It's Not Child's Play:

The Impact of SES and Urbanicity on Access to Recess

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Class size. Standardized testing. The three R's. When most people talk about how to improve education, they tend to focus only on what happens in the classroom. But the most unexpected opportunity to boost learning lies outside the classroom: on the playground at recess. (Robert Wood Johnson Foundation, 2010, p.1)

ABSTRACT OF THE DISSERTATION

It's Not Child's Play:

The Impact of SES and Urbanicity on Access to Recess

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Current trends towards increased accountability in public education have taken a toll on the opportunity for unstructured play time and recess breaks that are offered to elementary students during the school day (Barros, Silver, & Stein, 2009; Daly, 2006; Henley, McBride, Milligan, & Nichols, 2007). The demands on teachers and administrators to provide measureable progress towards curriculum standards has put pressure to increase time on task and to augment instructional time within an already overloaded school day. The current trend in education to increase reliance on standardized testing, coupled with federal mandates such as *No Child Left Behind* (NCLB), have created an atmosphere where testing results are paramount to determinations of success (Bracey, 1991; Dylan, 2010). During the school day, recess provides the opportunity for unstructured play and provides for a break from high demand, regimented classroom tasks (Dills, Morgan, & Rotthoff, 2011; Pellegrini & Bohn, 2005; Pellegrini & Davis, 1993). Unstructured play allows a child to recognize important relationships regarding cause and effect and manipulation of their environment; it serves to strengthens gross and fine motor skills (Ramstetter, Murray, & Garner, 2010; Zygmunt-Fillwalk, Bidello, & Evanko 2005; McKenzie & Kahan, 2008) and gives children the opportunity to develop social skills and interpersonal relationships (Sumpner

& Blatchford, 1998). There is an opportunity for educational research that provides insight into the benefits of recess and how socioeconomic factors affect access to recess opportunities in school. Access to recess was examined using a Multiple Linear Regression Analysis in the context of socioeconomic and locale variables. Findings indicated that access to recess opportunities and the benefits associated with recess correlate to specific local and socioeconomic variables.

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To my husband George, thank you for encouraging and supporting this crazy idea of mine. Few husbands would have the patience and selflessness to let their spouse follow their dream. Most especially to my children, George, Nicholas, and Madison; know that everything that I do is for you. I am so proud of you; being your mother is my inspiration every day. Have the courage to follow your dreams, and remember that sometimes courage is the ability to wake up in the morning and start all over again. There is an American proverb attributed to Franklin D. Roosevelt (1927) …

"When you get to the end of your rope. Tie a knot and hang on."

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CHAPTER I: INTRODUCTION AND STATEMENT OF THE PROBLEM

Current trends towards increased accountability in public education have taken a toll on the opportunity for unstructured play time and recess periods that are offered to elementary students during the school day (Barros, Silver, & Stein, 2009; Henley, McBride, Milligan, & Nichols, 2007). The demands on teachers and administrators to provide measureable progress towards curriculum benchmark achievement standards has placed pressure to increase time on task and to augment instructional time within an already overloaded school day (Hanushek & Raymond, 2005). Federal mandates, including *No Child Left Behind* legislation (NCLB, 2001) place accountability for student academic achievement directly on the shoulders of teachers and administrators, and federal funding formulas outlined in laws such as *Public Law 107-110* expressly link grants and monetary allocations to school performance based on specific evaluation criteria (Sec 1121, 1202, 1234). The allocation of resources within school districts can be influenced by the perceived pressure resulting from these increased accountabilities.

The current trend in education to increase reliance on standardized testing, coupled with federal mandates such as NCLB, have created an atmosphere where testing results are paramount to determinations of success (Bracey, 1991; Dylan, 2010; Hanushek & Raymond, 2005). Significant Title I funding is allocated to schools under Section E of the NCLB guidelines, and the Title I legislation purpose is to "ensure that high-quality academic assessments, accountability systems…are aligned with challenging State academic standards so that … administrators can measure progress against common expectations for students' achievement" (NCLB, Sec 1001). These existing funding

mandates require that all students test, at a minimum, within the proficient range by the school year 2014 for the district to continue to receive Title I funding (NCLB, 2001). Adequate Yearly Progress (AYP) towards these proficiency goals must be made in measurable increments, as assessed by performance on certain state mandated tests and related performance goals, and underperforming schools are often the first to eliminate recess in a drive to increase time on instruction as districts' strive to meet standardized test performance goals (Bergen & Fromberg, 2006).

During the school day, recess provides the opportunity for unstructured play and provides for a break from high demand, regimented classroom tasks (Dills, Morgan, & Rotthoff, 2011; Pellegrini & Bohn, 2005; Pellegrini & Davis, 1993). The term 'recess,' as used in the research literature, is equated with non-academic time allocated for exploration and play, and is differentiated from curricular based activities such as Physical Education class, which is a prearranged learning environment with clear goals and objectives (CDC, 1997; Jarrett, Maxwell, Dickerson, Hoge, Davies, &Yetley, 1998; Pellegrini & Bohn, 2005, Pellegrini & Bjorklund, 1997; Pellegrini & Smith, 1993). Unstructured play allows a child to recognize important relationships regarding cause and effect and manipulation of their environment, and it serves to strengthen gross and fine motor skills (McKenzie & Kahan, 2008; Ramstetter, Murray, & Garner, 2010; Zygmunt-Fillwalk & Bidello, 2005), while providing children with the opportunity to develop social skills and interpersonal relationships (Pellegrini, Kato, Blatchford, & Baines, 2002; Sumpner & Blatchford, 1998). After recess, children display a greater ability to stay focused on tasks with less fidgeting behaviors (Jarrett, Maxwell, Dickerson, Hoge, Davies, &Yetley, 1998).

Although research supports the significance of play in the development of children (Bergen & Fromberg, 2009; McKenzie & Kahan, 2008; Ramstetter, Murray, & Garner, 2010; Sumpner & Blatchford, 1998; Taras, 2005; Zygmunt-Fillwalk & Bidello, 2005), modest research inquiries have focused on understanding the influence that recess and instructional breaks may have in providing a supportive, positive school environment (Jarrett, 2002), as well as in support of overall achievement levels in school, improving student academic performance, and attentiveness to school tasks (Dills, Morgan, & Rotthoff, 2011). Pellegrini and Bohn (2005) presented one of the few longitudinal studies that supported the importance of recess breaks for attaining high cognitive performance. Cognitive performance is the term used by Pellegrini (2005) to describe the skills and strategies that are necessarily associated with school based learning, including performance on standardized tests.

In the elementary education literature, research has been directed on the study of specific trends related to recess, such as the relationship between recess and childhood obesity, or on the schools' role as an environment for enhancing healthy physical activity patterns (Bundy et al, 2011; Fairclough, Butcher, & Stratton, 2008; Winter, 2009) and on children's self-perception of competence and social development (Spencer-Cavaliere, Dunn, & Watkinson, 2009), rather than on access to recess, or on recess as a component of the school environment. There is an opportunity for educational research that provides insight into the benefits of recess, access to recess, and the influence that accountability consequences have on recess decision making.

Significant research exists in the literature that supports the concrete benefits associated with play and childhood development, which includes greater on-task

behavior, improved attention, the development of brain connections, and increased social and negotiation skill development (Adams, 2011; Dills, Morgan, & Rotthuff, 2011; Patt, 2011; Pellegrini, 2005; Pellegrini, Huberty, & Jones, 1995; Ramstetter, Murray, & Garner, 2010; Singer, Golinkoff, Hirsh-Pasek, 2006). The development of social competence is a complex building of relationships and interactions with others which are important childhood skill sets (Katz & McClellan, 1997). A child's ability to maintain quality relationships is important to the whole child, and critical in life satisfaction in later years (Kostelnik, 1993). Pepler and Ross contend that the opportunity for play has a significant impact on a child's ability to solve both convergent and divergent problems (1981; see also Wyver & Spence, 1999) and research has not demonstrated any correlation between decreased breaks and increased academic achievement. Similarly, inadequate research has been focused on recess in elementary school as a vital component of a child's cognitive and emotional development and as an influence on cognitive, social, and achievement outcomes (Bergen & Fromberg, 2006; Jarrett, 2002; Pellegrini & Bohn, 2005; Pellegrini & Davis, 1993).

Increased federal and state accountability mandates require that school leaders concentrate on raising test scores *a priori* (Hanushek & Raymond, 2005; Henley, McBride, Milligan, & Nichols, 2007). Within the scope of instructional resources, time allocated throughout the school day for direct instruction is controllable and can be manipulated, with the allocation of time generally within the realm of the school administrator's direct responsibilities (Clark & Clark, 2002; Slater, Nicholson, Chriqui, Turner, & Chaloupka, 2012). When allocating instructional resources, school administrators consider various factors that both directly and indirectly influence student

achievement during their decision making (Baker, 2009; Newstead, Saxton, & Colby, 2008; Hallinger & Heck, 1998; Simon, 1976; Supovitz, Sirinides & May, 2010).

Administrators, which include both district wide superintendents and school based principals, must have available evidence based research that can endorse their support for recess and preserve recess when allocating school resources. School leaders are obligated to implement programs that demonstrate improved academic performance for all students in their schools (Waters, Marzano, & McNulty, 2003) and this accountability directive makes it necessary for school leaders to concentrate on raising test scores while simultaneously overseeing their various managerial responsibilities (Dylan, 2010; O'Donnell, 2005). Leadership decision making and resource allocation should occur predicated on research based understandings of what positively influences learning outcomes (Firestone & Shipps, 2005; Supovitz, Sirinides, & May, 2010) and requires leaders to have a complete understanding of the role that recess and instructional breaks serves in elementary schools when allocating scarce resources (Gortner, 2001).

Firestone and Shipps (2005; Driscoll & Goldring, 2005) agreed that the educational leader's obligation towards improving student performance is the first and foremost priority. While administrators set the tone for the entire school, including morale and achievement (Clark & Linn, 2003; Newstead, Saxton, & Colby, 2008;), sustaining and nurturing the components of a successful school entails understanding what it takes to educate students better, and allocating resources as necessary for this to occur. Research has delineated areas where administrators have an indirect influence on student achievement by shaping the environment and the staff that work with the students, rather than shaping or influencing the students directly (O'Donnell, 2005).

Although school administrators are required to fill many varied roles, one of their primary responsibilities is to facilitate effective teaching and learning within the overall goal of enhancing student achievement through shaping the environment and the context where learning takes place (Deaton, 2006; Newmann, King, & Rigdon, 1997).

Statement of the Problem

The demands on teachers and administrators to provide measureable progress towards curriculum benchmark achievement standards has placed pressure on school districts to increase time on task and to augment instructional time within an already overloaded school day (Katz & McClellan, 1997). The length of the school day is finite, set by board and contract stipulations, and is not easily modified, and the allocation of scarce resources within the school includes the time that is available for recess and instructional breaks (Newstead, Saxton, & Colby, 2008; Hallinger & Heck, 1998; Simon, 1976; Supovitz, Sirinides, & May, 2010).

Limited research has focused on play in elementary school as a vital component of a child's cognitive and emotional development, or as an influence on cognitive and achievement outcomes. While significant research has established the beneficial influences of recess, including higher on-task behavior, sustained attention, the development of improved brain connections, and increased social and negotiation skills (Adams, 2011; Burdette & Whitaker, 2005; Dills, Morgan, & Rotthoff, 2011; Jarrett, Maxwell, Dickerson, Hoge, Davies, & Yetley, 1998; Jarrett, 2002; Pratt, 2011; Ramstetter, Murray, & Garner, 2010, Santa, 2007), students who are most at risk for academic failure may have the least access to these vital resources both while at school

and away from it (Basch, 2011, Carver, Timperio, & Crawford, 2008) .Young children are designed to learn from their environments (Tullis, 2011) and providing recess opportunities in a safe environment can support other important achievement goals that are not easily measured. This research study aims to fill the gaps in the current research regarding the relationship between the allocation of resources during the school day with the locale and socioeconomic status of a school and the resulting access to the benefits that are associated with recess breaks.

Research Questions:

1. There is no statistical relationship between Low, Middle, and High socioeconomic status schools and the locale of the school as correlated to the access to recess opportunities in school.

2. There is no statistical relationship between Low, Middle, and High socioeconomic status schools as correlated to the access to recess opportunities in school.

3. There is no statistical relationship within Low, Middle, or High socioeconomic status schools, the locale of the school district, and the access to recess as correlated to the recess opportunities in school.

The importance of play for increasing social interactions and cognitive processing, and as a vehicle for developing emotional regulation, has become de-emphasized in the contemporary education landscape (Carlsson-Paige, 2008; Pellegrini, 2005). Yet, various components that comprise our understanding of what it means to 'play' have been shown to support aspects of cognitive and emotional development that are not often associated with typical classroom requirements (Pellegrini, 2005; Pellegrini

& Bohn, 2005; Vygotsky, 1967). During play activities, children are required to negotiate and collaborate, develop self-control, and delay gratification (Dills, Morgan, & Rotthoff, 2011; Bergen and Fromberg, 2006; Pellegrini & Bjorkland, 1997). Children at play have an opportunity to improve cognitive skills, including the use of preplanning and symbolic representations (Pellegrini & Bjorklund, 1997; Piaget & Inhelder, 1969) and self-regulation of behavior (Vygotsky, 1967). These skills are better developed in children through environmental learning rather than through goal directed tasks, as young children are not as well designed for goal-directed behaviors as they are capable of learning from their environment (Tullis, 2011). Overall, these cognitive skills increase a child's confidence in their abilities, allow for them to master language and social interactions, and teach them to be successful at a multitude of tasks (Abedi, Kao, Leon, Sullivan, et al, 2008). Recess offers students the opportunity to learn through hands-on and exploratory experiences which impacts their overall development and maturity (Bjorkland & Brown, 1998; Pellegrini, 2005; Ramstetter, Murray, & Garner, 2010).

The research literature has been examined in the areas of recess, access to play, and socioeconomic factors to provide the context in which this research study has been conducted. The benefits of play and recess have been widely discussed in the literature for their influence on the development of emotional, social, and problem solving skills (Adams, 2011; Burdette & Whitaker, 2005; Dills, Morgan, & Rotthuff, 2011; Jarrett, 2000; Pratt, 2011; Ramstetter, Murray, & Garner, 2010, Santa, 2007). However, linking the benefits of play through recess with the role of the school in supporting whole child development, and the potential disparities that arise from school socioeconomic factors and access to recess, has been largely unstudied.

The implications of *No Child Left Behind* (NCLB, 2001) mandates have changed the dynamics and function of elementary schools, leaving students 'robbed' of their childhood (Henley, McBride, Milligan, & Nichols, 2007; Santa, 2007) despite research which has found that recess is a positive social and emotional experience for students (Jarrett et al, 1998; Jarrett, 2002; NAECS-SDE, 2002; Pellegrini & Bohn, 2005). Pellegrini (2005) has conducted numerous studies on the benefits of recess, and has found that research on recess is largely unrepresented in the literature on education outcomes. This adds to the difficulty in ascertaining the effects of recess on the data when making school policy decisions which are designed to improve the learning environment of a school, and subsequently, student achievement and outcomes.

Research has also established that access to the benefits that play affords is further affected by a child's socioeconomic status and the school locale (Hoy, 2012; Sirin, 2005; Tajalli & Opheim, 2005). Children from lower socioeconomic households, who are already at a disadvantage academically (Baker, J., 2009; Lee & Burkham, 2002; Johnson & Perkins, 2011; Noble, Tottenham, & Casey, 2005; Sirin, 2005; Tajalli & Opheim, 2005) are further hampered by a lack of access to safe play and quality social interactions outside of the school day (AAP, 2012; Demerath, Lynch, Milner, Richard, Peters, & Davidson, 2010; Fantuzzo, Bulotsky, McDermott, Mosca, & Lutz, 2003; Kimbro, Brook-Gunn, & McLanahan, 2011; Lee, Burgeson, Fulton, & Spain, 2006; Parsad,& Lewis, 2005; Sirin, 2005; Southworth, 2010).

As a nation, our focus for students and our vision of responsibility towards them as educators has narrowed in on specific academic outcomes (Barksdale-Ladd & Thomas, 2000; Daly, 2006; Dylan, 2010; NCLB, 2001). A culture of teaching towards the test and

focusing on measurable progress in specific academic areas has created an atmosphere where less tangible outcomes and larger social and child development goals have become secondary objectives (Barksdale-Ladd & Thomas, 2000; Christenson, Decker, Trienzenberg, Ysseldyke, & Reschly, 2007; Simon, 2010). Increasingly, time allocated for recess breaks is being eliminated and replaced with instructional time (Carlsson-Paige, 2008; Milteer, Ginsberg, & Mulligan, 2012; Pratt, 2011; RWJ, 2010). This study is intended to add to existing research based understandings of the benefits that recess affords to students, to provide school decision makers with quantitative findings that will support their understanding of the disparities that exist in access to recess opportunities (Spencer-Cavaliere, Dunn, & Watkinson, 2009), and to support the critical role that recess can play in the development of the whole child and in fostering a welcoming, productive school environment (Johnson, McGue, & Iacono, 2005).

CHAPTER II: REVIEW OF THE LITERATURE

In the march towards public school reform, outside influencing agents can pressure school leaders to impose changes that have not been supported by research or have not been demonstrated to be linked to increased learning outcomes (Dylan, 2010; Jarrett, 2002). The push to limit or eliminate recess and replace it with academic tasks is one such casualty in the age of accountability (Bergen & Fromberg, 2006; Pellegrini, 2005). The implication that increased time on instructional tasks should equate to increased learning outcomes assumes a linear correlation between these variables. However, the way in which humans learn is a complex system which does not occur linearly (Forys & McCune, 1984). Education research attempts to attribute certain cause and effect relationships to the process of learning and attribute these influences on learning outcomes, which presumes that simple cause and effect relationships exist between inputs and results (Thelen, 2005) and that these relationships are quantifiable. When studying the allocation of scare resources and access to these resources, it is difficult to identifying the potential confounding effects that exist in the study of the relationship between the experimental variables (Pellegrini, 2005).

This research underscores the significance that opportunities for recess breaks have on childhood development, to recognize access to recess as inherently valuable, and to further clarify the disparities in access to recess based on socioeconomic variables (Adams, 2011; Burdette & Whitaker, 2005; Dills, Morgan, & Rotthuff, 2011; Jarrett, 2000; Pratt, 2011; Ramstetter, Murray, & Garner, 2010, Santa, 2007). The relevant literature evaluation included research on the role of play and instructional breaks as a means of increasing concentration and task performance, as well as the psychological

implications of play on cognitive development, and administrator decision making in terms of resource allocation. Peer reviewed research is included on the use of socioeconomic status variables and educational outcomes, the use of socioeconomic status as a means to group school districts to classify similar districts, the effects of locale on access to resources, and the association between socioeconomic status and locale with access to recess.

Attributions of Socioeconomic Status in Public Schools

Socioeconomic Status in Education Research

The impact of the socioeconomic status (SES) of a school district is widely considered to be a critical aspect in the measure of academic outcomes (Hoy, 2012; Tajalli & Opheim, 2005). It has been extensively established in the research literature that measures of socioeconomic status are associated with student performance on standardized tests, with those students who are economically disadvantaged consistently performing below their peers of higher economic status (Demerath, Lynch, Milner, Richard, Peters, & Davidson, 2010; Fantuzzo, Bulotsky, McDermott, Mosca, & Lutz, 2003; Johnson & Perkins, 2011; Noble, Tottenham, & Casey, 2005; Perry & McConney, 2010; Sirin, 2005; Southworth, 2010). National achievement data show that students from lower socioeconomic backgrounds are further behind their more advantage peers in basic math competencies even before entering elementary school (NCES, 2009). Even after one year in school, the discrepancy between math skills for disadvantaged students still exists (Denton & West, 2002). Research by Reardon (2011) estimates that the

achievement gap between low and high income students has grown by approximately 40% since the 1960s, as measured through standardized achievement tests.

The practice of identifying socioeconomic status as a variable, and controlling for it when reporting results in education research, has been widely demonstrated in the US education research literature (e.g., Lee, Brescia, & Kissinger, 2009; Tajalli & Opheim, 2005) and in research published in other countries (e.g., Frempong, Ma, & Mensah, 2012; Resh, 1998; van der Berg, 2008; Yang & Gustafsson, 2004). The National Center for Educational Statistics (2011) itself uses SES as a determinate variable in its widely accessed Early Childhood Longitudinal Study (ECLS) and National Educational Longitudinal Study (NELS). The connotation from the research literature is both the explicit and implicit corroboration that a students' socioeconomic status is an important consideration when discussing academic achievement, from preschool through post secondary education.

Research has demonstrated that a dramatic difference exists in overall academic achievement when groups are controlled for measures such as race, ethnicity, and socioeconomic status (Lee & Burkham, 2002; McPartland & Slavin, 1990; Noble, Tottenham, & Casey, 2005; Reardon, 2011; Sirin, 2005; Tajalli & Opheim, 2005). Neuroscientists have gone as far as to make connections between racial and ethnic disparities and school readiness by studying specific brain-based functions (Nobel, Tottenham, & Casey, 2005). Socioeconomic status (SES) is thought to influence achievement on several fronts including through environmental factors, parenting

influences, levels of stress, and opportunities for enriching experiences (Greenhough, Black, & Wallace, 1987; McPartland & Slavin, 1990).

The wording itself –*disadvantaged*, implies that other students are somehow *more advantaged*. The link between financial advantage and school advantage, as measured by SES, includes additional measures of privilege that are associated with the concept of 'cultural capital' (English, 2002). Cultural capital includes broader concepts related to student social advantage, such as parental involvement, access to middle class cultural norms, higher parental and societal expectations, and a greater emphasis on academic achievement (Pellicano, 1987; Vandergrift & Greene, 1992). Having parents who are better educated, who have a greater appreciation and support for the value of education (Kahlenburg, 2000; Taylor & Graham, 2007), and who have the ability to provide their children with enriching activities outside of the school day serves to compliment and support overall learning (McNeal, 2005; Vandermass-Peeler, Nelson, Bumpass, & Sassine, 2009; Vandergrift, & Greene, 1992).

These advantage measures are included in research conceptualizations of what is integrated in the determination of socioeconomic status; it is not only fundamentally a financial consideration, but refers to parental and societal support in broader terms. The concept of socioeconomic status is designed to encompass the measure of the impact that opportunities for enriching experiences outside of the school day plays in a child's success academically. Learning does not stop at the end of school day, and support and opportunities for enrichment received by students outside of school is an important consideration in measuring overall academic success (Davis-Kean & Sexton, 2009). Parents with a higher level of education and higher socio-economic status are more likely

to read with their children (Vandermass-Peeler, Nelson, Bumpass, & Sassine, 2009), they often provide better academic support at home (Davis-Kean & Sexton, 2009; Reardon, 2011; Vandermass-Peeler, Nelson, Bumpass, & Sassine, 2009), and they have higher academic expectations for their children and their schools (Kahlenburg, 2000; Vandergrift & Greene, 1992). A parent's involvement in school can influence both the success and length of a child's schooling (Lareau & Cox, 2011; McFarland & Rodan, 2009), but parents from higher socioeconomic backgrounds with higher levels of education appear to employ more effective methods of involvement with school decisions (Lareau & Cox, 2011)

Poverty levels in schools, combined with a decrease in forced segregation, have led to an increased stratification among schools based on income, which in turn significantly effects academic achievement (Pallas, 1989; Southworth, 2010). Researchers have demonstrated that students from low income schools score lower on standardized assessments overall when compared to students who attend middle and higher socioeconomic status schools (Borman & Dowling, 2010; NCES, 2007; Perry & McConney, 2010). This result exists regardless of the level of income of the individual student; it is associated specifically with the socioeconomic status of the school. School finance reform and funding adequacy issues are central themes in the attempt to level the playing field for students from low socioeconomic backgrounds (Glenn, Picus, Odden, & Aportela, 2009). School finance adequacy litigation has become increasingly popular as a means to improve educational outcomes for children (Glenn, Picus, Odden, & Aportela, 2009). However, the long term effectiveness of the litigation strategy aimed to increase funding has not been connected in the research to increased student outcomes. Glenn et al

(2009) used a linear regression analysis using data from the Early Childhood Longitudinal Study, Kindergarten Cohort, and showed a small, but measurable, positive relationship between achievement test scores of students from very low SES backgrounds after increased funding due to litigation. The researchers concluded that this litigation strategy was unlikely to lead to increased student achievement in isolation.

Free lunch programs and At-Risk students. In 1946, Congress passed the National School Lunch Act, which provides students with healthy lunches at school, based on their family's ability to pay. The New Jersey Department of Agriculture administers this program in New Jersey (NJDOAg, 2009). Eligibility for free lunch is widely used in the research literature as a consistent measure of poverty, and rates of free lunch eligibility as a percentage of school population are a consistent comparative tool used to describe relative wealth or poverty among school districts (Dills, Morgan, & Rotthoff, 2011; RWJ, 2007). These types of federal programs are one means used to identify potential at-risk students and low income school populations.

'At-risk' is a term that is based on a model which looks at cultural deprivation and the lack of fit between minority and poor students and their schools (Jonhson & Perkins, 2011). At-risk students are identified by Pallas (1989) as students who are not experiencing success in school and are at an increased potential to become dropouts. Usually, these students are low academic achievers who exhibit low self-esteem, and they generally arise from low socioeconomic status families (Tajalli & Openheim, 2005). These at-risk students tend to not participate in school activities, have a minimal identification with the school, and experience both disciplinary and truancy problems. At-

risk student's exhibit impulsive behavior and their peer relationships are problematic (Johnson & Perkins, 2009).

The at-risk population by definition has a history of family difficulties, including drug addictions, pregnancies, and other problems that prevent them from participating successfully in school. As they experience failure and fall behind their peers, school becomes a negative environment that reinforces their low self-esteem (McPartland & Slavin, 1990). Pallas (1989) identified five factors that are associated with inadequate educational resources and therefore are indicators of being at-risk. These factors include poverty, race, family composition, mother's education levels, and English language proficiency, with the highest concentration of students being identified as at-risk residing in urban centers and rural areas. In cities, not only is the poverty rate for children around 31%, it is expected that these children are more likely to be in a single family home with poorly educated parents that do not speak English (US Bureau of the Census, 1996).

Poverty, as a factor when considering access to recess, has been the focus of limited research (AAP, 2012; Lee, Burgeson, Fulton, & Spain, 2006; Leong, 2012; Parsad,& Lewis, 2005).The correlation between physical activity and student achievement in the urban minority population was investigated by Basch (2011) to understand if disparities exist in activity levels for this underserved population. He concluded that the level of physical inactivity is high among the urban minority school population, and is disproportionately prevalent for this group. Basch also contends that this has a negative impact on academic achievement through related effects on cognitive development. One of the suggestions borne from this research to support urban minority populations was the implementation of comprehensive opportunities for physical activity,

including the use of recess breaks within the school day (see also Fairclough, Butcher, & Stratton, 2008).

Degree of urbanization. The practice of labeling school districts based on their location stemmed originally from the Elementary and Secondary Education Act (ESEA-Title 1) during a time when the national education debate focused on issues of minorities and poor outcomes. Regrettably, achievement gaps between the performance of minorities and low income students became almost synonymous with the construct of urban schools and to this day, the term 'urban' has the connotation of 'low performing'. Current research indicates that race has become less indicative when discussing education outcomes, and performance measures are more closely linked to poverty levels than race (Reardon, 2011). Elias and Leverett (2011) discussed specific issues faced by urban students from low-income and minority backgrounds, including the high economic demands on parents, the increased stress experienced due to the breakdown of neighborhoods and families, and weakened community institutions (see also Tajalli & Opheim, 2005). They further discuss the accountability pressures in schools that exist in this high pressure environment, which have developed to meet accountability standards and high stakes testing requirements.

The issues faced by urban communities are also reflected in the access to, and nature of, play opportunities (Carver, Giedd, & Thomas, 2000, Leong, 2012). While urban areas may be equally poverty stricken based on free lunch statistics, the students in rural environments typically have greater access to play based on environmental considerations (Fernandes & Sturm, 2010). Urban schools that are located in high crime

areas offer less access to safe playgrounds and outdoor play outside of the school day (Kimbro, Brook-Gunn, McLanahan, 2011). Other considerations such as fear of strangers and the lack of appropriate playscapes also contribute to the decline in outdoor play in urban locales (Basch, 2011; Burriss & Burriss, 2011).

Funding formulas. In the United States, programs such as Head Start have been established to create early school based services for impoverished families with the desire to have these socioeconomically disadvantaged students begin school with a 'head start', with the understanding that once the higher socioeconomic students began formal education they would quickly surpass their disadvantaged peers (Fantuzzo, Bulotsky, McDermott, Mosca, & Lutz, 2003). In high need urban and suburban areas, the Head Start program is being expanded to include the 'Early Head Start' program designed to serve children as young as eighteen months old. In New Jersey, school funding reform has been intertwined with the court system since 1973, when the Supreme Court decided in *Robinson v. Cahill*, 303 A2d 273, that New Jersey school funding statues violated the constitutional requirement to provide a "thorough and efficient" education for every student. Further shifts in state aid came as a result of the 1994 and 1997 *Abbott v. Burke* decisions requiring parity funding to bring per-pupil expenditures in the poorest districts up to the level of that of the wealthiest districts in New Jersey. While these funding formulas have recently been modified to include needy students in other districts, the result has been a high level of involvement between the government, the courts, and school districts within the State of New Jersey in an attempt to level the playing field between districts with varied socioeconomic status students.

Socioeconomic status and access to play. The opportunity for access to outdoor play is limited by a child's socioeconomic status (American Academy of Pediatrics, 2000; Malone & Tranter, 2003), with minorities being at a much higher risk of growing up in poverty in the United States (US Census Bureau, 2000). Play is a spontaneous, exploratory, and intrinsically motivated developmental process which spans race and culture (Fischer, 1992). Poverty and race play a significant role in access to play through recess opportunities, with 39 percent of African American students and 44 percent of poor children lacking access to recess breaks, as opposed to 15 percent of white students (Teachers College Record, 2003). Parsad and Lewis (2006) surveyed public schools for the U.S. Department of Education, and found disparities existed based on both geography and demographics, with city schools offering 24 minutes of recess per day on average to students, as opposed to rural schools which offered an average of 31 minutes per day. The shortest recess periods were found in schools where 75% or more of the students received free or reduced lunch, with a daily average of 21 minutes of recess per day (Parsad & Lewis, 2006). It is noted by researchers that living in poverty already limits a child's exposure to appropriate play opportunities (Evans, 2004), and removing access to recess at school further erodes a child's opportunity to benefit from the cognitive, social, and emotional aspects that play affords.

In the United States, a student's access to recess time is not governed by state or district wide policies. Rather, it differs from school to school within a district, and even between classrooms within a school (Barros, Silver, &Stein, 2009; Pellegrini & Bohn, 2005; Pellegrini & Smith, 1993; Ramsetter, Murray, &Garner, 2010). The opportunity for recess time is decided according to any number of factors relating to the teacher, the

curriculum, and the administration. Zygmunt-Fillwalk and Bilello (2005) reported that as many as 40 percent of school districts in the United States have reduced or eliminated recess. Simultaneous to the decline in recess periods being offered within the school day, there has been a shift in the nature of play activities outside of school over the past fifty years in the United States (Gray, 2011). Gray (2011) identified a twenty-five percent decrease in reported play opportunities for children when comparing 1981 and 1997, as well as a significant shift away from self-chosen activities that were offered during free time. The research noted substantial increases in the amount of time devoted to school work at home and organized activities, as opposed to unguided free play (Stanford University School of Medicine, 2007).

Recess and other times within the school day spent on non-curricular activities has become an easy target for administrators looking to increase time on instruction. There is a growing body of educational leadership research focused on decision making and accountability in schools (Firestone, & Shipps, 2005; Kerr, Marsh, Ikemoto, Darilek, & Barney, 2006; Newmann, King, & Rigdon, 1997) and decisions regarding the allocation of resources are fundamental to the discussion on access to recess. At first glance, the idea of minimizing 'play' time can be an easy sell to parents from district administrators who are concerned with educational success, adequate yearly progress, and standardized testing. However, in lower income school districts, the time for recess that is eliminated can be the only safe play opportunity that a child has with their peers (Malone & Tranter, 2003). States can regulate the number of hours spent on instruction, either annually or per day, but these stipulations do not account for any discrepancy in the overall length of the school day between districts and access to recess. This leaves the

balance of the school day as an important consideration where leaders have the ability to be flexible in make scheduling decisions within a specific context, such as allowing for recess periods (Burris, & Burris, 2011; Deaton, 2006; Slater, Nicholson, Chriqui, Turner, & Chaloupka, 2012). Data based research supporting the access to recess is intended to add the knowledge base and serve to support future decision making.

No Child Left Behind

Federal *No Child Left Behind* (2001) regulations stipulate benchmark achievement levels that are required for school districts, with one of the stated goals for the legislation declared to be closing the achievement gap (US DOE, 2004). This legislation marked an important shift in education policy in the United States, changing the focus of efforts to the reduction of achievement gaps that exist between socioeconomic groups by holding districts, teachers, and states accountable for academic achievement (Southworth, 2010). *No Child Left Behind* requires that states develop challenging academic content and achievement standards for all schools and all children in the state (US DOE, 2004). The standards in each state must include the "same knowledge, skills, and levels of achievement expected of all children" in reading and mathematics, beginning in 2005-2006 (US DOE, 2004). In addition, the state standards must be part of the accountability system used to determine if Adequate Yearly Progress (AYP) towards benchmark goals are being achieved by its schools and districts. States' accountability systems must also include rewards and sanctions for making, or failing to make, AYP. Although *NCLB* leaves some discretion to each State to define AYP, certain guidelines apply for comparative purposes. These guidelines intend to impose some uniform application to schools and students, including statistical validity and reliability

and the measurement towards progress which is primarily based on academic assessments (US DOE, 2004, p.1446). The *NCLB* mandate requires accountability for graduation rates for secondary students as well.

Title I Designation. Benchmark achievement levels are monitored in part by district attainment of Adequate Yearly Progress (AYP), the measure by which schools, districts, and states are held accountable for student performance under Title I of the *No Child Left Behind* Act of 2001 (NCLB), the current version of the Elementary and Secondary Education Act. Title I details federal compensatory funding for education programs in the section of the *NCLB* which governs resources for schools and districts serving disadvantaged populations. The concept of AYP was first introduced into federal law in the ESEA's 1994 reauthorization. AYP is a compilation of weighted variables, including items such as proficiency in standardized testing and progress towards proficiency and graduation rates which are designed to give an overall snap shot of how well a district is educating its' students (NCLB, 2001). The attainment of these goals has been deemed essential as a measurement of academic progress, and significant funding is linked to the attainment of AYP goals. A school that fails to make AYP for five years becomes identified for restructuring, which can include consequences such as state takeover, conversion to a charter school, or some other prescribed remedy.

Consequently, the pressure on school or district administrators to make progress towards achieving their AYP goals has significant consequences. These consequences are critical when considering the pressure to increase time on instruction and in the decision making process relating to the allocation of school resources, especially time on instruction. Those who oppose high stakes tests point to concerns that these tests

promote narrowing the curriculum and argue that test preparation and associated preparatory activities result in reduced time for academic learning at high levels while educators concentrate on "teaching to the test" (Barksdale-Ladd & Thomas, 2000; Simon, 2010), and for failing to understand other relevant measures of learning and success that are not testable in a traditional sense.

The trend to eliminate recess began in the late 1980s, when pressure increased on school districts to eliminate recess as a way to increase time on instruction (Adams, 2011). Only eleven percent of states and fifty-seven percent of districts currently require elementary schools to provide recess to their students (Centers for Disease Control, 2006). Forty percent of US school districts have reduced or eliminated recess to increase academic time in response as a means of allocation of scarce resources (Clements, 2000; McKenzie and Kahan, 2008; Zygmunt-Fillwalk & Bidello, 2005), with one in four elementary schools having eliminated recess in certain grades altogether. The US Department of Education reports that 14 to 18 percent of US students in grades one through six receive fewer than 15 minutes of recess per day (National Center for Education Statistics, 2007).

The American Academy of Pediatrics (2012) published an opinion statement extolling the benefits of recess for its positive influence on the development of cognitive, social, and emotional payback. The authors urged educators to regard recess as personal time necessary for students for mental refocusing, and not as a time that should be withheld for punitive purposes. While two thirds of principals that participated in the RWJ survey reported that students listen better and were more focused after recess (2010), over two thirds of principals reported taking away recess as a punishment for

behavior problems (Ramstetter, Murray, & Garner, 2010; Robert Wood Johnson, 2007, 2010), although these same administrators concede that this punishment likely contributes to an escalation of the unwanted behaviors, not the elimination of them (see also Johnson, McGue, & Iacono, 2005) . There persists a perception that the longer students work, they more they will learn. One in five principals surveyed indicated that the pressure for academic success as measured by Adequate Yearly Progress (AYP) requirements has been a motivating factor that has lead to a decrease in recess minutes at their school (RWJ, 2010).

The implications of *No Child Left Behind* (NCLB, 2001) mandates have changed the dynamics and function of elementary schools, leaving students 'robbed' of their childhood (Henley, McBride, Milligan, Nichols, 2007; Santa, 2007), despite research which has found that recess is a positive social and emotional experience for students (Jarret et al, 1998; Jarret, 2002; NAECS-SDE, 2002; Pellegrini & Bohn, 2005). Pellegrini (2005) has conducted numerous studies on the benefits of recess, and has found that research on recess is largely unrepresented in the literature on education outcomes. This adds to the difficulty in ascertaining the effects of recess on the data when making instructional decisions which are designed to improve student achievement and outcomes.

Data based decision making. The U.S. Department of Education encourages schools to use assessment data to respond to students' academic strengths and needs (What Works Clearinghouse, 2010) leaving states and districts increasingly focused on data based decision making. Meanwhile, the association between leadership decision making and the influence of these decisions on student outcomes is still being teased out

by researchers (Hallinger & Heck, 1998; Eilers & Comacho, 2007). Changing accountability and testing mandates have provided educational leaders with abundant data for analysis, and current trends reinforce using this data for guiding instruction and improving student learning (Kerr, Marsh, Ikemoto, Darilek, & Barney, 2006). Although accountability trends explain why more data is available in school decision making, the question of what to do with all of this data remains problematic. Data provides a way to assess what students are learning and the extent to which students are making progress toward goals. Making sense of the data requires the administrator to be able to interpret and apply the data and to make instructional and environmental changes aimed at improving student outcomes (Knapp, Copeland, & Talbert, 2003). Questions have been raised over the influence of these accountability pressures on the allocation of resources at the district and school level (Baker, 2012).

There is a growing interest among educators and policy advocates to use these data sources to increase operational efficiency inside and outside of the classroom (Newstead, Saxton, & Colby, 2008; Hallinger & Heck, 1998; Simon, 1976; Supovitz, Sirinides & May, 2010). School leaders use the data to prioritize instructional time, gauge instructional effectiveness, and target teaching methods and possible interventions in the desire to maximize learning (What Works Clearinghouse, 2010). The goal of data driven decision making is to create learning centers which inform instruction and promote successful leadership and decision making (Williams, 2006). However, the WWC research panel (2010) concluded that data based instructional decisions are not conclusively associated to the improvement of student achievement. The panel reached this conclusion based on a number of factors, including the difficulty in designing

experimental studies that accurately reflect certain data-use practices, and the use of practices that look at a host of confounding factors, not individual elements.

The Value of Unstructured Breaks during the Instructional Day

In the elementary school setting, regularly occurring instructional breaks are equated with the term "recess" (Jarrett, Maxwell, Dickerson, Hoge, Davies, & Yetley, 1998; Pellegrini & Bjorklund, 1997; Pellegrini & Bohn, 2005; Ramstetter, Murray, & Garner, 2010). The trend to reduce time at recess as a means to increase time on instruction has been widely reported in the literature (Adams, 2011; Clements, 2000; Henley, McBride, Milligan, & Nichols, 2007; Pellegrini, 2005; Santa, 2007), although researchers have not found any statistical significance in support of an increase in academic gains through the elimination of recess (Dills, Morgan, & Rottliff, 2011; Pellegrini, 2005). Numerous researchers have documented that programs such as recess, music, and art are being altered and eliminated at the elementary level in the pursuit of higher test scores (Patte, Kirylo, & Thirmurthy, 2010; Pellegrini & Bjorkland, 1997).

An examination of the literature on the role of recess and play on the cognitive and emotional development of school aged children underscores the importance of incorporating unstructured breaks into the school day. Significant research exists that has established the beneficial influence of recess, including higher on-task behavior, less fidgeting, development of improved brain connections, and increased social and negotiation skills (Adams, 2011; Burdette & Whitaker, 2005; Dills, Morgan, & Rotthuff, 2011; Jarrett, 2000; Pratt, 2011; Ramstetter, Murray, & Garner, 2010, Santa, 2007). However, linking these benefits to increased academic achievement is problematic.

Pellegrini reported one of the few studies correlating play and its ability for predicting first grade achievement (1992). In this longitudinal study, Pellegrini concluded that giving Kindergarteners the Metropolitan Achievement Test (MAT) provided significant predictive ability for first grade achievement. However, an astonishing 40% of the proportion of the remaining variation between the predictive ability of the standardized assessment could be accounted for by measuring specific playground behaviors. Tomporowski (with Dacis, Miller, Naglieri, 2008; & Ellis, 1986) has studied the effects of exercise on student achievement and cognition, noting particular improvements in goal directed tests in high stimulus environments when opportunities for exercise are afforded to students.

Modest research exists in the literature that addresses the question of how the length of time spent in recess at school correlates to academic achievement (Pellegrini & Bjorklund, 1997), while notable research studies have sought to understand correlations that might exist between recess and childhood concerns such as obesity and physical health. For example, research conducted by Trudeau and Shephard (2009) found that student academic performance increased when time on instruction was replaced with time for recess as a method for increasing exercise time. Grissom (2005) researched the association between physical fitness and academic achievement using a sample of 884,715 students. Although the research cautions against directly linking physical fitness to academic achievement, it concluded that a consistent overall positive relationship existed in the sample between overall fitness and academic achievement. Additionally, the benefits of recess have been shown to persist for the long-term, as a survey of college students (Klugman, 1996) credited recess opportunities to the development of positive

lifelong memories. These students recalled vivid memories of childhood play and recess experiences, and made personal attributions of the value of a play for both socialization and its learning connections.

Similarly, research has been conducted to study the relationship between recess breaks and behaviors in preschool children (Wadsworth, Robinson, Beckham, &Webster, 2012). Pellegrini and Bohn (2005) presented one of the few longitudinal studies that supported the importance of recess breaks with the purpose of maximizing cognitive performance, as well as addressing the timing of recess for promoting increasing attention, without specifically focusing on fitness as the explanatory variable. Cognitive performance is described by Pellegrini as having both proximal and distal components (2005). These measures differentiate immediate learning (proximal), where the learning connection can easily be observed, such as the attention to classroom tasks that have a direct impact on school performance, from distal learning, which impacts learning in less immediate ways. Recess effects learning in both ways. Through proximal measures, student's task attention will be greater after recess breaks, and learning is achieved through greater attention to task (Pellegrini, 2005; Pellegrini & Bjorkland, 2005). In distal measures, the distribution of learning across time through the incorporation of recess breaks will cumulatively result in higher levels of learning (Hunter, 1929).

Cognitive Theory

Cognitive deliberation (Bratman, 1987; McCall, 1987; Lehrer, 2008) research has implications relevant to the understanding of the usefulness of instructional breaks toward the development of high quality instructional environments. Cognitive

deliberation theory proposes that the mind requires opportunities to rest and think freely, which includes giving attention to the benefits that arise from letting the mind wander. This perception flies in the face of current education policy. In reaction to state and federal performance standards and mandates, districts are pushing to structure every moment of the school day in order to squeeze in as much time on instructional tasks as possible, in spite of the research that supports the understanding that young children learn substantively when they are at play (Barros, Silver, & Stein, 2009; Dills, Morgan, & Rotthoff, 2011; Milteer, Ginsburg, & Mulligan, 2012). It is through the manipulation and interaction that occurs during play that children begin to understand and practice how to act and to react cognitively and emotionally. This, in turn, fosters their cognitive development (Ginsburg, 2007).

A study by Holmes, Pellegrini, and Schmidt (2006) examined the effects of recess timing on classroom attention using the cognitive immaturity theory (see also Pellegrini & Bohn, 2005; Pellegrini, Huberty, & Jones, 1995). The cognitive immaturity theory speaks to a child's ability to perform higher level cognitive tasks with the same efficiency as adults performing similar tasks, noting that these task completion abilities are age appropriate, and the specific adaptations of children are designed for long term cognitive development (Pellegrini & Bohn, 2004). The cornerstone of this theory is that children do not attend to information or process this information in the same way as adults do (Bjorkland & Harnishfeger, 1990). Young children, as a natural part of their cognitive processes, are subject to cognitive interference due to the immaturity of their nervous systems (Bjorkland and Green 1992; Pellegrini & Bohn, 2004). This interference affects the retention of cognitive information after long periods of structured work without

breaks. The conclusions from this research included the understanding that attention to classroom tasks for children was greater after breaks, and these findings support the reasonableness that primary school children would benefit from recess breaks to help them to attend to classroom tasks (see also Bjorkland & Harnishfeger, 1990).

Learning theory has supported the concept that children learn more effectively when tasks are distributed rather than concentrated or massed (Hunter, 1929; Pellegrini, 2005). Distributed tasks are spread over longer periods with frequent breaks, and have been shown to be an effective method for learning complex tasks for a variety of learning tasks, including math, language, and comprehension (Dempster, 1988; Toppino, Kasserman, & Mrack, 1991). Dempster further suggested that distributing effects result from making tasks less boring which results in a higher level of attention to task. Bjorkland and Green (1992) described the theory of cognitive immaturity as an adjunct to the distributive practice theory, further stipulating that younger children experience greater benefits from distributive learning. Young children do not process information as effectively as older children, as they are less able to inhibit task-irrelevant thought and distractions that contribute to overall cognitive development (Bjorkland & Harnishfeger, 1990) and they are more susceptible to the effects of interference.

Pellegrini and Bohn (2005) described the process of cognitive interference, and further argued that unstructured breaks, such as recess, serve to maximize student performance by reducing this build up of interference caused by high demand cognitive tasks. They described cognitive interference as "a continued build-up of interference with repeated performance of highly focused tasks, even if the tasks are different" (Pellegrini & Bohn, 2005, p.14). Repetitive high demand classroom tasks lead to a build-

up of ‘interference’, which needs to be eliminated for the child to be able to re-engage in a high demand cognitive task. One suggested method for reducing this interference is through instructional breaks. Students experience decreased performance and attention when they are required to remain sedentary and at constant attention to higher order thinking tasks. As a child matures, their ability to remain focused and on-task increases.

Pellegrini (1997; 2003; 2005) conducted a series of experiments in which he manipulated recess breaks, performance tasks, and recess timing, and measured the attention to task and socialization of students before and after breaks. He concluded that all students, but especially boys, demonstrated inattentive behaviors as the length of time increased for academic tasks that were performed without a break. Norvell, Ratcliff, and Hunt studied first grade students to determine if a relationship existed between recess breaks and literacy lessons (2009). They concluded that students performed better if they were given a break before the lesson, and they learned better when given the opportunity to play and socialize. Not only do breaks allow for greater attention to task, it is believed that physical movement fosters growth and improved neurological connections which are responsible for the encoding, retention, and retrieval of information (Ramstetter, Murray, & Garner, 2010).

The support for instructional breaks as a means to increase attention was confirmed by Barros, Silver, and Stein (2009) in a correlation study which looked at recess and behavior. The focus of the study was the impact of time spent at recess and subsequent behavior in the classroom, and drew from the Early Childhood Longitudinal Study, Kindergarten Class of 1998-1999 (ECLS-K). Barros and his colleagues analyzed the data from the ECLS-K and separated students into two groups; one which received

minimal recess breaks (*no recess group*), and the other which received varying frequencies of breaks on a daily basis (*some recess group*). They also collected teacher self-report data which identified classroom characteristics, physical education data, and a Teacher Rating of Classroom Behavior (TRCB). Using these responses, they were able to demonstrate that classroom behavior was more positively rated by teachers in classrooms having "some recess" when compared to the "no recess" group. Students behaved better and learned more with as little as fifteen minutes of recess per day (Barros, Silver, & Stein, 2009). They also concluded that the length of recess was not an indicator of level of behavior; any recess longer than fifteen minutes was associated with better behavior, and those students who received longer breaks were not better behaved than students who received shorter breaks. However, both groups were better behaved than students who were given no recess opportunities (Barros, Silver, & Stein, 2009). This study made no attempt to differentiate students by socioeconomic or locale factors in the analysis.

Further attempts to draw inferences between academic performance with recess and instructional breaks support the position that academic outcomes improve with increased breaks (Archibald & Odden, 2000; Basch, 2011; Dills, Morgan, & Rotthoff, 2011). The Robert Wood Johnson (2010) survey of elementary school faculty members concluded that teachers could reclaim approximately 18 minutes of instructional time each day by eliminating behavior problems though offering a short recess period. Instructional breaks underscore the need for physical and mental breaks through the incorporation of movement, and results in improved attention to academic tasks (Dills, Morgan, & Rotthoff, 2011; Hilman, Pontifex, Raine, Castelli, Hall, & Kramer, 2009).

An equally important discovery during the literature review was the lack of research which established a statistically significant positive influence on student learning that could be associated with decreased recess breaks (Dills, Morgan, and Rotthoff, 2011). While administrators make decisions to eliminate recess in pursuit of increased time on instruction and academic performance, this position does not appear to be statistically supported in the research literature. Although recess serves as an outlet for students and is essential to the development of children (RWJ, 2009), a study reviewed by Miller and Almon (2009) found that play is disappearing for those as young as Kindergarten. Tullis also reported that the trend in early childhood education is focused on replacing play based curriculums with academic curriculums (2011). This research established that twenty to thirty minutes per day of testing and test preparation were occurring in large cities across America, including Los Angeles and New York, as districts focus increasingly on testing outcomes.

The benefits associated with unstructured play time in early childhood are well documented in the literature (Elkind, 2006; Stephens, 2009; Tyler, 2000). Researchers have long extolled the virtue that play opportunities have on the development of the whole child (Carlsson-Paige, 2008; Sumpner & Blatchford, 1998). The American Academy of Pediatrics has stressed the importance of play as an essential component to the cognitive and physical development of children *(*AAP, 2012; see also Milteer, Ginsburg, & Mulligan, 2012; Riley & Jones, 2010*).* These studies, while emphasizing the importance of structured instructional time in preschool and elementary years, underscore the notion that academic gains made during instructional periods do not replace the critical learning that is acquired during non-academic play.

A significant level of importance is placed on the allocation of time in the school day, with configurations such as direct instructional time, wait time, transition time, and timed tests. There is little time specifically purposed during the day where students are given the opportunity for mental breaks and cognitive deliberation, which has been identified as an often neglected part of their physiology (Lehrer, 2008). Lehrer describes the time for cognitive deliberation as useful with the implication that requiring constant concentration in young students "comes with the hidden cost of diminished creativity" (p. 44). Lehrer (2008) introduced the concept of "the insight experience," as a function of learning. Milteer, Ginsburg, and Mulligan discussed essential traits that develop from play experiences that are necessary for success in an increasingly complex world (2012). These traits include the ability to overcome adversity, tenacity, and the ability to get along with others. These are the specific characteristics that are developed during interactive play, and which are generally not equated with traditional classroom learning. As we prepare students to become productive members of a technologically advanced and integrated twenty-first century world community these 'soft' skills will be critical to their success and preparedness.

Stages of cognitive development. Cognitive researchers such as Piaget (1969) and Vygotsky (1967; 1978) have based entire theories on the stages of cognitive development. The crux of these theories lies in understanding that children are not undersized adults; that their physiology and mental process are different and distinct (Piaget & Inhelder, 1964). Developmental Psychologists and Neuroscientists recommend play as a key component of successful cognitive development and preparation for later academic challenges for children through age seven (Tullis, 2011). Bjorklund and Green

(1992) developed a theory of cognitive immaturity, which argues that young children have a lessened capacity for sustained task attention and a reduced effectiveness in processing information. On the surface, it may appear as though cognitive immaturity is a detriment or limitation to the abilities of children in their cognitive processing. However, these theorists propose that while young children process information differently than adults, their functioning is appropriate to the specific task demands of childhood (Piaget & Inhelder, 1964). This is an important facet in the foundation that supports the importance of recess in elementary schools as a means for increasing achievement, as children are essentially hard-wired to learn through active, hands-on, and role playing experiences.

The fundamental importance of play in promoting childhood development has lead to the evolution of a field of experts whose sole purpose is to evaluate the effects of play on development (Watkinson, Dwyer & Nielsen, 2005; Zygmunt-Fillwalk & Bidello, 2005). These self-purported 'play theorists' have closely studied the implications that activities such as recess have for the physical, social, and cognitive development of children. The National Association of Early Childhood Specialists (2002) and the American Academy of Pediatrics (2012) have gone as far as to write position statements offering recommendations in support of policies that promote recess and the value of play in the developmental growth of children. Through play, children "negotiate (their) place in the world and sort out (a) sense of ourselves as we take stock in our capabilities" (Eberle, 2011, p. 1). Children need to draw relationships between what they see and to think and question these relationships (Tullis, 2011), which happens fluidly in unstructured play situations.

Proprioception. Proprioception is an important physiological component that underscores the importance of recess and movement breaks in cognitive development. The benefits of movement that are described in the research literature are a consideration for their support in the important role of incorporating recess into our understanding of cognitive development. The proprioceptive system is responsible for modulating vestibular and tactile input, and the body's proprioceptive system functions in calming other sensory inputs and the receptors between joints, muscles, and tendons (Berkey, 2009). Alderman is currently researching whether low-intensity exercise favorably influences job productivity (2010), while other research studies have demonstrated a positive relationship between physical activity and academic achievement in students (Dwyer, Sallis, Blizzard, Lazarus, & Dean, 2001; Pesce, Croca, Cereatti, & Bellucci, 2009; Wittberg, Cottrel, Davis, & Northrup, 2010; Wittberg, Northrup, Cottrel, 2009). Castelli studied the relationship between physical fitness and academic achievement in third and fifth graders (2007), while Henning et al. studied work productivity when participants were given frequent short breaks from computer tasks (1997). Overall, physical activity provides the brain with renewed supplies of blood and causes natural chemicals to secrete which support neuron connectivity (Healy, 1995).

Proprioception is based in neuroscience research, and understanding sensory processing gives support to the theory that opportunities to relieve stress through free play and movement can have positive impacts neurologically (Milteer, Ginsburg, & Mulligan, 2012; Toporowski & Ellis, 1986). Humans produce stress chemicals, and these have a demonstrable effect on the sympathetic nervous system. It is not difficult to consider the possibility that through decreasing stress chemicals through physical

activity, we can in turn increase academic attention and subsequently, achievement. Researchers have begun to examine the impact of physical activity on academic achievement elementary school setting for its impact on outcomes (Hillman, Pontifex, Raine, Castelli, Hall, & Kramer, 2009; Reed, Einstein, Hahn, Hooker, Gross, & Kravitz, 2010). Sensorimotor and environmental factors have a profound effect on children's learning, and incorporating student's needs for movement through recess breaks can maximize the link between movement and learning (Berkey, 2009; Bundy, Luckett, Naughton, Tranter, Wyver, Ragen, Singleton, & Spies, 2008; Sibley & Etnier, 2003).

Sensorimotor applications can support areas such as increased attentiveness, improved writing skills and fine motor ability, promoting imaginative play, recognizing and minimizing students' stress; decreasing restlessness and increasing attention (Berkey, 2009, Sibley & Etnier, 2003). Movement during recess breaks can address the needs of all students to assist them with concentration and provides an outlet for healthy impulse discharge, helping to control impulsivity and reducing problematic classroom behavior, and better focuses students' attention on content instruction (Milteer, Ginsburg, & Mulligan, 2012; Thorne, Thomas, & Lawson, 2005; Toporowski & Ellis, 1986). It also gives students an opportunity to digest information and to integrate newly introduced concepts into real-world applications (Sibley & Etnier, 2003). Further studies will be required to understand if these same movement principles apply to students and learning outcomes. The importance of this physiological research lies in understanding that what comes before and after heavy sensory input which promotes the integration of the information (Berkey, 2009).

Brain research. The implications of brain research and its effect on learning connections are in their infancy, with the full understanding of their interactions still emerging (Jensen, 2012; 2000; 1998; Willingham, 2008). In the last few decades, scientists have uncovered novel conceptualizations about the inner workings of the brain and how human's learn via complex imaging technology and brain studies (Goswami, 2004; Hall, 2005). Advances in medical imaging have led to breakthroughs regarding potential links between a strong mind and a healthy body, including the role that oxygen saturation levels, increased serotonin levels, and neural differentiation plays in brain development (Basch, 2011). As researchers gain further appreciation of neuroscience-based understandings of how brain functioning occurs, these new understandings will have the potential to change the way educators approach learning (Jensen, 2012).

Young children have a high level of plasticity in their brains. The ability to alter neural pathways allows for a high degree of growth and the potential to improve cognitive functioning given the proper conditions (Basch, 2011; Casey, Giedd, & Thomas, 2000; Noble, Tottenham, & Casey, 2005). As brain research develops, researchers are finding that a continual growth and development of neural pathways occurs in response to learning (Brookhart, 2009). Scientific research has uncovered that cognitively, young children are not as well designed for goal-directed behaviors as they are capable of learning from their environment (Tullis, 2011) and experience shapes brain development at a number of levels from simple to complex (Greenough, Black, & Wallace, 1987). Additionally, specific sensitive periods exist during brain development that pre-dispose children to depression and anxiety disorders, and the cognitive learning that occurs during play is an essential component of pathway development (Tullis, 2011).

As cited previously, neuroscientists have begun to make further connections between racial and ethnic disparities with cognitive development and school readiness by studying specific brain-based functions that are affected by environmental stimuli (Nobel, Tottenham, & Casey, 2005).

Research by Zigmunt-Fillwalk and Bielello (2005) discussed findings in brain research and the impact that excessive periods of instruction have on cognitive functioning, while Kounios and Jung-Beeman (2009) used brain research to map how moments of understanding occur (Brookhart, 2009; Demster, 1988; Toppino, Kasserman, & Mracek, 1991). These researchers concluded that mental fatigue and the ability to attend to cognitive tasks develops as a part of cognitive maturity, and that cognitive tasks that exceed these fatigue limits are essentially fruitless. Brain research has estimated that the upper limit for the human brain to maintain focused attention is approximately twenty minutes. After that time, the brain begins to wander, reflect, consolidate, and rest (Brookhart, 2009). Pellegrini and Davis (1993) found that for children in Kindergarten through grade four who are exposed to long periods of sustained tasks without breaks demonstrated lower levels of attention overall when compared to learning that occurred over shorter periods of attention interspersed with breaks. This research was supported by Norvell, Ratcliff, and Hunt in their investigation of first grade literacy acquisition after recess breaks (2009). Brain research-based learning theory supports problem based learning, such as the type of learning that occurs during play and unstructured learning. The brain appears to function at its best in a state of relaxed alertness when there is an absence of threat, and when focused learning is based on prior knowledge (Connell, 2009).

The World Health Organization (WHO) described *mental health* as not merely as the absence of mental illness but the presence of "a state of well-being in which the individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to his or her community" (WHO, 2004, p. 12). The combined effect of play serves to promote mental health. Play allows children to exert self-control and to learn to regulate their emotions. Other critical functions of play include the ability to make friends, to learn how to get along with others, and provide an opportunity to experience joy. Gray has gone as far as to document the simultaneous decline of play with the increase in childhood psychopathology (2011). Gray contends that play promotes five critical functions for children and functions as the major means by which children develop intrinsic interests and competencies and learned decision making and problem solving skills. Schweinhart and his colleagues followed low income three and four year olds through early adulthood, and found that almost 50% of those who attended 'academic' preschool had emotional problems, as opposed to only 6% of those who attended a 'play' based preschool (1997).The students who attended the play based preschools also had fewer felony arrests as adults and spent less time in special education classes.

Lessons from special education research. The implication that instructional breaks are worthwhile when deliberating whole child development and cognitive success is born from the customary use of breaks as a valuable accommodation tool in special education. In the field of special education, opportunities for instructional breaks are recognized as an important component for addressing mental fatigue in students and as a means for regrouping and refocusing (Mulligan, 2011; Ridgeway, Northrup, Pellegrini,

Larue, & Hightshoe, 2003). Research on students with Attention Deficit Hyperactivity Disorder (ADHD) has underscored the benefits to students that are derived from instructional breaks (Mulrine, Prater, & Jenkins, 2008, Ridgeway, et al, 2003; Silver, 2005). Movement breaks and movement activities built into the daily schedule were shown to reduce problem behaviors, and to promote better focus on content instruction. This physical activity provides an outlet for healthy impulse discharge and promotes improved attention. Ridgeway et al. (2003) used a match pairs study design to differentiate the time during the school day when off task or inappropriate behaviors occurred for students with and without ADHD. They found that inappropriate behaviors were more frequently observed on non-recess days, and subsequently escalated throughout the course of non-recess days. On days when a recess break was given, a decrease was noted in inappropriate behaviors that occurred, and this improvement was notably sustained throughout the day (2003).

Jarrett, Maxwell, Dickerson, Hoge, Davies, and Yetley (1998) implemented a behavior time sampling program to research the correlation that recess breaks have on off-task behaviors. On days that recess was offered, off-task behaviors decreased by the students, and there appeared to be a sense of renewed interest in academics in the post-recess period. On non-recess days, the students demonstrated increased fidgeting and off task behaviors. The researchers discussed consistent interventions implemented for students with Autism Spectrum Disorder (ASD) and demonstrated that recess interventions improved problem behavior, social skills, play, and communication, and further demonstrated that children with ASD can make significant educational progress during recess. Harper, Symon, and Frea (2008), as well as Langa, Kuriakose, Lyons,

Mulloy, Boutot, Britt, Cartuthers, Ortega, O'Reilly, & Lancioni (2011) conducted research supporting the benefits of recess opportunities for students with Autism Spectrum Disorders. Specifically, the researchers stressed the importance of recess as an opportunity for students to model appropriate behaviors, learn functional skills, and increase peer social abilities such as turn taking. Research by Sit, McKenzie, Lian, & McManus (2008) further illustrated the positive influence of increased activity on students with mild intellectual disabilities in two schools for the disabled.

As increasing numbers of students with Individualized Education Plans (IEPs) participate in standardized testing, educators have become proficient at providing accommodations to the test format while not altering the underlying academic construct or validity of the test (Abedi, Kao, Leon, Sullivan, Herman, Pope, Namibar, & Mastergeorge,). In 2005, 42 states allowed for test breaks as a reasonable accommodation during standardized testing (Lazarus, Thurlow, Lail, Eisenbraun, & Kato, 2006) and allowing for breaks are one of the most commonly provided and accepted testing accommodations (Abedi, et al., 2008). The National Association for Educational Policy compiled a report of the most frequent accommodations offered during standardized testing that are supported by state policies (Bolt & Thurlow, 2001). Test breaks are listed as one of the ten most commonly prescribed accommodations for students taking standardized tests, with the test break accommodation offered as a means to support students in need of interventions in order to complete standardized testing. These policies emphasize the productivity and benefits that are realized from the inclusion of breaks for students with testing difficulties, including the ability to focus and concentrate for long

periods (Christenson, Decker, Triezenberg, Ysseldyke, & Reschly, 2007; Elliott, Thurlow, Ysseldyke, & Erickson, 1997).

Additional research is necessary to further interpret the implications that giving breaks during testing would offer for typical students, especially for elementary aged students. Research by the National Center for Research on Evaluation, Standards, and Student Testing (2008) considered the benefits of offering test breaks routinely offered to special education students during standardized reading assessments, and suggested further research for possible implications for non-disabled peers, and specifically to understand how breaks may alter the validity of these assessments. Under the controlled setting of standardized testing, the benefits associated with breaks could be analyzed for all students. This would require large scale participation to determine if benefits could be derived from breaks for all students and the alteration of standardized testing format and protocol. While it is widely accepted in special education that students with concentration issues will perform better when they are given breaks during the testing sessions, the argument can be made that typical students would benefit from breaks as well (DiCerbo, Stanley, Roberts, & Blanchard, 2001). Although test protocols are purposely structured to standardize the administration among schools, the consequence might be an over structured format that does not provide the best environment for demonstrating subject mastery. If the goal of standardized testing is to evaluate content knowledge, then logically, the objective would be to provide a testing environment that ensured the highest level of success for every student to demonstrate their mastery of the subject material.

Recess across industrialized nations. Americans have struggled with understanding where our school systems fall short on academic achievement when compared to other industrialized nations. The National Council of Teachers of Mathematics (2010) offers some insights as to why the Japanese educational system seems to prepare their students better, which includes many areas that are not realistically changeable by school leaders, including cultural and familial norms and attitudes regarding school that differ in other countries. However, the length and frequency of breaks was noted as significantly different and worthy of further investigation. This research was supported by Pellegrini and Bjorklund (1997), who studied elementary school recess in Minnesota, Taiwan, and Japan. Interestingly, they found that not only are school days longer in Japan than in American schools (8 hours versus 6 ½ hours), the extra time Japanese students spent in school is spent on morning stretching, short recess breaks, and other less structured or non-academic activities (Jarrett, Maxwell, Dickerson, Hoge, Davies, & Yetley 1998; Stevensen & Lee, 1990). In Japanese schools, the students are given a ten- to twenty-minute break for every forty-five minutes of instructional time (Jarrett, et al., 1998; Stevensen & Lee, 1990). In the United Kingdom, students receive three standard breaks throughout the school day; in addition to short breaks in the morning and afternoon, they receive eighty to ninety minutes each day for their lunch break (Pellegrini, 2005). Taiwanese students are allotted multiple breaks as well, including down time between academic subjects.

Not only do these break periods promote socialization with classmates, the researcher believed that breaks at the elementary level promote lower levels of psychological stress and they leave students revitalized for class and paying closer

attention to the teacher (Jarrett et al., 1998). These findings correspond to research based in the US on the benefits of recess, which had similar conclusions (AAP, 2012; Jarrett, 2002; Sibley & Etnier, 2003). Successful models that exist outside of the United States for increased breaks during the instructional day can be used to foster understanding of how and why these models work.

Summary of the Literature

The importance of play for increasing social interactions, as a support for cognitive processing, and as a vehicle for developing emotional regulation, has become de-emphasized in the contemporary education landscape (Carlsson-Paige, 2008; Pellegrini, 2005). Although the components that comprise our understanding of what it means to 'play' have been shown to support aspects of cognitive and emotional development that are not often associated with typical classroom requirements (Pellegrini, 2005, Pellegrini & Bohn, 2005), the opportunity for play is disappearing from the contemporary educational landscape. Play requires children to negotiate and collaborate, develop self-control, and delay gratification (Dills, Morgan, & Rotthoff, 2011; Bergen and Fromberg, 2006; Pellegrini & Bjorkland, 1997), and provides an opportunity to improve cognitive skills, including the use of preplanning and symbolic representations (Pellegrini & Bjorklund, 1997; Piaget & Inhelder, 1969).

Recess offers students the opportunity to learn through hands-on and exploratory experiences which impacts their overall maturity, increases their confidence in their abilities, and allows them to master language and social interactions with peers (Bjorkland & Brown, 1998; Pellegrini, 2005; Ramstetter, Murray, & Garner, 2010).

Recess has been shown to play a crucial role in the development of the whole child and in the development of lifelong skills necessary for social negotiation, problem solving, cooperation, and emotional health. As a result of societal changes, students have decreased access to free social play opportunities outside of the school day (Kimbro, Brook-Gunn, McLanahan, 2011). This is increasingly common among students from lower socioeconomic backgrounds (Johnson, McGue, & Iacono, 2005; Pallas, 1989).

One of the primary responsibilities of education leaders is to facilitate effective teaching and learning within the overall goal of enhancing student achievement through shaping the environment and context where learning takes place (Newstead, Saxton, & Colby, 2008; O'Donnell, 2005). This research has addressed a shortage that exists in the field of education research in terms of access to recess and the disparities that exist for students access to recess based on their socioeconomic background. Current reliance on standardized testing outcomes alone as a measure of school success does not address critical aspects of child development and fails to provide students with optimal learning environments. This dissertation attempts to demonstrate how the disparity that exists between access to resources for those who live in poverty is mirrored by a disparity in access to recess opportunities in schools.

Limited education research has been devoted to studying the correlation between access to recess and specific district identifiers such as income levels and locale. The increased reliance on federal and state mandates that link funding to academic outcomes has resulted in many districts' eliminating recess breaks in a drive to increase the time allocated for instruction (Pratt, 2011; Pelligrini, 2005; Pelligrini & Brjorkland, 1997). Access to recess is further impacted by socioeconomic and district factors that result in

unequal access to recess breaks for the impoverished and minority groups (Lee & Burkham, 2002). The increased reliance on data driven decision making by administrators requires education research be available to support recess based decision making at all levels.

CHAPTER III: METHODOLOGY

Introduction

The researcher used a quantitative study design that included data collection that was closed-ended and structured (Slavin, 2007). The research used data gathered from publicly available databases that was measurable and useful for statistical analysis, and was used to provide a contextual framework for the data. The purpose of the intended design was to gain an understanding if relationships exist between school socioeconomic status, urbanicity, and access to recess. It was intended to be included in the discussion of the impact of school level decisions on recess breaks and to add to the grounded empirical research-based understanding of those practices that influence access to resources for underserved populations. The study was designed to evaluate the data on time at recess based on information that is located in state and national databases in order to understand the relationship between district locale, the allocation of resources, and access to recess as a critical component in providing a high quality school environment.

To avoid a fundamental error in the research design, the researcher used a research model that was a quantitative study with a limited scope. The data obtained was then presented in a numerical, objective way, in order to provide some indications that correlations existed and are worthy of future investigation. The value of well-designed quantitative research lies in its independence from subjectivity (Slavin, 2007). If, in fact, the research conclusions herein reject the hypotheses, the researcher would suggest follow up research of qualitative or mixed method design as appropriate to further explore our understanding of the decision making process in respect to recess determinations. Through a restriction on the number of variables that were analyzed, it

was anticipated that the researcher would capture the complexity of the data, without creating a forced simplicity that resulted in a study that was stretched thin and provided little reasonable chance of success. However, this restriction on variables analyzed serves as a limiter on the ability to draw conclusions and generalize the results.

Through this inquiry, the researcher has endeavored to identify if a relationship exists between a schools' socioeconomic status and the locale of the school district when compared with the opportunity for recess breaks within the school day. Specifically in terms of recess, this research has sought to clarify the relationship between a schools' socioeconomic status, as described by the ratio of students who are eligible for the Federal Free Lunch program to the total school population, and the locale of the school, in comparison to the length of recess time within the school day that is afforded to students. This research has focused on Public Elementary Schools in the State of New Jersey, which report their data on the New Jersey School Report Card as established by the State of New Jersey, for the year 2010, as well as publically available data gathered from the National Center for Education Statistics for 2009-2010.

Research Questions

1. There is no significant statistical relationship between Low, Middle, and High socioeconomic status schools and the locale of the school as correlated to the access to recess opportunities in school.

2. There is no significant statistical relationship between Low, Middle, and High socioeconomic status schools as correlated to the access to recess opportunities in school.

3. There is no significant statistical relationship within Low, Middle, or High socioeconomic status schools, the locale of the school district, and the access to recess as correlated to the recess opportunities in school.

A pilot study was conducted to evaluate the use of the original variables identified and to determine the feasibility of a larger analytical analysis. The focus of the pilot study was to determine if a preliminary relationship existed between a school districts' socioeconomic status (SES) and the length of the school day that was allocated for recess. The proposed instrument was piloted to identify potential concerns regarding procedure and protocols, and to clarify any uncertainty in data gathering and responses. The importance of piloting the instrument prior to use was emphasized by Gudmundsdottir and Brock-Utne (2010; Slavin, 2007). They reported that the results of research studies can be fundamentally altered if the researcher fails to properly pilot their research instrument and then make the necessary alterations prior to the study implementation. They further implicate that this is an area that is often underemphasized in the design of quality research protocols.

After reviewing the conclusions from the pilot study (Sofield, 2011), the variables were modified and incorporated into the recent study design to recognize and account for the complex relationship that exists between the variables, and the potential statistical significance that these variables have on recess opportunities. It was clear from the inconclusive results of the pilot study that the variables must be re-evaluated in an attempt to eliminate the noise that existed in the pilot study results. In an effort to more clearly address the research questions, the researcher modified the design of the study to

include variables which appear significant in describing the relationship that exists between school socioeconomic status and locale with the allocation of recess time as identified in the research literature.

The pilot study Analysis of Variance (ANOVA) provided a statistical analysis of the relationship between the means of three District Factor Group (DFG) clusters; *Low DFG districts, Middle DFG districts,* and *High DFG districts*, in evaluating the null hypothesis, that the mean time spent on Instructional Breaks is equal between the clusters, regardless of which DFG cluster the school district fell into. The researcher anticipated that the analysis would disprove the null hypothesis and conclude that the DFG of the school district attributes to a statistically significant difference in the mean time spent on Instructional Breaks between the three clusters, specifically, that the *Low DFG* school districts had fewer minutes spent on Instructional Breaks when compared to the *Middle DFG* and *High DFG* school districts. Using an F distribution, the researcher compared the mean time on *Instructional Breaks* for these sample groups using a one way ANOVA. The results of the pilot study were inconclusive, since a statistically significant relationship between the identified variables was not established.

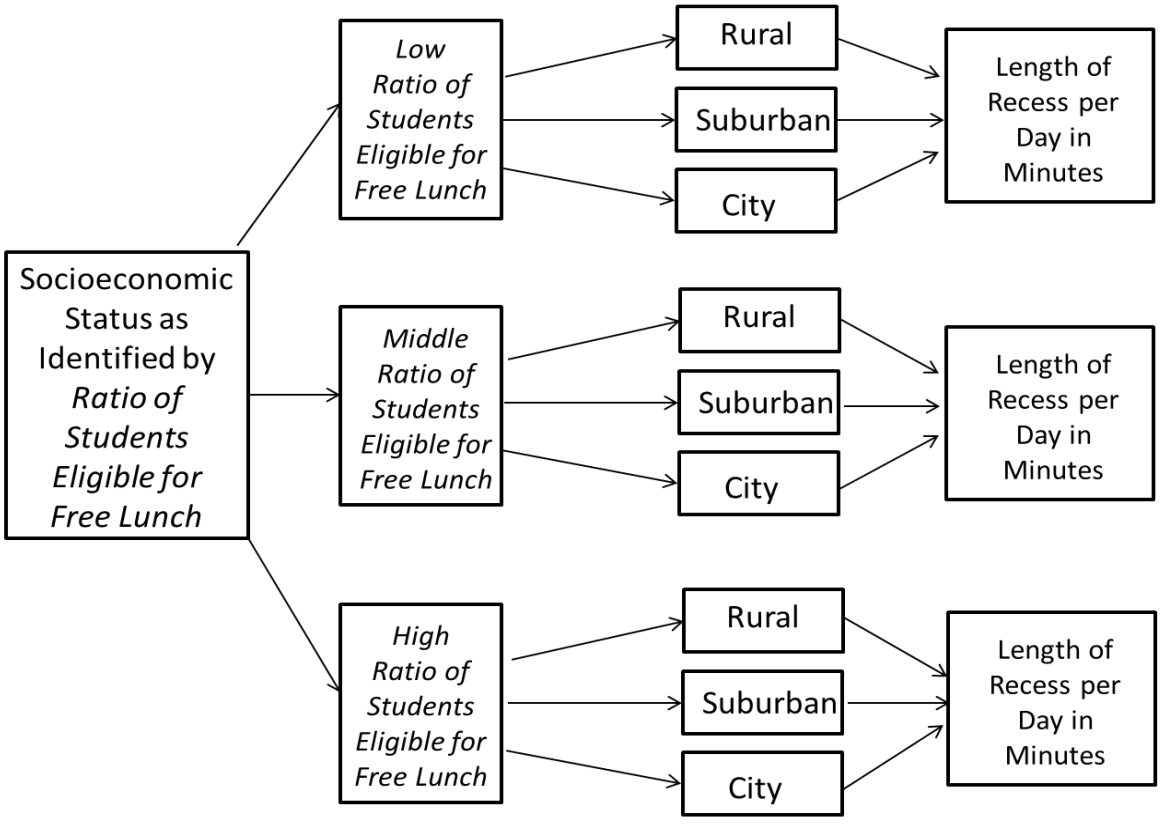
The current research design was revised to more clearly describe the variables in the overall relationship of interest, and the research study was restructured to address these additional factors. In order to better define this relationship, the researcher modified the independent variables and formatted the design of the current research study as a multiple linear regression analysis to more accurately explain the relationships of interest. The current research design is conceptualized in Figure 1.

Research Variables

Socioeconomic status. The measures for determining the wealth or poverty of a school district is complicated at best, and the criteria used for determining socioeconomic status levels are largely driven by the results that the formula is designed to measure (Ravallion & Sen, 1996). Poverty

Figure 1

Conceptualization of Methodology



determinations are complex and arguments have been made against using income based determinations of wealth alone (Ravallion & Sen, 1996; Wagle, 2002). In New Jersey, progress towards making AYP has been the driving factor for creating a classification method to provide comparisons between similar groups towards the attainment of the benchmark achievement standards. The classification system designed by the state is the District Factor Groups (DFGs). The DFGs calculations are a complicated formula of attributes linked to socioeconomic status, and are the relative measure of wealth for public school districts in New Jersey. The State of New Jersey cites that comparisons of progress towards AYP for evaluative purposes are intended to be made between schools within the same DFG group (State of NJ Department of Education, 2010). This measure has been specifically designed to confer comparative data among school districts in New Jersey for use in monitoring progress towards the attainment of benchmark standards. However, the locale of the school district is not a factor considered in the calculation of DFG (State of NJ, 2010).

In contrast to the New Jersey DFG classification methods, eligibility for the Child Nutrition Programs (referred to in this study as the Federal Free Lunch programs) are regulated by the US Department of Agriculture using guidelines applied to students across the United States based on income limits that are updated annually (2012). The guidelines are specifically designed to measure poverty, and not intended for use as a comparison tool *per se*. The USDA defines income eligibility specifically as earned income and income received from Social Security and public assistance (p. 17005). While the Free Lunch eligibility criterion includes income guidelines (USDA, 2012), it is not reliant on other measures, such as levels of education and employment rates, that

influence a school districts' DFG categorization using the New Jersey method. This is because the Federal guidelines are looking at poverty from a *de facto* standpoint: Income equals access to a nutritious lunch. There are no attempts to equate free lunch eligibility with comparative progress towards benchmark curriculum standards. The Federal Free Lunch eligibility information is made publically available (USDA, 2012), and includes the numbers of students eligible for Free Lunch and Reduced Lunch based on these Federal guidelines.

While the pilot study used AYP as the measure of Socioeconomic status (SES), the researcher has concluded that the Free Lunch eligibility criteria was pertinent for use as the independent variable for SES for these research purposes, and replaced the DFG variable from the pilot study with the *Free Lunch Eligibility Ratio*. The number of students who are eligible for Free Lunch at each school is detailed in the free lunch data that is located in the NCES Report (2010). This data allowed the researcher to create a formula to sort the districts by the ratio of the number of students who are eligible to receive free lunch, based on the federally established criteria and as counted by the district, in comparison to the total number of students enrolled at the school.

The schools were sorted by the ratio of students eligible for the free lunch program (*f*) as a percentage of overall school population from lowest to highest percentage (rounded to the second decimal). The groups were stratified into three categories Low Ratio (0% to 33.33%), Middle Ratio (33.34% to 66.66%), and High Ratio (66.67% to 100%) of students eligible for free lunch as a percentage of the overall school population. None of the sampled schools selected overlapped categories by falling into multiple strata. Five of the sampled schools were eliminated before the final analysis due

to unreported data. The benefit of using a stratified sample includes greater precision than a simple random sample of the same size, allowing the researcher to use a smaller sample size. The researcher selected a sufficient sample to support a separate analysis within any strata. Once the population of schools was separated into the stratum, a simple random sample of schools was selected from within each stratum using a random number generator. The sample of schools selected was in proportion to the stratum's size when compared to the total population of schools.

In this study the income level was considered separately from the urban-centricity of the district, since the access to recess may be further limited or enhanced by the availability of space and similar considerations which are location based and not income based. Additional data was then collected on the selected schools for study purposes using publically available reported fiscal, performance, and environmental data retrieved from the NJ State Report Card 2010 database.

Urban-Centric Locale. The socioeconomic categorization *Free Lunch Eligibility* alone fails to incorporate an important school district factor that is deemed relevant to access to recess, and that is the urban-centric locale of the school district; specifically, whether the district is urban or rural in composition. The researcher anticipated that access to recess, as well as the opportunity for safe outdoor unstructured play, was more strongly connected to the location of the school (urban or rural) more so than the overall poverty level of the district (free lunch eligibility). For example, opportunities for recess were anticipated to differ between a high free lunch ratio school in an urban district when compared to a low SES school in a suburb based on factors related to locale, not income.

In New Jersey, large urban districts with little access to safe outdoor play space might be categorized within the same free lunch ratio category as a small rural farm district, because the free lunch eligibility categories are income based, not population/locale based. On the contrary, these same two districts may have quite different DFG assignments. Therefore, knowing the locale of the school, when used in conjunction with the free lunch eligibility ratio, was a variable worthy of consideration in the discussion of access to recess.

In an approach designed to most appropriately categorize the variables to reflect the proposed research questions, the school districts for this study were assigned a *Locale* (*l*) variable using the National Center for Education Statistics (NCES) report data from 2009-2010 which identifies schools by locale. The *locale* variable was assigned to each school district, as a measure of the districts' location relative to populated areas. This variable was modified on the NCES database tables beginning in 2006-07, based on the year 2000 census, to better describe the urbanicity of a school district. This urban-centric *locale* variable was designated as a second variable along with the socioeconomic variable *Free Lunch Ratio (f).*

The randomly selected schools were further sub-categorized within their free lunch cluster to include a specific locale variable as identified on the NCES database. Locale codes were grouped into three categories: *City* (1), *Urban* (2), or *Rural* (3). This variable was used during the post hoc analysis to understand if correlations exist between these subgroups. The locale variable was used to compare the schools within a group to add clarification to the data; specifically to understand if a relationship exists between

access to recess and the locale of the school while holding the income variable (*free lunch ratio*) constant. Ad-hoc T-test comparisons were made to compare subgroups within and between the free lunch ratio groups to clarify the understanding of the interaction between the variables if the initial regression is significant and worth further analysis.

Time at Recess. For the purposes of the proposed research, the term *recess* consisted of specific time during the school day that has been set aside for the sole purpose of allowing students to engage in unstructured activities. The initial definition of recess for the pilot study focused on the term 'recess breaks' as unstructured time not set aside specifically for the purposes of academic learning. While preparing the pilot study, it became apparent that a direct, concise measure of recess could not be gathered from the publicly available self report data that exists in the 2010 New Jersey State Data Report Card. Because length of time at recess is not counted *per se*, the researcher created a formula to identify time spent on recess breaks from the available data, since any discrepancy between accounting procedures among districts would hinder an accurate measurement of time at recess. In order to calculate *Time at Recess (tr)*, the researcher obtained the *Length of the School Day* (*l*) as reported on the New Jersey State Report Card database, and then subtracting this number from the length of time the district reported spending on instruction, *Time on Instruction (i)*, during the school day. The remainder of unspecified time was designated as *Time at Recess (tr)* for the purposes of the study.

As a result of this method, the suggested computation of *Time at Recess* (*tr*) captured time at lunch within the measurement. However, the researcher concluded that time spent at lunch is an unstructured break time which allows for socialization and a mental fatigue break, and therefore is appropriately included within the measure. Additionally, many elementary schools regard the 'lunch' period as a mixed purpose allocation of time which allows for eating and a recess break, generally without accounting for these times separately. Attempts to dissect these functions would create difficulty in making accurate comparisons between school districts. For clarification, the concept of *Recess* was conceptualized in this study to be used interchangeably with the term *Instructional Breaks*. Any school time that was curriculum driven or instructional in nature, such as during Physical Education class, was not counted as recess time for the purposes of this study. The American Academy of Pediatrics agrees (2012) that the benefits derived from recess are unique, and it is not a substitute for Physical Education (PE) classes. Recess offers complementary benefits to the curriculum driven nature of PE, including creative, social, and emotional outlets for students.

Time at Recess (tr) was calculated using the self-report data provided directly by school districts regarding the length of instructional day, population statistics, and district costs for educating students (State of NJ, 2010). *Time at recess (tr)* was a calculation that was expressed as the *Length of School Day (s)* minus the *Length of Time on Instruction (i)* as reported on the New Jersey School Report Card Database. *Time at recess (tr)* was expressed in terms of minutes spent in recess, in contrast to minutes spent on instruction. The *Time on Instruction (i)* was taken from the NJ State Report Card data, which includes self-reported public data. Using the random sample, the researcher used the information

self reported on the NJ School Report Cards to calculate the *Time at recess* (*tr*) in minutes for each selected school by using the data for *time on instruction* (*i*) and subtracting this from the *length of the school day* (*l*).

A second computation was also calculated to describe the time spent at recess in relation to the length of the school day. This variable was introduced to further clarify the length of time at recess as a percentage of the length of the overall school day, and is intended to further clarify the data regarding the time at recess. The *Time at Recess Percentage* (*tr%*) was calculated as the *Time at recess (tr) divided by the Time on Instruction (i),* with the result expressed as a percentage of the *Length of School Day (s).* The use of the second method of calculating recess was intended to account for the discrepancy that exists in the length of the school day among the school population. By calculating the length of recess using two methods, the researcher expects to have a clearer understanding of access to recess as a function both in minutes and a percentage of the larger school day.

Data

The data used for the study comes from pre-existing publically accessible informational databases that are maintained on the state and national level which are voluminous in nature. The researcher intended to limit the scope of this aspect of the study to the report of the specific variables identified, such as *Federal Free Lunch* and School Population data, School District *Locale* information, and the calculated *Time at Recess* variables. The population for this study includes Elementary Public School Districts in the State of New Jersey. Elementary Schools in New Jersey are classified by

the NJ Department of Education as those schools which are responsible for educating students in Preschool through grade Eight, inclusive (2010).

Using the custom data table feature located at the NCES website, several parameters were used to select *public primary schools in New Jersey*, as these are the subject of the inquiry. Using the NCES Common Core of Data (CCD), "Public Elementary/Secondary School Universe Survey" 2009-10 and "Local Education Agency Survey" 2009-10 v 1.a data available through the NCES website, the school districts were first sorted to select New Jersey school districts. In the tables, districts that are coded one or two were selected, as these represent public schools and eliminate charter, regional, and special population school districts from the study. From this range of public schools the list was further limited to primary schools, using parameters to limit the *Lowest grade* as *PreK* and the *Highest grade* as *fifth*. This resulted in a list of 1022 individual schools which met the criteria for inclusion in the study. Of these schools, twenty-three did not report data for the number of students eligible for free lunch, and they were subsequently excluded from the study population.

Research Methodology

A multi-staged sampling technique was employed to capture the complexity of the research. Using the free lunch data located in the NCES Report (2010) allowed the researcher to create a formula to sort the districts by the ratio of the number of students who are eligible to receive Federal Free Lunch as compared to the total number of students enrolled in the school based on the federally established criteria and as counted by the district on a scale from 0% to 100%. A calculation was performed to determine

the ratio of students eligible for the Federal Free Lunch program as a percentage to the overall school population for each of the schools using an Excel spreadsheet. The schools were then sorted from lowest to highest percentage of students eligible from zero percent to 100 percent (rounded to the second decimal), and this calculation was used as the socioeconomic variable designed for the first research question.

The groups were also stratified into three categories *Low Ratio* (0% to 33.49%), *Middle Ratio* (33.50% to 66.49%), and *High Ratio* (66.50% to 100%) of students eligible for free lunch as a percentage of the overall school population. None of the sample schools overlapped by falling into multiple strata, as each school could only have one distinct ratio assigned to it based on enrollment figures. The schools were assigned to one of three groups based on their Free Lunch ratio (*Low, Middle, or High*). It is noted that the assignment of a particular school into a specific range of fixed ratios resulted in a disproportionate division of schools amongst the groups. The stratified sorting resulted in 739 public elementary schools in New Jersey being classified as "*Low* Ratio," which represents 72.31 percent of the total eligible school population. 161 schools classified as "*Middle* Ratio," which represents 15.75 percent of the population, and 98 schools were classified as "*High* Ratio" of free lunch eligibility to total school population, which represents 9.59 percent of the population. The stratified sample was used to select the random sampling of schools proportionately among the groups, and for comparisons among the subgroups relative to research question number three.

The subsets of the strata were pooled and a random sample of schools was selected from each stratum in proportion to the stratum's size when compared to the total

population of schools (Table 1) using a random number generator for each strata. The benefit of using a stratified sample included greater precision over a simple random sample of the same size, which allows the researcher to use a smaller sample size. The researcher selected a sufficient sample to support a separate analysis within any strata. The assignment of a particular school into a specific range of fixed ratios resulted in a disproportionate division of schools among the groups.

Table 1

Strata and Sample Size Calculations

Strata	*Low Ratio*	*Middle Ratio*	*High Ratio*
Population Size	739	161	98
Sampling Fraction	1/10	1/10	1/10
Final Sample Size	74	16	10

During the second step of the sorting process, ten percent of each group was randomly selected using a random number generator which was set specifically to reflect the number of schools in the group. This resulted in a study population of n_l = 74 *low ratio*, n_m =14 *middle ratio* and n_h =10 *high ratio* participants. Additional data was then collected on the selected schools for study purposes using the publically available fiscal, performance, and environmental data retrieved from the NJ State Report Card 2011database. Using the random sample, the researcher used the information self reported on the NJ School Report Cards to calculate the *Time at Recess* (*tr*) and the

Percentage of Time at Recess (tr%) for each selected school by using the data for *Time on Instruction* (*i*) and the *Length of the School Day* (*s*).

Through the use of the data available from these resources, the researcher sought to identify correlations that may exist between the target variables, identified as the socio-economic level of the district, the locale of the school district, and the length of time students spend at recess. Data analysis was performed using a Multiple Regression Linear Analysis within the Excel spreadsheet program to perform inferential analysis, including statistical significance and reliability measures such as alpha levels and residual plots. One important statistic that was attended to was the reporting of effect sizes and confidence intervals in assessing statistical significance of the outcomes. Sun, Pan and Wang (2010) evaluated 1,243 research studies that were published in academic journals in the areas of education and psychology to evaluate the use of effect size and to provide a guideline for quantitative researchers when proposing research studies. They concluded from their investigation that the use of calculation and reporting of effect size adds to the research studies in answering the research questions through the strength of associations. Byrd and Eddy (2009) reported similar results in their analysis of the use of confidence intervals and the use of effects sizes in educational journals. Byrd and Eddy found similar results to Sun, Pan, and Wang (2010) and stressed the importance of reporting confidence intervals and effect size information in providing the audience with a complete interpretation of the results.

The researcher used a Multiple Regression Linear Analysis to compare the means of the independent variables using a two tailed test of the null hypothesis at the $p < 0.05$

Level of Confidence to determine if the difference between the means was statistically significant. The variables of interest were the *time at recess* and the *socioeconomic* status and *locale* of the school, with further comparison made among groups of schools assigned to the *low, middle, and high ratio* groups of free lunch, and the interaction between the factors. If the *F observed* was less than the critical value ($\alpha < 0.05$), the researcher would conclude that there was a statistically significant difference between at least one of the means. Then individual comparisons could be made between the groups using two-sample t-tests to test for a difference of means for each pair of groups and subgroups by performing pairwise comparisons between groups (*low ratio to high ratio, medium to high*, etc).

A two–tailed analysis of the data was warranted for this research design, since the researcher did not have previous research data to support a possible correlation (positive or negative) that might exist between the identified variables. Data collected on the length of *recess* was correlated to the *free lunch* ratio and *locale* identifiers as the basis for determining if significant correlations existed between recess and income or school locale. The researcher proposed the null hypothesis for the study that there is no statistically significant correlation between schools relative to their free lunch population and the locale of the school when compared to time spent at recess. The sample schools for this research study were considered independent as each district could have only one specific calculated *free lunch ratio (f)* and one specific *locale (l)* variable. Responses for a given cluster are independent, and selection was based on a simple random sample (SRS) taken from all possible participating districts.

Potential Limitations

As this was an exploratory analysis of the proposed research design, certain data on variables within the design were not practical to collect or did not serve to accurately define the inherent relationships that are occurring. Learning is a complex puzzle and it may be impossible to link outcomes to a few simple quantitative variables. Due to the limited amount of existing research in this area, an area of concern was the possibility that confounding variables exist or that unforeseen limitations obscured the results and interpretation of the data. Correlations between recess time and school locale and free lunch eligibility may be more complicated than predictable and require additional restructuring of the research questions. This illustrated a potential limitation of the design, as the topic was inherently complicated in nature and may have proved too difficult to delineate or too cumbersome for analysis.

The research was intended as a preliminary inquiry in the discussion of the role of recess in public schools, and the consequences of recess decision making on school environment and overall cognitive development. Further research to understand the recess decision making process and to interpret the results of these decisions on student outcomes would be warranted. Future approaches to research in this area are suggested to be qualitative in nature, and would serve to provide a richer analysis of the decision making process, specifically focusing on an in depth analysis of the decision making as it occurs in a sample of the districts within the study.

Although recess time might be clearly incorporated within the school day, other potential inadequacies of the research findings might occur if there are unreported

instances where recess is built into the school day, but school building level administrators allow staff to pull students from recess. Since recess is not a state mandated 'subject' area, the time allotted for recess can be confiscated to incorporate other instructional supports that might be difficult to schedule for particular students, such as a basic skills or resource replacement class, or to provide opportunities for extra help, or as a discipline action. It would be difficult to account for these actions in the research design.

The use of certain variables, such as the variables chosen for the research study was another area of potential concern. Educators and district leaders may disagree with the use of such measures as free lunch ratios and locale as accurate indications of wealth and access. However, the limited pool of previous quantitative research on recess required the use of certain consistent measures in the evaluation for continuity sake. If the research demonstrated some positive correlation between income and recess data, further research would be required to understand the additional relationships on student outcomes and increased achievement.

Significance

At the school and district level, recess decision making should include an understanding of current research-based connections on access to recess and the positive role that recess can play in achieving increased social competencies and whole child development (Pelligrini, 2005; Pelligrini & Bjorkland, 1997). Sustaining and nurturing the components of a successful public school entails understanding what it takes to educate students better, including the connections between educational leadership, staff

interaction, and student achievement (Clark & Clark, 2002; Clark & Linn, 2003). Understanding how to allocate resources within the school day has been proposed as one method for increasing student achievement (Archibold & Odden, 2000).

Essentially, the underlying purpose for providing school opportunities for all children in our society must be re-examined (Spring, 2008). In the 1930s, Eleanor Roosevelt wrote that "the true purpose of education was to develop citizens" (p.1). She suggested that learning citizenship was best accomplished in school where students have the ability to develop team play, cooperation, and thought and consideration for others. Historically, school has been accessible to all children in the United States as a fundamental right and as a means to provide for the common good by having citizens who can fully participate in and promote the democracy (Spring, 2008).

This perspective is still relevant in contemporary education decision making. As educators, we are required to examine what comprises 'education' and to fully understand our intentions for providing education to all children. If, as educators, our desire as a country is to provide instruction in testable skill sets, such as in math and reading, we need to focus on providing a learning environment in schools that delivers the opportunities to learn effectively. If, as a society, we have broader goals for our children and social order, such as reducing the effects of poverty, training a competent workforce, and providing students with the social and negotiation skills necessary to survive in the twenty first century and beyond, we have to stand back and look at the consequences, intended and unintended, of our actions (Spring, 2008).

Significant research exists in the literature that supports the concrete benefits associated with recess and childhood development, which includes higher on-task behavior, improved attention, the development of brain connections, and increased social and negotiation skill development (Carlsson-Paige, 2008; Pellegrini, 2005; Piaget & Inhelder, 1967; Sumpner & Blatchford, 1998). Some of the benefits of recess noted in the literature include higher on-task behavior, improved attention, the development of brain connections, and increased social and negotiation skills (AAP, 2012). The development of social competence is complex, and a child's ability to maintain quality relationships and to function in an increasingly connected and complex society is an important consideration when discussing the development of the whole child (Schacter, 2005).

CHAPTER IV: RESEARCH FINDINGS

Research Question 1

The initial research question focused on a comparison of the ratio of *Free Lunch Eligibility* using a multiple regression linear analysis stipulating that *locale* and *free lunch ratio* were the independent variables, and with the dependent variable of interest identified as the *time at recess,* in minutes or as a percentage, as captured by the data sources. The *Free Lunch Eligibility* was calculated as a percentage from 0% to 100 %. The *locale* variable was set as the constant for *City* (1) schools, with *Suburban* (2) and *Rural* (3) schools used as the comparison groups. Results of the study were interpreted using a quantitative data analysis which served as a tool to either support the null hypotheses, that given the variables analyzed that the research study has failed to detect a correlation between recess and learning outcomes; or to support the conclusion that some relationship exists between the variables identified.

The researcher hypothesized that the *free lunch* variable and the school *locale* variable would have no correlation to the *time at recess* if the null hypotheses were correct, and that the time spent at recess had no correlation to the locale or socioeconomic status of the school district. Through the process of establishing the *free lunch ratio* eligibility and the *locale* subgroups, the researcher has attempted to eliminate the possible confounding effects that might occur due to the socioeconomic status of a school or district in an attempt to create data comparisons that are meaningful. The Variances of the Cluster Means for the populations were shown to be approximately equal in the analysis (Table 2).

Table 2

Variances of the Cluster Means

Cluster	**Variance**
High Free Lunch Ratio	88742.98851
Middle Free Lunch Ratio	89257.74681
Low Ratio Free Lunch	88495.63573

The Regression Statistics for the cluster analysis are provided as Table 3. The adjusted R^2 calculation provides an overall goodness of fit measurement for understanding the ability of the model to predict the *y* variable (time at recess) when given the independent variables *Ratio of Free Lunch* and *Locale*. The resulting adjusted R^2 = .078054 means that 7.8 % of the adjusted variation of the Recess variable (y_r) around the u_r is explained by the regressors (x_f and x_l). This adjusted R^2 value offers little predictability value to the model, and limits the ability for the researcher to predict a dependent *y* value given a set of independent variables. This indicates that a very weak positive relationship exists between the two independent variables and their predictive ability for the dependent variable. The residuals appear normal without obvious outliers, which allows the researcher to have confidence in the data (see Appendices A and B for a complete set of the residuals and probability output).

Eligibility ratio when expressed from zero to 100%. The analysis indicated that as schools reported increasingly higher ratios of the total number of students

enrolled as eligible for free lunch (lower income), that the length of time spent at recess decreased

Table 3

Regression Statistics

Regression Statistics	
R Square	0.1068
Adjusted R Square	0.078053891
Observations	96

proportionally. This result was significant $\alpha < 0.05$ level ($p < .001$) to support rejecting the null hypothesis that the *Time at Recess* in minutes is not equal among schools based on income as measured by the *Free Lunch Eligibility ratio*. As a function of time, the length of time spent at recess decreased by 15.535 minutes on a scale from the wealthiest schools (0% Free Lunch eligibility) to the lowest income schools (100% Free Lunch eligibility). Appendix A and Appendix B contain the Residual data and the Probability data for the analysis.

To corroborate this conclusion, the researcher calculated the MLR using the *Free Lunch Eligibility* ratio of zero to 100%, and calculated the Time at Recess as a percentage of the length of the school day (*tr* %). These results are presented as Table 5. The results of the analysis are statistically significant at the $\alpha < 0.05$ level ($p = .001$)

Table 4

Analysis of Variance (ANOVA) Calculations

Time at Recess in Minutes (tr)

		Coef.	*Std. Err.*	*P>t*
Free Lunch Eligibility Ratio		-15.535	5.925	< 0.001
Locale				
	Suburban	5.810	7.490	
	Rural	-5.197	9.854	
Constant	City	47.271	7.856	< 0.001

to support rejecting the null hypothesis that the *Time at Recess* as a percentage of the *Length of School Day* is not equal among schools based on income as measured by the *Free Lunch Eligibility* ratio. As a function of percentage, the percent of time spent at recess decreased by -0.034 percent of time when calculated on the scale from the wealthiest schools (0% Free Lunch Eligibility) to the poorest schools (100% Free Lunch Eligibility).

Table 5

Analysis of Variance (ANOVA) Calculations

Time at Recess as Percent of School Day (tr)

		Coef.	*Std. Err.*	*P>t*
Free Lunch Eligibility Ratio		-0.034	0.014	< 0.001
Locale				
	Suburban	0.016	0.018	
	Rural	-0.010	0.023	
Constant	City	0.119	0.019	< 0.001

Regression Coefficients. The Regression Coefficients for this sample were statistically significant at the critical value $\alpha < 0.05$. Therefore, we reject the null hypothesis and conclude that for this sample, the mean time spent in *Recess* in minutes was longer at schools within at least one of the *Free Lunch Eligibility* clusters (*low*, *middle*, *high*) when calculated as both a percentage of the school day and in minutes of recess. These results do not give enough information to determine which of the cluster means differs or any additional information that would be required to draw conclusions regarding access to recess, locale, and free lunch eligibility. In order to clarify these results, a post-hoc analysis of the data was conducted to respond to Research Questions 2 and 3.

Post-Hoc Analysis

Research Question 2. The significant p-value obtained in the regression analysis allows the researcher to conclude that, for the sample of the population selected, the time at recess is not equal among schools based on free lunch eligibility and locale factors, and we rejected the null hypothesis for the initial research question. Further analysis is required to clarify which of the cluster means is unequal, and was conducted to describe patterns and relationships between the clusters of the sampled population that would otherwise remain undetected. This analysis served to strengthen conclusions by limiting the probability that significant effects have not been discovered between subgroups of a population that do not exist, or that relationships that do exist remain undetected (*Type I* or *Type II* errors). The regression analysis conducted by the researcher indicated a significant effect on the time at

recess based on the control variables, with a significant difference in means for at least one of the independent variables.

Research question 2 removes the *locale* variable and compares the mean *time spent at recess* (in minutes) between the three *free lunch ratio* clusters using a t-test analysis. Recall that the explanatory variables *Ratio of Students Eligible for Free Lunch (f)* and *School Locale (l)* were divided into the three independent clusters: *Low Ratio of Students who are eligible* (schools with 0 to 33 percent of enrolled students eligible for free and reduced lunch), *Middle Ratio of Students who are eligible* (schools with 34 to 66 percent of enrolled students eligible for free and reduced lunch), and *High Ratio of Students who are eligible* (schools with 67 to 100 percent of enrolled students eligible for free and reduced lunch). The random sampling was performed with a simple random number generator, separately run for each of the three free lunch clusters based on the total number of school possibilities for each cluster.

The clusters of *free lunch eligible* schools for this study (*Low*, *Middle,* and *High*) were not equal, and this analysis did not attempt to quantify the number of students that are enrolled in each district nor assume that an equal number of students were enrolled in each cluster. Using these parameters, the mean time spent at *recess* was calculated for the *low* ratio of sampled schools as $u_l = 50.74$ minutes. The mean time spent at recess for the *high* ratio schools was $u_h = 39.5$ minutes, and the *middle* ratio schools offered a mean of $u_m = 47.27$ minutes of recess during the school day. The individual t-test analysis for each *Free Lunch Ratio* cluster mean (*high, middle, low*) was calculated and compared to the other cluster means. The results are included in Table 6, Cluster Mean T-Test Analysis.

Table 6

Cluster Mean T-Test Analysis, Minutes of Recess

	High Free Lunch Ratio	Middle Free Lunch Ratio	Low Free Lunch Ratio
High Free Lunch Ratio	_	0.0746921	0.026736
Middle Free Lunch Ratio	0.07469209	_	0.28117
Low Free Lunch Ratio	0.02673553	0.2811696	_

The t-test analysis was computed for the means using a two array, two-tailed analysis of equal variance (homoscedastic). The t-test comparison of the mean recess time in minutes for the *Low Free Lunch Ratio* cluster versus the *High Free Lunch Ratio* cluster for this sample, where t = 0 .026736 < 0.05, is significant to reject the null hypothesis, and to conclude that $u_l \neq u_h$; that the minutes spent at *Recess* for the *Low Free Lunch Ratio* elementary public schools in this sample are significantly longer that the minutes spent at *Recess* for the *High Free Lunch* Ratio cluster. There was not a significant discrepancy between the mean minutes of recess between the Low and Middle Free Lunch Ratio (t = 0.2811696) clusters, or between the Middle and the High Free Lunch clusters (t = 0.0746921).

Research Question 3. During the post-hoc analysis the researcher sought to further clarify the results by comparing each group mean *Recess (tr)* time in minutes as correlated to the independent variables, *Free Lunch Ratio (f)* and *Locale (l)* within and between the clusters. The locale variable was assigned to each school independently of the free lunch ratio variable. This variable was used in conjunction with the free lunch

ratio in the post hoc analysis to add depth to our understanding of how the free lunch and recess variables are correlated.

Further t-test comparisons were made to compare subgroups within and between the free lunch ratio groups to clarify the understanding of the interaction between the variables. The urban-centric *Locale* variable that was assigned to each school district was used as a subset of the socioeconomic variable *Free Lunch Ratio* to create nine cluster subgroups (*High Free Lunch Ratio City*, *Low Free Lunch Ratio Suburb*, etc). The combined variables were used during the post hoc analysis to identify correlations that might exist between the subgroups. The *locale* variable was used to compare the schools within a cluster of schools to add clarification to the data; specifically to understand if a relationship exists between access to Recess and the Locale of the school while holding the income variable (*Free Lunch Ratio*) constant. Table 7 presents the comparative mean probabilities for each of the nine subgroup t-tests.

Examination of the data suggests some limitations in the incidence of specific locale variables within each of the Free Lunch ratio clusters. Specific categories within the clusters (*High Free Lunch Rural*, *Middle Free Lunch Rural*, and *Middle Free Lunch City)* had no eligible schools in the selected sample; therefore comparisons could not be made for these subsets. Upon review of the population data, the sample was consistent with the incidence of these variables within the total population, since no *Rural* schools existed in the total *High Free Lunch* population, and relatively few *Rural* or *City* schools existed in the *Middle Free Lunch* population. The researcher does find it relevant to understanding access to recess, however, that the *High Ratio Free* lunch sample does not

include any *Rural* schools, nor does the *Middle Ratio Free* lunch school sample include any *Rural* or *City* schools.

The limited data availability for specific locale groups made for limited comparisons within and between the sub-clusters. Due to the lack of data in these sub-clusters, the comparisons of the means between the subgroups was dismissed as lacking in sufficient information to draw meaningful conclusions. This data is noteworthy, however, as it does illuminate the incidence of specific income level schools and their occurrence within specific locale types. This is an important point supporting the conclusion that the locale of the school influences access to recess, and that poverty plays a larger role in determining access. The research has shown that access to safe play in urban areas outside of school is limited (Demerath, Lynch, Milner, Richard, Peters, & Davidson, 2010; Fantuzzo, Bulotsky, McDermott, Mosca, & Lutz, 2003; Noble, Tottenham, & Casey, 2005; Perry & McConney, 2010; Sirin, 2005; Southworth, 2010) and these findings indicate that this access to safe play is further hampered by limits on recess breaks within the school day within low income schools located in urban areas.

CHAPTER V: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Research has long extolled the benefits of play in the cognitive and emotional development of the whole child (Adams, 2011; Burdette & Whitaker, 2005; Dills, Morgan, & Rotthuff, 2011; Jarrett, et al, 1998; Jarrett, 2002; Pratt, 2011; Ramstetter, Murray, & Garner, 2010, Santa, 2007). Opportunities for recess breaks serve to support long term student success by allowing students to interact with their environment, learn problem solving strategies and to develop other critical cognitive skills (Pelligrini & Bohn, 2005; Pellegrini & Bjorkland, 1997; Pellegrini, 2005). Recess serves as an important opportunity within the school day to interact socially with others and serves as a mental break from fatigue which allows for better task attention and long term retention of information (Pellegrini, Huberty, & Jones, 1995; Pellegrini & Smith, 2005; Reed, Einstein, Hahn, Hooker, Gross, & Kravitz, 2010). In the literature, access to recess has been demonstrated to be associated with increased time on task and better reported behavior for students (AAP, 2012; RWJ, 2010).

As decisions are made in schools to eliminate recess, students in higher income schools, regardless of locale, had significant advantages in access to recess that are supported at the school, district, or parental level. As cited in the literature (Ginsburg, 2007; Lee & Burkha, 2002; Parsad & Lewis, 2005), these access discrepancies could be due to the effects of higher income, which is associated with better educated parents who may have heightened insight into strategies for positive child development and who are more vocal regarding recess while influencing decision making at the district and school level (Davis-Kean & Sexton, 2009; English, 2002). It is also possible that a discrepancy

exists in the length of the school day across income levels, which would allow for longer recess breaks to be incorporated into the school day.

The research literature has identified the relationship between students who are economically disadvantaged and their consistent performance below their peers of higher economic status on standardized assessments (English, 2002; Johnson & Perkins, 2011). These results add to the conversation of socioeconomic status and academic success, and identify recess as an important component of the school environment that should be explored when making decisions regarding the allocation of time during the school day (Malone & Tranter, 2003). Access to recess appears to be associated in part on the socioeconomic status of a school district, and further research should delve further into how recess can be allocated to improve learning environments and subsequently increase academic performance.

Significant research has been shown to exist in the literature to support the benefits associated with recess and childhood development, which includes higher on-task behavior, improved attention, the development of brain connections, and increased social and negotiation skill development (AAP, 2012; Adams, 2011; Burdette & Whitaker, 2005; Dills, Morgan, & Rotthuff, 2011; Jarrett, et al, 1998; Jarrett, 2002; Pratt, 2011; Ramstetter, Murray, & Garner, 2010, Santa, 2007). These fundamental benefits underscore the same advantages that are absent for the at-risk student populations as identified in the research. The highest at-risk populations, which are low income students in urban locales, are identified by this study as also having the least access to recess and the associated support for the social and emotional wellbeing of these students. This research has identified a correlation between these at-risk school populations and a

decreased access to recess opportunities, and the contention is that these are the students that may benefit the most from the positive impact that recess has on a child's cognitive and emotional development. It is only through finding methods to support all students, and especially those who are historically underserved in the population, that we will best be able to meet the educational needs of these students.

The current climate in education that demands highly structured curriculum driven instruction for longer periods of time without breaks is not compatible with research based understandings of how children learn (AAP, 2012; Pellegrini & Bjorkland, 1997; Pellegrini & Smith, 2005). Children are not small adults. The research literature is consistent in representing that children do not have the ability to concentrate and attend to structured learning in the same manner as adults do, which is a result of cognitive development and brain maturity. Children are wired to learn through play (Piaget & Inhelder, 1969; Pellegrini & Bohn 2005; Vygotsky, 1967), and it is not reasonable for educators to teach children using methods that are not compatible with what is known about childhood brain development and expect successful outcomes. This holds especially true for children with limited access to alternative play opportunities outside of the school environment.

This study has demonstrated a correlation between access to recess and poverty in elementary school students in conjunction with a specific locale variable. The most remarkable findings that arose from the current research study were those that contradicted current research based understandings of locale and access to recess that existed prior to this study (Barros, Silver, & Stein, 2009; Basch, 2011; Burriss & Burriss, 2011 Henley, McBride, Milligan, & Nichols, 2007). Specifically, this research found that

schools that are located in urban locales are not at a disadvantage outright when determining access to recess at school, but are at a disadvantage when the school is economically disadvantaged as well as located in an urban setting. A statistically significant discrepancy existed in this study between the *length of time for recess* when comparing high income schools and low income schools that are located within city (urban) locales, leading the researcher to conclude that the lack of access to recess is an issue of poverty first and foremost for the schools selected in this study.

In conjunction with the significant research that exists in the literature that supports the concrete benefits associated with recess and childhood development, including higher on-task behavior, improved attention, the development of brain connections, and increased social and negotiation skill development (AAP, 2012; Adams, 2011; Burdette & Whitaker, 2005; Dills, Morgan, & Rotthuff, 2011; Jarrett, et al, 1998; Jarrett, 2002; Pratt, 2011; Ramstetter, Murray, & Garner, 2010, Santa, 2007), the economically disadvantaged student is at an increased 'play' disadvantage in terms of school recess, especially in urban settings. The development of social competence in school aged children is regarded by the researcher as a critical component of the school experience (Katz & McClellan, 1997; Kostelnik, et al., 1993) and a child's ability to maintain quality relationships is important to the development of the whole child (Pepler & Ross, 1981; Piaget; Wyver, & Gustafsson, 2004).

Childhood is a crucial period for the development of a complex array of social, emotional, and cognitive skill sets which are vital to long term emotional and academic success (Singer, 2006). The development of the mental capacities necessary to succeed in school should mirror the skills necessary to succeed as participants of a global society,

and those criteria for success are not easily measured by standardized assessments. As education decision makers, we must be conscientious of how our decisions affect a student's capability and aptitude to be successful after they leave the school setting.

This research supports the conclusion that students from higher socioeconomic status schools, who already are at an advantage when discussing achievement and outcomes, are at an additional significant advantage in critical areas of development when they have opportunities for longer recess periods. Cognitive research has positively correlated behavior and time on task measures to these break periods (AAP, 2012; Sibley & Etnier, 2003), and limiting access to recess further serves to divide students who have advantage in schools from those who are underserved, creating a larger gap that must be understood and addressed. Further research should be done to understand the possible effect on learning outcomes with increased access to recess.

Significant effect findings were found in the post-hoc t-test analysis when comparing the mean length of Recess time for Suburban schools across all of the Free Lunch Ratio clusters when compared to the City schools across all locales. These outcomes lead the researcher to conclude that not only is income level an important factor in determining access to recess, but within the low income level cluster specifically (High Ratio Free Lunch schools), locale plays an interrelated significant role in the access to recess opportunities for students. In contrast, among the Low Free Lunch Ratio Schools (high income level schools), access to recess was more consistent across the three locale variables, and the mean recess time was not shown to be significantly different based on the locale of the school within the cluster ($t = 0.31086, 0.17271, 0.15789$).

The variance of the model indicated a very weak positive relationship exists between the two independent variables and their predictive ability for the dependent variable. While theoretically an ideal model would have both explanatory power and statistical significance, Fichman (1999) made the case that variance alone does not gauge the adequacy of the theory in research areas such as leadership and organization. The research ascertains that certain environmental and leadership factors may have small explanatory power as described by the variance of the model, but that these small, positive effects may have a significant influence on outcomes. Lieberson (1985) argued that even strong leadership explanations could have small variances and that discussions of variance alone can be misleading in social science research. Educational variables are difficult to quantify and the variables identified to study may overlap and interact in unidentified relationships. The current research study demonstrates a strong statistical significance between the research variables selected, suggesting that the variance alone does not diminish the results of the study.

In the current climate of reliance on data collection and formalized assessment as measures of school success, accountability concerns drive decision making (Barros, Silver, & Stein, 2009; Henley, McBride, Milligan, & Nichols, 2007) and the lack of quantitative analysis in studies relating to access to recess and school outcomes have left a void in our understanding of how to positively influence learning by establishing successful school environments. School leaders are tasked with allocating scarce resources within the school, and recess allocation during the instructional day has been demonstrated in the literature as worthy of consideration when allocating time. Further

research is necessary to establish possible relationships that might exist between access to recess and length of school day.

Limitations

When researchers strive to understand how school environments influence learning, we are mindful that learning is complex and many variables attribute to outcomes. Attributions of a few simple quantitative variables are difficult, at best, to link to education outcomes. There exists a limited amount of quantitative research that contributes to the discussion of how recess is a positive influence on child development and the subsequent role that recess plays in school outcomes. Therefore, another area of potential concern during this study was the possibility that unforeseen limitations obscured the results and interpretation of the data. Correlations between recess time and school locale and free lunch eligibility are complicated, and identification of the appropriate variables for the analysis is complicated.

An additional limitation of the analysis was exposed during the post-hoc comparison of the between clusters mean analysis. Specifically, it was determined that several of the sub-groups had few, if any, schools assigned to them. This occurred because of specific anomalies that exist in the overall population (as in the non-existence of suburban schools in low income and rural schools with high income). These limitations left the comparisons between the sub-groups with little explanatory meaning as they described a limited number of schools. It is not practical to draw conclusions based on a comparison of two or three schools in a large overall population.

This research analysis was intended as a preliminary inquiry in the discussion of the role of recess in public schools, and on the consequences of the allocation of time within a school day, recess decision making on the school environment, and overall student development and success. Further research to understand the recess decision making process and to interpret the results of these decisions on student outcomes would be warranted. Specifically, associations between length of recess and academic outcomes are of particular interest, and future approaches to research in this area are suggested to be qualitative in nature, and would serve to provide a richer analysis of the decision making process. Additionally, research that focused on an in-depth analysis of decision making as it occurs within districts and the perceived ramifications of the process for allocating resources would be germane.

Although recess time might be clearly incorporated within the school day, other potential inadequacies of the research findings include a lack of consistency when schools report time allocated to instruction and recess, including unreported instances where recess is offered, but students are pulled from recess. Since recess is not a state mandated 'subject' area, the time allotted for recess can be is easily manipulated despite the data provided in yearly school and district reporting. It would be difficult to account for these discrepancies in the research design. The researcher used a reasonable measure to calculate and approximate recess, but issues such as number of breaks versus length of breaks are not addressed. Future research would be warranted to determine if fewer longer breaks provide better outcomes, or if shorter more frequent breaks are preferable.

The use of the specific variables chosen for this research design offers another area of potential concern. Educators and district leaders may disagree with the use of

such measures as *free lunch ratios* and *locale* as accurate indications of wealth and access. Noted in the research is the ability to manipulate variables to focus on aspects of variables that are most relevant to the study design. The limited collection of quantitative research that exists on recess required the use of certain consistent measures in the study for continuity sake. As this research has demonstrated some positive correlation between income, locale, and recess data, further research would be warranted to understand if additional relationships exist between student outcomes and recess opportunities.

Conclusions

This analysis was intended to promote the understanding of statistical correlations amongst school variables that administrators cannot change, such as school locale and socioeconomic status, when compared to the time allocated for recess, which is within a school and school district's ability to influence. The research is intended to support the decision making process as it happens within schools districts, as administrators seek information necessary to make resource allocation decisions that ultimately create effective school environments where students can learn successfully and be prepared for the future. Beliefs and values that school leaders purport to hold as important conceptually might not be the same as those standards that their actions support. Fundamentally, leaders should have some empirical foundation for their decision making, but a lack of data and conflicting accountabilities with contributions from a variety of sources complicates these decisions (Baker, 2009; Newstead, Saxton, & Colby, 2008; Hallinger & Heck, 1998; Simon, 1976; Supovitz, Sirinides & May, 2010).

This research study concluded that access to recess within a school day is limited by the socioeconomic status of the school, with poorer students in New Jersey having less equal access to recess and the benefits associated with recess and childhood development. The implications of this discrepancy support the need for policies that protect access to safe play for students living in poverty. The research literature has shown that children are essentially hard-wired to learn through active, hands-on, and role playing experiences. The manipulation and interaction that occurs during play allows children to begin to understand and practice cause and effect, understand how to act and to react cognitively and emotionally, and fosters their overall cognitive development (AAP, 2012; Adams, 2011; Burdette & Whitaker, 2005; Dills, Morgan, & Rotthuff, 2011; Jarrett, et al, 1998; Jarrett, 2002; Pratt, 2011; Pellegrini,2005; Ramstetter, Murray, & Garner, 2010; Santa, 2007).

Educational planning exists in an environment where there is data and information which integrates with all aspects of planning and decision making (Baker, 2009; Newstead, Saxton, & Colby, 2008; Hallinger & Heck, 1998; Simon, 1976; Supovitz, Sirinides & May, 2010). The goal of this research was to provide quantitative information to decision makers and other researchers to bring consistency and coherence to education in terms of policy making and implementation regarding the positive influence that recess plays within a school. Implicit in educational research is a desire for the mutual exchange of ideas intended to promote increased effectiveness, and for change to occur, the data must have a strong research component and contain information essential for decision making (Hallinger & Heck, 1998; Eilers & Comacho, 2007).

Decision-making is thought of most often as an objective exercise based on the analysis of verifiable hard facts. There is a need for educational research that provides insight into the benefits of recess, the positive role that recess opportunities can play in the pursuit of a positive, supportive learning environment (AAP, 2012; Pellegrini,1998; Pellegrini & Bohn, 2005), and the trade-offs that exist when instructional time replaces recess breaks (RWJ, 2007;). Future research is essential to investigate the decision making process that school leaders engage in when making decisions regarding allocations of time for recess and instructional purposes, specifically as that decision making process pertains to decisions to reduce or eliminate instructional breaks. The choices made by administrators, and their justification in supporting those decisions, should be the subject of future inquiries.

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Appendix A

Residual Output

Observation	*Predicted 60*	*Residuals*	*Standard Residuals*
1	48.51343467	16.48656533	1.186891469
2	48.0202818	-18.0202818	-1.297305916
3	48.37324475	-18.37324475	-1.322716225
4	47.86964308	-17.86964308	-1.286461219
5	47.79256866	2.207431339	0.158916146
6	46.99423357	22.00576643	1.584226667
7	52.54233124	-2.54233124	-0.18302607
8	52.54233124	7.45766876	0.536888263
9	52.46762127	2.53237873	0.182309575
10	52.460532	2.539467997	0.182819941
11	52.44997001	-22.44997001	-1.61620552
12	52.42680036	7.573199641	0.545205497
13	52.37507011	52.62492989	3.788544132
14	52.29585407	7.704145933	0.554632508
15	52.28891803	7.711081975	0.555131844
16	52.27899323	7.721006774	0.555846344
17	52.26855692	-2.26855692	-0.163316664
18	52.21906695	14.78093305	1.064100557
19	52.18467713	-12.18467713	-0.877192371
20	52.18314869	-12.18314869	-0.877082337
21	52.15639326	17.84360674	1.284586825
22	52.1289769	7.871023102	0.566646235
23	52.05081828	7.94918172	0.572272986
24	52.01427648	7.985723522	0.574903683
25	52.00541069	12.99458931	0.93549911
26	51.96268492	-11.96268492	-0.861210834
27	51.94435618	-6.944356184	-0.499934155
28	51.88793734	-21.88793734	-1.575743982
29	51.86001694	28.13998306	2.025837715
30	51.85715149	-1.857151488	-0.133698998
31	51.85340734	8.146592663	0.586484883
32	51.82871006	-1.828710064	-0.131651459
33	51.7688768	-1.768876796	-0.127343976
34	51.6775213	8.322478702	0.599147171
35	51.5288026	-21.5288026	-1.549889357

36	51.43399652	-21.43399652	-1.543064132
37	51.40834062	-14.40834062	-1.037277094
38	51.36564921	24.63435079	1.773462223
39	51.31235003	3.687649973	0.265479207
40	51.26110081	8.738899191	0.629125879
41	51.24927407	41.75072593	3.005694603
42	51.22124031	8.778759693	0.631995493
43	51.2202166	-21.2202166	-1.527673809
44	51.17770264	-7.177702637	-0.516733101
45	51.15067494	-16.15067494	-1.162710238
46	51.1111987	18.8888013	1.35983188
47	50.97219039	-5.972190387	-0.429946546
48	50.94412136	-10.94412136	-0.787882983
49	50.63114596	9.368854039	0.674477231
50	50.61621483	-10.61621483	-0.764276522
51	50.61232368	9.387676318	0.675832274
52	50.42910637	-20.42910637	-1.47072065
53	50.22374596	-5.223745964	-0.376064959
54	50.02086975	-5.020869752	-0.36145961
55	50.00422644	-10.00422644	-0.720218601
56	49.93021392	5.069786084	0.364981167
57	49.88466432	10.11533568	0.728217514
58	49.82392392	-14.82392392	-1.06719553
59	49.62635537	-4.62635537	-0.333057954
60	49.60062617	-14.60062617	-1.051120006
61	49.52801864	-4.528018641	-0.325978552
62	49.35216099	0.647839012	0.046638859
63	49.26238134	-4.262381337	-0.306854942
64	49.01032293	10.98967707	0.791162604
65	48.21982583	-18.21982583	-1.311671377
66	48.0179697	-8.017969702	-0.577225131
67	47.86677351	-12.86677351	-0.926297468
68	47.60506951	-7.605069508	-0.547499855
69	47.41208492	12.58791508	0.906222049
70	51.57510395	-17.57510395	-1.265256924
71	49.96459523	-19.96459523	-1.437279827
72	48.29159157	16.70840843	1.202862272
73	48.56746415	-3.567464153	-0.256826858
74	46.78429764	-3.78429764	-0.272437011
75	46.69992048	13.30007952	0.957491788
76	46.53157456	-3.531574562	-0.254243115
77	46.48300518	-3.483005184	-0.250746536

78	46.32177653	-1.321776534	-0.095156587
79	44.16061353	2.83938647	0.204411502
80	43.33021206	1.669787943	0.120210427
81	43.23021278	1.769787221	0.127409519
82	42.8747559	-12.8747559	-0.926872131
83	42.2506517	17.7493483	1.277801025
84	42.0781898	-2.078189796	-0.149611862
85	41.96787236	18.03212764	1.298158715
86	41.89616051	-1.896160514	-0.136507313
87	42.10657286	-12.10657286	-0.871569533
88	41.12929823	-11.12929823	-0.801214132
89	42.33330188	-12.33330188	-0.88789208
90	39.81631092	0.183689075	0.01322404
91	39.50831493	-9.508314934	-0.684517221
92	39.50507162	5.494928378	0.39558777
93	38.87434511	6.125654887	0.440994675
94	38.46048492	6.539515081	0.470789064
95	38.33600903	11.66399097	0.839707429
96	40.34359395	9.656406051	0.695178512

Appendix B

Probability Output

Percentile					
0.520833333	30	42.1875	45	83.85416667	60
1.5625	30	43.22916667	45	84.89583333	60
2.604166667	30	44.27083333	45	85.9375	60
3.645833333	30	45.3125	45	86.97916667	60
4.6875	30	46.35416667	45	88.02083333	60
5.729166667	30	47.39583333	45	89.0625	65
6.770833333	30	48.4375	45	90.10416667	65
7.8125	30	49.47916667	45	91.14583333	65
8.854166667	30	50.52083333	45	92.1875	67
9.895833333	30	51.5625	45	93.22916667	69
10.9375	30	52.60416667	45	94.27083333	70
11.97916667	30	53.64583333	47	95.3125	70
13.02083333	30	54.6875	50	96.35416667	76
14.0625	30	55.72916667	50	97.39583333	80
15.10416667	30	56.77083333	50	98.4375	93
16.14583333	30	57.8125	50	99.47916667	105
17.1875	34	58.85416667	50	40.10416667	45
18.22916667	35	59.89583333	50	41.14583333	45
19.27083333	35	60.9375	50	81.77083333	60
20.3125	35	61.97916667	50	82.8125	60
21.35416667	35	63.02083333	50		
22.39583333	37	64.0625	55		
23.4375	40	65.10416667	55		
24.47916667	40	66.14583333	55		
25.52083333	40	67.1875	55		
26.5625	40	68.22916667	60		
27.60416667	40	69.27083333	60		
28.64583333	40	70.3125	60		
29.6875	40	71.35416667	60		
30.72916667	40	72.39583333	60		
31.77083333	40	73.4375	60		
32.8125	40	74.47916667	60		
33.85416667	40	75.52083333	60		
34.89583333	43	76.5625	60		
35.9375	43	77.60416667	60		
36.97916667	43	78.64583333	60		
38.02083333	44	79.6875	60		
39.0625	45	80.72916667	60		