned a Level 3; and, students that exceeded the achievement standards earned a Level 4.

Procedure

Letters were mailed home and emailed to the parents of thirty-eight potential 5th through 8th grade participants (See Appendix C). The letters described the purpose of the study and the materials that were to be used. The letters also emphasized that confidentiality and anonymity would be of utmost importance throughout the study. For the purpose of this study only, a random four-digit number was assigned to each participant and was used to tag the materials for each participant. Parents were asked to sign and return a consent form allowing their child to participate in the study. Some parents chose to provide consent via email. A total of twenty-two students received parental consent to participate.

In their respective math classes, participants completed the questionnaire, which took approximately ten minutes to complete for each parent. The respective mathematics teachers administered the questionnaire, and all students completed it on the same day. The parent version of the questionnaire was distributed to parents through a popular online survey provider. Parents were given two weeks to complete the survey, with a reminder sent after one week. Those who completed the survey within the given timeframe were offered access to the researcher's results and analysis, if so desired. Parent surveys were completed by the primary caregiver for twenty-one of the twenty-two participants. All primary caregivers identified themselves as the mother.

Results

Data Analysis

Following the completion of questionnaires by both the students and parents, the means and standard deviations were calculated for each parenting dimension (demandingness and responsiveness) and for each group (parents and students). These values were then used to classify parenting style tendencies in each participant's family structure, as defined by each group. Scores at or above the mean indicated relatively high levels of the dimension, and scores below the mean indicated relatively low levels of the dimension. A t-test was used to compare demandingness and responsiveness mean scores of students and parents and to determine statistical significance. In addition, the relationship between the two dimensions of parenting and mathematics achievement were examined using the Pearson Correlation Coefficient. For the purpose of this study, a p-value of less than 0.05 was considered statistically significant.

Table 1 shows the demandingness and responsiveness means and standard deviations for participants and their parents, calculated separately for male and female students. For both male and female students, and with respect to both parenting dimensions, parents scored themselves

higher than their students. An unpaired t-test indicated that the difference between the parent and student means (for both male and female students) of the demandingness subscale was statistically significant, with a p-value of less than 0.0001. The t-test showed that the difference between the responsiveness means of male students and their parents was statistically significant, with a p-value equivalent to 0.0026. There was no statistical significance between the responsiveness means of female students and their parents.

Table 1

Mean Parenting Dimension Scores of Students and Parents

(with Standard Deviations in Parentheses)

Survey Group	Parenting Dimension	
	Demandingness	Responsiveness
Male Students ($n = 8$)	3.22 (0.28)	3.76 (0.24)
Female Students ($n = 14$)	3.16 (0.24)	3.72 (0.39)
Parents of Male Students ($n = 8$)	4.22 (0.25)	4.27 (0.31)
Parents of Female Students ($n = 13$)	3.92 (0.56)	3.75 (0.46)

Hypothesis One

The first hypothesis made by the researcher was that the most parents would self-identify as having an authoritative parenting style; that is, relatively high levels of both demandingness and responsiveness. The mean demandingness score for all the parent surveys was 4.04, so demandingness scores at or above 4.04 were considered relatively high, and demandingness scores below 4.04 were considered relatively low. The mean responsiveness score for all the parent surveys was 3.95, so responsiveness scores at or above 3.95 were considered relatively

high, and responsiveness scores below 3.95 were considered relatively low. Parents were instructed that the survey should be completed by the primary caregiver of the participant, while keeping in mind the general parenting style used in the home. All primary caregivers that completed the survey identified themselves as the mother. Parent survey results for each participant are shown in Table 2.

Table 2

Parent Survey Results for Individual Participants

Student Number	Demandingness Score	Relative Level of Demandingness	Responsiveness Score	Relative Level of Responsiveness
1236	4.33	High	4.13	High
1766	4.27	High	4.93	High
2011	3.53	Low	3.00	Low
2038	2.47	Low	4.13	High
2118	4.60	High	3.60	Low
3155	3.53	Low	3.00	Low
3707	3.73	Low	3.53	Low
3841	4.53	High	3.93	Low
4055	4.07	High	4.13	High
4193	4.33	High	3.80	Low
4286	3.87	Low	4.20	High
4400	4.07	High	4.27	High
4453	4.13	Low	4.27	High
4536	4.07	High	4.13	High
4821	3.80	Low	3.53	Low
6644	4.07	High	4.53	High
6664	4.60	High	3.60	Low
6827	4.60	High	4.47	High
7111	No Response		No Response	
7578	4.33	High	4.13	High
8016	4.07	High	4.07	High
8065	3.80	Low	3.53	Low

The results shown in the table indicated that ten parents self-identified as possessing an authoritative parenting style characterized by relatively high levels of both demandingness and responsiveness; four parents self-identified as possessing an authoritarian parenting style characterized by relatively high levels of demandingness and relatively low levels of

responsiveness; two parents self-identified as possessing a permissive-indulgent parenting style characterized by relatively low levels of demandingness and relatively high levels of responsiveness; and five parents self-identified as possessing a permissive-neglectful parenting style characterized by relatively low levels of both demandingness and responsiveness. One parent of a participating student did not complete the online survey. Parenting style results as identified by the parents are summarized in Table 3.

Table 3

Parenting Style as Identified by Parents

Parenting Style	Authoritative	Authoritarian	Permissive-Indulgent	Permissive-Neglectful	No Response
Parent Response	45.5%	18.2%	9.1%	22.7%	4.5%

Therefore, since the highest percentage of parents identified themselves as employing an authoritative parenting style, the researcher's first hypothesis is supported by the data.

Hypothesis Two

The second hypothesis made by the researcher was that fewer students than parents would identify their parent's style of parenting as authoritative, demonstrated by relatively high levels of both demandingness and responsiveness on the survey. Students completed surveys for their primary male and female caregivers, with the mean of the two scores used to represent the general parenting style employed in the home. Twenty students identified their primary male caregiver as the father, one identified their primary male caregiver as the stepfather, and one did not identify their primary male caregiver. Twenty-one students identified their primary female caregiver as the mother and one did not identify their primary female caregiver.

The mean demandingness score for all the student surveys was 3.18, so demandingness scores at or above 3.18 were considered relatively high, and demandingness scores below 3.18 were considered relatively low. The mean responsiveness score for all the student surveys was 3.74, so responsiveness scores at or above 3.74 were considered relatively high, and responsiveness scores below 3.74 were considered relatively low. Results of the student surveys are shown in Table 4.

Table 4

Student Survey Results for Individual Participants

Student Number	Demandingness Score	Relative Level of Demandingness	Responsiveness Score	Relative Level of Responsiveness
1236	3.30	High	3.83	High
1766	2.80	Low	3.79	High
2011	3.23	High	3.57	Low
2038	2.79	Low	4.65	High
2118	3.11	Low	3.43	Low
3155	3.21	High	3.17	Low
3707	3.00	Low	3.83	High
3841	3.60	High	3.60	Low
4055	3.23	High	3.97	High
4193	2.93	Low	3.53	Low
4286	3.53	High	3.97	High
4400	3.33	High	3.41	Low
4453	3.50	High	3.30	Low
4536	3.20	High	3.70	Low
4821	3.40	High	4.27	High
6644	3.13	Low	3.93	High
6664	2.81	Low	3.77	High
6827	3.10	Low	4.03	High
7111	3.17	Low	3.87	High
7578	3.13	Low	3.37	Low
8016	2.90	Low	3.47	Low
8065	3.63	High	3.73	Low

The results shown in Table 4 indicated that four students identified their parents as possessing an authoritative parenting style characterized by relatively high levels of both

demandingness and responsiveness; seven students identified their parents as possessing an authoritarian parenting style characterized by relatively high levels of demandingness and relatively low levels of responsiveness; seven students identified their parents as possessing a permissive-indulgent parenting style characterized by relatively low levels of demandingness and relatively high levels of responsiveness; and four students identified their parents as possessing a permissive-neglectful parenting style characterized by relatively low levels of both demandingness and responsiveness. Parenting style results as identified by the students are summarized in Table 5.

Table 5

Parenting Style as Identified by Students

Parenting Style	Authoritative	Authoritarian	Permissive-Indulgent	Permissive-Neglectful
Male Student Response	37.5%	25.0%	25.0%	12.5%
Female Student Response	7.1 %	35.7%	35.7%	21.4%
Total Student Response	18.2%	31.8%	31.8%	18.2%

Therefore, since a higher percentage of parents (45.5%) than total students (18.2%) identified an authoritative parenting style in their home, the data supports the researcher's second hypothesis.

Hypothesis Three:

The researcher's third hypothesis was that students who identified their parents as possessing relatively high levels of responsiveness and demandingness would have higher mathematics test scores than those who identified their parents as possessing relatively low levels of the two dimensions. Table 6 shows the level of mathematics achievement for each

student as determined by their most recent results on the South Dakota Smarter Balanced Summative Mathematics Test, as well as the demandingness and responsiveness scores as determined by the student and parent surveys.

Table 6

Survey Results and Mathematics Achievement Level for Individual Participants

Student Number	Demandingness Score – Student Survey	Demandingness Score – Parent Survey	Responsiveness Score – Student Survey	Responsiveness Score – Parent Survey	Mathematics Achievement Level
1236	3.30	4.33	3.83	4.13	4
1766	2.80	4.27	3.79	4.93	4
2011	3.23	3.53	3.57	3.00	4
2038	2.79	2.47	4.65	4.13	3
2118	3.11	4.60	3.43	3.60	3
3155	3.21	3.53	3.17	3.00	4
3707	3.00	3.73	3.83	3.53	1
3841	3.60	4.53	3.60	3.93	2
4055	3.23	4.07	3.97	4.13	4
4193	2.93	4.33	3.53	3.80	1
4286	3.53	3.87	3.97	4.20	2
4400	3.33	4.07	3.41	4.27	3
4453	3.50	4.13	3.30	4.27	4
4536	3.20	4.07	3.70	4.13	3
4821	3.40	3.80	4.27	3.53	3
6644	3.13	4.07	3.93	4.53	2
6664	2.81	4.60	3.77	3.60	4
6827	3.10	4.60	4.03	4.47	4
7111	3.17	No Response	3.87	No Response	4
7578	3.13	4.33	3.37	4.13	2
8016	2.90	4.07	3.47	4.07	4
8065	3.63	3.80	3.73	3.53	2

The Pearson Correlation Coefficient was calculated and examined to determine any relationships that exist between the levels of the two parenting dimensions, as identified by the student and parent surveys, and each participant's mathematics achievement level. The analysis was conducted separately for male and female students. Results are shown in Table 7.

Table 7

Correlations Between Parenting Subscales and Mathematics Achievement

Survey Group	Demandingness		Responsiveness	
	R	R ²	R	R ²
Male Students ($n = 8$)	-0.8168	0.6672	0.1592	0.0253
Female Students ($n = 14$)	0.1432	0.0205	-0.1116	0.0125
Parents of Male Students ($n = 8$)	0.1616	0.0261	0.4023	0.1618
Parents of Female Students ($n = 13$)	-0.1032	0.0107	-0.2809	0.0789

The only statistically significant correlation was a negative, rather than positive, correlation between the level of demandingness and mathematics achievement level for male students, which had a correlation coefficient of -0.8168. There was no statistically significant correlation found between the level of demandingness and mathematics achievement level for female students. There was also no statistically significant correlation found between the level of responsiveness and mathematics achievement for male or female students. Therefore, the researcher's third hypothesis is not supported by the data.

Hypothesis Four:

The researcher's final hypothesis was that a student's indication of high demandingness and responsiveness would correlate more strongly to higher mathematics achievement than a parent's indication of high demandingness and responsiveness. As shown in Table 7, the only statistically significant correlation between the parenting subscales and mathematics achievement was for male students. Although male students' perceptions of their parent's demandingness correlated more strongly with mathematics achievement than the parent's

perceptions, the relationship was negative rather than positive. The perceptions of demandingness by female students were only slightly more correlated than their parents; however, neither group showed significant correlation.

With regards to responsiveness, parental perceptions of both male and female students showed stronger correlation to mathematics achievement than the male and female student perceptions, although none of the responsiveness correlations showed statistical significance. Therefore, the researcher's fourth hypothesis is not supported by the data.

Discussion

Overview of the Study

The purpose of this study was to determine whether an authoritative parenting style, characterized by relatively high levels of responsiveness and demandingness, is related to higher mathematics achievement in middle school students and to determine whose perception of parenting style (the parent's or child's) is more closely related to mathematics achievement. Twenty-two participants and their parents completed two parts of the Parenting Style and Parental Involvement questionnaire, measuring student and parent perceptions of demandingness and responsiveness in their home. The results of these surveys were compared to the most recent student results on the mathematics portion of the South Dakota Smarter Balanced Summative Assessment.

Summary of Findings

Results from the parenting style surveys indicated that parents and children perceive parenting within their family structures differently, which is consistent with the findings of other researchers (Feldman et al., 1989; Paulson, 1994; Paulson & Sputa, 1997). In this study, parents of both male and female students perceived themselves as being more demanding than their

children perceived them. Parents of male students also perceived themselves as being more responsive than their children perceived them. Surprisingly, female students and their parents differed very little in their perceptions of parental responsiveness, which was inconsistent with some previous research studies (Paulson, 1994; Paulson & Sputa, 1997). Since all the parent surveys were completed by the mother (as the primary caregiver), none of these results are reflective of situations in which the primary caregiver is the father.

As expected, more parents than students reported having relatively high levels of both responsiveness and demandingness, resulting in an authoritative parenting style. Parent survey results identified ten parents possessing an authoritative parenting style, whereas only four student surveys identified an authoritative parenting style in the home. Interestingly, three of the four students that identified their parents as authoritative were male, representing the highest percentage of the parenting styles reported by male students. On the other hand, the authoritative parenting style was the least reported parenting style by female students, with the highest percentage of female students identifying their parents as authoritarian or permissive-indulgent.

In contrast to previous research studies, which have indicated direct relationships between the two parenting dimensions and academic achievement (Baumrind, 1967, 1971, 1978; Dornbusch et al., 1987; Lamborn et al., 1991; Maccoby & Martin, 1983; Masud, Thurasamy, & Ahmad, 2014; Paulson, 1994; Piquart, 2015; Steinberg, Elmen, & Mounts, 1989), the data from this study only indicated one statistically significant relationship between parenting style dimensions and mathematics achievement, which was an inverse relationship between demandingness levels perceived by male students and their mathematics achievement levels. The negative relationship may be due to this study specifically examining mathematics achievement rather than student achievement in general, as measured by GPA. Or, as other researchers have

claimed, other factors, such as parent education, and family demographics, may have a larger impact on student achievement than parenting style (Brown & Iyengar, 2008; Rivers, Mullis, Fortner, & Mullis, 2012).

Although the data did not support the researcher's hypothesis that a student's indication of high levels of the two parenting dimensions would correlate more strongly to higher mathematics achievement than a parent's indication of high levels of the dimensions, the inverse relationship described above does seem to reveal that a male student's perception of their parent's demandingness impacts mathematics achievement more strongly than their parent's perception of demandingness. This is consistent with the findings of Paulson (1994), who noted that "adolescents' achievement may be more highly related to their own perceptions of parenting than to what parents think they are doing in the home" (p. 264).

Implications

Based on the data results, the researcher recommends that stakeholders not place too high of an importance on the relationship between parenting style and mathematics achievement with regards to increasing mathematics achievement of students in the United States. Although high levels of responsiveness and demandingness may have other positive effects in the home and at school, no significant positive relationships were found between an authoritative parenting style and mathematics achievement levels. In fact, demanding more of a male middle school student or pushing them harder to achieve may result in lower mathematics achievement levels.

Limitations of the Study

This research study focused on the relationship between mathematics achievement and an authoritative parenting style, as determined by parent and student surveys. Although students and parents were instructed to answer the surveys as truthfully as possible, respondent bias may

account for some of the parenting style results. Also, since all the parent surveys were completed by mothers, the results do not reflect the father's perception of parenting style. Future researchers may wish to survey both mothers and fathers of participating students.

Another limitation of this study was a small and relatively uniform sample. All students that participated are Caucasian, belong to two-parent homes, and attend a small, Christian school in the Midwest. Relationships between factors such as ethnicity or family structure and mathematics achievement could not be examined because there were no variances in these factors. Furthermore, parenting styles were determined based on relative levels of responsiveness and demandingness within the sample. Because of the uniformity of the sample, the responsiveness and demandingness means might have been higher in this sample than they would have been in a larger and less uniform sample. This researcher recommends that a larger sample with a wider cross-section of the population be considered for future research.

Additionally, the questionnaires only measured levels of parent demandingness and responsiveness. The surveys did not include questions to measure other parenting dimensions and factors that may contribute to student achievement, such as parental involvement (Paulson, 1994) and autonomy-granting (Steinberg et al., 1989). Previous research studies also indicated that parental education may have an impact on student achievement (Brown & Iyengar, 2008; Pong et al., 2009). To maintain the anonymity of the participants in this study, parental education data was not collected by the researcher, so the relationship between parental education and mathematics achievement for participants in this study could not be examined. Future research studies should include gathering information on parental education and may wish to include measures of other dimensions that potentially impact parenting style and student achievement.

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Appendix A**PSPI – Father's Form**

Student Number: _____ Student Age: _____ Student Gender: Male Female

Who are you filling this out for? Father Stepfather Grandfather Other Male Guardian

Instructions: Complete the following questionnaire for the male parent or guardian in your family by circling a single number on every question.

**1 = Very Unlike, 2 = More Unlike Than Like, 3 = Neither Like nor Unlike,
4 = More Like Than Unlike, 5 = Very Like**

Demandingness Scale					
1)	My father has rules for me about watching TV.	1	2	3	4 5
2)	I would describe my father as a strict parent.	1	2	3	4 5
3)	It is okay with my father if I do not follow certain rules.	1	2	3	4 5
4)	When I do something that is wrong, my father usually does not punish me.	1	2	3	4 5
5)	I think my father disciplines me a lot.	1	2	3	4 5
6)	My father usually wants to know where I am going.	1	2	3	4 5
7)	My father gives me a lot of freedom.	1	2	3	4 5
8)	My father makes most of the decisions about what I am allowed to do.	1	2	3	4 5
9)	My father gives me chores to do around the house routinely.	1	2	3	4 5
10)	My father lets me do pretty much what I want without questioning my decisions.	1	2	3	4 5
11)	My father rarely gives me orders.	1	2	3	4 5
12)	My father has few rules for me to follow.	1	2	3	4 5
13)	My father expects me to be home at a certain time after school or in the evening.	1	2	3	4 5
14)	It does not really matter to my father whether or not I do assigned chores.	1	2	3	4 5
15)	My father sometimes tells me that his decisions should not be questioned.	1	2	3	4 5

**1 = Very Unlike, 2 = More Unlike Than Like, 3 = Neither Like nor Unlike,
4 = More Like Than Unlike, 5 = Very Like**

Responsiveness Scale					
1)	My father sometimes criticizes me for what I do.	1	2	3	4 5
2)	My father expects me to tell him when I think a rule is unfair.	1	2	3	4 5
3)	My father encourages me to look at both sides of an issue.	1	2	3	4 5
4)	It is hard for my father to admit that sometimes I know more than he does.	1	2	3	4 5
5)	My father does not think I should help with decisions in our family.	1	2	3	4 5
6)	My father encourages me to talk with him about things.	1	2	3	4 5
7)	My father does not believe that he should have his own way all the time anymore than he believes I should have mine.	1	2	3	4 5
8)	My father would rather I not tell him my troubles.	1	2	3	4 5
9)	My father expects me to do what he says without having to tell my why.	1	2	3	4 5
10)	My father seldom praises me for doing well.	1	2	3	4 5
11)	My father believes I have a right to my own point of view.	1	2	3	4 5
12)	My father takes an interest in my activities.	1	2	3	4 5
13)	My father encourages me to talk to him honestly.	1	2	3	4 5
14)	My father usually tells me the reasons for rules.	1	2	3	4 5
15)	My father does not believe I should have a say in making rules.	1	2	3	4 5

PSPI – Mother's Form

Student Number: _____ Student Age: _____ Student Gender: Male Female

Who are you filling this out for? Mother Stepmother Grandmother Other Female Guardian

Instructions: Complete the following questionnaire for the female parent or guardian in your family by circling a single number on every question.

1 = Very Unlike, 2 = More Unlike Than Like, 3 = Neither Like nor Unlike,

4 = More Like Than Unlike, 5 = Very Like

Demandingness Scale					
1)	My mother has rules for me about watching TV.	1	2	3	4 5
2)	I would describe my mother as a strict parent.	1	2	3	4 5
3)	It is okay with my mother if I do not follow certain rules.	1	2	3	4 5
4)	When I do something that is wrong, my mother usually does not punish me.	1	2	3	4 5
5)	I think my mother disciplines me a lot.	1	2	3	4 5
6)	My mother usually wants to know where I am going.	1	2	3	4 5
7)	My mother gives me a lot of freedom.	1	2	3	4 5
8)	My mother makes most of the decisions about what I am allowed to do.	1	2	3	4 5
9)	My mother gives me chores to do around the house routinely.	1	2	3	4 5
10)	My mother lets me do pretty much what I want without questioning my decisions.	1	2	3	4 5
11)	My mother rarely gives me orders.	1	2	3	4 5
12)	My mother has few rules for me to follow.	1	2	3	4 5
13)	My mother expects me to be home at a certain time after school or in the evening.	1	2	3	4 5
14)	It does not really matter to my mother whether or not I do assigned chores.	1	2	3	4 5
15)	My mother sometimes tells me that her decisions should not be questioned.	1	2	3	4 5

**1 = Very Unlike, 2 = More Unlike Than Like, 3 = Neither Like nor Unlike,
4 = More Like Than Unlike, 5 = Very Like**

Responsiveness Scale					
1)	My mother sometimes criticizes me for what I do.	1	2	3	4 5
2)	My mother expects me to tell her when I think a rule is unfair.	1	2	3	4 5
3)	My mother encourages me to look at both sides of an issue.	1	2	3	4 5
4)	It is hard for my mother to admit that sometimes I know more than she does.	1	2	3	4 5
5)	My mother does not think I should help with decisions in our family.	1	2	3	4 5
6)	My mother encourages me to talk with her about things.	1	2	3	4 5
7)	My mother does not believe that she should have her own way all the time anymore than she believes I should have mine.	1	2	3	4 5
8)	My mother would rather I not tell her my troubles.	1	2	3	4 5
9)	My mother expects me to do what she says without having to tell my why.	1	2	3	4 5
10)	My mother seldom praises me for doing well.	1	2	3	4 5
11)	My mother believes I have a right to my own point of view.	1	2	3	4 5
12)	My mother takes an interest in my activities.	1	2	3	4 5
13)	My mother encourages me to talk to her honestly.	1	2	3	4 5
14)	My mother usually tells me the reasons for rules.	1	2	3	4 5
15)	My mother does not believe I should have a say in making rules.	1	2	3	4 5

Appendix B**PSPI - Parent's Form**

Who is filling this out? Mother Father Stepmother Stepfather Grandmother
 Grandfather Other Female Guardian Other Male Guardian

Instructions: Complete the following questionnaire for the participating children in your family by circling a single number on every question.

**1 = Very Unlike, 2 = More Unlike Than Like, 3 = Neither Like nor Unlike,
 4 = More Like Than Unlike, 5 = Very Like**

Demandingness Scale					
1)	I have rules for my child about watching TV.	1	2	3	4 5
2)	I would describe myself as a strict parent.	1	2	3	4 5
3)	It is okay with me if my child does not follow certain rules.	1	2	3	4 5
4)	When my child does something that is wrong, I usually do not punish him/her.	1	2	3	4 5
5)	I think I discipline my child a lot.	1	2	3	4 5
6)	I usually want to know where my child is going.	1	2	3	4 5
7)	I give my child a lot of freedom.	1	2	3	4 5
8)	I make most of the decisions about what my child is allowed to do.	1	2	3	4 5
9)	I give my child chores to do around the house routinely.	1	2	3	4 5
10)	I let my child do pretty much what he/she wants without questioning his/her decisions.	1	2	3	4 5
11)	I rarely give my child orders.	1	2	3	4 5
12)	I have few rules for my child to follow.	1	2	3	4 5
13)	I expect my child to be home at a certain time after school or in the evening.	1	2	3	4 5
14)	It does not really matter to me whether or not my child does assigned chores.	1	2	3	4 5
15)	I sometimes tell my child that my decisions should not be questioned.	1	2	3	4 5

**1 = Very Unlike, 2 = More Unlike Than Like, 3 = Neither Like nor Unlike,
4 = More Like Than Unlike, 5 = Very Like**

Responsiveness Scale					
1)	I sometimes criticize my child for what he/she does.	1	2	3	4 5
2)	I expect my child to tell me when he/she thinks a rule is unfair.	1	2	3	4 5
3)	I encourage my child to look at both sides of an issue.	1	2	3	4 5
4)	It is hard for me to admit that sometimes my child knows more than I do.	1	2	3	4 5
5)	I do not think my child should help with decisions in our family.	1	2	3	4 5
6)	I encourage my child to talk with me about things.	1	2	3	4 5
7)	I do not believe that I should have my own way all the time anymore than I believe my child should have his/hers.	1	2	3	4 5
8)	I would rather my child not tell me his/her troubles.	1	2	3	4 5
9)	I expect my child to do what I say without having to tell him/her why.	1	2	3	4 5
10)	I seldom praise my child for doing well.	1	2	3	4 5
11)	I believe my child has a right to his/her own point of view.	1	2	3	4 5
12)	I take an interest in my child's activities.	1	2	3	4 5
13)	I encourage my child to talk to me honestly.	1	2	3	4 5
14)	I usually tell my child the reasons for rules.	1	2	3	4 5
15)	I do not believe that my child should have a say in making rules.	1	2	3	4 5

Appendix C

January 27, 2017

Dear WCS Parent,

Thank you for taking the time to read this letter. I myself am a WCS parent, with children in preschool, first grade, and fourth grade. I am also a graduate student at Dordt College (Sioux Center, Iowa) working toward my Masters of Education in Teacher Leadership. To conclude this graduate program, I am conducting a research study examining the relationship between parenting styles and student achievement in mathematics for children in the middle grades (fifth through eighth grades).

Participation in this study will require:

- Completion of a 15-minute questionnaire by you, administered by email.
- Completion of a 15-minute questionnaire by your child for each parent, administered in their math class.

Consent allows access to your child's scores on the mathematics portion of the 2016 Smarter Balanced Assessment. Participation in this study is voluntary. If you or your child chooses not to participate or to withdraw from this study at any time, there will be no penalty.

Anonymity and confidentiality are of utmost importance in this study. All students will be assigned a random number by Mrs. Weber, to tag materials for each participant and their parent. No names will be used, and all individual materials will be destroyed following the conclusion of the study.

The possible benefits of participation include the improvement of the learning environment both at our school and in the home. Participants and WCS will have access to the results of this research study following its conclusion.

If you have any questions concerning this research study or participation in the study, please contact me at (402) 853-3288 or lkramer439@gmail.com. If you would like to participate, return this consent form to the WCS Office by Wednesday, February 8.

Sincerely,

Laura Kramer

.....

I give consent for my child(ren) _____
to participate in the above study.

Signature: _____ Date: _____