THE PENNSYLVANIA STATE UNIVERSITY
SCHREYER HONORS COLLEGE

DEPARTMENT OF HUMAN DEVELOPMENT AND FAMILY STUDIES

ASSOCIATION BETWEEN SEATING ARRANGEMENT AND ACHIEVEMENT MOTIVATION AND EFFORT IN ELEMENTARY CLASSROOMS

KELSEY DAVIS
SPRING 2015

A thesis
submitted in partial fulfillment
of the requirements
for a baccalaureate degree
in Human Development and Family Studies
with honors in Human Development and Family Studies

Reviewed and approved* by the following:

Scott Gest
Professor of Human Development and Family Studies
Thesis Supervisor

Charles Geier
Assistant Professor of Human Development and Family Studies
Honors Adviser

* Signatures are on file in the Schreyer Honors College.

ABSTRACT

Student motivation in the classroom has become an important topic of interest for educational researchers as formal education has become an essential requirement for adult employment. Multiple factors contribute to the development and retention of motivation across students' K-12 educational careers. The present study focuses on motivation in the elementary school context, examining the association between teacher-defined seating arrangements and student motivation and effort in the classroom. Data were analyzed from the Classroom Peer Ecologies Project, a study investigating teacher practices, classroom peer ecologies, and youth outcomes. Participants were recruited from 111 1st, 3rd, and 5th grade classrooms. Students reported on their motivation and effort and teachers reported on student effort. Each teacher provided the classroom seating chart. The overall configuration of seats was coded as Rows (all desks facing front of the room), Tables/Groups (clusters of seats facing each other) or Other. OLS regressions were conducted focusing on the main effects of seating arrangements on motivation and effort. Results provided partial support for the hypothesis that motivation would be higher in classrooms in which seats were arranged in rows.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

ACKNOWLEDGEMENTS

I would like to thank Dr. Gest for his guidance during this entire process. During my exploration of topics he offered me an abundance of literature that allowed me to discover my interests, including a future career. During analysis and the writing process, he consistently provided me with support that eased my mind and was the catalyst of my own motivation.

I would also like to thank Kathleen Zadzora for her help in the analysis aspects of this project, particularly when the only result I was producing was ‘error’. I sincerely appreciate her guidance, assistance, and patience as I navigated through SAS, ultimately conquering it and this thesis as whole.

Additionally, I would like to thank Aaron Miller for sharing his expertise on the topic of academic engagement, motivation and achievement as I delved into the literature. I would also like to thank him for reading and providing valuable feedback my drafts.

I would also like to thank Dr. Geier for taking the time to read over my thesis as the second reader and offering feedback.

Introduction

Achievement motivation is relevant to students' academic and non-academic adjustment across childhood and adolescence. In the short term, achievement motivation predicts students' classroom grades, learning, and achievement test scores; in the long-term it predicts patterns of school attendance, graduation, retention, and academic resilience (Skinner et al., 2008; Wentzel, 1996). Achievement motivation can also serve as a protective factor against risky behaviors such as substance abuse, delinquent behavior, and early promiscuous sexual behavior in adolescence (Skinner et al., 2008). Public concern about lagging levels of achievement motivation has been particularly strong in United States secondary schools, where 40-60 percent of students report chronic disengagement including inattention, distractibility, and lack of interest in schoolwork (Marks, 2000). Research regarding achievement motivation has increased over the past forty years within both educational and developmental psychology (Wigfield & Eccles, 2002). While high school retention rates have been increasing since the 1970's, school administrators and government officials continue to debate the most cost-effective interventions for classrooms (Smith, 1997). They have shifted their research focus from dynamics influencing high school classroom achievement to protective factors found in early to middle childhood, such as achievement motivation and effort in the classroom. It is important to examine achievement motivation in elementary and middle school classrooms because day to day experiences handling academic challenges provide many opportunities for children to experience success, mastery, and a reinforced sense of competence as well as failure and diminished competence (Wigfield & Eccles, 2002).

Learning in a formal education system provides children with multiple levels of development including interpersonal, intrapersonal, and academic skills. Learning is a social

activity and occurs in the context of relationships; these relationships provide opportunities for social growth and have been shown to increase aspects of student academic performance, such as reading (Wigfield, Eccles, & Rodriguez, 1998). Children spend about six to seven hours in the classroom each day surrounded by their peers, developing interpersonal skills and friendships. Classrooms are fluid, physical entities as well as structural units that require persistent interactions between students who have diverse needs and abilities; such interactions subsequently influence the behavior of each student (Farmer, Reinke, & Brooks, 2014; Marx, Fuhrer, & Hartig, 2000). It is clear that social interactions among students in a classroom can support learning, but is it possible that environmental factors, such as seating arrangements in the classroom, may hinder student learning if they foster too much social interaction? In fact, classroom arrangements have been found to hinder learning when they are categorized as being unfit or mismatching with the nature of the classroom tasks (Hastings & Schwieso, 1995).

Researchers who argue for the importance of the interaction between the student and the classroom environment have proposed an examination of varying strategies and programs to increase contextual support for children's positive behavior (attentive, prosocial; Farmer et al., 2014). In the past two decades, there has been an increase in the implementation of school-wide intervention programs that increase support for positive behavior by applying principles from operant conditioning (Farmer et al., 2014). Multiple contextual factors contribute to the educational environment encountered every day by students, including peer relationships and teacher-student interactions. In addition, the physical context of the classroom, including the arrangement of student seats, may contribute to the educational environment by supporting different types of social and academic behaviors. In fact, teachers are often encouraged to consider the classroom seating chart in the context of an overall classroom management plan

(Bicard, Ervin, Bicard, & Baylot-Casey, 2012; Marx et al., 2000; Wannarka & Ruhl, 2008; Wentzel, 1998; Wentzel, Barry, & Caldwell, 2004).

The current study examines levels of student academic engagement and effort in relation to the physical arrangement of seating within the classroom. Specifically, in a sample of first, third and fifth grade classrooms, it will test whether student motivation is higher in classrooms where seats are organized in rows compared to classrooms where seats are organized in groups.

Conceptualizing Achievement Motivation and Engagement

Academic engagement is a psychological process that can be defined as involvement in school and classwork (Marks, 2000; Skinner, Kindermann, & Furrer, 2009; Wentzel, 1998). Skinner and colleagues (2009) distinguish between engagement and its counterpart, disaffection. Disaffection implies the deficiency of engagement (Skinner et al., 2009). Engagement and disaffection are analyzed separately as emotions and behaviors. Behavioral engagement includes persistence, attention, and application; in the classroom these behaviors are referred to as academic behavior/interest or class participation. Emotional engagement is characterized by enthusiasm, gratification, and interest in classwork and instructional activities (Skinner et al., 2009). Conversely, disaffected behavior is typically described as inactivity, lack of initiation, and giving up during schoolwork. Disaffected emotions include apathy, discouragement, and dejection; within the classroom, disaffection can be seen as lack of participation, frustration, and boredom (Skinner et al., 2009).

A study conducted by Kathryn Wentzel (1996) evaluated motivation by dividing it into general and content or context-specific motivation. General motivation was defined as the orientation towards school and learning overall. This type of motivation might prove to be an important predictor of academic effort and engagement over time because it does not apply to a

specific subject or topic within the curriculum. In a separate study that examined children's academic motivation, Wentzel (1998) also analyzed motivation with regards to social and academic goals as well as interest in academic activities. Interest and enthusiasm in activities were viewed as a catalyst for goals and subsequent achievement. The study found that the extent to which a student exhibits effort in classroom activities depends on the student's level of interest in school overall (Wentzel, 1998). Similarly, classroom engagement and persistence have been significantly associated with general academic performance. Skinner and colleagues (2009) found that student ratings of classroom engagement were higher than ratings made by their teachers: the students reported that they tried harder and participated more than what the teachers reported observing. Interestingly, students also indicated that they were more disaffected than their teachers reported them to be (Skinner et al., 2009).

Grade and Sex Differences in Achievement Motivation

The complexity and differentiation of achievement motivation develops throughout childhood, with reliable individual differences in achievement motivation being measurable as early as first grade (Dweck, 2002; Wigfield & Eccles, 2002). Unfortunately, while there are developmental increases in the complexity of constructs related to achievement motivation, there are developmental decreases in average levels of engagement and interest in class activities (Marks, 2000; Wigfield & Eccles, 2002). These decreases begin as early as kindergarten and continue until the completion of high school; they include an overall decrease in interest, enthusiasm, and intrinsic motivation (Skinner, Furrer, Marchand, & Kindermann, 2008). Younger students in early grades have higher classroom engagement and effort compared to their older counterparts. One explanation for this developmental decrease focuses on the gradual emergence of experiences and beliefs about achievement in specific domains. For example,

children's interests are very general in early childhood but become distinguished in different subjects across middle childhood (Wigfield & Eccles, 2002). Within these newly categorized areas of interest, children encounter specific experiences that could either foster or hinder a sense of efficacy and further interest. Thus, one child may feel very competent in math and exhibit greater interest in the topic even though he may display a decrease in more general achievement motivation. Nonetheless, levels of general achievement motivation may still be important: for example, students who are more involved in their academics and overall school environment tend to be more successful academically and more likely to avoid a significant decrease in achievement motivation in adolescence (Skinner et al., 2008).

As these developmental changes in interest and achievement motivation emerge, gender differences begin to surface. Gender-specific interests emerge between the ages of three and eight years (Wigfield et al., 1998). With the formation of gender identity, children begin to positively evaluate activities and subject matter consistent with gender stereotypes for their gender compared to activities consistent with stereotypes for the other gender. For example, elementary girls were more interested in reading while boys were more interested in sports (Wigfield et al., 1998). For both girls and boys achievement motivation generally decreases as grade level increases, though the decline may be more severe for boys compared to girls (Skinner et al., 2008). In comparisons involving elementary, middle, and high school students, Marks (2000) found that girls were significantly more engaged in classroom activities than boys at each grade level (Marks, 2000).

Seating Arrangements and Student Motivation

Seating arrangements are a relatively understudied aspect of the classroom environment that may have important implications for student achievement motivation. Research on seating in

the classroom have examined two types of concepts: seating configuration and student seating location in the classroom. Despite a limited empirical literature, seating arrangement interventions are appealing because they are naturalistic and are among the easiest, most cost-effective classroom management tactics available to teachers (Bicard, Ervin, Bicard, & Baylot-Casey, 2012; Wannarka & Ruhl, 2008). For example, row arrangements in the classroom have been used as a strategy to prevent unwanted, disruptive behavior (Wannarka & Ruhl, 2008). Most existing research focuses on the impact of the overall configuration of seats in the classroom (e.g., rows of desks all facing the same direction versus clusters of 4-6 desks facing each other). For example, in a prior study of the data set to be analyzed for the present study, most classrooms were arranged in rows (30%) or in small groupings of desks (46%) (Gest & Rodkin, 2013).

A smaller research literature focuses on the consequences of a student's specific location in the classroom. Seating location can have multiple influences on a student's academic performance. For example, student location has been linked to the number of questions teachers ask their students, thus creating varying feedback loops for children to respond and grow academically (Wannarka & Ruhl, 2008). In one experimental study, pairs of students who disliked each other and were placed closer together expressed greater acceptance of each other over time (van den Berg, Segers, & Cillessen, 2012). The present study focuses on the effects of overall configuration of the classroom seating arrangement rather than the effects of seating location, so the literature reviewed below focuses on seating configurations.

Multiple research studies have examined how seating configurations, in particular row and group arrangements, are associated with achievement motivation. When analyzing students in the fifth and sixth grades, van den Berg et al. (2012) found those students who were seated in

circle, groups, or clusters interacted more with peers and displayed more on-task behavior compared to students seated in rows. Rosenfield, Lambert, and Black (1985) examined fifth and sixth grade students categorized as having either high or low ability whose classrooms were arranged into rows, groups, or a circle. They found that students sitting in groups exhibited significantly more on-task behavior compared to students seated in rows; however, students seated in the circle arrangement engaged in even more on-task behavior than in the group or row arrangements (Rosenfield et al., 1985). Both of these studies suggested that group arrangements were associated with more on-task behavior than row arrangements.

In contrast, when Bicard et al. (2012) studied a sample of fifth grade students, on-task behavior doubled when students were seated individually, compared to their grouped counterparts. The higher rates of off-task behavior in group arrangements could be attributed to the increased accessibility of social interaction such as the ease of conversation and grasping the attention of a fellow student in class due to the close proximity of the seating (Bicard et al., 2012). In addition, disruptive behavior (i.e., talking without permission or touching another student) occurred less frequently when the teacher selected the students' location compared to when students selected their own seats (Bicard et al., 2012). The disruptive behavior occurring during group arrangements tended to involve multiple students whereas when students were seated in rows, disruptive behavior tended to be isolated and involve only one student.

Two other studies have produced similar results suggesting more on-task behavior and less disruptive behavior in row arrangements compared to group arrangements. When Wannarka and Ruhl (2008) evaluated behavior during tasks requiring individual work, row arrangements increased on-task behavior, including hand raising and complying with rules and requests. In addition, off-task behavior, such as talking and getting up out of their seat without permission,

decreased in row arrangements (Wannarka & Ruhl, 2008). The same pattern emerged when analyses were restricted to students who were categorized as disruptive (Wannarka & Ruhl, 2008). Wheldall and Lam (1987) observed three classrooms of children with emotional and learning disabilities when arrangements were in desk clusters (groups) and rows. The results suggested that on-task behavior doubled when desk clusters were changed to row arrangements. It was also noted that disruptive behavior was more frequent (by three times) when students were seated in the desk cluster arrangements compared to row arrangements (Wheldall & Lam, 1987).

In summary, several studies have suggested higher rates of social interaction (van den Berg et al., 2012) and disruptive behavior (Wannarka & Ruhl, 2008; Wheldall & Lam, 1987) for group arrangements compared to row arrangements. Findings regarding on-task behavior are mixed, with two studies finding more on-task behavior in group arrangements (van den Berg et al., 2012; Rosenfield et al., 1987) and three studies finding more on-task behavior in row arrangements (Bicard et al., 2012; Wannarka & Ruhl, 2008; Wheldall & Lam, 1987). Wannarka and Ruhl (2008) suggest that the inconsistent findings may reflect differences in the nature of the tasks assigned when observations were made: rows may support more on-task behavior during individual tasks whereas groups may support more on-task behavior during group tasks. This presents a challenge for teachers because on an average day in the classroom teachers often use both individual work as well as group work to facilitate learning in different subjects. Asking the students to change their desk arrangements for a short period of time to accommodate the new activity may waste instructional time and offset any gains in on-task behavior.

Gender and Grade as Moderators of Seating Arrangement Effects

Little research has evaluated the association between seating arrangements and student or teacher reports of effort or achievement motivation, but there are reasons to expect that the

association may vary by gender and grade level. During pre-adolescence (10-11 years), students display increased psychological investment in their peer groups and depend on peers for support more than in early or middle childhood (Wentzel et al., 2004). The increased importance of social relationships increases the significance and urgency of where one may be seated in the classroom. At the same time, as children move through elementary school there is more emphasis on individual academic work and less on group activities (Wigfield et al., 1998). Group arrangements in the upper elementary grades, when students are strongly oriented toward peers, may cause a greater conflict with the individual-focused achievement tasks at these ages. Therefore row seating may be especially conducive to greater academic effort among older students. Similarly, research suggests that males may be more susceptible to distractions than females during middle childhood (Wigfield et al., 1998). This notion would lead to the assumption that males would have decreased effort and motivation when seated in desk clusters (which provide more social distractions), compared to rows.

Other Factors Contributing to Student Motivation

The primary focus of the present study is evaluating the association between seating arrangement and student effort and engagement, but it is important to take into account other factors that could contribute to student effort in the classroom. Factors that are related to both seating arrangement and to student effort represent potential confounds. In other words, if a factor is associated with seating arrangement and with motivation, then any association between seating arrangement and motivation may reflect the influence of the factor rather than the seating arrangement itself. The present study will consider several such factors, testing each factor's correlation with seating arrangement and student effort and motivation. These factors include

class size, classroom socioeconomic status (SES), gender, grade, and overall quality of teacher-student interaction.

It is generally thought that students have a more positive experience in a classroom when the class size is smaller due to the teacher's increased ability to focus on each individual child (Hoxby, 2000). If the classroom experience is more positive then students may tend to exhibit more effort in their schoolwork. Classroom SES has also been suggested to affect levels of student engagement in their schoolwork; across grade levels (elementary, middle, and high school) the higher the classroom/student SES was, the higher the student academic engagement tended to be (Marks, 2000). With regards to gender and grade, the majority of research suggests that females tend to exhibit more effort in school overall; and younger students tend to have a more positive affect and increased effort in schoolwork (Marks, 2000). Finally, the quality of teacher-student interaction, in particular patterns of warmth and supportiveness, has been found to affect student effort (Madill et al., 2014). Positive student outcomes related to teacher support include higher levels of interest and enjoyment in the classwork, greater expectancy for academic success, and an increased positive academic self-concept (Ryan & Patrick, 2001). An increased level of teacher support is also suggested to be significantly related to students' interest and pursuit of academic achievement (Wentzel, 1998). Due to the research support for these potential contributing factors, each factor will be considered during the present study.

The Present Study

The present study will examine four hypotheses concerning the association between seating arrangements and students' academic engagement and effort within elementary school classrooms.

Hypotheses

Hypothesis I: It is expected that boys will be less engaged than girls. Similarly, it is expected that 1st grade students will exhibit more effort compared to 3rd and 5th grade students. Finally, it is expected that group arrangements will be more common than row arrangements.

Hypothesis II: It is hypothesized that students who are seated in group arrangements will be less engaged compared to students sitting in row arrangements.

Hypothesis III: It is hypothesized that the effect of seating arrangement will be greater for boys than for girls, with boys in group arrangements showing the lowest level of motivation.

Hypothesis IV: It is anticipated that the effect of seating arrangement will vary by grade level such that 1st grade students will show higher motivation in group arrangements while 3rd and 5th grade students will show higher motivation in row arrangements.

Method

Participants

Data were analyzed for 2,732 participants from 134 1st-, 3rd- and 5th-grade classrooms in 25 elementary schools ($n_{1st} = 44$, $n_{3rd} = 36$, $n_{5th} = 46$). Students and teachers in these classrooms were participants in the Classroom Peer Ecologies Project (Gest & Rodkin, 2011; Gest et al., 2014), which studied peer relationships, teaching practices, and student outcomes. Classrooms were selected from school districts from small-to mid-sized cities in Northeast rural and Midwest urban areas of the United States. Each classroom was studied on three occasions within a single school year. The goal was to understand classroom contextual influences on children's development during the present school year. The sample was accumulated across 5 years of data collection, with new classrooms recruited each year. The present study includes classrooms assessed during Years 2-5 of the project. (Seating arrangements were not available in Year 1.)

Fifty-two percent of participants were male (see Table 1). Classrooms were diverse in terms of family socioeconomic resources: on average, 60% of students qualified for free and reduced priced lunch, but the percentage of students who qualified ranged from 0% to 100% across classrooms.

Table 1. *Sample Characteristics: Gender, Grade level and Seating Arrangements*

Characteristic	N Classrooms	% Classrooms	N Individuals	% Individuals
Gender				
Male	-	-	1414	51.8
Female	-	-	1318	48.2
Grade Level				
1st	44	34.9	962	35.2
3rd	36	28.6	735	26.9
5th	46	36.5	1035	37.9
Seating Arrangement				
Tables/Groups	66	59.5	1421	59.3
Rows	45	40.5	976	40.7

Procedure

Teachers provided informed consent to participate in the study. Parents in classrooms with consenting teachers received information regarding the nature of the study and provided consent for their child to participate. Overall, parent consent was obtained for 83% of all students in the participating classrooms. Student surveys were group-administered to students in 3rd grade

and 5th grade, with children providing written assent prior to completing the survey. Surveys were individually administered to students in 1st grade, with these children providing oral assent prior to the interview. Three assessments were conducted in each classroom: Wave 1 occurred early in the school year (September-October), Wave 2 occurred approximately 8 weeks later (November-January) and Wave 3 occurred near the end of the school year (April-May). The assessments used in the present analysis were collected during wave two of the project.

Measures

Three measures were used to assess academic engagement: student ratings of academic striving and affect towards school, and teacher ratings of child effort.

Academic Striving. Students responded to eight statements to evaluate how much they cared about and put effort into their schoolwork. Using a Likert-type scale, students rated how often each statement applied to them (1= never; 5= always). Examples of statements included "I feel sure about my schoolwork", "I work hard at school", "I do extra schoolwork on my own", and "I do the best I can at my schoolwork." The eight items were strongly intercorrelated and formed a scale with strong internal consistency (α=.89).

Affect towards School. Students responded to eight statements describing their affective engagement towards school. Students rated the degree to which each statement applied to them on a Likert-type scale (1 =never; 5 = always). These statements assessed the child's general feelings towards school and achievement: for example, "I like going to school", "Schoolwork is boring to me", "I like doing schoolwork", and "I feel like I really belong at school." The eight items were moderately strongly intercorrelated and formed a scale with adequate internal consistency (α=.81).

Teacher-rated Effort. Teachers responded to five statements describing each of their student's level of effort during classwork. Using a Likert-type scale (1= never; 5= always),

teachers were asked to report the degree of effort that each particular student put in his/her schoolwork. The statements assessed the teacher's perception of the student's effort: for example, statements included "tries hard at school", "does the best he/she can at schoolwork", "shows poor effort" (reversed), "completes assignments", and "works hard." The eight items were strongly intercorrelated and formed a scale with strong internal consistency (α=.94).

Seating Arrangements. The questions used to elicit each teacher's classroom seating arrangement varied across years of the study. In Year 2, teachers were asked to categorize their classroom arrangement type from a list of choices with brief definitions: groups, tables, rows, u-shape, or other. The "groups" and "tables" categories were combined into a "groups" category. U-shaped and "other" configurations were excluded from analyses.

In Years 3–5 the survey was revised such that teachers were asked to draw their seating arrangement. Research assistants then determined the type of arrangements. Arrangements were categorized as "groups" if there was a cluster of individual desks pushed together into a pod. Arrangements were categorized as "tables" if there were large tables at which a number of children were seated. "Row" arrangements involved rows of individual desks pushed together to form long horizontal lines, with multiple rows arranged all facing in the same direction. If the desks were positioned in a horseshoe shape it was categorized as "U-shaped." Finally, if the arrangement could not be categorized as groups, tables, or u-shaped it was categorized as "other." These "other" arrangements were uncommon and varied broadly ("E-shaped," rectangle, etc.). Tables and groups were combined for the present analysis creating an overarching "group" variable. Only the classrooms categorized as groups, tables, and rows were included in the current study: Classrooms were excluded if they were categorized as u-shaped (n = 5) or "other" (n = 10), or if the classroom arrangement was not provided by the teacher (n = 8). Seating

Arrangement types were then dichotomized as 0 for groups/tables and 1 for rows. Group arrangements (59%) were more common than row arrangements (41%).

Covariates

Several additional variables were included as potential covariates because they may be related to both seating arrangements and student effort and motivation. At the individual level, gender and grade level were considered. At the classroom level, class size and the proportion of students qualifying for free and reduced-price lunch were considered. The overall quality of teacher-student interactions was assessed with the Classroom Assessment Scoring System (CLASS; Pianta, La Paro, & Hamre, 2008). Observers visited each classroom for 90 minutes and completed a series of ratings that describe the overall level of Emotional Support provided by teachers (1 = very low; 7 = very high). Prior findings from the Classroom Peer Ecologies Project indicates that observed emotional support is positively related to a range of student adjustment variables (Madill et al., 2014).

Analytic Plan

Before analyses were conducted, covariates were assessed and recoded if necessary. Gender was dichotomously coded as 0 for male and 1 for female. Class-level SES was calculated as the percentage of students eligible for free and reduced-price lunch. Finally, grade level was coded dichotomously as 1 for 1st grade and 0 for 3rd and 5th grade.

Hypothesis I. A one-way analysis of variance (ANOVA) was conducted to evaluate the association between gender and grade level and student effort. Effort was evaluated based on level of academic striving, affect toward school, and teacher-reported effort. Correlations were run to investigate the potential association between class size, quality of teacher-student interaction and class SES.

Hypothesis II. To analyze the association between student effort and seating arrangement, an analysis of covariance (ANCOVA) was conducted. The variables identified as covariates were gender, grade, percentage of students with free and reduced-priced lunch, and quality of teacher-student interaction.

Hypothesis III and IV. An ANCOVA was conducted with an interaction to analyze the association between gender and seating arrangement as well as grade level and seating arrangement. The variables identified as covariates were gender, grade, percentage of students eligible for free and reduced-priced lunch, and quality teacher-student interaction.

Results

Exploring Potential Covariates

To strengthen the inference that any differences in effort associated with seating arrangements were not due to confounding factors, several potential confounding factors identified in previous research were considered. For each potential confounding variable, the Pearson Correlation coefficient between the variable and each achievement motivation variable was examined. Nearly all potential confounding variables were significantly correlated with at least one of the dependent variables (student-rated academic striving and affect toward school; teacher-rated effort). For example, teacher-rated effort was correlated with gender ($r = .23$, $p < .001$), grade level ($r = -.07$, $p < .01$), percent of students receiving free and reduced-priced lunch ($r = -.15$, $p < .001$) and observer-rated teacher emotional supportiveness ($r = .08$, $p < .001$). The only potential covariate that was not significantly correlated with any of the dependent variables was class size. Therefore, all of these variables with the exception of class size were used as covariates in analyses.

Gender and Grade Differences in Motivation and Engagement

A series of one-way ANOVAs were conducted to test whether there were statistically significant gender and grade differences in academic striving, affect toward school, and teacher-reported student effort. Girls had a significantly higher mean level of academic striving [F (1) =29.26, $p < .001$], affect toward school [F (1) =70.79, $p < .001$], and teacher-reported effort [F (1) =104.03, $p < .001$]. When examining the mean levels of effort between 1st, 3rd, and 5th grade (see Table 2), there were significant differences across grade levels for academic striving [F (1) = 119.34, $p < .001$], affect towards school [F (1) = 178.95, $p < .001$], and teacher-reported effort [F (1) = 3.92, $p < .05$]. All of the findings support the hypothesis.

Table 2**.** *Levels of Motivation by Gender and Grade Level*

	Gender		Grade	
	Male	Female	1	3 & 5
Variable	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
Academic Striving	4.05 (.90)	4.23 (.77)	4.41 (.65)	4.02 (.85)
Affect toward School	3.53 (1.15)	3.91 (.96)	4.15 (.91)	3.53 (1.06)
Teacher-rated effort	3.72 (.91)	4.15 (.84)	3.99 (.90)	3.89 (.93)

Association between Seating Arrangement and Motivation

A series of one-way ANCOVAs were conducted to test whether there was a statistically significant difference between seating arrangement configurations in levels of academic striving, affect toward school, and teacher-reported effort, after controlling for classroom SES, gender, grade, and quality of teacher-student interaction (see Table 3). Mean levels of each variable are shown in Figure 1 for row and group arrangements.

Academic Striving. Grade level and gender were significantly associated with levels of student-reported academic striving. First grade students were more likely to report higher levels of academic striving compared to older students (b = 0.31, SE = 0.04, $p < .001$). Girls reported higher levels of academic striving than boys (b = 0.18, SE = 0.04, $p < .001$). After taking these effects into account, there was no significant difference between the two seating configurations in levels of students' academic striving [F (1) = 2.46, p = .12].

Affect toward School. Grade level, gender, and quality of teacher-student interaction were significantly associated with levels of student-reported affect towards school. First grade students reported more positive affect toward school compared to third and fifth grade students (b = .62 SE = .05, $p < .001$). Similarly, girls reported having more positive affect towards school compared to boys (b = .41 SE = .05, $p < .001$). Students also reported having more positive affect towards school when their teachers displayed a more emotionally supportive interaction style (b = .11, SE = .04, $p < .01$). After taking these effects into account there was a significant association between affect toward school and students seated in rows [F (1) = 11.12, $p < .001$]: compared to students seated in groups, students seated in rows expressed more positive affect toward school.

Teacher-rated Effort. Classroom SES and gender were significantly associated with teacher-rated effort. Teachers were more likely to rate their students as exhibiting less effort if there were more students receiving free and reduced-priced lunch (b = -.42, SE = .10, $p < .001$). Conversely, teachers tended to rate girls as exhibiting higher levels of effort compared to boys (b = .42, SE = .05, $p < .001$). After taking these effects into account there was no significant difference between the two seating configurations in teacher-reported effort [F (1) = .31, p = .58].

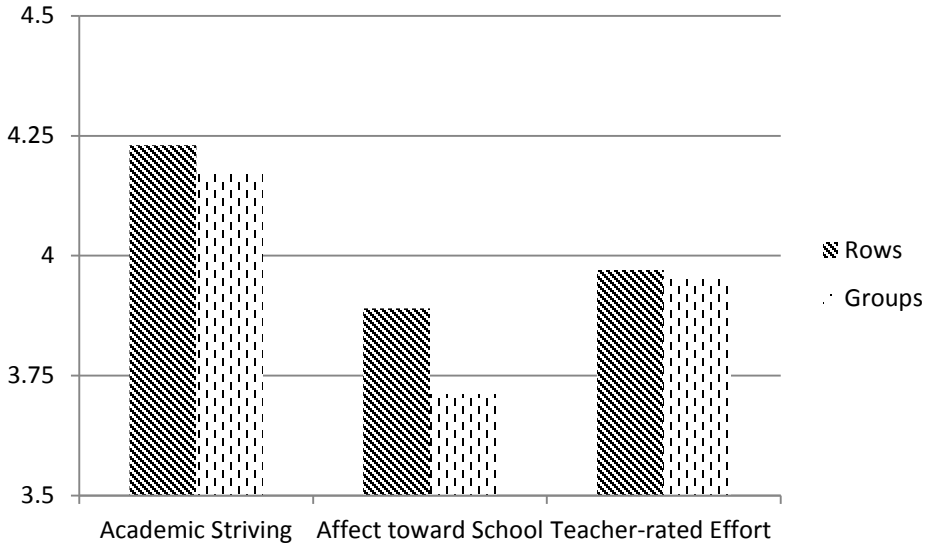
Table 3**.** *Association between Seating Arrangement and Student Motivation (ANCOVA)*

	Academic Striving		Affect toward School		Teacher Reported Effort	
	b	(SE)	b	(SE)	b	(SE)
Covariates						
% FRL	-.03	(.08)	.19	(.12)	-.42***	(.10)
Grade level	.31***	(.04)	.61***	(.05)	.02	(.05)
Gender	.18***	(.04)	.41***	(.05)	.43***	(.05)
Emotional Support	.01	(.03)	.11**	(.04)	.05	(.04)
Seating arrangement	.06	(.04)	.18**	(.05)	.03	(.05)

* $p < .05$. ** $p < .01$. *** $p < .001$.

Note. Gender and grade were dichotomized and dummy-coded. For gender, 1 = female, 0 = male. For grade level, 1 = 1st grade, 0 = 3rd grade or 5th grade. Seating arrangement was dummy-coded such that rows = 1, groups = 0.

Figure 1. *Levels of Academic Striving, Affect toward School, and Teacher-rated Effort by Seating Arrangement: Adjusted Means from ANCOVA*



Moderation of Seating Effects by Gender

A one-way ANCOVA was conducted to test whether there was a statistically significant interaction between seating arrangement type and student gender after controlling for classroom SES, gender, grade, and quality of teacher-student interaction. The seating*gender interaction term was not statistically significant for academic striving [F (1) = .82, p =.36], teacher-reported effort [F (1) = 2.08, p =.15], or affect toward school [F (1) = .09, p = .76]. These findings indicate that the effects of seating arrangement did not differ significantly for boys and girls and therefore do not support the hypothesis that boys will be less engaged when seated in groups compared to girls.

Moderation of Seating Effects by Grade Level

A one-way ANCOVA was conducted to test whether there was a statistically significant interaction effect between seating arrangement type and grade level controlling for classroom SES, gender, grade, and quality of teacher-student interaction. The seating*grade interaction term was not statistically significant for levels of striving [F (1) = .17, p = .68], teacher-reported

effort [F (1) = .03, p = .87], or affect toward school [F (1) = 1.56, p = .21]. These findings indicate that the effects of seating arrangement did not differ across grade levels and do not support the hypothesis that first grade students will exhibit more motivation and effort when seated in groups compared to third and fifth grade students.

Discussion

The present study examined the association between student achievement motivation and effort and seating arrangement in the classroom. Consistent with previous research (Skinner et al., 2008), results indicated that girls are generally more engaged and motivated in the classroom compared to boys, and that younger students are more engaged and motivated than older students. The primary hypothesis that students seated in rows would be more motivated and engaged than students seated in groups received partial support. Students who were seated in row arrangements reported more positive feelings about going to and being in school, but they did not report higher levels of academic striving and teachers did not describe them as showing higher levels of effort. The effects of seating arrangement did not differ for boys compared to girls, or for older students compared to younger students. Due to the limited amount of research in this area and the limitations of the present study, it is important to explore factors that may contribute to student motivation in elementary classrooms in order to further understand the development of childhood motivation in an academic setting.

Gender and Grade Differences in Motivation

As expected, group arrangements were more commonly reported by teachers as their primary classroom arrangement compared to row arrangements. It was expected that girls would have an overall higher level of motivation in the classroom compared to boys. According to Skinner and colleagues (2008), boys tend to have lower levels of motivation in schoolwork

compared to girls at all grade levels. Similarly, motivation tends to decrease as students move up in grade level. The results supported previous research and indicated that girls exhibited more academic striving, had more affect towards school, and were rated by their teachers as displaying greater effort in the classroom compared to boys within the sample. Furthermore, effort and motivation decreased as grade increased: 1st grade students had higher levels of academic striving, affect towards school as well as teacher-reported effort compared to 3rd and 5th grade students. These findings are consistent with previous research documenting developmental decreases in motivation that may be related to changes in how children think about achievement tasks (Dweck, 2002).

Relationship between Seating Arrangement and Motivation

With regard to a potential association between seating arrangement and level of student motivation, several studies have suggested higher rates of social interaction (van den Berg et al., 2012) and disruptive behavior (Wannarka & Ruhl, 2008; Wheldall & Lam, 1987) for group arrangements compared to row arrangements. Findings regarding on-task behavior are mixed, with two studies finding more on-task behavior in group arrangements (van den Berg et al., 2012; Rosenfield et al., 1987) and three studies finding more on-task behavior in row arrangements (Bicard et al., 2012; Wannarka & Ruhl, 2008; Wheldall & Lam, 1987). Row arrangements are associated with higher rates of social interaction and disruptive behavior (van den Berg et al., 2012; Wannarka & Ruhl, 2008; Wheldall & Lam, 1987), but associations with off-task behavior may depend on the nature of the academic task (Wannarka & Ruhl, 2008). The results from the present study are consistent with previous findings that row arrangements are sometimes associated with greater on-task academic behavior (Bicard et al., 2012; Wannarka & Ruhl 2008; Wheldall & Lam 1987). Students reported feeling more bonded with school (e.g.

liking going to school and liking their classwork) when they were seated in row arrangements. These results could also be related to work by Marx and colleagues (2000) which found that student-teacher interaction was more positive in row arrangements. If student-teacher interactions are more positive in row arrangements, perhaps because of lower levels of off-task or disruptive behavior, then students may find school more enjoyable.

However, these results suggest that row arrangements may be more beneficial only with respect to students' affect towards school. Neither row nor group arrangements were associated with the students' reports of their level of striving in the classroom or teacher-reported effort. This implies that while the teacher may be able to affect the overall interpersonal climate of the classroom for students through the seating arrangement, he or she may not be able to successfully alter students' level of motivation during classwork.

Seating Effects on Motivation by Gender

It was anticipated that overall, girls would have higher levels of motivation and effort in the classroom compared to boys; however, the present study aimed to delve further into this issue and determine if the effects of seating arrangement varied by gender. It was predicted that boys would have lower levels of motivation and effort in the classroom when seated in group arrangements compared to girls in group arrangements. Contrary to expectation, the seating arrangement did not affect levels of striving, affect towards school, or teacher-reported effort differently for girls and boys. This indicates that the tendency of students to feel more positively about school when seated in rows was equally true for girls and boys.

Seating Effects on Motivation by Grade Level

The present study also attempted to determine whether the effects of seating arrangement varied by grade level. It was expected that the tendency of group seating arrangements to lead to a decrease in effort and motivation in the classroom would be especially strong for 3rd and 5th grade students, compared to 1st grade students. Previous research has suggested that younger students, such as in the 1st grade, tend to have an overall more positive outlook and increased enjoyment in school compared to older grades, such as 3rd and 5th (Marks, 2000; Wigfield & Eccles, 2002). It was found that the seating arrangement did not affect levels of striving, affect towards school, or teacher-reported effort differently for younger and older students. All three grade levels were equally likely to be motivated and exhibit effort in the classroom regardless of the seating arrangement.

Limitations

There are a few limitations to the present study. One limitation is that the consistency of seating chart arrangements across the school year was not considered. Data were obtained across 3 waves in a single school year. The present analyses used seating arrangement data collected at wave 1 (early fall), while student outcome data were collected at waves 2 and 3 (winter and spring). Therefore, this study was using wave one seating arrangements to predict wave two effort and motivation, resulting in a lack of consistency between seating arrangement and student reports of effort. It is possible that teachers changed their seating arrangement, even more than once, between the wave 1 assessment and the wave 2 and 3 assessments. This would interfere with making a clear comparison of motivation levels associated with particular seating arrangements.

Another limitation concerned the type of analyses that were conducted. Simple linear regressions were used to conduct the analyses for this study, examining students individually without taking into consideration differences that may be present within each classroom. For instance, students in the same classroom may be more similar to each other than they would be to students in other classrooms. More advanced multi-level models are necessary to take this into account (Wigfield et al., 1998).

Lastly, this study was correlational in design, and therefore causation cannot be inferred. We are unable to determine the direction of the association between seating arrangement and student reports of positive affect toward school. For example, it could be that teachers are arranging the classroom in rows and the students are responding to the arrangement with more positive feelings about school, or it could be that when students have more positive feelings about school teachers are more likely to arrange seats into rows.

Future Directions

Due to the relatively novel nature of studying seating arrangements, it is important for future studies to further explore potential associations seating arrangements may have with a student's interpersonal and intrapersonal development within the school context. Studies should aim to examine a broader range of student characteristics, such as student achievement. Future analyses should use multilevel modeling to account for nesting in the data set. Future studies should also consider implementing an experimental design in which classrooms are randomly assigned a specified seating arrangement for an extended period of time. Any significant differences in achievement and effort between the two groups could be interpreted as being caused by the seating arrangement.

Conclusion

The present study is a step toward further exploring the possible association seating arrangements have with a student's academic development. From the analyses conducted for this study, there is evidence that row arrangements are associated with students feeling more positively about school and schoolwork, but seating arrangement was not associated with student reported striving or teacher-rated effort. Moreover, girls were generally more engaged in school compared to boys and younger students tended to have a more positive outlook on school compared to older students. It is essential to further investigate the association between seating arrangement and motivation in the classroom to fully understand the potential influence that physical location in the classroom has on a student's educational experience. Results from future analyses and studies similar to this one may provide teachers and school administration officials with a foundation that could lead to evidence-based classroom management techniques, ultimately leading to a more positive academic experience for students and an overall increase in school retention rates.

References

Bicard, D. F., Ervin, A., Bicard, S. C., & Baylot-Casey, L. (2012). Differential effects of seating arrangements on disruptive behavior of fifth grade students during independent seatwork. *Journal of Applied Behavior Analysis*, *45*(2), 407–11. doi:10.1901/jaba.2012.45-407

Dweck, C. (2002). The Development of Ability Conception. In *Development of Achievement Motivation* (pp. 57-82). New York: Academic Press.

Farmer, T. W., Reinke, W. M., & Brooks, D. S. (2014). Managing classrooms and challenging behavior; Theoretical considerations and critical issues. *Journal of Emotional and Behavioral Disorders, 22*, 67-73.

Gest, S. D., Madill, R. A., Zadzora, K. M., Miller, A. M., & Rodkin, P. C. (2014). Teacher management of elementary classroom social dynamics; Associations with changes in student adjustment. *Journal of Emotional and Behavioral Disorders*, *22*, 107-118.

Gest, S. D.,& Rodkin, P. C. (2013, April). *Teacher effects on classroom peer relationships: seating charts and friend formation.* Paper presented at the Biennial Meeting of the Society for Research in Child Development, Seattle, WA.

Gest S. D., & Rodkin P. C. (2011). Teaching practices and elementary classroom peer ecologies. *Journal of Applied Developmental Psychology, 32*, 288-296. doi: 10.1037//0022-0663.90.2.202

Hastings, N., & Schwieso, J. (1995). Tasks and tables: the effects of seating arrangements on task engagement in primary classrooms. *Educational Research*. doi:10.1080/0013188950370306

Hoxby, C. M. (2000). The effects of class size on student achievement: new evidence from population variation. *The Quarterly Journal of Eonomics, 115*(4), 1239-1285.

Madill, R. (2014). How do elementary school teachers shape children's social development? A study of teachers' use of seating arrangements and responsive teaching. (Unpublished doctoral dissertation). The Pennsylvania State Univeristy, University Park, PA.

Marks, H. M. (2000). Student engagement in instructional activity: patterns in the elementary, middle, and high school years. *American Educational Research Journal*, *37*(1), 153–184. doi:10.3102/00028312037001153

Marx, A., Fuhrer, U., & Hartig, T. (2000). Effects of classroom seating arrangements on children's question-asking. Learning Environments Research, 2, 249–263. doi:http://dx.doi.org/10.1023/A:1009901922191

Pianta, R. C., La Paro, K. M., & Hamre, B. K. (2008). *The Classroom Assessment Scoring System (CLASS).* Brookes Publishing.

Rosenfield, P., Lambert, N. M., & Black, A. (1985). Desk arrangement effects on pupil classroom behavior. *Journal of Educational Psychology*, *77* (1), 101-108. doi:10.1037/0022-0663.77.1.101

Ryan, A. M., & Patrick, H. (2001). The classroom social environment and changes in adolescents' motivation and engagement during middle school. *American Educational Research Journal*, *38*(2), 437–460. doi:10.3102/00028312038002437

Skinner, E. A., Kindermann, T. A., & Furrer, C. J. (2009). A motivational perspective on engagement and disaffection: conceptualization and assessment of children's behavioral and emotional participation in academic activities in the classroom. *Educational and Psychological Measurement*, *69*(3), 493–525. doi:10.1177/0013164408323233

Skinner, E., Furrer, C., Marchand, G., & Kindermann, T. (2008). Engagement and disaffection in the classroom: Part of a larger motivational dynamic? *Journal of Educational Psychology*, *100*(4), 765–781. doi:10.1037/a0012840

Smith, J. B. (1997). Effects of eighth-grade transition programs on high school retention and experiences. *The Journal of Educational Research*, 90:3, 144-152, DOI: 10.1080/00220671.1997.10543770

Van den Berg, Y. H. M., Segers, E., & Cillessen, A. H. N. (2012). Changing peer perceptions and victimization through classroom arrangements: a field experiment. *Journal of Abnormal Child Psychology*, *40*(3), 403–12. doi:10.1007/s10802-011-9567-6

Wannarka, R., & Ruhl, K. (2008). Seating arrangements that promote positive academic and behavioural outcomes: A review of empirical research. *Support for Learning*. Retrieved from http://onlinelibrary.wiley.com/doi/10.1111/j.1467-9604.2008.00375.x/full

Wentzel, K. (1996). Social and academic motivation in middle school concurrent and long-term relations to academic effort. *The Journal of Early Adolescence*. Retrieved from http://jea.sagepub.com/content/16/4/390.short

Wentzel, K. R. (1998). Social relationships and motivation in middle school: The role of parents, teachers, and peers. *Journal of Educational Psychology*, *90*(2), 202–209. doi:10.1037//0022-0663.90.2.202

Wentzel, K., Barry, C., & Caldwell, K. (2004). Friendships in middle school: influences on motivation and school adjustment. *Journal of Educational Psychology*, *96*(2), 195–203. doi:10.1037/0022-0663.96.2.195

Wheldall, K., & Lam, Y. Y. (1987). Rows versus Tables. II. The effects of two classroom seating arrangements on classroom disruption rate, on-task behaviour and teacher behaviour in three special school classes. Educational Psychology. doi:10.1080/0144341870070405

Wigfield, A., & Eccles., J. S. (2002). Introduction. In *Development of Achievement Motivation* (pp. 1-11). New York: Academic Press.

Wigfield, A., Eccles, J., & Rodriguez, D. (1998). The development of children's motivation in school contexts. *Review of Research in Education*, 23, 73–118.

ACADEMIC VITA

Kelsey Davis
702 Pinchot Hall
University Park, PA 16802
Email: kad5503@gmail.com

Education

Bachelor of Science with Honors in Human Development and Family Studies with Psychology Minor, The Pennsylvania State University expected May 2015

Honors Thesis: Association Between Seating Arrangement and Achievement Motivation and Effort in Elementary Classrooms

Research Experience

Research Assistant, Classroom Peer Ecologies Project, The Pennsylvania State University. September 2013-February 2014, January 2015-May 2015.

Research Assistant, PROSPER Peers Project, The Pennsylvania State University. August 2014-March 2015

Employment

Interim Head Kindergarten Teacher, The Malvern School. May 2014-August 2014

Resistant Assistant, Residence Life, The Pennsylvania State University. August 2014- May 2015.

Academic Honors

Honors Scholar, Schreyer Honors College. Fall 2013- Present.
College of Health and Human Development Honors Society. Fall 2013- Present.