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Patterns of Family Context and Their Associations With Child Cognitive and Social-Emotional Outcomes

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Abstract
Family environments can be characterized by their protective factors, risk factors, or both. Environments categorized as supportive and warm, where children are provided with resources such as a stimulating home environment, mother with a college degree, financial stability, and two-parent families afford children with many protective factors and have been shown to provide children with an opportunity for better academic and social-emotional outcomes. Whereas environments traditionally considered disadvantaged (e.g., parental mental health problems, low socioeconomic status, low parent education, high parental disagreement), where the presence of risk factors outweigh that of protective factors, evidence lower academic and social-emotional outcomes in children. Due to the multifaceted nature of families, it is most likely the case that families evidence both protective and risk factors at the same time. Developing patterns of protective and risk factors within families is useful as it provides a picture of how these important variables work together to relate to child cognitive and social-emotional outcomes. It is within this framework that the current study was undertaken using data from the Child Development Supplement (CDS) of the Panel Study of Income Dynamics (PSID). The primary aims of the current study were to explore the structural and psychometric integrity of measures included in the CDS (insofar as this is an important precursor to using these measures in additional analyses) and to uncover the existence of clusters of patterns of family context and their relationship with child cognitive and social-emotional outcomes. Several reliable measures of family variables and child behavioral outcomes were uncovered and Multistage Euclidean Grouping (i.e., cluster analysis) revealed the existence of five distinct and meaningful clusters of family context. Furthermore, membership in these clusters was shown to be related to child social-emotional and cognitive outcomes.

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“Treat a child as though he already is the person he’s capable of becoming.”

~ Haim Ginott

Many thanks to my parents.

ABSTRACT

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Family environments can be characterized by their protective factors, risk factors, or both. Environments categorized as supportive and warm, where children are provided with resources such as a stimulating home environment, mother with a college degree, financial stability, and two-parent families afford children with many protective factors and have been shown to provide children with an opportunity for better academic and social-emotional outcomes. Whereas environments traditionally considered disadvantaged (e.g., parental mental health problems, low socioeconomic status, low parent education, high parental disagreement), where the presence of risk factors outweigh that of protective factors, evidence lower academic and social-emotional outcomes in children. Due to the multifaceted nature of families, it is most likely the case that families evidence both protective and risk factors at the same time. Developing patterns of protective and risk factors within families is useful as it provides a picture of how these important variables work together to relate to child cognitive and social-emotional outcomes. It is within this framework that the current study was undertaken using data from the Child Development Supplement (CDS) of the Panel Study of Income Dynamics (PSID). The primary aims of the current study were to explore the structural

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CHAPTER 1: INTRODUCTION

Recent Educational Context

Achievement gaps between white and nonwhite students persist despite national efforts to reduce these disparities (Achievement Gap Initiative, n.d.; Editorial Projects in Education Research Center, 2011; Hemphill, Vanneman, & Rahman, 2011; Vanneman, Hamilton, Baldwin Anderson, & Rahman, 2009). Similarly, students from economically disadvantaged families continue to lag behind their more advantaged peers on measures of school success (Achievement Gap Initiative, n.d.; Editorial Projects in Education Research Center, 2011). Heightened attention to student achievement – including both academic and social-emotional outcomes – over the past two decades has led to systems of accountability for school districts, programs, and educators (No Child Left Behind Act of 2001 [NCLB], 2002). Preschool programs, especially those that are federally funded, are expected to send children to school ready to learn (Head Start Act, 2007); while elementary and secondary education systems are mandated to evidence substantial student progress each year (NCLB, 2002). For over a decade, many researchers, educators, and politicians have criticized the emphasis that NCLB places on standardized assessments and making Adequate Yearly Progress (AYP) as well as the sanctions placed on schools failing to reach these predetermined goals (Meier, Kohn, Darling-Hammond, Sizer, & Wood, 2004; Rich & Lewin, 2015). As if operating in isolation, teachers and administrators have been held responsible for the growth and development of America's schoolchildren within a system of sanctions with few rewards or incentives to truly educate and excel (Rich & Lewin, 2015). Though some credence has been given to the

importance of including parents and families in the educational process (Individuals with Disabilities Improvement Education Act of 2004, 2004; NCLB, 2002), only recently has it become apparent that the U.S. Department of Education (US DOE) recognizes the true foundational value of families in the development and education of children.

Secretary of Education Arne Duncan recently announced a new family and community engagement framework developed by researchers at the Southwest Educational Development Laboratory (SEDL), a nonprofit education research and dissemination company, in collaboration with US DOE (Mapp & Kutner, 2013) that outlines a comprehensive framework for partnerships between educators, parents, and the community. The new *Dual Capacity-Building Framework for Family-School Partnerships* is built on a body of research that highlights the importance of family engagement in education for improved student success and systematic school turnaround and reform efforts (Weiss, Lopez, & Rosenburg, 2010). In addition, President Barack Obama's administration has taken an active interest in the reauthorization of the Elementary and Secondary Education Act (ESEA), most notably in increasing the emphasis on building the capacity of districts to engage, empower, and hold parents responsible in the education of their children (US DOE, 2010). The Institute of Education Sciences (IES), through requests for applications for research grants, encourages the exploration of the needs of students from low-income families (e.g., IES, 2010), and multiple Regional Educational Laboratories (RELs) have conducted studies regarding parent involvement in education (Agronick, Clark, O'Donnell, & Stueve, 2009; Mackety & Linder-VanBerschot, 2008; Speth, Saifer, & Forehand, 2008). Furthermore, data

collection efforts by the National Center for Education Statistics (NCES, 2007) include the National Household Education Surveys Program (NHES), a public-use data set that began in the mid-1990's and includes both a parent and family involvement in education survey and a school readiness survey.

While the heightened attention to the impact of family engagement on the success of children is promising, it is important to understand the family mechanisms that lead to better student outcomes. For decades, researchers have been working to make clear the relationship between multiple family characteristics and child cognitive and social-emotional outcomes. Numerous compendiums of research revolve around the role of parent and family characteristics in the educational and social-emotional outcomes of children and adolescents (e.g., Brannen & O'Brien, 1996; Conley & Albright, 2004; Crane & Heaton, 2008; Kahlil & DeLeire, 2004; Moore & Lippman, 2005). Family socioeconomic status, parent educational attainment, one- versus two-parent family structure, number of siblings, parenting style, and the home environment are among the many characteristics explored in these volumes. Likewise, SEDL has developed in-depth research reviews of current literature in the area of family involvement in education as well as multiple newsletters dedicated to the topic.

Recently, programs aimed at improving life outcomes for children have used this growing body of literature to support the development of evidence-based programs that highlight how families are integral to supporting the developing child. One such initiative is the Center for the Study of Social Policy's (CSSP) Strengthening Families Framework, which highlights the existence of five family protective factors associated with positive

early childhood outcomes and school readiness (CSSP, n.d.). Of the 20 states that have won Race-to-the-top: Early Learning Challenge grants, 13 are implementing some form of the Strengthening Families Framework to achieve the stated goals of the grant (CSSP, n.d.). A program aimed at providing comprehensive family services in order to bolster student achievement is the Full-Service Community Schools Program administered by the US DOE. This program provides services such as counseling and psychological services to assist children in being successful in school. Finally, Early Head Start programs that serve children birth to 3-years-old and their families often hold supporting positive parenting among their program's top three priorities (Raikes et al., 2014). Clearly, there is growing national recognition that a link exists between family engagement and characteristics and a child's educational outcomes—this trend is in line with the bioecological approach to child development, perhaps the most prominent theoretical model of child development to date.

CHAPTER 2: LITERATURE REVIEW

Taking into account the current educational context described above, as well as a bioecological approach to child development and numerous studies regarding the relationship between family characteristics and child outcomes (described below), the current study proposes a theoretical framework that highlights the multifaceted nature of families and their relationship to child outcomes. Family environments can be characterized by their protective factors, risk factors, or both. Due to the multifaceted nature of families, it is most likely the case that families evidence both protective and risk factors at the same time. Developing patterns of protective and risk factors within families is useful as it provides a picture of how these important variables work together to relate to child cognitive and social-emotional outcomes. Specifically, aspects of the family context including the home environment, parental cognitive performance, parental attitudes, and parental psychological well-being will be explored simultaneously by looking at family patterns that emerge across all of these variables. Although each family will present its own pattern of family context, similar family context patterns will be grouped together into a smaller number of family context clusters. Finally, membership in each of these clusters will be used to explore their relationship with child outcomes (see Figure 1).

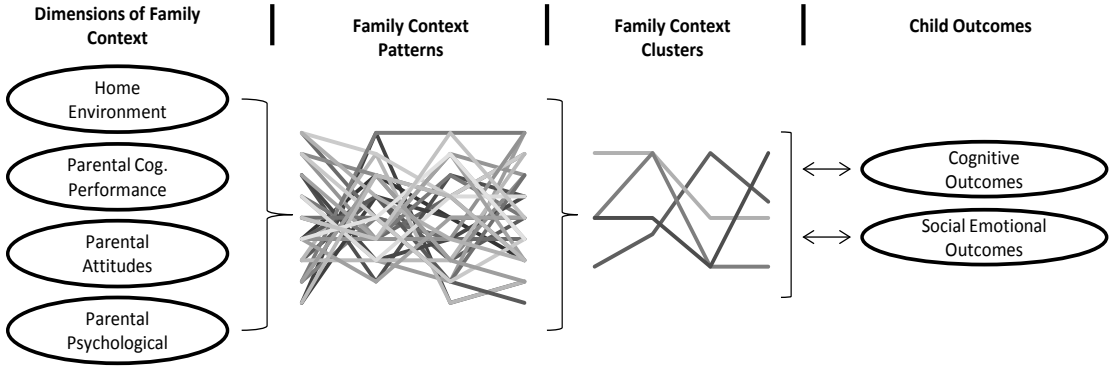

Figure 1. Theoretical Framework for the Relationship of Family Context to Child Outcomes

Bioecological Approach to Child Development

Children develop within and across multiple contexts (Bronfenbrenner, 1998; National Research Council and Institute of Medicine [NRC/IM], 2000). Most proximally, children develop within the family context; interactions between the family and child are immediate and occur multiple times daily. Within this context, the child is commonly interacting with multiple people and varying aspects of the home environment. Arguably, it is here that the most important interactions occur (Bronfenbrenner, 1998; NRC/IM, 2000); these interactions work together to provide the foundation for future development. Bronfenbrenner (1994), in his bioecological model, refers to the most proximal processes as microsystems. He writes:

> A microsystem is a pattern of activities, social roles, and interpersonal relations experienced by the developing person in a given face-to-face setting with particular physical, social, and symbolic features that invite, permit, or inhibit, engagement in sustained, progressively more complex interaction with, and activity in, the immediate environment. (Bronfenbrenner, 1994, p. 1645)

Peer and school networks are additional microsystems that shape the development of the child. Like the family microsystem, these contexts are multifaceted. The child must learn

to navigate within and across these complex systems with successful navigation aiding in more positive developmental experiences and outcomes for the child (Cicchetti & Toth, 1997). The relationship among a child's various microsystems is, in the bioecological framework, referred to as the mesosystem (Bronfenbrenner, 1994). Navigation across microsystems is made easier when disparities in ideals and structure are minimal. For example, a child from a family that sets clear boundaries for behavior at home will find it easier to adjust to the demands of the classroom than a child who is rarely supervised at home.

It should be noted that although the focus of the current study is on the family microsystem and that the most proximal influences on child development include family, peer, and school contexts and the relationships between them, these only represent part of the bioecological theory of development. Specifically, individual characteristics of the child as well as more distal processes including social structures such as neighborhoods and the availability of services (i.e., exosystems) and cultural values and beliefs (i.e., macrosystems) all influence the developing child across time (Bronfenbrenner, 1994; Cicchetti & Toth, 1997). Brofenbrenner's theory was nicely depicted in the 11th edition of *Child Development* (Santrock, 2007) as presented below in Figure 2.

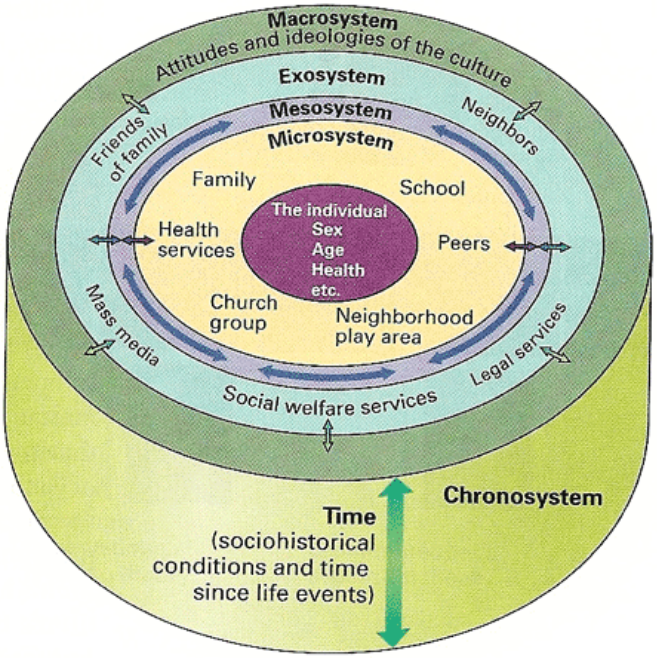

Figure 2. Depiction of Bronfenbrenner's Bioecological Approach. Source: Santrock, J. W. (2007). Child Development. Eleventh edition. NY: McGraw-Hill Companies, Inc.

Parent and Family Characteristics

The literature reviewed below highlights parent and family characteristics that have been shown to be associated with child outcomes including parental education, attitudes and psychological well-being, and other family characteristics (such as socio-economic status and number of biological parents residing with the child). It is important to note that these areas are the focus of the current study due to the evidence of their importance for healthy child development as well as the data available to explore the relationship between family and parent characteristics and child outcomes.

Repeatedly, studies have found that parent educational attainment is associated with improved child outcomes (Currie & Moretti, 2002; Gennetian, Magnuson, & Morris, 2008) and mother's education level, in particular, has been found to have positive and

strong associations with child cognitive outcomes (Burchinal, Peisner-Feinberg, Pianta, & Howes, 2002; Downer & Pianta, 2006; Hofferth, 2006b; Joo, 2010; Magnuson, 2007; Mohanty & Raut, 2009). The importance of maternal educational attainment may be due, in part, to the more highly developed language skills of mothers with higher educational attainment (Dauber & Epstein, 1993; Hoff, 2003). In addition to having a direct association with child outcomes, parent educational attainment has been linked to positive parenting practices (Davis-Kean & Sexton, 2009, Suizzo & Stapleton, 2007). Furthermore, parent educational attainment, particularly in families with two biological parents, has been found to have a moderating effect on parent involvement in school with more highly educated parents displaying increased involvement in school (Cooper, 2010).

Similarly, Hofferth (2006a) found that family structure has an effect on both child cognitive outcomes and behavioral problems. While some have found evidence that single mothers are less likely to engage in positive parenting behaviors (Arnold, Zeljo, Doctoroff, & Ortiz, 2008; Nord & West, 2001) and two-parent families report higher involvement in home-based parental involvement, a predictor of student success (Fantuzzo, Tighe, & Childs, 2000), others have found no significant differences across one- and two-parent families on measures of parental involvement (Manz, Fantuzzo, & Power, 2004).

Fantuzzo, McWayne, Perry, and Childs (2004) found that home-based involvement was a significant and strong predictor of school readiness in a sample of low-income urban children. Parent-child book reading has also been shown to be positively related to children’s receptive and expressive language abilities (Cunningham

& Stanovich, 1991; Storch & Whitehurst, 2002). This association is strongest when parents engage in more cognitively demanding forms of extra-textual talk during book reading (Gelman, Coley, Rosengren, Harman, & Pappas, 1998) such as referencing events outside of the book and using generic nouns (Gelman & Raman, 2003). And others have found that when parents used more sophisticated vocabulary and elaborated on sentences (e.g., higher lexical richness) as well as contingent responsiveness during parent-child book reading, children displayed increases in receptive and expressive vocabulary (Mol & Neuman, 2014). Differences in book reading interactions have been found to be related to cultural differences as well as the literacy levels of parents (Bus, Leseman, & Keultjes, 2000).

Aspects of the home environment such as access to books may influence parent-child book reading (Bradley, McKelvey, & Whiteside-Mansell, 2011; Neuman & Celano, 2012). Furthermore, book access may mediate relationships between family economic status and children's language abilities (Mistry, Biensanz, Chien, Howes, & Benner, 2008). In addition to the parenting practices highlighted above, home environment has been found to be associated with fewer behavior problems in children (Joo, 2010; Yeung et al., 2002).

Not surprisingly, children of parents with poor mental health suffer from increased externalizing and internalizing behaviors, with the most pronounced risk occurring when mothers and fathers both present with poor mental health. Interestingly, mentally healthy fathers can mitigate some of the problems associated with having a mother with poor mental health and if only the father presents with mental health

symptoms, children do not seem to be at increased risk for increased behavior problems (Kahn, Brandt, & Whitaker, 2004). Similarly, having a heavy drinker in the household was associated with increased problem behaviors (Hofferth et al., 2000).

Hofferth et al. (2000) found that children of parents exhibiting higher parental warmth have been found to display fewer internalizing behaviors (e.g., social withdrawal, nervousness or irritability, or fearfulness), while Boisvert and Wright (2008) failed to find significant associations between parental warmth and child externalizing behaviors (e.g., fighting, stealing, or impulsive behaviors). Boisvert and Wright (2008) also found that positive sibling interactions were important predictors of externalizing behaviors and that parental monitoring was associated with fewer behavioral problems in children. Conversely, increased parenting stress has been linked to adverse child outcomes, though parent efficacy may mediate this relationship through its impact on increasing home-based involvement (Semke, Garbacz, Kwon, Sheridan, & Woods, 2010). Finally, Burchinal et al. (2002) found that parent caregiving practices and attitudes were strong predictors of child outcomes.

Family socioeconomic status (SES) and its relationship to child outcomes has been widely researched. Researchers have recently been trying to ascertain the aspects of low-income status that lead to poorer cognitive outcomes for children (Attewell, Suazo-Garcia, & Battle, 2003; Downer & Pianta, 2006; Hofferth, Smith, McLoyd, & Finkelstein, 2000; Hsin, 2009; Yeung, Linver, & Brooks-Gunn, 2002). While some studies have found that family income-to-needs ratios are significant predictors of child cognitive ability in addition to other family characteristics (i.e., maternal education and

sensitivity and home learning environment; Downer & Pianta, 2006), others have found that much of the association between family income and cognitive outcomes can be explained by family ability to invest in a stimulating home environment (Yeung et al., 2002). Likewise, Hsin (2009) discusses the link between SES and the verbal engagement of parents with their children; positing that verbal engagement is the primary mechanism operating to increase cognitive outcomes. Divides in the accessibility of resources such as computers for low-income versus middle- to upper-income children may further explain differences in cognitive outcomes across these income levels (Attewell et al., 2003). Furthermore, welfare receipt for parents and children has also been shown to have a negative effect on academic outcomes (Guo, 2005; Neblett, 2007). Although related to issues regarding the effect of SES on child outcomes, the implication of Neblett's (2007) study is that even among low-income mothers, there is something specific to welfare receipt that can negatively affect the cognitive trajectories of their children.

Similar to findings on cognitive achievement, studies have found that although there is a positive relationship between income and social-emotional outcomes (i.e., low-income children are more at risk for behavior problems and delinquency than middle- and upper-income children; Yeung et al., 2002), this link may be better explained by accompanying predictor variables such as economic strain (Agnew, Matthews, Bucher, Welcher, & Keyes, 2008), income instability, maternal emotional distress and parenting practices (perhaps due to low-income status; Yeung et al., 2002), and welfare transition status (Hofferth et al., 2000; Neblett, 2007).

Limitations of Existing Research

The literature cited above establishes a relationship between multiple aspects of the family context and cognitive and social-emotional outcomes for children and adolescents; however, further research is necessary to uncover how these aspects of family context work together in their relationship with positive child outcomes. Though essential for the development of theory in this area, future research needs to better reflect the fact that families are not two-dimensional. The multifaceted nature of the family context needs to be taken into account. Children do not come from families that are just low-income or not. Families have many different characteristics – parental warmth and style, family structure, parent educational attainment, home environment, parent mental health, and more. Statistically controlling for related variables is not enough. Research that brings to light the connection across multiple areas of family context to child outcomes will be useful in informing policies and targeting interventions aimed at improving family involvement in the education of children (both in and out of school).

Work in this area has primarily taken a variable-centered approach as opposed to a person-centered approach. Variable-centered approaches, or R-type analyses, focus on the correlation matrix and association of the independent variable(s) with the dependent variable without regard to the attributes of the person. In contrast, in person-centered approaches, or Q-type analyses, the attributes of the person are permanently linked throughout the analysis and the person is the primary conceptual unit of analysis (Bergman, Magnusson, & El-Khouri, 2003). A person-centered approach, such as cluster analysis, is more appropriate than a variable-centered approach especially in the area of

child development due to the fact that many dimensions of the child and family are working together to affect child outcomes. The literature reviewed above, though variable-centered, provides the basis for understanding which characteristics of the family context are important for inclusion in person-centered analyses.

Purpose of this Study

The current study is meant to expand on previous research by taking a person-centered approach while exploring how multiple aspects of the family relate to child outcomes. In order to improve generalizability of the results to those outside of the study sample, nationally-representative survey data were used; however, the use of such data is not without its limitations, and the current study explores some of these limitations as well. The specific aims of the current study are fourfold: (1) to establish the structural and psychometric integrity of measures of family context, economic strain, and the Behavior Problems Index (BPI) available in the Child Development Supplement (CDS) of the Panel Study of Income Dynamics (PSID); (2) to uncover patterns of family context across multiple variables that take into account the complex nature of families (i.e., include variables across multiple dimensions of family characteristics); (3) to group children with similar patterns together into distinct clusters of family context; and, (4) to explore the associations between cluster membership and child cognitive and social-emotional outcomes.

The exploration of the psychometric integrity of various measures provided by the CDS is an important contribution to the field because it highlights the need for researchers to carefully choose the data files and measures within a chosen data file that

best suit their research aims. In addition, the use of multiple family attributes to identify family context patterns (or profiles) will provide the study author and others with the ability to consider combinations of different family attributes and their relationship with child outcomes. Identifying family context clusters and, specifically, those that relate to lower child outcomes can help practitioners and policy makers that work with families to target families in need of intervention. Furthermore, by identifying clusters of patterns through cluster analysis, one can establish how the family system functions as a whole instead of merely having an understanding of how one or two aspects of the family context operate in isolation.

Research Questions

Based on a review of current literature, a research agenda was established to address the following questions:

(1) What measures of family context can be derived from the data provided by the Child Development Supplement (CDS) of the Panel Study of Income Dynamics (PSID)? What is the structural integrity of the Economic Strain scale and Behavior Problems Index in the CDS sample?

(2) Do distinct clusters of patterns of family context exist? If so, what do they look like?

(3) Are clusters of family context related to child cognitive and social-emotional outcomes?

CHAPTER 3: METHODOLOGY

This chapter provides an overview of the research and statistical methodologies used in the current study. A description of the data, study sample, and measures used are provided below. Finally, this chapter details the measurement and data analysis procedures used to uncover clusters of family context and their associations with child outcomes.

Procedures

Data from the Child Development Supplement (CDS) of the Panel Study of Income Dynamics (PSID; Survey Research Center, Institute for Social Research [SRC/ISR], n.d.) were used in the current study. The PSID is a public-use longitudinal data set containing information on individuals and families regarding their demographic, economic, sociological, and psychological characteristics. Data collection for the PSID began in 1968 on a nationally representative sample of families. The CDS was implemented in order to provide additional, more detailed information about educational and developmental outcomes for children and their families to allow researchers to explore mechanisms that lead to positive outcomes for children.

Individuals in the CDS consist of a subsample of PSID children and their parents. Specifically, PSID families interviewed in 1997 that had children under the age of 13 years were recruited for inclusion in the CDS (2,705 eligible families). During the first wave of CDS data collection (CDS-I), 2,394 families (88% response rate) were successfully interviewed, producing a sample of 3,563 children aged birth to 12-years-old. Information was collected for a maximum of two children per CDS family, resulting

in approximately half of the families providing data on two children. Follow-up data collection occurred in 2002-2003 (CDS-II) and 2007-2008 (CDS-III). Data from CDS-II and CDS-III were not used in the current study.

Data collection methods included Primary caregiver (PCG) child-level and family-level interviews (in person or telephone), in person interviews for children 10-years and older, and in person child assessments (SRC/ISR, 2010a). Although a nationally representative sample of families was recruited for inclusion in the CDS, participant nonresponse led to slight differences across some sub-groups. For this reason, sample weights are provided for each wave of CDS data. CDS-provided weights were used for child assessment variables and PCG-child interview variables in order to preserve the representative nature of the data.

Sample

Several subsets of CDS children were included in the current study. Children under the age of 36 months at the time of the 1997 (CDS-I) PCG interview were excluded from the current study because data were not available on the variables of interest (e.g., children under 36-months-old were not administered cognitive measures). In all, 2,809 children aged 36 months and older were included in the CDS-I sample. Table 1 displays descriptive characteristics for all children eligible for participation in the current study.

Table 1. *Child Development Supplement Sample Characteristics for Children 36-Months and Older*

Descriptive Characteristics	*n*	Percent
Child sex		
Male	1,432	51.0
Female	1,377	49.0
Child race[a]		
White	1,271	45.2
Black	1,171	41.7
Latino	207	7.4
Asian	50	1.8
Native American	18	0.6
Other	84	3.0
In Federal lunch program[b]	1,821	64.8
Ever in special education[c]	234	8.3
Ever in gifted program[d]	358	12.7
Ever expelled[e]	172	6.1
Live with biological parents		
Both	1,606	57.2
Mother only	995	35.4
Family received welfare in '97[f]	262	9.3
Parent highest education[g]		
Less than high school	662	23.6
Completed high school	925	32.9
Completed 4 yrs post-secondary	332	11.8
Post-bachelor's	189	6.7

[a] Missing data for 8 children. [b] Missing data for 281 children.
[c] Missing data for 741 children. [d] Missing data for 742 children.
[e] Missing data for 754 children. [f] Missing data for 127 children.
[g] Missing data for 121 children; data for children with parents completing less than 4 years post-secondary schooling also not included (n = 580).

The paragraphs below describe each subset of CDS-I children included for the analyses conducted to address each research question. For each analysis, cases that were missing data on any variables included in the analysis were removed. Listwise or

casewise deletion was used, where children with missing data on any given variable to be used in the analysis are deleted from the data file (Allison, 2002; Bourque & Clark, 1992). This method of handling missing data was appropriate given the robustness of this method to violations to the assumption that data are missing completely at random in regression analyses (Allison, 2002), the large size of the study samples, and the fact that the sample weights employed in analyses already accounted for missing data (SRC/ISR, 2010b).

Research Question 1: What measures of family context can be derived from the data provided by the Child Development Supplement (CDS) of the Panel Study of Income Dynamics (PSID)? What is the structural integrity of the Economic Strain scale and Behavior Problems Index in the CDS sample? All children 36-months and older who had data on all items on a given child-level measure were included in the associated exploratory and confirmatory factor analyses and item response theory (IRT) scoring (see detailed explanation of analyses below). For household measures that were rated the same across siblings within the same household only data from one sibling 36-months and older was included in the associated exploratory and confirmatory factor analyses and in establishing item parameters using IRT. The sample of children with all data on a given measure was randomly split into an exploratory sample and a confirmatory sample of the same size so that the same sample was not used in both the exploratory and confirmatory analyses. Sample sizes ranged from n = 415 for the structural analyses of household characteristics to n = 1,337 for analyses of the Behavior Problems Index (BPI).

Research Question 2: Do distinct clusters of patterns of family context exist? If so, what do they look like? Of the 2,809 children in the CDS-I sample who were 36-months and older, 1,330 children did not have data from the PCG Household Interview and another 339 were missing data on at least one variable used to define the family context patterns (or clusters of these patterns). Finally, an additional 20 outlier children were removed from the sample during cluster analysis. This resulted in a total of 971 children in the CDS-I sample used to define the family context clusters. Sample characteristics for these 971 children are provided in Table 2. There are slight differences between the makeup of the sample of children shown in Table 2 and the sample of all children 36-months and older; this may indicate that parents of children with particular demographic characteristics were more or less likely to complete the PCG Household Interview. A subset of the sample used to address Research Question 2 (n = 851) was used in additional analyses performed to explain cluster membership and distinguish between clusters using child outcome variables (analyses described in detail below).

Table 2. *Sample Characteristics for Children Included in Cluster Analysis*

Descriptive Characteristics	*n*	Percent
Child sex		
Male	500	51.5
Female	471	48.5
Child race[a]		
White	597	61.5
Black	279	28.7
Latino	49	5.0
Asian	8	0.8
Native American	3	0.3
Other	33	3.4
In Federal lunch program[b]	529	54.5
Ever in special education[c]	75	7.7
Ever in gifted program[d]	126	13.0
Ever expelled[e]	44	4.5
Live with biological parents		
Both	751	77.3
Mother only	164	16.9
Family received welfare in '97[f]	43	4.4
Parent highest education[g]		
Less than high school	166	17.1
Completed high school	326	33.6
Completed 4 yrs post-secondary	173	17.8
Post-bachelor's	97	10.0

[a] Missing data for 2 children. [b] Missing data for 95 children.
[c] Missing data for 242 children. [d] Missing data for 242 children.
[e] Missing data for 246 children. [f] Missing data for 23 children.
[g] data for children with parents completing less than 4 years post-secondary schooling not included (*n* = 209)

Research Question 3: Are clusters of family context related to child cognitive and social-emotional outcomes? A total of 653 children had data on all variables used to explore the relationship between family context cluster membership and child outcomes.

Measures

The following section overviews the measures that were used in the current study. Each of the measures that were taken from the CDS are described in detail. In addition, items pertaining to parent and family characteristics are described; these are items for which there were no existing measures and that were used in structural analyses in the study.

Child Cognitive Outcomes

At each wave of CDS data collection children were administered several measures of cognitive and academic functioning. Several subtests of the Woodcock-Johnson Revised Tests of Achievement for Reading and Mathematics (WJ-R; Woodcock & Johnson, 1989) were administered to children aged three years and older. The WJ-R assessments are widely-used, norm-referenced assessments with subscale internal consistencies ranging from the .80s to .90s. Children three years and older were administered the Letter-Word Identification and Applied Problems subscale. Because only children above the age of six years were additionally administered the Passage Comprehension and Calculation subtests, these measures were not included in the study. The Letter-Word Identification subtest provides a measure of reading skills and symbolic learning. Ability to solve mathematics problems is assessed by the Applied Problems subscale. In addition, the Digit Span for Short-Term Memory subtest from the Wechsler Intelligence Scales for Children – Revised (WISC-R; Wechsler, 1974), a measure of the child's ability to process information, was administered to all children three years and

older. Like the WJ-R, the WISC-R is a widely-used, norm-referenced assessment with subscale reliabilities above .79.

Child Social-emotional Outcomes

During interviews, PCGs completed measures regarding their child(ren)'s behaviors. One instrument that was used was the Behavior Problems Index (BPI; Peterson & Zill, 1986). Many of the 30 BPI items are taken directly from the Achenbach Behavior Problems Checklist (Achenbach & Edelbrock, 1981) altered for the National Longitudinal Survey of Youth (NLSY) and provide an overall indication of existing behavior problems as well as a measure of externalizing, or aggressive behaviors, and of internalizing, or withdrawn behaviors. Parents were asked to indicate whether the behaviors of their children aged three years and older were often, sometimes, or never true. Although the CDS data file provides externalizing and internalizing scores at each wave as well as evidence of structural analysis of the factors, BPI items were submitted to exploratory and confirmatory factor analysis in the study. CDS documentation indicates that at least one item loads differently at CDS-II than it did at CDS-I (e.g., falls on the externalizing factor in CDS-I and the internalizing factor in CDS-II), compelling the study author to conduct structural analyses for the current study prior to using the measure in additional analyses.

The Positive Behavior Scale (PBS; Polit, 1998) was administered to assess prosocial behaviors children may manifest. The PBS, as used in the CDS, is identical to the version created for the Child Trends JOBS study, which consists of 10 items taken from Polit's (1998) original 25-item scale. Parents are asked to rate their children on a

scale of 1 (“not at all like my child”) to 5 (“totally like my child”). Results from CFA indicate that all 10 items load >.35 with $\alpha = .82$ (SRC/ISR, 2010b).

Home Environment

Emotional support and cognitive stimulation in the home environment were assessed during all three CDS waves using the Home Observation for Measurement of the Environment-Short Form (HOME-SF). The short form used for the CDS closely resembles the alteration made on the original form (Caldwell & Bradley, 1984) for the NLSY79. Observations on the HOME-SF were recorded during PCG-Child and PCG-Household interviews. Questions for the cognitive stimulation portion of the HOME-SF vary by age, with there being an early childhood (3- to 5-years-old), middle childhood (6- to 9-years-old), and early adolescent (10-years and older) version of the instrument. Total scores and subscale scores for cognitive stimulation were created for each age group (SRC/ISR, 2010b).

Family and Parent Characteristics

Items assessing child rearing values and rules, household tasks, parent disagreement, family conflict, economic strain, number of siblings in the family, and family structure were used to address aspects of the family context that may be important for child outcomes (see literature review above). The items included in the study represent the full set of parent and family characteristics related to these constructs that were available in the CDS-I that were administered at all three CDS data collection waves (i.e., CDS-I, CDS-II, and CDS-III). Using only these items will allow future research to explore how patterns of family context may change over time.

Items assessing child rearing values come from the Detroit Area Study (Alwin, 1990) and household tasks items are meant to ascertain parent interactions with children. Because there are only a few items for each of these areas and it is feasible that many of these items overlap or assess similar domains, exploratory factor analysis (EFA) was conducted (as described later) to uncover factors that were used in the main analyses for the current study. Likewise, items assessing parent characteristics (e.g., school expectations and participation in child's education) were included in EFA analyses due to the small number of items per area assessed. Factor analyses for family characteristics that are specific to the individual child (e.g., parent interactions with the child) were included in a separate EFA from the variables addressing household characteristics that were common across all children within a family unit (e.g., parent attitudes towards work).

Several established measures were administered during the PCG interviews that assessed additional parent or family characteristics. Specifically, PCG literacy was established using the Passage Comprehension subscale of the WJ-R (Woodcock & Johnson, 1989) during the first wave of CDS data collection. PCG self-esteem, psychological distress, parental warmth, aggravation in parenting, and parental disagreement were also measured and scale scores provided across all waves of CDS data collection. PCG self-esteem was measured using the Rosenberg Self-Esteem Scale (Rosenberg, 1965), which is a unidimensional 10-item scale that measures global self-worth (Gray-Little, Williams, & Hancock, 1997) and was previously used in NLSY data collection efforts. Psychological distress was measured using the K6 scale (Kessler et al.,

2003), a 6-item scale that was developed for use in the U.S. National Health Interview Survey (NHIS) and measures nonspecific distress. The Parental Warmth and Aggravation in Parenting scales (Child Trends, Inc., 1993) were developed as part of the JOBS Child Outcomes Study and measure the level of warmth in the parent-child relationship and parenting stress parents feel due to changes in employment, income, and other life factors, respectively. Finally, the Parent Disagreement scale was taken from the NLSY and National Survey of Families and Households and measures the amount of agreement between parents on daily activities.

Demographic Characteristics

Family and child demographic characteristics including the race (white, black, Latino, Asian, Native American, or other) and sex (male or female) of the head of household, highest level of education completed by the head of household (less than high school, high school diploma, bachelor's degree, or graduate), a binary indicator of whether or not the family received Welfare assistance in 1997, and an indicator of which biological parents lived with the child at the time of the PCG interview (both vs. mother only) were used in the current study. A continuous variable indicating the PCG's highest level of education was also used. Additional demographic characteristics used in the current study included child race and sex as well as indicators of whether or not a child was ever in a gifted program, ever in a special education program, or ever expelled from school. Finally, child sex, race, age in months at PCG interview, and an indicator of their receipt of special education services were included.

Analytic Method

The following section provides an overview of the analytic method used to address each of the three research questions. A description of the analyses conducted includes a summary of the statistical methods and criteria used to arrive at the results presented later.

Research question 1: What measures of family context can be derived from the data provided by the Child Development Supplement (CDS) of the Panel Study of Income Dynamics (PSID)? What is the structural integrity of the Economic Strain scale and Behavior Problems Index in the CDS sample?

Exploratory analysis. The first step in the current study was to conduct an exploratory factor analysis (EFA) for the family characteristics, the economic strain scale, and the Behavior Problems Index (BPI), followed by confirmatory factor analysis (CFA) to confirm the factor structures obtained. To begin, each sample was randomly split into an exploratory sample and a confirmatory sample.

Minimum average partialling (MAP; Velicer, 1976) was used to suggest the number of factors to be retained. Following this, iterative principal factoring with squared multiple correlations as initial communality estimates including sample weights was conducted using varimax, equamax, and promax rotation. The factor solution that came closest to simple structure (highest hyperplane count, smallest number of double-loaders, maximum coverage of items) and produced the maximum number of meaningful and reliable factors was retained for confirmatory analyses. Factor loadings $\geq .40$ were considered salient for all exploratory analyses except for that of the BPI, where loadings

≥ .30 were considered salient in order to increase coverage and be consistent with previous structural analyses of the measure (SRC/ISR, 2010b).

Confirmatory analysis. The factor structures obtained from the EFAs were submitted to CFAs using the confirmatory samples. The CFAs were conducted within a structural equations modeling (SEM) framework using the EQS 6 (Bentler, 2006) software. A confirmatory solution was accepted based on the criteria that the Root Mean Squared Error of Approximation (RMSEA) < .06 (including the upper 90% confidence limit) and the Comparative Fit Index (CFI) ≥ .95 (as per Hu & Bentler, 1999).

Scoring. Once a factor structure was obtained, factors were scaled via item response theory (IRT). The one- and two-parameter logistic (1PL and 2PL) models were tested for their fit for scales with dichotomous items (insofar as guessing should not be an issue for these variables, the 3PL model was not tested). The model that produced the lowest -2 log likelihood was selected. Likewise, the graded response and partial credit models were tested for their fit with polytomous item scales. IRT scores (M = 0 and SD = 1) were applied for use during subsequent analyses. Scores incorporated sample weights because the method of cluster analysis described below does not allow for the inclusion of sample weights. Weighting child scores ensured the clusters produced would be representative of what would be expected in the population.

Research question 2: Do distinct clusters of patterns of family context exist? If so, what do they look like?

Although each child may have presented his or her own unique pattern of family context, children with similar patterns were placed into the same cluster—resulting in

only a handful of meaningful family context clusters. A child's cluster membership was then used in correlational analyses, representing multiple aspects of family context at once.

Multistage Euclidean Grouping (MEG; McDermott, 1998) was used to uncover clusters of family context patterns. Family and parent variables of interest were used to define the clusters including PCG passage comprehension score, self-esteem, parental distress, parental attitudes towards work, parental warmth, aggravation in parenting, parental disagreement, and overall HOME-SF score. These eight variables were used to define the family context clusters because the literature supports their relation to child outcomes individually (see Chapter 1). In addition, bivariate correlations between each of these variables were not so high as to indicate a potential issue with multicolinearity across these eight attributes.

The three-step process employed using MEG results in clusters that are distinct and replicable. Clusters are distinct insofar as the patterns (or profiles) that make up a given cluster are maximally similar to one another and dissimilar to patterns that make up other clusters. The multi-stage nature of MEG allows for the analysis of replication, where individuals displaying particular patterns of family context are re-allocated to clusters across independent subsamples of the data. High replication indicates less likelihood that the clusters occurred by chance.

Data were first broken into random blocks (with approximately 150 – 300 cases per block). In the first stage, independent replications were produced where each block was submitted to its own agglomerative hierarchical clustering using Ward's (1963)

minimum-variance procedure and the best solution was chosen for each block. Solutions where outlier cases were removed were compared with solutions were outliers were not removed. The appropriate number of clusters was obtained when: (1) an atypical increase in within cluster variance occurred in conjunction with an overall decrease in between cluster variance (R^2;Ward, 1963), (2) Mojena's (1977) first stopping rule was reached, and (3) where the pseudo-*F* statistic was greater than the pseudo-t^2 (McDermott & Weiss, 1995).

In the second stage, the clusters obtained in the first stage were clustered, producing second stage clusters using the same criteria as listed above. Finally, in the last stage any cases that did not fit with their cluster were relocated to a more appropriate cluster. The final cluster solution was required to meet the following criteria where all clusters: (1) evidenced a replication rate of at least 60%, (2) produced an average within-cluster homogeneity coefficient ($\overline{H}$; Tryon & Bailey, 1970) > .60, and (3) were psychologically meaningful. In addition, the average between-cluster similarity coefficient ($\overline{r}_p$; Cattell, 1949) was required to be < .40.

Following final assignment to clusters, plots of the means for each cluster across all eight attributes were examined to ensure the psychological meaningfulness of the cluster solution as well as to present a visual of the distinctness of each cluster. In addition, prevalence analysis was conducted to further support the validity of the final clusters. In the prevalence analysis, descriptive parent and child characteristics were used to highlight differences across clusters (for example, clusters with higher or lower parent education levels than the overall sample). Deviations from the expected rate of child and

family characteristics were identified using two-tailed tests of the standard error of proportional differences (Ferguson & Tukane, 1989) for all pairwise comparisons. Bonferroni correction was used to correct for Type I error.

A one-way multivariate analysis of variance (MANOVA) was used to further differentiate clusters by providing evidence that there are differences in child outcome variables across clusters. Five dependent child outcome variables were used in the analyses including externalizing behaviors, positive behaviors, letter word identification, applied problems, and digit span scores. Cluster membership served as the independent variable of interest. Separate analysis of variance (ANOVA) models were run for each dependent variable once significance of the omnibus F test was established (as per Tabachnick & Fidell, 2007). Pairwise comparisons were not conducted when results of individual ANOVAs were found to be significant. The purpose of the MANOVA and ANOVAs was to highlight differences in clusters; because some of the specific differences among clusters may be altered after controlling for additional family and child characteristics, pairwise comparisons were not deemed prudent. Instead, pairwise comparisons were conducted during analyses used to address Research Question 3, as described below.

Research question 3: Are clusters of family context related to child cognitive and social-emotional outcomes?

A one-way multivariate analysis of covariance (MANCOVA) was used to explore the relationship between cluster membership and child outcomes. Five dependent child outcome variables were included in the analyses including externalizing behaviors,

positive behaviors, letter word identification, applied problems, and digit span scores. Cluster membership served as the independent variable of interest and models were controlled for child sex, age in months, race, an indicator of having ever received special education services, Welfare assistance in 1997, and PCG highest level of education. The use of control variables was important as prevalence analyses revealed differences in the prevalence of these demographic characteristics across family context clusters and outcome scores are expected to vary by these characteristics. Separate analysis of covariance (ANCOVA) models were run for each dependent variable once significance of the omnibus F test was established (as per Tabachnick & Fidell, 2007). Likewise, pairwise comparisons of least squares means (i.e., means adjusted for covariates) across all clusters were conducted for each significant ANCOVA model and the Type I error rate was controlled via Tukey-Kramer.

CHAPTER 4: RESULTS

The current chapter details the results of the analyses conducted to address each of the three stated research questions. Specifically, a description of the results from each exploratory and confirmatory factor analysis and the resulting scales is followed by a description of the IRT results for each relevant scale. The resultant family context clusters are presented along with the associated prevalence analysis, results from the MANOVA and MANCOVA, and associated analyses.

Research Question 1: What measures of family context can be derived from the data provided by the Child Development Supplement (CDS) of the Panel Study of Income Dynamics (PSID)? What is the structural integrity of the Economic Strain scale and Behavior Problems index in the CDS sample?

Family characteristics. Of the 43 items related to family characteristics that could vary across siblings, 27 were administered across all CDS data collection waves. In order to allow for future studies to explore the longitudinal nature of the family context clusters uncovered during the current study, only these 27 variables were included in factor analyses. Bartlett's chi square test indicated there was no identity matrix and suggested six potential factors. Parallel analysis suggested a possible 10-factor solution, while minimum average partialling (MAP) suggested four. Because a 10-factor solution would have yielded too few items per factor (i.e., fewer than four), six- to one-factor solutions were tested using varimax, equimax, and promax rotation and sampling weights. A four-factor model using equamax and promax ($k = 4$) rotation where 19 of the 27 items were retained seemed to be the best exploratory factor solution (i.e., the solution

that yielded the highest hyperplane count, smallest number of double-loaders, maximum coverage of items, and produced the maximum number of meaningful factors) and was subjected to CFA procedures.

CFA results indicated that the four-factor solution was supported assuming categorical variables using maximum likelihood procedures and robust model fit statistics where RMSEA = .04 (95% CI = .03-.05) and CFI = .96. Prior to settling on a factor solution, each factor was scaled using IRT in order to establish the empirical reliability of each scale. Both the partial credit (PCM) and graded response models (GRM) were tested for each of the four factors due to the polytomous nature of the variables. Reliabilities for each of the scales ranged from .32 to .66 across models. No scale reached the requisite .70 reliability necessary for inclusion in the current study and, therefore, no IRT model was chosen and none of these family characteristics were included in the study.

Household characteristics. Twenty-five variables related to family characteristics that remain static across siblings (i.e., household characteristics) were included in factor analyses. Bartlett's chi square test indicated there was no identity matrix and suggested a seven-factor solution. Parallel analysis also suggested a seven-factor solution while MAP suggested three factors. Seven- to one-factor solutions were tested using varimax, equamax, and promax rotation and sampling weights. A two-factor model using equamax and promax (k = 2) rotation where 13 of the 25 items were retained seemed to be the best exploratory solution and was subjected to CFA procedures. CFA results indicated that the two-factor solution was supported assuming categorical variables using generalized least squares approximation and robust model fit statistics

where RMSEA = .05 (95% CI = .04 - .06) and CFI = .94. Generality analyses indicated that the two-factor structure held up for males and females, white and non-white children, and across all waves of CDS data collection. Wrigley-Newhaus coefficients ranged from 92 to 99 while Kappa coeffients ranged from .78 to 1.0.

As with the child-specific family characteristics, IRT scoring was conducted prior to establishing scale reliabilities and settling on a factor solution. Both the PCM and GRM were tested due to the polytomous nature of the items. The GRM fit best for both factors, though the resultant scale of the second factor did not meet the requisite reliability to be included in the current study (i.e., $\geq .70$). Therefore, the second factor was dropped from further analyses. As mentioned, the GRM fit best for the first factor (*M* slope = 1.06, *M* item information = 0.53, total test information = 3.7) and is scaled such that $M = 0$ and $SD = .92$ with an estimated reliability of .82. The seven items on this scale are indicative of the PCG's attitudes towards gender and work roles such that the higher a person's score on this scale, the more conservative or traditional their views are regarding women's and men's work roles.

Finally, analyses of subgroup reliabilities were conducted on the retained factor for the truncated one-factor solution. Empirical reliabilities were established for males and females, white and non-white children, and across all waves of CDS data collection and ranged from .79 (for white children) to .82 (for non-white children). The retained scale was named Gender Work Roles and included in subsequent study analyses. The promax and equamax factor loadings for the truncated one-factor solution as well as the weighted item-total correlation coefficients are displayed in Table 3 below.

Table 3. *Factor Loadings and Weighted Item-Total Correlations for Gender Work Roles*

Item	Promax loading	Equamax loading	Item-total correlation
Better if dad earns living	.75	.75	.64
Mom not working if child < 5 yrs.	.70	.71	.66
Better if wife helps husband's career	.67	.66	.54
Preschool child suffers if mom works	.67	.67	.66
Women happier at home	.66	.66	.59
Employed mom ≠ unemployed mom	.46	.45	.44
Not okay if child < 3 in all-day care	.45	.46	.48

Economic strain. A total of 16 items were used to assess family economic strain at each CDS wave. Though previous studies have used all 16 items together as if they comprise a scale, no evidence was available to suggest that structural or psychometric analyses support the use of these items as one economic strain scale. For this reason, the 16 items were submitted to EFA, CFA, and IRT analyses. Bartlett's chi square test indicated there was no identity matrix and suggested a seven-factor solution. Parallel analysis suggested an eight-factor solution while MAP suggested one factor. Eight- to one-factor solutions were tested using varimax, equamax, and promax rotation and sampling weights. A one-factor model using varimax prerotation where 5 of the 16 items were retained seemed to be the best exploratory solution and was subjected to CFA procedures. CFA results indicated that the one-factor solution was supported assuming categorical variables using generalized least squares approximation and robust model fit statistics where RMSEA = .04 (95 % CI = .02 - .06) and CFI = .99. Generality analyses indicated that the one-factor structure held up for males and females, white and non-white

children, and across the second wave of CDS data collection. Wrigley-Newhaus coefficients ranged from 91 to 99 while Kappa coeffients ranged from .71 to 1.0.

As with the family characteristics, IRT scoring was conducted prior to establishing scale reliabilities and settling on a factor solution. Due to the dichotomous nature of the items, one and two parameter logistic models were tested. The two-parameter model produced the best fit with an empirical reliability of .66. The economic strain scale was dropped from further analyses because the resultant scale did not meet the requisite reliability to be included in the current study (i.e., $\geq .70$).

Behavior Problems Index (BPI). All 30 BPI items were included in factor analyses. Bartlett's chi square test indicated there was no identity matrix and suggested a nine-factor solution. Parallel analysis also suggested a nine-factor solution while MAP suggested two factors. Nine- to one-factor solutions were tested using varimax, equamax, and promax rotation and sampling weights. A two-factor model using equamax and promax ($k = 3$) rotation where 26 of the 30 items were retained seemed to be the best exploratory solution and was subjected to CFA procedures. CFA results indicated that the two-factor solution was supported assuming categorical variables using generalized least squares approximation and robust model fit statistics where RMSEA = .05 (95% CI = .04 - .05) and CFI = .97. Generality analyses indicated that the two-factor structure held up for males and females, white and non-white children, and across all waves of CDS data collection. Wrigley-Newhaus coefficients ranged from 93 to 99 while Kappa coefficients ranged from .73 to .93. The one exception to this was the confidence interval for non-

white children ranged from -.10 to .99, not supporting the use of this factor structure with non-white children.

As with the factor analyses described above, IRT scoring was conducted prior to establishing scale reliabilities and settling on a factor solution. Both the PCM and GRM were tested due to the polytomous nature of the items. The GRM fit best for the first factor and the PCM for the second. The resultant scale of the second factor did not meet the requisite reliability to be included in the current study (i.e., $\geq .70$). Therefore, the second factor was dropped from further analyses. As mentioned, the GRM fit best for the first factor (*M* slope = 0.94, *M* item information = 0.32, total test information = 4.48) and is scaled such that *M* = 0 and *SD* = .91 with an estimated reliability of .81. The 14 items on this scale are indicative of a child's externalizing behaviors such that the higher a child's score on this scale, the more he or she presents negative externalizing behaviors such as impulsivity and demands for attention (see item descriptions in Table 4 below).

Finally, analyses of subgroup reliabilities were conducted on the retained factor for the truncated one-factor solution. Empirical reliabilities were established for males and females, white and non-white children, and across all waves of CDS data collection and ranged from .79 for females to .81 for males, non-white children, and the second and third waves of CDS data collection. The retained factor was named Externalizing Behaviors and included in subsequent study analyses. The promax and equamax factor loadings for this final solution as well as the weighted item-total correlation coefficients are displayed in Table 4 below.

Table 4. *Factor Loadings and Weighted Item-Total Correlations for Externalizing Behaviors*

Item	Promax loading	Equamax loading	Item-total correlation
Disobedient	.74	.67	.59
Strong tempered	.66	.63	.58
Argues too much	.61	.59	.57
Stubborn	.59	.59	.58
Impulsive	.58	.56	.54
Mean to others	.54	.52	.48
Restless	.52	.51	.51
Feels no regret	.48	.47	.45
Destructive	.48	.46	.42
Cheats	.46	.44	.43
Sudden mood swings	.39	.44	.47
Difficulty concentrating	.35	.40	.45
Demands attention	.35	.40	.45
Hangs around trouble	.32	.31	.29

Research Question 2: Do distinct clusters of patterns of family context exist? If so, what do they look like?

First-stage clustering resulted in 44 pattern groups (an average of 8.8 per analysis). The first-stage groups were submitted to second-stage agglomerative clustering based on a 44 X 44 similarity matrix and the solution at each step was evaluated against the above-stated criteria. Second-stage five- and seven-cluster solutions both satisfied all criteria with the five-cluster solution displaying superiority in terms of parsimony and psychological meaningfulness of clusters; thus, the five-cluster solution was chosen as the final solution.

The average coefficient of within-type homogeneity (H), between-types similarity (r_p), and the replication rate for each profile type are displayed in Table 5. H is a measure

of the internal cohesion of each cluster where values approaching 1.0 indicate increased similarity across member patterns within a cluster (with a value of 1.0 indicating identical patterns within a cluster); as indicated in Table 5, all values were near 1.0. The mean within-type homogeneity coefficient across all clusters ($\bar{H}$) was equal to .997, satisfying the > .60 criterion and indicating high internal pattern cohesion for the overall solution. Between-types similarity is a measure of external isolation and coefficients (r_p) approaching 0.0 indicate chance similarity across clusters, whereas values of r_p that reach 1.0 indicate that the mean score pattern of one type is identical to that of another type; as indicated in Table 5, r_p values range from .32 to .47. The average between-clusters similarity for the overall solution ($\overline{r}_p$) was equal to .39, satisfying the < .40 criterion. The average replication rate across all clusters was 92%, with four of the clusters displaying 100% replication across the five random blocks and one displaying 60% replication across blocks, meeting the 60% replication criterion. The prevalence of each cluster in the study sample is also displayed in Table 5. Clusters 2 and 3 have the highest membership, respectively, with cluster 4 displaying the smallest number of members.

Table 5. *Prevalence and Properties of the Family Context Clusters*

Cluster number (N = 971)	% Prevalence	Internal pattern cohension (H)	External isolation (r_p)	Independent replication across 5 random blocks (%)
1	16.3	.997	.46	100
2	32.5	.998	.37	100
3	24.8	.997	.47	100
4	12.0	.996	.32	100
5	14.3	.996	.34	60
Average	100.0	.997	.39	92

Weighted mean scores across the eight attributes used to define clusters are provided by cluster in Table 6. All attributes are scaled with an overall M = 0 and standard deviation = 1. Weighted mean scores on each of the attributes and pattern shape are displayed for each cluster in Figure 3. Table 6 and Figure 3 show variability across clusters in mean scores on the eight defining attributes and were used to define (i.e., name) the clusters.

Table 6. *Weighted Mean Scores Across the Eight Attributes by Cluster*

	Family-specific attributes				Child-specific attributes			
Cluster number	Passage comp	Self-esteem	Psychological distress	Work attitudes	Home environment	Parental warmth	Parenting aggravation	Parenting disagreement
1	-0.18	0.29	-0.35	-0.45	-0.81	0.19	0.13	-0.61
2	0.26	0.80	-0.55	-0.24	0.72	0.43	-0.82	-0.47
3	0.70	0.04	-0.04	0.04	0.73	0.02	0.70	0.12
4	-0.32	-1.13	1.37	0.28	-0.25	-0.45	0.72	0.35
5	-1.07	-0.28	-0.21	0.53	-0.46	-0.24	-0.34	1.34

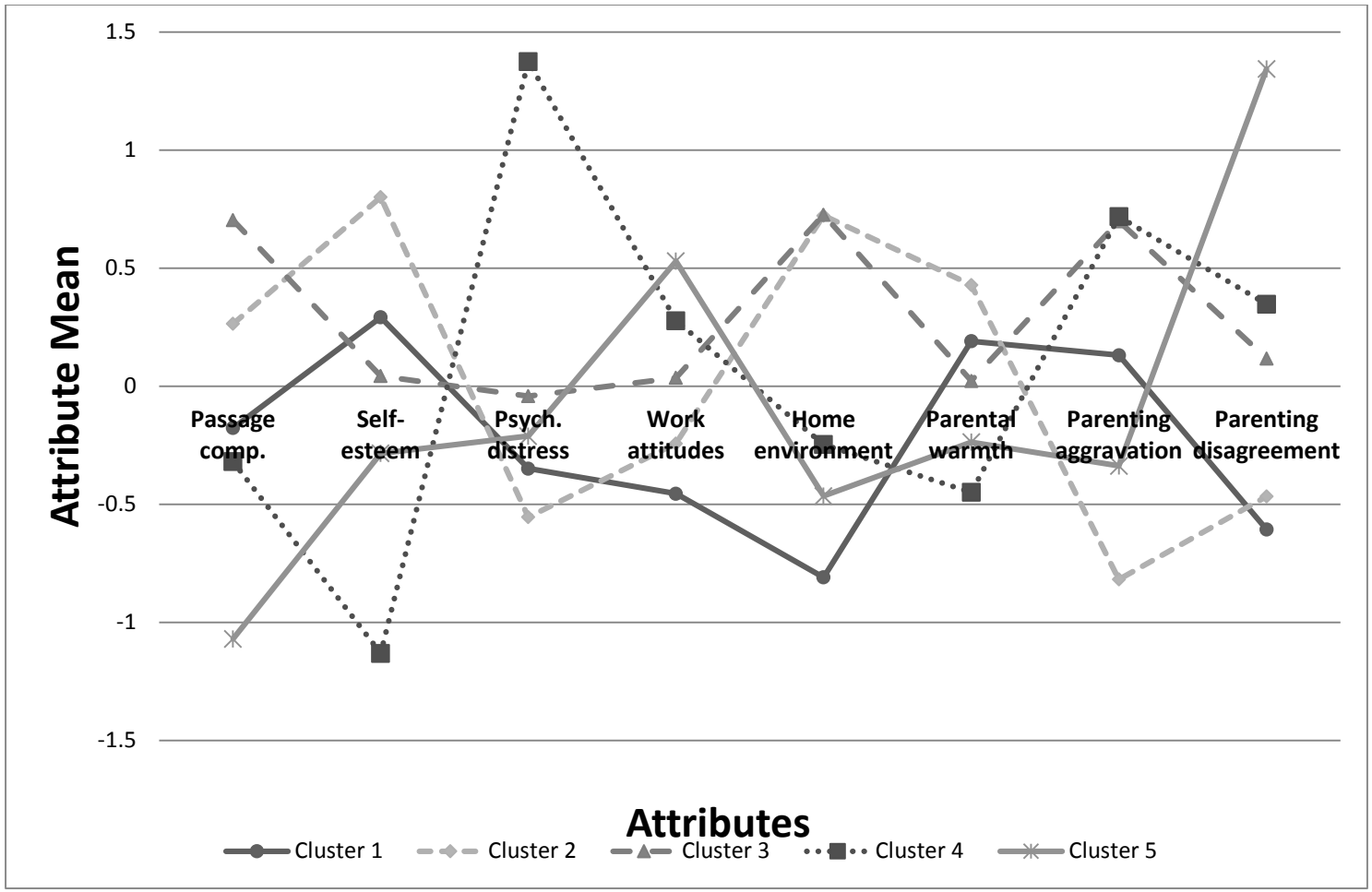

Figure 3. Weighted Mean Scores Across the Eight Attributes by Cluster

Cluster descriptive names were created based on each cluster's largest deviations from the mean (i.e., the attributes with weighted mean scores substantially different than 0), which were considered the cluster's defining characteristics. Attributes substantially higher than the average (≥ 0.5 standard deviations above the mean) were deemed "high" while those substantially lower than the average (≥ 0.5 standard deviations below the mean) were deemed "low." Weighted means one or more standard deviations above the sample mean were deemed "very high" while those one or more standard deviations below the sample mean were deemed "very low." Cluster descriptive names are provided in Table 7 below.

Table 7. *Cluster Descriptive Names Based on Weighted Mean Scores Across Attributes*

Cluster number	Cluster descriptive name
1	**Low** home environment and parenting disagreement
2	**High** home environment and primary caregiver self-esteem; **Low** parental distress and parenting aggravation
3	**High** primary caregiver passage comprehension, home environment, and parenting aggravation
4	**Very low** primary caregiver self-esteem; **Very high** primary caregiver psychological distress; **High** parenting aggravation
5	**Very low** primary caregiver passage comprehension; **High** work attitudes (traditional gender roles); **Very high** parenting disagreement

Results of the analysis of the prevalence of family and child characteristics are presented in Table 8 and were used to explicate and differentiate clusters. For each family

and child characteristic, the prevalence (i.e., percentage) per cluster was compared against the expected prevalence of these subgroups in the overall sample. Results indicate differences in member characteristics across clusters. Member characteristics for each cluster are described in detail below.

Table 8. *Prevalence of Demographic Subgroups Across Clusters*

Subgroup	% Overall	% Cluster 1	% Cluster 2	% Cluster 3	% Cluster 4	% Cluster 5
Sex of Head						
Male	89.0	78.0****	**96.5****	**96.3****	82.9*	77.0****
Fed. Lunch Pr.	60.4	**71.0****	55.5*	41.0****	**71.0***	**85.9****
Gifted Pr.	17.3	9.5*	**22.6****	19.4	12.9	12.9
Special Ed.	10.3	12.6	4.6***	8.6	**18.3****	**16.4***
Expelled	6.1	5.3	2.5**	4.3	**14.1*****	**10.3***
Welfare '97	4.5	7.2	0.0****	3.4	**10.4****	**9.0****
Parents Live						
Both	77.3	64.6****	**87.3****	**83.8****	66.7**	66.9**
Mom Only	16.9	**26.6*****	7.9****	13.3	**23.9***	**26.6*****
Education						
Less H.S.	17.1	18.1	12.0**	7.5****	**28.2*****	**30.2****
H.S.	33.6	39.9	27.5**	25.7**	41.0	**47.5*****
Bachelor's	17.8	10.8*	20.6	**29.5****	9.4*	6.5***
Graduate	10.0	1.3****	**14.2****	**17.0****	5.1	2.2***
Race of Head						
Asian	1.4	1.3	**2.5***	0.4	0.9	1.4
Black	28.5	**40.5*****	20.6***	13.3****	33.3	**54.7****
Latino	4.7	5.1	4.1	1.2**	6.0	**10.8*****
Multi-racial	2.7	3.8	2.5	2.1	3.4	2.2
Native Amer.	0.4	0.6	0.0	0.4	**1.7***	0.0
Other	1.4	0.6	1.3	2.1	0.0	2.9
White	60.8	48.1***	**68.9*****	**80.5****	54.7	28.1****
Race of Child						
Asian	0.8	0.6	**2.6***	0.4	0.9	1.4
Black	28.8	**41.8****	21.0***	12.5****	35.0	**54.7****
Latino	5.1	5.7	4.1	0.8***	6.8	**12.2****
Native Amer.	0.3	0.0	0.3	0.0	0.9	0.7
Other	3.4	4.4	3.2	4.2	0.9	3.6
White	61.6	47.5****	**70.3*****	**81.7****	55.6	27.3****

Note. Significant values in **bold** are higher than expected. Significant values not bold are lower than expected. *$p < .05$, **$p < .01$, ***$p < .001$, ****$p < .0001$. Fed. Lunch Pr. = child is in a federal lunch program; Gifted Pr. = child has been in a gifted program; Special Ed. = child has received special education services; Expelled = child has been expelled; Welfare ’97 = child’s family received Welfare services in 1997; Parents Live = child lives with both parents or his or her mother only; Less H.S. = primary caregiver’s highest level of education is less than a high school diploma; H.S. = primary caregiver’s

highest level of education is a high school diploma; Bachelor's = primary caregiver's highest level of education is a bachelor's degree; Graduate = primary caregiver's highest level of education is graduate school.

Cluster 1: Low home environment and parenting disagreement. Cluster 1 comprises 16.3 percent of the overall study sample (N = 971). Membership for this cluster includes significantly lower male heads of household than expected (as compared to the sample as a whole) with a significantly higher percentage of children residing with their biological mothers only. More children than expected are in a federal lunch program. There are fewer white children and white heads of household than expected as well as more black children and black heads of household than expected. Fewer primary caregivers than expected hold either Bachelor's or graduate degrees.

Cluster 2: High home environment and PCG self-esteem; Low parental distress and parenting aggravation. Cluster 2 comprises 32.5 percent of the study sample. There are significantly more households with male heads than expected along with more children residing in two-parent households than expected. There are a higher percentage of children who have ever been in a gifted program and significantly more primary caregivers who have attended graduate school. In addition, fewer children have been expelled, in a special education program, in a federal lunch program, and none were reported to have been receiving Welfare in 1997. There are more Asian and white children and heads of household than expected and fewer black children and heads of households than expected in Cluster 2.

Cluster 3: High PCG passage comprehension, home environment, and parenting aggravation. Cluster 3 comprises 24.8 percent of the study sample. As with

Cluster 2, Cluster 3 membership includes more male heads of household than expected and more children residing in two-parent households. Significantly more primary caregivers obtained a Bachelor's degree and attended graduate school and fewer than expected only held a high school diploma or less. Fewer children than expected are in a federal lunch program. Children in Cluster 3 are more likely than expected to be white and so are their heads of household while fewer than expected are black or Latino.

Cluster 4: Very low PCG self-esteem; Very high PCG psychological distress; High parenting aggravation. Cluster 4 comprises 12.0 percent of the study sample. There are fewer children residing in households with male heads and significantly more children residing in families with only their biological mother. Significantly more children than expected come from families where their primary caregiver has less than a high school diploma and fewer children than expected come from families where the primary caregiver has received a Bachelor's degree. More children than expected are receiving special education services, have been expelled, are in families that received Welfare in 1997, and are in a federal lunch program. There are more Native American heads of household than expected in Cluster 4.

Cluster 5: Very low PCG passage comprehension; High work attitudes (traditional gender roles); Very high parenting disagreement. Cluster 5 comprises 14.3 percent of the study sample. Fewer children than expected come from households with a male head and more than expected live with their biological mother only. Significantly more children than expected come from households where the primary caregiver has received less than a high school diploma or a high school diploma and

significantly fewer children than expected come from households where the primary caregiver has received either a Bachelor's degree or attended graduate school. There are markedly more children in a federal lunch program (25 percent more than expected) and significantly more children are in special education, have been expelled, and come from families that received Welfare in 1997. There are significantly more black and Latino children and children with black and Latino heads of household than expected and fewer than half of the expected percentage of white children or heads of household in Cluster 5.

Finally, the one-way MANOVA used to further differentiate clusters revealed that the dependent variables were significantly related to cluster membership, Wilks' $\Lambda = .75$, multivariate $F(20,2794) = 12.60$, $p < .0001$. In the ANOVAs that followed, cluster membership was shown to be significantly related to externalizing behaviors, $F(4,846) = 27.13$, $p < .0001$ ($R^2 = .11$), to positive behaviors, $F(4,846) = 24.29$, $p < .0001$ ($R^2 = .10$), to letter word identification, $F(4,846) = 17.85$, $p < .0001$ ($R^2 = .08$), to applied problems, $F(4,846) = 22.88$, $p < .0001$ ($R^2 = .10$), and to digit span scores, $F(4,846) = 6.57$, $p < .0001$ ($R^2 = .03$). Means across all dependent variables are presented by cluster in Figure 4. ANOVA tables are provided in Appendix A for reference.

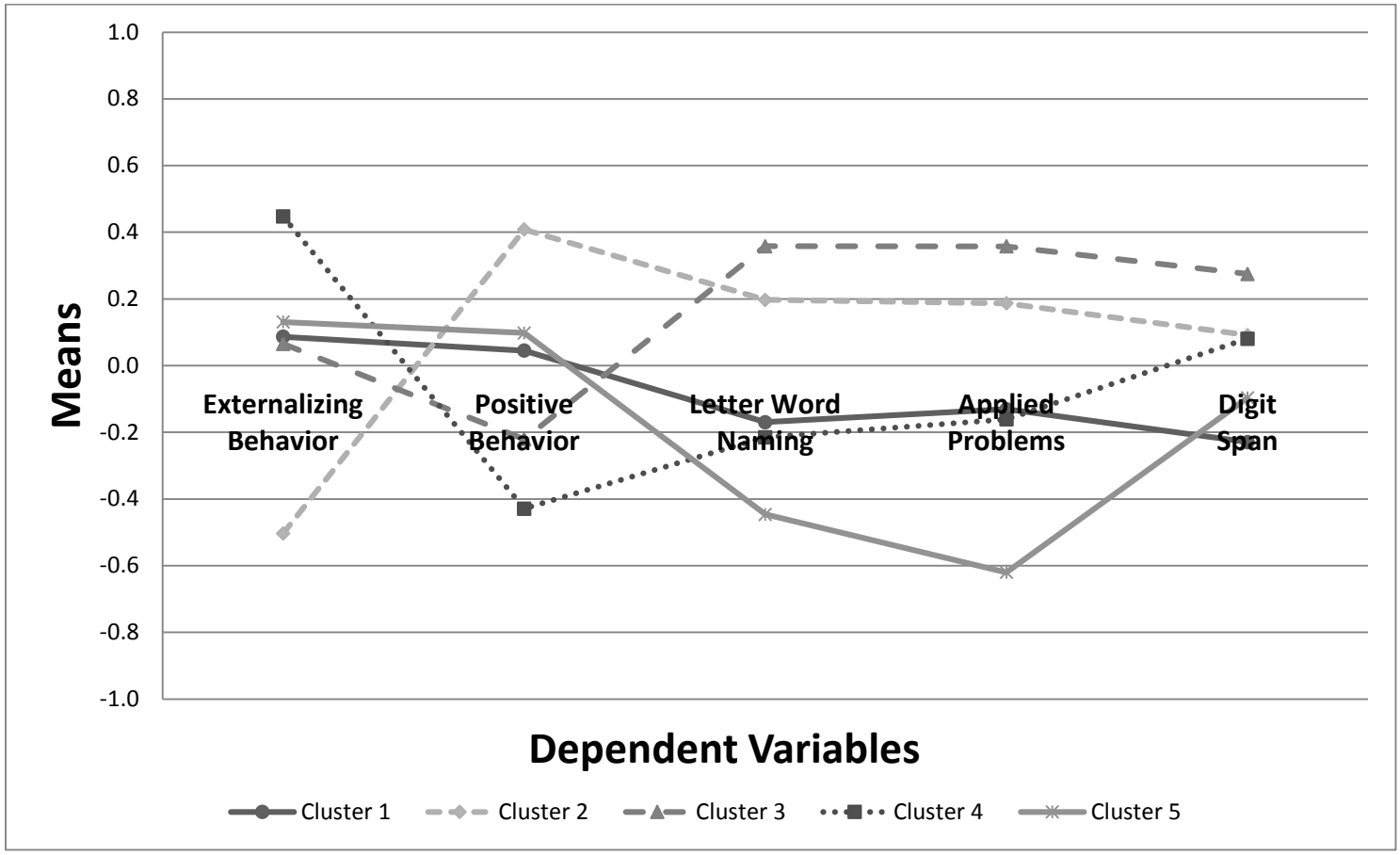

Figure 4. Means on Dependent Variables by Cluster

Research Question 3: Are clusters of family context related to child cognitive and social-emotional outcomes?

The one-way MANCOVA revealed that the dependent variables were significantly related to the independent variable (i.e., cluster membership), Wilks' Λ = .84, multivariate F(20,2104) = 5.82, $p < .0001$. Likewise, all covariates including child sex, Wilks' Λ = .93, multivariate F(5,634) = 9.63, $p < .0001$, child age in months, Wilks' Λ = .62, multivariate F(5,634) = 76.85, $p < .0001$, child race, Wilks' Λ = .85, multivariate F(5,2357) = 4.22, $p < .0001$, child receipt of special education, Wilks' Λ = .85, multivariate F(5,634) = 21.93, $p < .0001$, PCG's highest education level, Wilks' Λ = .93, multivariate F(5,634) = 9.66, $p < .0001$, and receipt of Welfare in 1997, Wilks' Λ = .98, multivariate F(5,634) = 2.87, $p < .05$ were significantly related to the dependent variables.

In the ANCOVAs that followed, cluster membership was shown to be significantly associated with externalizing behaviors, F(4,638) = 16.98, $p < .0001$ (model R^2 = .18), to positive behaviors, F(4,638) = 18.70, $p < .0001$ (model R^2 = .15), to letter word identification, F(4,638) = 2.4, $p < .05$ (model R^2 = .31), to applied problems, F(4,638) = 2.97, $p < .05$ (model R^2 = .31), and to digit span scores, F(4,638) = 3.25, $p < .05$ (model R^2 = .40) when controlling for child sex, age in months, race, receipt of special education services, PCG's highest level of education, and Welfare receipt in 1997. The shared variability was low between cluster membership and both externalizing behaviors (partial η^2 = .10, 95% confidence limits from .05 to .14) and positive behaviors (partial η^2 = .10, 95% confidence limits from .06 to .15). Furthermore, cluster

membership showed a weak relationship with letter word identification (partial $\eta^2 = .01$, 95% confidence limits from .00 to .03), applied problems (partial $\eta^2 = .02$, 95% confidence limits from .00 to .04), and digit span scores (partial $\eta^2 = .02$, 95% confidence limits from .00 to .04). ANCOVA tables are presented in Appendix B for reference. Because all ANCOVAs revealed significant relationships between the independent and dependent variables, pairwise comparisons (using Tukey-Kramer adjustment) across all clusters were conducted to uncover differences in least squares means on each dependent variable. Least squares means across all dependent variables are presented by cluster in Figure 5 and Table 9.

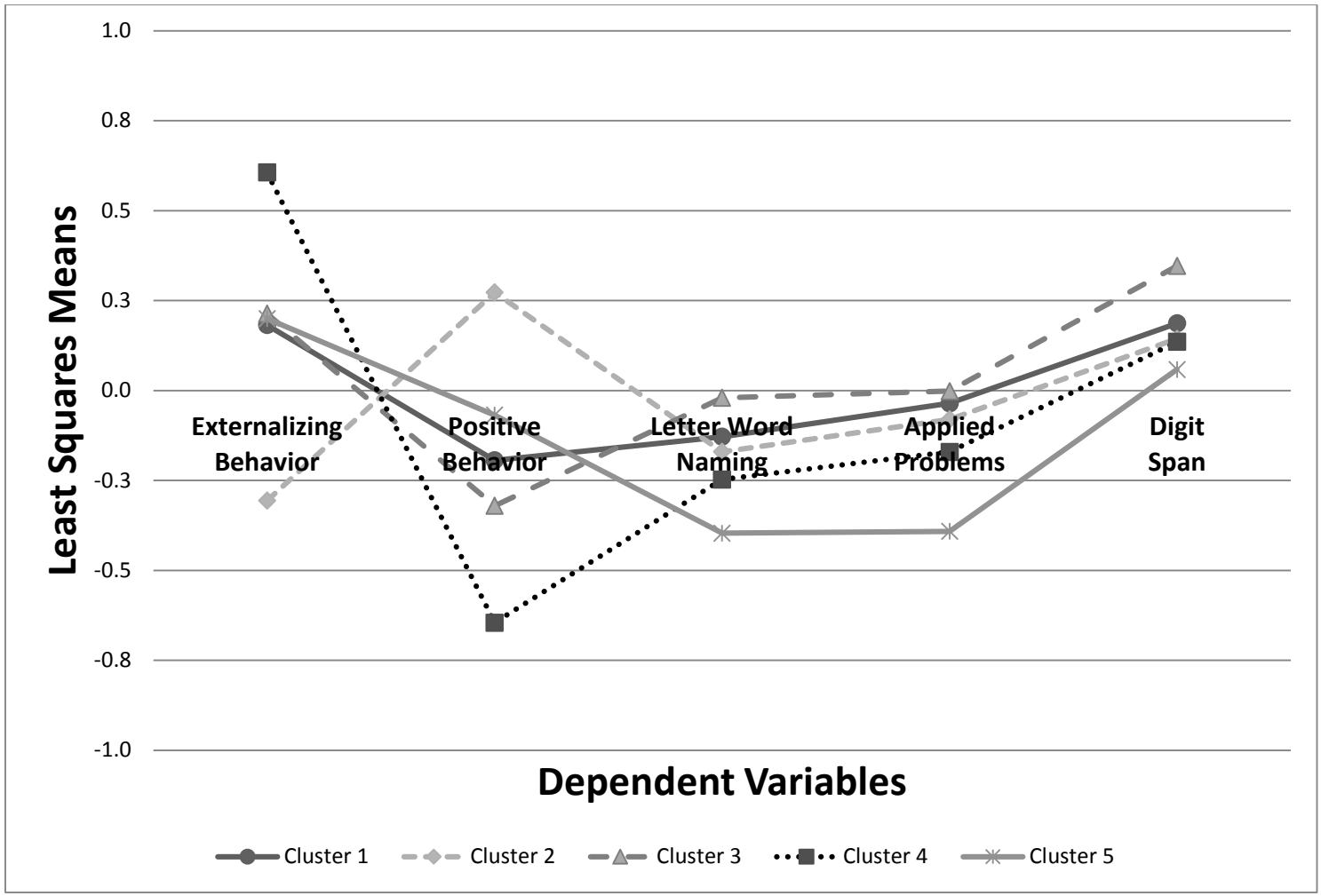

Figure 5. Least Squares Means on Dependent Variables by Cluster

Table 9. *Least Squares Means on Dependent Variables Across Clusters*

	Dependent variables				
Cluster number	Externalizing behaviors	Positive behaviors	Letter word identification	Applied problems	Digit span
1	0.18	-0.19	-0.13	-0.04	0.19
2	-0.31	0.27	-0.17	-0.08	0.14
3	0.21	-0.32	-0.02	0.00	0.35
4	0.61	-0.65	-0.25	-0.17	0.14
5	0.20	-0.07	-0.40	-0.39	0.06

For each dependent variable, all possible pairwise comparisons were conducted by cluster membership. The figure and table above depict differences in least squares means on dependent variables across the different clusters. As with the scale scores, the least squares means are scaled with a $M = 0$ and standard deviation = 1. Results of pairwise comparisons are described in detail below and in Table 10.

Table 10. *Significant Results of Pairwise Comparisons Across Clusters*

Dependent variable	Significant relationships among clusters[a]
Externalizing behaviors[b]	Cluster 2 < Clusters 1***, 3****, 4****, & 5*** Cluster 1 < Cluster 4* Cluster 5 < Cluster 4* Cluster 3 < Cluster 4*
Positive behaviors	Cluster 2 > Clusters 1**, 3****, 4****, & 5* Cluster 5 > Cluster 4*** Cluster 1 > Cluster 4*
Letter word naming	Cluster 3 > Cluster 5*
Applied problems	Cluster 3 > Cluster 5*
Digit span	Cluster 3 > Clusters 2* & 5*

* $p < .05$, ** $p < .01$, *** $p < .001$, **** $p < .0001$ [a]Clusters are listed in order of their least squares means values, where the cluster with the most desirable least squares mean for a particular dependent variable is listed first. [b]Whereas higher scores are indicative of higher functioning for all other dependent variables, lower scores are indicative of higher functioning on the Externalizing Behaviors scale.

Externalizing behaviors. Children in Cluster 2 displayed significantly lower externalizing behaviors scores than children in all other clusters. In addition, children in Clusters 1, 5, and 3 showed significantly lower externalizing behaviors scores than children in Cluster 4.

Positive behaviors. Children in Cluster 2 had significantly higher positive behaviors scores than children in all other clusters. Children in Cluster 5 had significantly higher positive behaviors scores than children in Cluster 4. Likewise, children in Cluster 1 had significantly higher positive behaviors scores than children in Cluster 4.

Letter word naming. Children in Cluster 3 displayed significantly higher letter word naming scores than those in Cluster 5.

Applied problems. Children in Cluster 3 had significantly higher applied problems scores than those in Cluster 5.

Digit span. Children in Cluster 3 displayed significantly higher digit span scores than those in Cluster 2 and Cluster 5.

CHAPTER 5: DISCUSSION

Family environments can be characterized by their protective factors, risk factors, or both. Environments categorized as supportive and warm, where children are provided with resources such as a stimulating home environment, mother with a college degree, financial stability, and two-parent families afford children with many protective factors and have been shown to provide children with an opportunity for better academic and social-emotional outcomes (Bradley, McKelvey, & Whiteside-Mansell, 2011; Burchinal, Peisner-Feinberg, Pianta, & Howes, 2002; Cooper, 2010; Currie & Moretti, 2002; Downer & Pianta, 2006; Fantuzzo, McWayne, Perry, and Childs, 2003; Fantuzzo, Tighe, & Childs, 2000; Gennetian, Magnuson, & Morris, 2008; Hofferth, 2006b; Joo, 2010; Magnuson, 2007; Mohanty & Raut, 2009; Neuman & Celano, 2012; Yeung et al., 2002). Whereas environments traditionally considered disadvantaged (e.g., parental mental health problems, low SES, low parent education, high parental disagreement), where the presence of risk factors outweigh that of protective factors, evidence lower academic and social-emotional outcomes in children (Arnold, Zeljo, Doctoroff, & Ortiz, 2008; Attewell et al., 2003; Attewell, Suazo-Garcia, & Battle, 2003; Downer & Pianta, 2006; Hofferth, Smith, McLoyd, & Finkelstein, 2000; Hsin, 2009; Kahn, Brandt, & Whitaker, 2004; Nord & West, 2001; Semke, Garbacz, Kwon, Sheridan, & Woods, 2010; Yeung, Linver, & Brooks-Gunn, 2002). Due to the multifaceted nature of families, it is most likely the case that families evidence both protective and risk factors at the same time. Developing patterns of protective and risk factors within families is useful as it provides a picture of how these important variables work together to relate to child cognitive and social-

emotional outcomes. Though exploratory in nature, the current study adds to the research base regarding associations between parent and family characteristics and child outcomes by establishing five distinct clusters of patterns of family context and uncovering how membership in each of these clusters is positively or negatively associated with better child outcomes.

What follows is a discussion regarding the study findings—beginning with a discussion regarding the findings from structural and psychometric analyses of some of the measures provided by the study data file. This was an important first step as the results of the study hinged on the quality of data used to address the research aims and there was little previous evidence to support the use of many of the items related to parent and family context included in the data. Following this is a discussion on the established set of five clusters of patterns of family context and the characteristics of the children assigned to each of these clusters as well as the relationship of cluster membership to child outcomes. Finally, limitations and recommendations for future research are addressed as well as implications for policy and practice.

Measures Used in the Study Data File

Data files such as the Child Development Supplement (CDS) of the Panel Study of Income Dynamics (PSID) provide researchers with longitudinal data on nationally representative samples of children across many variables of interest. These data files are publically available and easily accessible via Internet download or other media transfer, though sometimes users are required to apply for restricted-use data licenses prior to being granted access to the data. The breadth of variables available in the data files

allows researchers to address a multitude of research questions and the representative nature of the files and provision of weights allow researchers to generalize their findings to the population. While a great resource, especially for researchers with little money to collect data on their own, researchers should be cautioned that the measures used in these survey efforts may not be reliable or they may not be valid for use with the sample of individuals included in the survey. For example, LeBoeuf, Fantuzzo, and Lopez (2010) found no evidence of the structural integrity of the Achenbach Child Behavior Checklist (CBCL) in a sample of nonclinical children—though this measure is widely used with these types of populations and often used in national survey efforts. Furthermore, in order to include data across many constructs of interest, national survey efforts frequently include shortened versions of longer measures. The use of shortened forms of measures may be problematic because, in general, if items are removed from a measure the reliability of that measure will be reduced (as per the Spearman-Brown Prophecy Formula; Kingston & Tiemann, 2010). In addition, shortened forms may fail to retain the content coverage and/or factor structure of the original measures (Smith, McCarthy, & Anderson, 2000).

While documentation for the CDS included evidence of reliability for many of the measures used in the current study, there were also collections of items for which no evidence was provided to suggest that they operated as a reliable *measure*. In particular, the 16 items intended to measure economic strain as well as the dozens of items used to measure various aspects of the family environment. Furthermore, CDS documentation revealed that the structure of the Behavior Problems Index (BPI) changed slightly from

CDS-I to CDS-II, where an item that was included as part of the externalizing measure at CDS-I was included as part of the internalizing measure at CDS-II. For these reasons, the study author undertook a set of exploratory and confirmatory factor analyses and subsequent item response theory analyses with the hope of establishing additional family context variables for inclusion in the study.

In an attempt to make the family context clusters relevant across each wave of the CDS, the study author included only those items administered across all CDS data collection waves. This, unfortunately, led to the deletion of almost half of the family context items that could have been used to define measures of family context—pointing to an additional issue with longitudinal survey efforts: Item changes across time reduce the ability of researchers to explore growth and other relationships that may vary over time. Perhaps more concerning was the fact that the study author found no viable measures during exploratory and confirmatory analyses of items that could be different across siblings. Similarly, only one viable measure emerged during analyses exploring items related to family characteristics that are static across siblings. Ultimately, only one additional measure, Gender Work Roles, was able to be extracted from family context-related items included in the CDS.

In order to include a more comprehensive measure of the economic context in which children reside rather than strictly relying on a categorical indication of whether or not a child receives free or reduced price lunch, the study author attempted to provide evidence of the viability of the economic strain items included in the CDS. Unfortunately, no reliable measure could be pulled from the economic strain items. For

this reason, a measure of economic context could not be included as a risk factor in the exploration of the patterns of family context.

The results from exploratory and confirmatory analyses of the BPI were more promising, though only one of the measures displayed the requisite ≥ .70 reliability for inclusion in the current study. While structural analyses supported the existence of two factors, the reliability of the second factor (internalizing behaviors) was too low. The externalizing factor displayed an estimated reliability of .81 and was used as an outcome variable in the current study.

Various difficulties were faced in exploring the structural nature of several CDS variables. The results of these structural analyses highlight the need to explore the structural integrity and reliability of measures that are part of national survey data. Documentation for the CDS does not provide reliability information for all items or measures, though they frequently reference other places in which these measures were used (Survey Research Center, Institute for Social Research, 2010b). Using unreliable measures in statistical analyses limits the ability of researchers to find relationships among variables and may also produce misleading results.

Established Clusters and Their Associations with Child Outcomes

Distinct Clusters of Family Context

The results presented in Chapter 3 suggest the existence of five distinct clusters of patterns of family context across eight attributes: (1) primary caregiver's passage comprehension score; (2) primary caregiver's self-esteem; (3) primary caregiver's psychological distress; (4) primary caregiver's attitude towards gender work roles; (5)

emotional support and cognitive stimulation in the home environment; (6) parental warmth; (7) aggravation in parenting; and (8) parenting disagreement. The first four of these attributes represent variables that are characteristics of the primary caregiver while the last four represent variables that are specific to the home environment as experienced by a particular child in the household and parent-child interactions experienced by that child. The five clusters of family context patterns were named according to their most defining characteristics:

Cluster 1: Low home environment and parenting disagreement
Cluster 2: High home environment and PCG self-esteem; Low parental distress and parenting aggravation
Cluster 3: High PCG passage comprehension, home environment, and parenting aggravation
Cluster 4: Very low PCG self-esteem; Very high PCG psychological distress; High parenting aggravation
Cluster 5: Very low PCG passage comprehension; High work attitudes (traditional gender roles); Very high parenting disagreement

In addition to meeting the specified criteria for a viable cluster solution, the chosen five-cluster solution included clusters of family context patterns that have meaningful interpretations. This became especially apparent following analysis of the percentage of children in each cluster evidencing particular family and individual characteristics. Children in Cluster 1 display a family context pattern that is characterized by both risk and protective factors—lower emotional support and cognitive stimulation in the home coupled with low parenting disagreement. This cluster has more children than expected (e.g., than in the sample overall) who received free or reduced price lunch,

reside with their mothers only, and are black, and fewer children than expected who have male heads of the household, have ever been in a gifted program, have parents who have achieved a bachelor's degree or attended graduate school, or are white. The lower educational attainment of parents of children with family context patterns that fall into Cluster 1 makes sense given the lower scores on the HOME-SF scale, which measures, in part, cognitive stimulation in the home. Likewise, the higher-than-expected rate of children residing with their mothers makes sense given the lower score for this group on parenting disagreement—if there is only one parent in the household, there is no one with which to disagree.

Children with family context patterns assigned to Cluster 2 have higher than expected rates of coming from male-headed households, residing in two-parent families, of having parents who have attended graduate school or obtained graduate degrees, of ever participating in a gifted program, and of being white or Asian. Furthermore, children assigned to Cluster 2 have lower than expected rates of being enrolled in a federal lunch program, of ever receiving special education services or being expelled, of being on Welfare in 1997, of residing with their mothers only or with parents who have less than a high school diploma or a high school diploma only, and are less likely to be black than expected. It seems that Cluster 2 represents children from more advantaged backgrounds in terms of economic status as measured by receipt of Welfare in 1997 and enrollment in a federal lunch program (notably, no children in Cluster 2 received Welfare in 1997) and the higher than expected rates of parents attending graduate school. Not surprisingly, Cluster 2 is characterized by high home environment and primary caregiver self-esteem

along with low parental distress and parenting aggravation—a cluster that is characterized by protective factors only.

Deviations from the expected rates of sample characteristics in Cluster 3 are similar to those in Cluster 2; however, children in Cluster 3 do not deviate from what is expected in terms of their rates of participating in gifted programs, special education, being expelled, or being on Welfare in 1997. It is interesting to note, in relation to this, that while both Cluster 2 and 3 have similar protective factors, Cluster 3 additionally presents the risk factor of high parenting disagreement, while Cluster 2 additionally presents the protective factors of high PCG self-esteem with low parental distress and aggravation.

Children in Clusters 4 and 5 display patterns characterized by multiple risk factors without accompanying protective factors, though these risk factors vary across the two clusters. There are fewer children than expected with male heads of household, who live with both biological parents, who have parents who have attended college or graduate school, or are white (for Cluster 5 only). In addition, more children than expected have been in a federal lunch program, received special education services, been expelled, and received Welfare in 1997. More of these children than expected reside with their mothers only, and have parents with less than a high school diploma. Children from Cluster 5 also are more likely than expected to be black or Latino. The higher rates of children who have indicators of poorer educational experiences such as being expelled and receiving special education services may be related to the parental mental health risk factors

present in Cluster 4 and the low PCG passage comprehension scores and high parental disagreement present in Cluster 5.

In short, five meaningful and distinct clusters of family context patterns were uncovered using the CDS. These clusters were defined using eight attributes of families that have been shown to be related to child cognitive and social-emotional outcomes in previous studies. The final step for the current study was to explore the relationship of cluster membership with child cognitive and social-emotional outcomes—the results of this correlational work are described below.

Associations between Clusters of Family Context and Child Outcomes

The results of the current study show that there are differences in child cognitive and social-emotional outcomes for children depending on cluster membership. Similar to other studies that found that children from families with stimulating and supportive home environments have increased social-emotional outcomes (Bradley, McKelvey, & Whiteside-Mansell, 2011; Neuman & Celano, 2012), children with family context patterns in Cluster 2 scored significantly lower on externalizing behaviors and higher on positive behaviors than children from all other clusters. In fact, Cluster 2 was the only cluster with an average externalizing behaviors score lower than the mean and the only cluster with a positive behaviors score above the mean. Furthermore, Cluster 2's scores on these measures was more than a standard deviation better than scores presented by Cluster 4. It is also notable that Cluster 4 scored significantly higher than all other clusters on externalizing behaviors and significantly lower than almost all of the other clusters on positive behaviors. These results are consistent with studies that show that

children with family risk factors including low parental self-esteem, high psychological distress, and high parenting aggravation have increased behavioral problems (Joo, 2010; Kahn, Brandt, & Whitaker, 2004; Yeung et al., 2002).

The association between the protective factors displayed by Cluster 2 and *cognitive* outcomes did not seem to be present; however, children from Cluster 3 had the added protective factor of a high PCG passage comprehension score and scored significantly higher on letter word naming and applied problems than children from Cluster 5. Children from Cluster 3 also had higher digit span scores than children from both Clusters 5 and 2. Though statistically significant, the relative importance of membership in Cluster 3 for increased cognitive outcomes is low given the minimal differences between the least squares means between children from Cluster 3 and the other clusters (less than half of a standard deviation). Notably, Cluster 3 also had the highest prevalence of parents with Bachelor's and graduate degrees, which could explain the higher scores on cognitive outcomes; however, even after controlling for parent educational level, membership in Cluster 3 was significantly related to child cognitive outcomes.

Limitations and Recommendations for Future Research

While the current study's author was able to establish the structural integrity of some measures of family context in the CDS, uncover the existence of five distinct clusters of patterns of family context, and relate those clusters to child outcomes, there are three main limitations that should be noted. First, as discussed in more detail above, the viable measures of family context that were present in the CDS were limited and did

not represent the full scope of family context variables that have been shown to be related to child outcomes. In addition, the approach of the study author to limit the items included in structural analyses to those that were administered at each data collection wave reduced the number of items that could be included in psychometric analyses by about half. Had these additional items been included in the analyses, more robust structural solutions may have been uncovered and the patterns may have included additional, important aspects of family context; however, this approach would have limited future studies and made it impossible to explore the nature of how membership in any of these clusters may change over time.

Second, the methodological approached used, while rigorous and sound, does not reflect more recent person-centered approaches used to examine patterns across multiple variables. Most notably, latent class analysis (LCA) and multilevel latent class analysis (MLCA) are statistical approaches very similar to cluster analysis in their purpose (for an overview of LCA see Collins & Lanza, 2010); however, unlike cluster analysis classes are not deterministic in nature. In cluster analysis, individuals are assigned to a specific cluster, in this way, cluster analysis is deterministic. In contrast, LCA and MLCA assign probabilities of membership in each class (i.e., cluster) for each individual, never actually assigning an individual to a class. Furthermore, the ability of MLCA to account for the clustering of individuals within an agent (for example, the clustering if children within a family) controls for violations of the assumption of independence of individuals in a data file. It would have been impossible, however, to implement MLCA for the current study since MLCA does not allow for the inclusion of variables that are both clustered within

an agent (i.e., the family context variables that are static across siblings) and those that are not clustered (i.e., the family context variables that are different across siblings) in the same analysis.

Third, the generalizability of the results outside of the study sample may be limited. One of the main reasons for using a nationally representative data file was to increase this generalizability; however, missing data resulted in a reduction of the sample that was included in the analyses. While the use of statistical weights in the study provides some mitigation against this issue, it must be noted that there were slight differences in the demographic makeup of the analysis sample as compared to the sample of all children aged 36 months and older (see Tables 1 and 2 in Chapter 3 above). Most notably, while the overall sample of children aged 36 months and older includes 45.2 percent white, 41.7 percent black, and 7.4 percent Latino children, the sample of children used to create the clusters of family context included 61.5 percent white, 28.7 percent black, and 5.0 percent Latino children. In addition, there were fewer children who were in a federal lunch program and more children who resided with both parents and with parents of higher educational attainment in the cluster analysis sample than in the sample overall. These differences indicate that white children, children residing with both parents, and children whose parents have higher educational attainment may have been overrepresented in the analysis sample while black children and those who are in a federal lunch program may have been underrepresented.

Given these limitations and the study results discussed above, there are several recommendations for future research. The first recommendation for future research

would be to attempt a similar exploration from an LCA or MLCA framework using more robust measures of family context variables. The second recommendation follows directly from the results of the associations between cluster membership and child outcomes. Although statistically significant results were found, the magnitude of the results is limited and the significance of the associations with cognitive outcomes is tenuous at best. Future research should explore whether or not these relationships are important and, perhaps, using additional, more robust measures of family context explore the possibility of different clusters (or classes using an LCA framework) of family context that better explain child cognitive outcomes.

Finally, future research could take two different, yet complementary approaches to the issue of the generalizability of the study findings. One approach would be to use nationally representative survey data and impute values for variables with missing data in an attempt to better retain the representative nature of the survey data in the analysis data file. The second approach would be to collaborate with practitioners and policymakers representing specific program(s) or jurisdiction(s) in order to create family context clusters specific to the populations they serve and data they collect. The added benefit of taking this researcher-practitioner partnership approach would be ability of the research to directly inform practice and policy related to families within the partnering agencies.

Implications for Policy and Practice

The current study was exploratory in nature and future research is necessary to fully uncover the utility of identifying patterns of family context on child outcomes; however, several implications for policy and practice can be gleaned from this study.

Perhaps most notable is the implication for research practice as it relates to the use of national survey data. By using national survey data, researchers avoid the burden of data collection, which can be particularly difficult due to restrictions set forth in the Federal Education Rights and Privacy Act (FERPA) on the collection of student data. Avoiding this burden allows researchers to increase production of new research and to contribute to the literature base in a timelier manner. However, as was discovered in the current study, the quality of the measures used in national survey data needs to be explored thoroughly prior to use in studies—using unreliable measures may lead to inaccurate conclusions or reduce the ability of researchers to find connections among variables. Researchers should choose data files that include a wide range of reliable measures related to their questions of interest and thoroughly inspect each measure prior to inclusion in their study. Researchers should share these explorations and psychometric information with data providers in order to inform their practice. Likewise, measurement experts should be included in the design of all national survey efforts. Finally, although it is desirable to collect information across a multitude of constructs in each survey effort in order to address many avenues for research with limited funds, data will most likely be improved if these survey efforts more carefully target a smaller number of constructs of interest for each particular data collection and ensure each construct is thoroughly and reliably measured using the chosen items and variables.

Program practice can also be informed by the current study. In particular, programs can use the study findings to inform their understanding of what a pattern of family context is, which families are likely to display different family context patterns,

and how those different patterns relate differentially to child outcomes. If they collect information on similar variables as were used in the study, programs may use this information to inform how they approach working with and supporting families that might fall within one of these clusters of family context.

A more rigorous approach to this would be for program(s) or jurisdiction(s) to partner with researchers or research organizations to uncover patterns of family context using their own data and a similar person-centered approach. This would allow these agencies to identify families that display patterns that are associated with lower or higher child outcomes and to target interventions and support services to those with the highest need and further explore the mechanisms for success in families displaying patterns with the best outcomes. This could be particularly useful for programs or school districts operating with restricted financial and personnel resources as it would allow those agencies to better disperse their limited resources.

Finally, the current study provides evidence that looking at patterns of family context is an important part of the conversation regarding targeting the family as a mechanism for improving child development and outcomes. It provides an example of how data can be used to explore the relationship of the whole family to child outcomes. Furthermore, it provides suggestions regarding how to use similar data to inform practice and the implementation of evidenced-based practice and policy.

APPENDIX A: TABLES OF RESULTS FROM ANALYSIS OF VARIANCE

Table A 1. *Analysis of Variance of Externalizing Behaviors*

Source	Degrees of freedom	Sum of squares	Mean square	F value
Between groups	4	91.85	22.96	27.13*
Within groups	846	716.04	0.85	

*$p < .0001$

Table A 2. *Analysis of Variance of Positive Behaviors*

Source	Degrees of freedom	Sum of squares	Mean square	F value
Between groups	4	75.87	18.97	24.29*
Within groups	846	660.61	0.78	

*$p < .0001$

Table A 3. *Analysis of Variance of Letter Word Identification*

Source	Degrees of freedom	Sum of squares	Mean square	F value
Between groups	4	68.59	17.15	17.85*
Within groups	846	812.57	0.96	

*$p < .0001$

Table A 4. *Analysis of Variance of Applied Problems*

Source	Degrees of freedom	Sum of squares	Mean square	F value
Between groups	4	86.04	21.51	22.88*
Within groups	846	795.37	0.94	

*$p < .0001$

Table A 5. *Analysis of Variance of Digit Span*

Source	Degrees of freedom	Sum of squares	Mean square	F value
Between groups	4	24.29	6.07	6.57*
Within groups	846	782.25	0.92	

*$p < .0001$

APPENDIX B: TABLES OF RESULTS FROM ANALYSIS OF COVARIANCE

Table B 1. *Analysis of Covariance of Externalizing Behaviors*

Source	Degrees of freedom	Sum of squares[a]	Mean square	F value
Cluster membership[b]	4	57.18	14.29	16.98****
Covariates[c]				
Child sex	1	20.99	20.99	24.93****
Child age in months	1	0.20	0.20	0.24
Child race	5	6.56	1.31	1.56
Special education	1	2.11	2.11	2.50
Parent education	1	1.86	1.86	2.21
Welfare receipt in 1997	1	8.18	8.18	9.71**
Error	652	655.41		

*p < .05. **p < .01. ***p < .001. ****p < .0001. [a]Adjusted. [b]Adjusted for all covariates. [c]Adjusted for all effects.

Table B 2. *Analysis of Covariance of Positive Behaviors*

Source	Degrees of freedom	Sum of squares[a]	Mean square	F value
Cluster membership[b]	4	62.16	15.54	18.70****
Covariates[c]				
Child sex	1	11.31	11.31	13.61***
Child age in months	1	0.09	0.09	0.11
Child race	5	13.89	2.78	3.34**
Special education	1	2.45	2.45	2.95
Parent education	1	0.14	0.14	0.17
Welfare receipt in 1997	1	0.02	0.02	0.03
Error	652	626.08		

*p < .05. **p < .01. ***p < .001. ****p < .0001. [a]Adjusted. [b]Adjusted for all covariates. [c]Adjusted for all effects.

Table B 3. *Analysis of Covariance of Letter Word Identification*

Source	Degrees of freedom	Sum of squares[a]	Mean square	F value
Cluster membership[b]	4	7.66	1.92	2.40*
Covariates[c]				
Child sex	1	4.24	4.24	5.31*
Child age in months	1	21.58	21.58	27.08****
Child race	5	23.52	4.70	5.90****
Special education	1	68.30	68.30	85.70****
Parent education	1	31.66	31.66	39.72****
Welfare receipt in 1997	1	0.25	0.25	0.31
Error	652	733.84		

*$p < .05$. **$p < .01$. ***$p < .001$. ****$p < .0001$. [a]Adjusted. [b]Adjusted for all covariates. [c]Adjusted for all effects.

Table B 4. *Analysis of Covariance of Applied Problems*

Source	Degrees of freedom	Sum of squares[a]	Mean square	F value
Cluster membership[b]	4	8.64	2.16	2.97*
Covariates[c]				
Child sex	1	3.11	3.11	4.27*
Child age in months	1	4.80	4.80	6.59*
Child race	5	52.06	10.41	14.29****
Special education	1	38.56	38.56	52.93****
Parent education	1	23.62	23.62	32.42****
Welfare receipt in 1997	1	0.59	0.59	0.82
Error	652	671.44		

*$p < .05$. **$p < .01$. ***$p < .001$. ****$p < .0001$. [a]Adjusted. [b]Adjusted for all covariates. [c]Adjusted for all effects.

Table B 5. *Analysis of Covariance of Digit Span*

Source	Degrees of freedom	Sum of squares[a]	Mean square	F value
Cluster membership[b]	4	5.66	1.42	3.25*
Covariates[c]				
Child sex	1	0.11	0.11	0.25
Child age in months	1	150.01	150.01	343.99****
Child race	5	1.84	0.37	0.84
Special education	1	25.21	25.21	57.81****
Parent education	1	3.69	3.69	8.46**
Welfare receipt in 1997	1	0.00	0.00	0.00
Error	652	464.79		

*$p < .05$. **$p < .01$. ***$p < .001$. ****$p < .0001$. [a]Adjusted. [b]Adjusted for all covariates. [c]Adjusted for all effects.

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