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Assessing Risk and Resilience Factors for Early Childhood Development

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Abstract

Adequate early child developmental screenings are often not available in many child care centers despite considerable research that points toward the importance and necessity of such screenings in assuring quality educational and social outcomes for children. A wealth of influences can affect how a child develops, with both negative risk and positive resilience factors playing a key role in determining outcomes. The present study was conducted through chart review of 55 children attending Winter Park Day Nursery (WPDN). We explored the relationships between risk factors, resilience, and outcomes by using measures currently collected by the center, and combining them in new ways. Predicting child outcomes was measured by taking a set of literature-derived risk and resilience factors and exploring how they predicted results of popular developmental screening assessments: the Ages and Stages Questionnaire (ASQ) and the Devereux Early Child Assessment (DECA). In addition, the study provided the community agency (WPDN) with a comprehensive profile of their constituents. Both ASQ and DECA scores were found to improve as the child developed. Regression analyses revealed that increasing household number and food eligibility, and having a single parent correlated with lower screening test scores. While a larger sample size and a more diverse population are needed to build upon this study, these results yield a preliminary glance at the family populations of WPDN in relationship to developmental outcomes.
Introduction

The early stages of a child’s life from birth until around the age of five are critical periods for neurological development. The World Health Organization (WHO) cites these early years as the world’s most significant social determinants of health (WHO, 2008). Measures such as cognitive development, socio-emotional development, and other indices of school readiness predict how well a child will succeed in an academic environment (Johnson et al., 2008). According to Glascoe and Shapiro (2004), in the United States about 16% of preschool children have some sort of developmental delay, either academic or emotional. While all of these children would benefit from early intervention, only about half of these issues are even discovered before the child enters formal schooling. In order to be addressed, these early delays must first be documented. Despite considerable research that shows the substantial and long-term benefits of early intervention in improving educational and social success, investment in comprehensive early child development screening and identification programs remains low.

The purpose of this study is to explore risk and resilience factors in early child development and to discover their relationships to developmental outcomes, while providing a data coordination service to a community agency. As an introduction to this study on assessing the role of risk and resilience factors in child development, the wealth of influences involved in how a child develops are first explored, along with a discussion as to which of these influences are most associated with risk or resilience in children. Terms for defining measures of developmental progress and delay as well as the benefits of screening are then reviewed. Finally, two common screening tools and their reliability in predicting developmental outcomes are discussed.
Development in Context

A child’s development is largely shaped by a combination of their biological makeup, the world surrounding them, and the interaction between the two, that occurs over time. In order to understand human development, the entire social and ecological environment in which a child is raised must be taken into consideration. In his ecological systems theory, Urie Bronfenbrenner (1977) postulates that there are five subsystems that co-exist to guide and direct human development. The *microsystem* encompasses the contact a child has with his or her immediate surroundings, such as relationships with family, teachers, childcare providers, etc. The *mesosystem* connects two or more systems, an example being how a child’s parents might interact with a child’s teacher or with the medical establishment. In this way, a mesosystem is essentially a “system of microsystems”. The *exosystem* exert an indirect effect on a child’s development. These structures do not touch the child directly, but yield benefits or consequences that ultimately reach the child. Government social programs or stressful working environments for parents are examples of such structures.

The *macrosystem* moves more broadly to encompass overarching themes of culture, including social, economic, legal, and political. This outermost layer can have cascading effects on the previous systems. For example, the existence in Florida of free, voluntary prekindergarten programs may influence the number of children who are ready for school. And finally the *chronosystem* involves the passage through time, focusing on the events that transpire throughout a child’s development and are subject to change as time progresses (Bronfenbrenner, 1994). Bronfenbrenner’s theory provides a detailed model for exploring and understanding the numerous factors at play in how a child matures. It is important to keep in mind that a wealth of influences all combine in creating the environment that shapes
a child’s development. In this thesis, data will be used to describe the ecological systems of the families enrolled in Winter Park Day Nursery environment (Figure 1).

**Risk Indicators for Early Childhood Development Occur at All Levels of the System**

Risk is the statistical likelihood of an adverse developmental outcome. A risk factor is one such risk. In an effort to understand the relative contributions of different risk factors, researchers have devised a number of measures or checklists of risk. Socioeconomic status (SES) is one of the mostly widely cited contributing risk factors to early childhood developmental delays. The Hollingshead Four Factor Index of SES measures social status through a combination of four areas: marital status, retired/employed status, educational completion, and occupational level (Hollingshead, 1975). Each domain is rated on a point-scale that allows a total SES score to be calculated. Hollingshead Index raw scores range from 8 to 66, with higher scores reflecting higher SES. Studies indicate that children who are born to economically disadvantaged families are at greater risk for developmental delays, learning disabilities and lower scholastic achievement (Morris & Gennetian, 2004; Moore et al., 2009). These results partially stem from issues related to inferior pre-natal care, resulting pregnancy complications, and an inability to afford resources that can mitigate these problems (McLoyd, 1988). Another measure of SES include eligibility for certain government programs, such as free and reduced lunch.

In the present study, SES was measured by reported income and food eligibility documented through the Florida Child Care Food Program. Food insecurity also plays into the SES trend, as inadequate nutrition is associated with many developmental issues, including poor long-term memory, lethargy, attention deficiencies, and insecure attachment (Korenman & Miller 1997; Valenzuela 1997). Parents with greater SES may have the ability
to use extra income to afford better food, child care, health care, and spend more time with their children (Duncan et al., 2011). However, growing research in the field has revealed that a substantial number of elements work together in increasing risk for development. Moore (p. 2, 2006) states that “children develop and grow up in complex environments, where they are influenced by multiple factors that cumulate to affect their well-being”. SES is a measure of income and status, but by itself is insufficient to describe the varieties of family and childrearing environments contained within a status level. SES will always remain important, but a number of other factors must be considered to reveal a more comprehensive view of child development and outcomes.

In the present study, we had access to limited medical information about children, including the results of vision screening and any current diagnoses. Medical issues can put children at a higher risk for developmental delays. Vision plays a critical role in how a child learns and develops. The Vision Council of America (2004) estimates that upwards of 80% of a child’s learning occurs through the eyes, yet almost 25% of children in school suffer from vision problems that could have been resolved with proper screening and follow-up action. One study found that undetected eye disorders such as amblyopia, strabismus, and uncorrected refractive errors are correlated with decreased reading ability and overall poorer school outcomes (Vaughn et al., 2006). Children use their vision to see the board, to read and write, to play sports; most ways in which a child successfully interacts with his or her environment would be near to impossible without proper vision.

In addition to vision and more serious medical conditions, asthma and allergies are common examples of medical risk factors that influence development. Upwards of 6.3 million children living in the United States have been diagnosed with asthma, which has been
found to have an impact on a child in several arenas, including physical, emotional, and social (Centers for Disease Control and Prevention, 2016). Having asthma can impact a child’s peer relationships, behavioral problems, anxiety, and is linked to learning disabilities (University of Virginia Health System, 2007). These children often miss more than ten days of school, which causes concern about negative impacts on academics stemming from these medical conditions. Children who have allergies were also shown to experience negative impacts on peer relationships, stress levels, and a small impact on school attendance (Skolnick, 2007).

Finally, family structure can play an important role in a child’s growth. This issue is particularly important to explore as divorce rates continue to escalate and the definition of the “typical” American family has changed drastically. Many families and children are able to resume normal functioning following divorce and experience no negative impacts of developmental outcomes as a result. In fact some would certainly argue that divorce is better for the children than the alternative of an unhealthy relationship between parents. Yet single parenting has been correlated with problem behavior, psychological distress, and poor academic performance (Allison & Furstenberg, 1989). Single versus married parenting lends itself to another indicator highly linked to child development: level of social support. This measure will be discussed in depth when looking at how resilience factors can shape outcomes.

Using Resilience Factors to Measure Outcomes

Classifying children as being “at-risk” has become a common feature in the study of child development, yet this term has no consistent definition and even a negative, and sometimes stigmatizing, connotation (Moore, 2006). Conducting longitudinal research on
classified “at-risk” populations has revealed that at least 50% and likely upwards of 70% of children labeled in this way are able to overcome the odds and achieve successful developmental outcomes (Werner and Smith, 1992). In the past few decades, researchers have begun to place more emphasis on the role of resilience factors as a measure of outcome. These studies explore the protective or “buffering” factors that help to explain why some children are able to thrive and succeed in academic and social environments in spite of being classified as “at-risk” due to environmental and biological influences (Rak & Patterson, 1996). Resilience serves as an interesting insight into how children might be able to mitigate potential risk factors and achieve positive developmental outcomes.

Strong measures of social support within the family are an example of a resilience factor. Social support is defined as “verbal and non-verbal information or advice, tangible aid, or action that is proffered by social intimates or inferred by their presence and has beneficial emotional or behavioral effects on the recipients” (Gottlieb, 1983). Social support networks are the “webs of relationships” that exist between an individual and the greater community, including relatives, friends, neighborhood, church groups, and work colleagues (Jack, 2000). Greater feelings of social support and ties to family and community serve as a “protective mechanism” whose “buffering effects” are associated with more positive outcomes in personal well-being of parents, attitudes toward interacting with children, and child behavior, resilience, and development (Armstrong et al., 2005; Dunst et al., 1986). Family, friends, and even home visitors can help in nurturing a mother’s self-confidence and her competence and care towards her baby. Social support in the form of emotional support is associated with greater nurturing skills while instrumental support leads to less use of punishment (Ceballo & McLoyd, 2002). Identifying, developing, and protecting social
support systems in high-risk environments has been recognized as a central strategy for social workers and other child development professionals (Jack, 2000). In the present study, we had limited access to social support measures, such as the number of friends and family on an emergency contact list.

In addition to social support, maintaining a healthy weight and body mass index (BMI) helps protect a child from a number of conditions in many areas of wellbeing. BMI is the ratio between an individual’s weight and the square of their height (Centers for Disease Control & Prevention, 2015). Maintaining appropriate caloric intake as well as promoting increased exercise and physical activity in children can have profound impacts on health. A healthy weight can help lower a child’s risk for heart disease, high blood pressure, diabetes, cancers, sleeping disorders, and much more (U.S. Department of Health and Human Services, 2006). It can help boost self-esteem and confidence while giving a child more energy to engage in physical activity and stress relief efforts. In one study researchers attempted to predict academic and cognitive outcomes based on the BMI of children (Bisset et al., 2013). The study looked at 1959 children grouped into four BMI clusters: two healthy weight groups, one overweight group, and one underweight group. The results suggested that children who maintained a healthy weight were at significantly reduced risk for poor cognitive and academic outcomes than those in both the overweight and underweight group.

In addition to maintaining good health, a number of protective factors exist at the family level. These include the presence of sibling caretakers, age of the opposite-sex parent, and a parent’s locus of control, which is the extent to which individuals believe they can control events affecting them (Armstrong et al., 2005). Siblings can provide extra help or guidance when parental figures are otherwise occupied, or serve as trusted confidants (Rak &
On the other hand, this might put excess pressure on these older siblings. Younger mothers are associated with more resilient male children while older fathers correlate with more resilient female children (Montgomery, 2013).

Family size is also cited as an important contributor. While sibling caretakers do play a positive role, having a family with four or less children spaced more than two years apart is reported to promote resilience (Rak & Patterson, 1996). However family size can also be construed as a risk indicator. Larger household numbers and over-crowding is correlated to worse outcomes. Crowding in the home can negatively impact a child’s behavioral attitudes and even their physical health (Solari & Mare, 2012). Despite the contrast often set between risk and resilience, it is important to keep resilience factors in mind as they can offer outlets for positive development outcomes given many difficult situations.

**Identifying Developmental Progress and Delays: Key Terms and their Usage**

**Screening vs. Assessment**

Screening is an invaluable tool that can be used in child development to monitor healthy development and pay special attention to a child’s physical, mental, social, and emotional well-being. The purpose of screening is to determine if there is a possible presence of a developmental issue, and whether a child may need further diagnostic assessment (Meisels & Provence, 1989). The outcome is typically a yes or no answer. Screening can take on a number of different forms. Medical examinations, hearing and vision testing, and review of records are all such examples (Meisels, 1989). Some screening tools involve the use of a set of questions that are specifically designed to explore key developmental areas and a child’s aptitude in them. (Meisels, 1989). Often these screening instruments require little to no training to administer and can be administered by parents and teachers. In addition to
identifying areas requiring further testing and monitoring, screening results can allows for instructors to realize areas of weakness and adjust curricula accordingly (Substance Abuse and Mental Health Services Administration, 2009).

Assessment entails a more detailed methodology that defines the nature of a problem, determines a diagnosis, and develops a specific treatment plan to meet the individual needs of that child (Shonkoff & Meisels, 2000). An assessment is designed to gather a deeper understanding of a child’s strength and weaknesses and discover how a child’s caregiving and learning environment can work together to ensure success for a child’s developmental outcomes (Greenspan & Meisels, 1996). Unlike screening, assessment leads to a definitive diagnosis and is necessary in order to provide a proper treatment regime for a child (Johnson & Marlow, 2006). Yet screening is important in prevention; with proper screening tools in place, developmental delays can be detected early enough and interventions put in place to treat the issue before it becomes more severe and difficult to reverse.

Typical, At-Risk, Delayed

According to First Signs (2012), the word “develop” means “to expand or realize the potentialities of; bring to a fuller, greater, or better state”. Typical child development occurs in a wide range, as children grow and develop at different times and in different ways. However, milestones are set in place to help set a guideline or “outer limit” for what is deemed as an acceptable timeframe for development (First Signs, 2012). The American Academy of Pediatrics and many other reputable child development institutions have created comprehensive milestone markers that outline progress reports for every few months of a child’s life from birth to around 5 years of age (Hagan et al., 2008). Screening tools utilize these milestone markers in creating measures to test whether a child is meeting certain
developmental expectations. Children who fall under this category are defined as experiencing “typical” development.

The term “at-risk” is not reflective of a certain outcome. Rather it demonstrates that a stronger likelihood of poor developmental outcomes may occur (Moore, 2006). Moore (2006) contributes a number of indicators as being associated with “at-risk” definitions on several levels, including individual, family, and community. For example, limited reading proficiency, family dysfunction, and high rates of neighborhood crime would all qualify as “at-risk” indicators in children that should be closely monitored. The American Academy of Pediatrics urges that developmental surveillance be a continuing process in children, especially those deemed “at-risk” by genetic or environmental factors (Center for Disease Control and Prevention, 2015). Developmental screening tools are useful in this regard to identify whether further concern is warranted.

Developmentally “delayed” children are defined as those who do not reach developmental milestones at the expected times (University of Michigan, 2010). Being “delayed” is more than a child temporarily lagging behind in a certain academic or social context. Strict guidelines are utilized by physicians or trained professionals to diagnose developmental delays in children (University of Michigan, 2015). It is important to address these delays as soon as they become apparent because if left untreated they can lead to developmental disabilities, conditions due to “impairment in physical, learning, language, or behavior areas” (Center for Disease Control and Prevention, 2015). Boyle et al. (2011) estimate that one in six children in the United States currently exhibit one or more developmental disabilities.

**Sensitivity vs. Specificity**
Many child developmental screening tools utilize statistics such as sensitivity and specificity to describe the reliability of the test in predicting correct outcomes (Glascoe, 2005). Sensitivity is defined as the statistical measure that represents the ability of a test to correctly identify the proportion of children who are at-risk (Early Head Start National Resource Center, 2000). It is the probability that the child will test “positive” for requiring further assessment when further assessment is indeed warranted (Parikh et al., 2008). Accurate measures of sensitivity usually lie between 70-80% for developmental screening (Glascoe, 2005). Specificity is defined as the statistical measure that represents the ability of a test to correctly identify the proportion of children who are not at-risk, and therefore do not need further assessment (Early Head Start National Resource Center, 2000). It is the probability that the child will test “negative” for requiring further assessment when they are in fact developing normally. Accurate specificity values should be closer to 80%, due to the fact that there are many more children experiencing typical development than not (Glascoe, 2005). A test with high sensitivity will find more of the children who need help, but may result in more false positives (and therefore a higher cost). In the present study, the ASQ-3 is a test found to have high sensitivity. In order to be referred for further assessment, a child must score 2 SD below the mean or average age of accomplishment of a particular set of developmental tasks.

**Benefits of Screening**

The ultimate goal of early childhood development initiatives is to ensure that “all children reach school healthy and ready to succeed, with age appropriate social-emotional, cognitive, and language development” (Johnson et al., 2008). Screening tools share a common purpose in ensuring that a child is on the right developmental path. Implementing
proper screening tools in childcare centers and physician offices could allow for upwards of 70% of children with developmental issues that go undetected to receive the early intervention they need (Glascoe, 2005). Children who receive preventative treatment due to properly identified developmental delays are more likely to graduate from high school, maintain employment, live independently, and avoid imprisonment and teen pregnancy. This is estimated to result in savings to society of around $30,000 to $100,000 per child (Glascoe, 2005).

Screening tools filled out by parents are advantageous due to their inexpensive cost as well as the relative ease and brief time it takes to complete the examinations. It also allows parents to become “active partners” in monitoring and evaluating their child’s development (Pinto-Martin et al., 2005). It is important for screening to occur at least once a year to compensate for false positive results and monitor any new indicators that may develop (Vellutino et al., 2007). Administering screening consistently also allows for progress to be monitored over periods of time. Interventions can be evaluated based on their ability to improve scores. Teachers may look to adjust their curriculum to accommodate class-wide trends in screening tests. Screening results can also have a huge impact on policy-making (Center for the Study of Social Policy, 2013). Collecting this data is a step in the right direction, but it amounts to nothing if results are not used to inspire better programs that promote early child development.

**Purpose of Study**

This study had two purposes. First, the study provided a valuable service to the community agency by combining their client-related data in one usable format, thus enabling descriptive analyses of their population. Second, statistical observations regarding risk and
resilience factors in early child development, and their relationship to child outcome, were examined. We hypothesized that children with more risk factors would show poorer developmental outcomes. Given literature reviewed on risk and resilience factors and links with social-emotional adjustment, we expected factors pertaining to SES, family structure, and medical risk to be predictive. While risk and resilience factors are expected to help predict developmental outcomes, this study is mainly exploratory in nature and designed to illuminate areas for further exploration. Placed in a broader context, the purpose of this study was to assist a community agency with program evaluation by providing information and a preliminary look at prediction of outcomes. We also provided a database developed through SPSS which the agency can use in the future. The main goal was to provide feedback on risk and resilience measures as they relate to outcomes that might assist the agency in its aim to ensure positive development for its children. Evaluation efforts are essential in stimulating innovation and improvement of public health outcomes.
### Table 1: Steps in Public Health Program Evaluation Planning (Joint Committee on Standards for Educational Evaluation, 1994)

<table>
<thead>
<tr>
<th>Step</th>
<th>Procedures</th>
<th>Dates Accomplished</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Visited WPDN with advisor, met with staff, discussed data they currently collect and can make available, reviewed instruments and their purposes, learned details about the program.</td>
<td>August-September 2015</td>
</tr>
<tr>
<td>2</td>
<td>Focused design on combining information from several datasets in one, collecting information on risk, resilience, and outcome factors, identified via a review of the research literature.</td>
<td>September-December 2015</td>
</tr>
<tr>
<td>3</td>
<td>Reviewed existing data, determined who had collected and entered the data originally, checked for errors, established coding schemes for data entry and reduction, created SPSS Database.</td>
<td>January-February 2016</td>
</tr>
<tr>
<td>4</td>
<td>Descriptive statistics, bivariate correlations, multiple linear regressions, One-way ANOVA testing, profile development.</td>
<td>February-April 2016</td>
</tr>
<tr>
<td>5</td>
<td>Invited WPDN to poster session, shared a copy of final thesis paper, made a PowerPoint presentation highlighting major areas of interest and potential future directions as they pertain to WPDN.</td>
<td>April 2016</td>
</tr>
</tbody>
</table>
Method

Young children (24 female, 31 male, mean age: 3.66, age range: 2-5 years) were recruited from Winter Park Day Nursery (WPDN) located in Winter Park, FL, as study participants. WPDN is a preschool accredited by the National Accreditation Commission through the Association of Early Learning Leaders. The center is licensed to serve 70 children. In the literature review, factors were examined that have been previously shown to relate to children’s developmental outcomes and are commonly found in the records of a high quality child-care center. From this, a set of risk and resilience factors was identified from data that were already being collected as a part of the screening and assessment routine at WPDN. Table 2 summarizes the risk and resilience measures used in the present study. Data were obtained through record review of the participating children attending WPDN who had been enrolled for at least six months. This study is a compilation of existing data; no new surveys or data were collected. A database was created to combine all existing data collected by WPDN for each child included in the study. Investigators met with staff to determine methods of record keeping as well as the best methods to find information within the records. Consent forms from the parents of participating children were attained. Of the 65 forms distributed, 58 were collected, for a response rate of 89%. Of these 58, complete data were available for 55, and these families were chosen for the study. Table 1 summarizes the community planning steps in the project.

In addition to demographic characteristics and other record information revealing risk and resilience factors, the children’s developmental outcomes were recorded. Two screening tools, the Ages and Stages Questionnaire (ASQ) and the Devereux Early Childhood Assessment (DECA), were used to quantify developmental outcome. Screening results from
the time of the child’s enrollment to most recent results were all recorded. ASQ’s were administered on the child’s birthday and every 6 months between. Table 3 shows the number and mean scores of children who had ASQ scores recorded for a particular month category. DECA’s were administered at the time of enrollment and typically every 3 months between. All tests were performed by parents and teachers of the children and verified by a Family & Behavioral Specialist who works for WPDN. A select number of both risk and resilience factors were then chosen, and their relative contributions to outcome were determined statistically.

Two Common Screening Tools and their Reliability and Validity

The following sections identify and describe two common screening tools: the Ages and Stages Questionnaire (ASQ) and the Devereux Early Childhood Assessment (DECA). These are just two examples of the wide variety of screening tools available, but these two were chosen for evaluation in this study due to their endorsement by the State of Florida as permissible screening tools for child care centers that are state licensed as well as their past and ongoing use at the study site.

Ages and Stages Questionnaire (ASQ)

The Ages and Stages Questionnaire is an accurate, family-friendly screening tool used to identify the need for further assessment in young children and is administered over the course of the child’s development from 6 to 60 months of age (Squires et al., 1999). Screening twice a year is preferred, with the first screening usually occurring near the child’s birthday and then every six months after. A parent or caregiver of the child who spends time with the child on a regular basis typically completes the 30-item Questionnaire, which takes about 10-15 minutes. The test screens children in five major areas: Communication, Gross
Motor Skills, Fine Motor Skills, Problem Solving, and Personal-Social Skills. The Questionnaire works by converting answers to numerical descriptors, and comparing totals to empirically derived cutoff points for each area. A response of “yes” converts to 10 points, a response of “sometimes” to 5 points, and a response of “not yet” to 0 points. Recommendations for further developmental evaluation are sent out when a child’s response score is at or below the cut-off total.

ASQ is designed for early educators, pediatricians, interventionists, and more. However, testing results do not serve as a clear indicator of developmental delays in children (Center for Disease Control and Prevention, 2015). Rather it indicates which children appear to be developing normally versus which children might benefit from further evaluation. This is important to keep in mind, as ASQ is not considered a method of diagnosis or conclusive evidence of developmental issues. However its use as a screening tool can help ensure that children do not go without the help they may need in order to thrive in any academic or social environment.

Hornman et al. (2013) performed a psychometric evaluation of the ASQ 60-month version. The goal was to determine which of the ASQ scoring methods was most accurate in identifying children with potential developmental issues. Results showed both a strong sensitivity and specificity using the ASQ total score, at 0.96 and 0.93, respectively. Another study conducted by Alvarez et al. (2013) collected data from 306 term and preterm children to test the ASQ’s psychometric properties. With a 75% sensitivity and 81% specificity, ASQ was found to meet the needs of child development specialists in screening for children to refer for further assessment. Both of these studies and their reported measures indicate the strength of this Questionnaire as an accurate screening tool.
Devereux Early Childhood Assessment

The Devereux Early Childhood Assessment (DECA) serves as a social and emotional screening tool for children aged two to five (Devereux Foundation, 1998). Sheridan et al. (2010) define social-emotional competence as “a child’s capacity to interact with and form relationships with others”. This type of development is critical for a child’s ability to communicate and regulate emotion effectively and to interact positively with others. Researchers estimate that as much as 20% of preschool-aged children may suffer from social-emotional issues (Lavinge et al., 1996). The DECA stands to serve an important role in helping to identify and encourage intervention for these children.

The DECA measures 4 items: (1) Initiative, which tests the child’s aptitude in thinking and acting independently, (2) Self-control, which capture’s the child’s ability to engage in a wide range of appropriate emotional expression, (3) Attachment, which looks at how a child relates to adults, and (4) Behavioral concerns, which addresses whether a child reveals problematic behaviors (Devereux Foundation, 1998). It assesses resilience factors through the evaluation of 27 questions pertaining to positive behaviors exhibited by children. Similar to the ASQ, this assessment is completed by a parent or caregiver. Studies have shown the ability of the test to discriminate between children with emotional and behavioral issues and those without (LeBuffe & Shapiro, 2004).

Data Analysis Plan

Following comprehensive compilation, we reviewed the data and met with WPDN staff to resolve any errors or conflicts. First we described the population of 55 children using the measures of risk, resilience, and child development that were available. Next, we reviewed bivariate correlations between the measures. Following this, multiple stepwise
linear regressions were performed to predict child development outcomes based on risk and resilience factors. ASQ scores at both 36 and 48 months were predicted, as these categories contained the highest number of participant scores. Most recent DECA scores for each child were predicted, as DECA’s are administered according to enrollment date, making comparison to age difficult. Risk and resilience factors were screened to determine which among them would be the strongest predictors. For both the ASQ and the DECA a selected number of the strongest risk and resilience factors were chosen to predict outcomes. The child’s score from the previous year was also used in the model, when available, to control for existing scores as a predictor.

Subsequently in order to explore the relationship between total risk and developmental outcomes, each child was given a risk index score from 0 to 2, based on major risk factors present. Each score represents the number of risk factors, with 0 representing zero to one risk factor present, 1 representing two to three risk factors present, and 2 representing four or more risk factors present. A One-way ANOVA test was run using ASQ and DECA scores as dependent variables. Following these data analyses, a profile of two hypothetical children from WPDN was developed, one representing a child who would be considered “low-risk” and the other representing a child who might be considered “high-risk”.

Results were presented and shared back to the community partner, Winter Park Day Nursery. The following framework for program evaluation in public health developed by the Centers for Disease Control was utilized throughout the research process. This ensured that the goal of providing feedback to a community agency to assist in positive development for its children was achieved.
Results

Winter Park Day Nursery Children Descriptors

Of the children participating in the study, 24 were females and 31 were males. The average age was 46 months with ages ranging from 2-5 years. Ethnicities included White (22), African American (9), Hispanic (10), Mixed (8), and Other (2). Sixty eight percent of the children come from households with both parents and 20% of children are from single parent households. A majority of the children qualified for free (65.5%) or reduced (9.1%) lunch. Of the 55 children, 12 showed small medical risk while 4 presented with significant medical risk, defined as a medical condition requiring care and monitoring by medical professionals. Five children had vision acuity scores greater than 20/40, indicating poor vision. See Table 2 for descriptions of the families.

Developmental Outcome Descriptors

Descriptive analyses were run to determine whether any significant trends could be observed pertaining to ASQ scores over the course of the child’s development at WPDN. Of the 55 children, 15 children (27.2%) scored below the ASQ cut off for their age in one category at some point in their development while 3 children (5.5%) scored below the ASQ cut off for the age in at least two different categories. Assessing longitudinally, 2 children (3.6%) scored below the ASQ cut off at least twice in their development for the same category. Looking at most recent scores, 5 children (9.1%) scored below the ASQ cut off in at least one category.

The same analyses were run for DECA scores. Thirty one children (57.4%) scored below the DECA cut off for their age in one category at some point in their development. 19 children (35.2%) scored below the DECA cut off for the age in at least two different
categories. Assessing longitudinally, 9 children (16.7%) scored below the DECA cut off at least twice in their development for the same category. Looking at most recent scores, 19 children (35.2%) scored below the DECA cut off in at least one category.

**Correlations between Associated Risk and Resilience Factors**

Correlation matrix results can be found in Table 4. Children who had single parents were more likely to have lower incomes and a smaller number in the household. Income was positively correlated to food eligibility, number in the household and BMI. Children with medical risk factors were also more likely to qualify for food eligibility, live in a larger household, and have a higher BMI. As age at delivery increased the number of emergency contacts decreased while vision screening results improved.

**Linear Regression Results**

A series of block-wise linear regressions were conducted to predict ASQ outcomes at 36 and 48 months based on selected risk and resilience factors. One significant prediction was found from the regression models with ASQ scores at 36 months as the dependent variable. Food eligibility and ASQ36 Fine Motor Skills were highly correlated; as food eligibility increased, ASQ scores decreased (Model 3, $\beta = -0.623$, $p < .01$). When assessing regression models with ASQ scores at 48 months as the dependent variable, one variable stood out as a significant predictor in several categories (Table 5). Increasing household numbers were associated with decreased ASQ48 Communication and Problem Solving Skills scores, but increased Gross Motor Skills scores (Model 1, $\beta = -0.423$, $p < .05$; Model 1, $\beta = 0.622$, $p < .05$).

A final model was run for each regression using the child’s ASQ score from the previous year as an independent variable, to assess whether risk and resilience variables still
contributed to the variance over and above the previous ASQ predictor. Results revealed strong correlations between previous scores and the current ASQ scores, indicating that past performance was a stronger predictor than the risk factors.

A series of block-wise linear regressions were also conducted to predict most recent DECA outcomes based on selected risk and resilience factors. DECA results were separated by respondent, each child having scores from both a parent and a teacher. No significant results were found from the parent-respondent regression models to predict outcomes. The teacher-respondent regression models yielded two significant results. Having a single parent was negatively associated with decreased DECA Initiative scores while qualifying for food eligibility was positively associated with DECA Initiative scores (Model 2, $\beta = -0.328$, $p < .05$; Model 3, $\beta = 0.34$, $p < .05$).

**Total Risk and Developmental Outcomes**

A one-way between subjects ANOVA was conducted to compare the effect of total risk on child developmental outcomes for ASQ scores in minimal risk, moderate risk, and significant risk groups (Table 6). The differences in ASQ36 scores between the minimal risk group ($n = 3$, $M = 274$), the moderate risk group ($n=9$, $M = 268$), and the significant risk group ($n=13$, $M = 263.5$) were not found to be statistically significant, $F(2,22) = .202$, $p = .819$. The differences in ASQ48 scores between the minimal risk group ($n = 3$, $M = 255$), the moderate risk group ($n=6$, $M = 285$), and the significant risk group ($n=15$, $M = 265.3$) were not found to be statistically significant, $F(2,21) = 1.111$, $p = .348$.

Likewise, a one-way between subjects ANOVA was conducted to compare the effect of total risk on child developmental outcomes for DECA scores in minimal risk, moderate risk, and significant risk groups (Table 6). The differences in most recent parent-respondent
DECA scores between the minimal risk group (n = 6, M = 180.3), the moderate risk group (n=12, M = 183.4), and the significant risk group (n=24, M = 158.3) were not found to be statistically significant, F(2,39) = .202, p = .348. The differences in most recent teacher-respondent DECA scores between the minimal risk group (n = 5, M = 169), the moderate risk group (n=14, M = 168.3), and the significant risk group (n=30, M = 149.9) were likewise not found to be statistically significant, F(2,46) = .202, p = .154.

**Discussion**

In the present exploratory study, a chart review was performed to examine child developmental outcomes as they relate to risk and resilience factors and draw substantive observations and conclusions. Developmental outcomes were measured using two primary screening assessments: the ASQ and the DECA. Descriptive tests revealed that both ASQ and DECA scores were found to improve as the child developed, which was an encouraging result. As hypothesized, a few of the risk and resilience factors chosen did play a statistical role in explaining developmental outcomes, including household number, food eligibility, and having a single parent. These results suggest that there are plausible areas for future research as to how these factors might be associated with a child’s development. However, many statistical analyses revealed no statistical significance for risk factors explaining outcome, perhaps due to low number of participants in the study as well as a homogenous population sampled.

**Risk and Resilience Factors Correlations**

Several of the results assessing correlations between the literature-derived risk and resilience factors were logical, and served to confirm the accuracy of the bivariate correlation
matrix. It makes sense that single parenting would correlate with lower income and a smaller household number. The statistical relationship found between income and BMI is interesting; as income increased, so did BMI. Literature typically cites households experiencing food insecurity due to lower income and SES resulting in increased BMI in children (Pan et al., 2012; Velasquez-Melendez et al., 2011). However the participating children generally did not exceed the limit for “overweight” and “obese”. Most children in this study were within the normal BMI range (M = 16.5, SD = 2.47), so this statistical relationship does not necessarily indicate that increased income leads to unhealthy BMI.

**ASQ and DECA Developmental Outcome Trends**

These results are perhaps most interesting to our community partner Winter Park Day Nursery in terms of providing them specific feedback on how their program has helped to impact children’s development. While 27.2% of children scored below the ASQ cut off for their age in one category at some point in their development, only 3.6% of children continually scored below the ASQ cut off for that same category in future screenings. This finding is both significant and encouraging. The same was true for the DECA, as 57.4% of children scored below the DECA cut off for their age in one category at some point in their development while only 16.7% of children scored below the DECA cut off at least twice in their development for the same category. This data shows that while there may be some room for improvement, overall the students are showing better scores over time, which is an important consideration for program evaluation.

**Predicting Outcomes Based on Selected Risk and Resilience Factors**
While including the previous ASQ predictor invalidated the significance of the selected risk and resilience factors in predicting ASQ outcomes, preliminary observations can still be made toward their potential effect on scores. The strong correlation between food eligibility and ASQ36 Fine Motor Skills reveals that SES might be related to a child’s coordination. A study conducted by Aiman et al. (2016) confirms this prediction, as they observed a significant correlation between fine motor skills and SES ($p < 0.05$). Children from families of lower SES had lower fine motor skills than those from families of higher SES (Aiman et al., 2016). Fine motor skills are important in that they are related to a number of tasks, including writing, coloring, and using tools. They help children to strengthen their muscles and develop hand-eye coordination. Studies even implicate fine motor skills as having an impact on perceived scholastic competence (Piek et al., 2006).

Increasing household number was cited as a significant risk factor in several models. More individuals in the household were associated with decreased communication and problem solving skills at 48 months. More siblings to take care of might divert parental attention from a child, resulting in decreased communicative ability. The same might be true for the second measure; less time spent with a child due to more siblings or individuals to care for might result in less problem solving skill development. Solari and Mare (2012) found that crowded homes had a negative effect on a child’s wellbeing in multiple areas, including internal behavior problems such as depression and withdrawal, external behavior problems such as strong temper, and even physical health. Future research will continue to elucidate the exact mechanisms by which crowding negatively affects children. It might become beneficial to work with families in helping to design housing environments that minimize these impacts in larger families, such as setting aside personal study spaces.
Looking at regressions associated with DECA outcomes, one significant result related to having a single parent with decreased initiative. It has been established that single parenting is correlated to problem behavior, psychological distress, and academic performance (Allison & Furstenberg, 1989). Being a single parent is also correlated to lower SES and lower measures of perceived social support, which compounds the issue (Escarce, 2003; Cairney et al., 2003). With the right resources available, being a single parent should not dictate child performance. Even as simple a measure as ensuring single parents within the childcare system feel supported by outside connections could play a significant role in improving developmental outcomes for children of the household.

**Predicting Outcomes Based on Total Risk**

None of the statistical analyses comparing total risk indexes to developmental outcomes were found to be significant. However descriptive differences between the mean ASQ and DECA scores of the three categorical risk groups were apparent. The greatest difference in means within the ASQ scores was observed in the 36-month samples. The minimal risk group, as defined by children with zero to one risk present, had a mean total ASQ score that was 10.5 points higher than that of the significant risk group, as defined by children with four or more risk factors present. A similar trend was observed in the 48-month samples, where mean total ASQ score differed between minimal and significant risk groups by 10 points.

The difference in means within the parent-respondent DECA scores dropped from 180.3 in the minimal risk group to 158.3 in the significant risk group, a full 22 points lower. The same was true for teacher-respondent DECA scores, which dropped from 169 in the minimal risk group to 149.9 in the significant risk group, a difference of 19.1 points. A number of factors could explain why these results are significant, but the most relevant
explanation with regards to this study is the way in which the risk indices groups were generated as well as the total number of risk factors that could be counted, which was fairly low. The children had to be grouped a certain way to make the sample size large enough in order for the test to be run, because not all children had both an ASQ36 and ASQ48. Therefore these groupings may not necessarily have represented children of similar risk profiles. All children did have a most recent DECA score, which is where greater and more logical differences in mean scores from the 0 to 2 risk index were observed. This particular analysis appeared to yield stronger results with the DECA than the ASQ due to having scores from every child. While not statistically significant, these results do suggest that total risk might play a role in compounding negative effects toward child developmental outcomes as measured by DECA categories. Studies have revealed the cumulative risk hypothesis to be true, which is the idea that the more co-occurring risk factors a child experiences, the more deleterious the impact on child behavior outcome (Appleyard et al., 2005).

Limitations, Future Directions, and Concluding Remarks

Challenges in this study included the sample size as well as the data available for review. Running data analyses for 55 samples was too often not large enough to see statistical significance. The data available for review were limited to what could be found within the existing charts for the participants, as no additional surveys were administered. An additional limitation was the difference in the time of administration of both the ASQ and the DECA. Direct comparison between the two in terms of contributing risk/resilience factors was difficult due to the ASQs completed according to date of birth and the DECA being completed according to enrollment date.
Future directions might take the risk and resilience factors found to be significant in predicting outcomes and explore them more in depth, specifically looking to see whether the relationship between the variables is truly correlated or merely coincidental. A larger sample size should yield more conclusive results. Additionally future research could look to more closely identify risk and resilience factors associated with the literature. In this particular study the factors chosen were limited to what was accessible within the children’s charts. In order to provide a better profile of how these risk and resilience measures reported in literature relate to developmental outcomes at WPDN, more data might need to be collected from parents and teaching staff in the form of surveys, questionnaires, etc. We specifically recommended that WPDN begin collecting information on the number of people living in a household, and that they add a parent-completed measure of social support or support networks to their intake. Further, the number of children with minor health problems is a concern, and the data may help the agency seek additional funding for this population.

This study has important considerations for the partner community agency, Winter Park Day Nursery. It examines the predictive value of risk and resilience measures currently found within a child’s chart, identifies the role of total risk in predicting developmental outcomes, and provides an assessment of ASQ and DECA scoring trends with the current population of WPDN children. Most of the findings are introductory, and further analysis is necessary in order to determine appropriate statistical significance. However this study provides unique insights of various family attributes that might be helpful for WPDN staff to consider when developing curriculum that helps a child to overcome risk factors while taking advantage of resilience factors.
Figures and Tables

Table 2: Risk and Resilience Descriptors

<table>
<thead>
<tr>
<th>Factor</th>
<th>Descriptors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td>24 females, 31 males</td>
</tr>
<tr>
<td>Age</td>
<td>Mean: 46 months, range: 2-5 years</td>
</tr>
<tr>
<td>Ethnicity</td>
<td>White (22), African American (9), Hispanic (10), Mixed (8), and Other (2),</td>
</tr>
<tr>
<td>Single Parent</td>
<td>68.4% both parent households. 29.8% single parent households</td>
</tr>
<tr>
<td>Food Eligibility</td>
<td>Free (65.5%); Reduced lunch (9.1%); None (25.4%)</td>
</tr>
<tr>
<td>Medical Risk</td>
<td>Significant medical risk (7.2%); Small medical risk (21.8%); No medical risk (70.9%)</td>
</tr>
<tr>
<td>Vision</td>
<td>50 had acceptable vision; 5 were recommended for further screening</td>
</tr>
<tr>
<td>Income</td>
<td>Mean: $38,164. Range: $0-$166,000</td>
</tr>
<tr>
<td>Household Number</td>
<td>Mean: 3.71. Range: 2-10</td>
</tr>
<tr>
<td>Number of Siblings</td>
<td>Mean: 1.14. Range: 0-7</td>
</tr>
<tr>
<td>Emergency Contacts</td>
<td>Mean: 3.09. Range: 0-18</td>
</tr>
<tr>
<td>Body Mass Index (BMI)</td>
<td>Mean: 16.5. Range: 13.6-27.8</td>
</tr>
<tr>
<td>Mother’s Age at Delivery</td>
<td>Mean: 26.2. Range: 16-38</td>
</tr>
</tbody>
</table>

Table 3: Ages and Stages Questionnaire Data Available at Each Age

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
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<td>ASQ24</td>
<td>11</td>
<td>175</td>
<td>300</td>
<td>235</td>
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<tr>
<td>ASQ27</td>
<td>8</td>
<td>190</td>
<td>280</td>
<td>239.3</td>
<td>34.17</td>
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<tr>
<td>ASQ30</td>
<td>17</td>
<td>170</td>
<td>300</td>
<td>254.7</td>
<td>40.6</td>
</tr>
<tr>
<td>ASQ33</td>
<td>6</td>
<td>225</td>
<td>280</td>
<td>257.2</td>
<td>21.12</td>
</tr>
<tr>
<td>ASQ36</td>
<td>27</td>
<td>185</td>
<td>300</td>
<td>261.6</td>
<td>30.99</td>
</tr>
<tr>
<td>ASQ42</td>
<td>20</td>
<td>170</td>
<td>300</td>
<td>261</td>
<td>32.99</td>
</tr>
<tr>
<td>ASQ48</td>
<td>26</td>
<td>174</td>
<td>300</td>
<td>267.3</td>
<td>33.07</td>
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<tr>
<td>ASQ54</td>
<td>16</td>
<td>185</td>
<td>300</td>
<td>264.7</td>
<td>31.75</td>
</tr>
<tr>
<td>ASQ60</td>
<td>3</td>
<td>260</td>
<td>290</td>
<td>276.7</td>
<td>15.28</td>
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</table>
### Table 4: Bivariate Correlation Coefficients of Risk and Resilience Factors

<table>
<thead>
<tr>
<th>Variable</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Single Parent</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Income</td>
<td>-0.701**</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>1.00</td>
</tr>
<tr>
<td>3. Food Eligibility</td>
<td>0.244</td>
<td>-0.768**</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Number in Household</td>
<td>-0.472**</td>
<td>0.363*</td>
<td>0.113</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Number of Emergency Contacts</td>
<td>-0.021</td>
<td>-0.119</td>
<td>-0.014</td>
<td>-0.124</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Medical Risk</td>
<td>0.085</td>
<td>0.010</td>
<td>-0.264*</td>
<td>-0.300*</td>
<td>0.012</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Body Mass Index</td>
<td>-0.194</td>
<td>0.444**</td>
<td>-0.074</td>
<td>0.264</td>
<td>-0.114</td>
<td>-0.335*</td>
<td>1.00</td>
<td></td>
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</tr>
<tr>
<td>8. Mother’s Age at Delivery</td>
<td>-0.263</td>
<td>0.255</td>
<td>-0.244</td>
<td>0.165</td>
<td>-0.324*</td>
<td>0.089</td>
<td>0.247</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>9. Vision</td>
<td>0.095</td>
<td>-0.005</td>
<td>-0.006</td>
<td>0.158</td>
<td>0.266</td>
<td>-0.071</td>
<td>0.125</td>
<td>-0.320*</td>
<td>1.00</td>
</tr>
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</table>

*p < .10. **p < .05. ***p < .01.
### Table 5: Multiple Regression Models Predicting ASQ Scores at 48 Months (N = 55):
Risk and Resilience Effects

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. DV: Communication</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Household Number</td>
<td>-0.432**</td>
<td>0.019</td>
<td></td>
<td>0.099</td>
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<tr>
<td>Single Parent</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Food Eligibility</td>
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<td></td>
<td>-0.273</td>
<td></td>
</tr>
<tr>
<td>Emergency Contacts</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R^2</td>
<td>0.187</td>
<td>0</td>
<td>0.07</td>
<td>0.009</td>
</tr>
<tr>
<td>2. DV: Gross Motor Skills</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Household Number</td>
<td>0.622**</td>
<td></td>
<td></td>
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<tr>
<td>Single Parent</td>
<td></td>
<td>0.084</td>
<td></td>
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</tr>
<tr>
<td>Food Eligibility</td>
<td></td>
<td></td>
<td>-0.139</td>
<td></td>
</tr>
<tr>
<td>Emergency Contacts</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R^2</td>
<td>0.387</td>
<td>0.006</td>
<td>0.018</td>
<td>0.002</td>
</tr>
<tr>
<td>3. DV: Fine Motor Skills</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Household Number</td>
<td>-0.278</td>
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<td></td>
<td></td>
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<tr>
<td>Single Parent</td>
<td></td>
<td>0.006</td>
<td></td>
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</tr>
<tr>
<td>Food Eligibility</td>
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<tr>
<td>Emergency Contacts</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R^2</td>
<td>0.077</td>
<td>0</td>
<td>0.004</td>
<td>0.027</td>
</tr>
<tr>
<td>4. DV: Problem Solving</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>Household Number</td>
<td>-0.543**</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Single Parent</td>
<td></td>
<td>0.104</td>
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<tr>
<td>Food Eligibility</td>
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<tr>
<td>R^2</td>
<td>0.295</td>
<td>0.01</td>
<td>0.075</td>
<td>0.013</td>
</tr>
<tr>
<td>5. DV: Personal-Social Skills</td>
<td></td>
<td></td>
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<tr>
<td>Household Number</td>
<td>-0.041</td>
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<td>0.237</td>
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<td>Food Eligibility</td>
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<td>Emergency Contacts</td>
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<tr>
<td>R^2</td>
<td>0.002</td>
<td>0.051</td>
<td>0.03</td>
<td>0.008</td>
</tr>
</tbody>
</table>

*p < .10. **p < .05. ***p < .01.
Table 6: ASQ and DECA Scores by Level of Risk in Family

<table>
<thead>
<tr>
<th>Risk Index</th>
<th>ASQ36 (N)</th>
<th>ASQ48 (N)</th>
<th>Mean DECA parent (N)</th>
<th>Mean DECA teacher (N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>274 (3)</td>
<td>255 (3)</td>
<td>180.3 (6)</td>
<td>169 (5)</td>
</tr>
<tr>
<td>1</td>
<td>268 (9)</td>
<td>285 (6)</td>
<td>183.4 (12)</td>
<td>168.3 (14)</td>
</tr>
<tr>
<td>2</td>
<td>263.5 (13)</td>
<td>265.3 (15)</td>
<td>158.3 (24)</td>
<td>149.9 (30)</td>
</tr>
</tbody>
</table>

Figure 1: Winter Park Day Nursery ecological environment, modeled from Bronfenbrenner’s “Ecological models of human development” (1994).
Acknowledgment

I would like to first thank Sharon Carnahan for all of her guidance and perseverance with this project. I would next like to thank Alice Davidson for all her help with the statistical analyses. I would also like to thank the additional members of my thesis committee, James Zimmerman and Emma Oxford, for their time and constructive criticism. Finally, I would like to acknowledge and thank those at Winter Park Day Nursery who helped to provide me with data and made this project possible, particularly Megan Brown and Ali DeMaria.
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