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Latent Growth Curve Modeling of Child-Mother And Student-Teacher Relationships From Kindergarten to Fifth Grade

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LATENT GROWTH CURVE MODELING OF CHILD-MOTHER AND STUDENT-TEACHER RELATIONSHIPS FROM KINDERGARTEN TO FIFTH GRADE

A Dissertation Submitted in Partial Fulfillment
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ABSTRACT

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The relationships between children and their parents and the relationships between the home and school have been studied extensively over time as important factors contributing to the outcomes of children. Given that the best outcomes for children likely occur when the home and school collaborate regarding each child, it is important to examine these relationships across time and both environments. In this study latent growth curve modeling was used to examine closeness and conflict relationships within child-mother and student-teacher dyads over five time points using data from the National Institute of Child Health and Human Development Study of Early Childcare and Youth Development (SECCYD). Results indicated that closeness between child-mother and student-teacher dyads decreased linearly from kindergarten to fifth grade. Conflict between child-mother and student-teacher dyads followed nonlinear trends. When parental involvement was included as a covariate in the statistical analyses of student-teacher closeness and conflict, teachers' perception of parental involvement further explained the majority of the variance in the complex relationships between students and teachers. The findings of the current study reinforce the vital importance of collaboration between the home and school.

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fur. Rainey, thank you for reminding me to take breaks to eat before you steal my lunch, and for reminding me that sometimes everybody just needs a little love to turn into who they are meant to be.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER I

INTRODUCTION

Scientific inquiry into child development has had a long and variable history. Theories and methods used to research child development and pragmatic consequences of research have evolved significantly over time. Research regarding child development questions relating to the child's environment has become increasingly important in applied psychology. The child has been viewed both as a partner and also as a reciprocally regulatory factor, i.e., children are not only shaped by their environments, they also help to shape their environments (Sameroff, 2009). The home, school, and social systems children develop within are highly complex, and have allowed for new methodology for inquiry into these multilevel relationships (Weston & Gore, 2006).

The history of child development theory has been long, extending from ancient Greek philosophy and the Socratic method of guided questioning, to the transactional model of development, which posits that children and their environment learn from and also shape one another (Sameroff, 2009). Throughout this history, predominant theory of the time has dictated the methods used for inquiry about child development. The reductionism of behavioristic inquiry saw the context of a child's world as the sole function for behavior (Skinner, 1971; Watson, 1913). Humanistic psychology saw children as sole builders of their environment and did not include the influences of the environment on behavior (Maslow, 1943; Rogers et al., 1967). Gestalt psychologists offered an insight previously unheard of in research, i.e., flexibility in rigorous methodology. For these psychologists, inquiry was designed to evaluate and understand

the complex and dynamic relationships of whole systems and the parts subsumed within them and gave the opportunity to consider the transactional nature of child development (Koffka, 1924; Kohler, 1969; Wertheimer & Riezler, 1944).

Recently, transactional models of development have become standard. Children have been acknowledged to interact with, as well as to be shaped by and to shape, contexts. The contexts may be the parent-child relationship, the home environment, or the teacher-child relationship. Systems of child development have been viewed to be reciprocally regulatory. Past research on the parenting relationship has shed light on the nature and salience of these transactional relationships. Parents and children form an attachment early in life that has become the basis for other relational interactions. In other words, the child-parent interactional basis has been applied to future relationships in other contexts.

The knowledge base regarding the parent-child relationship and attachment has begun to expand to include the teacher-child relationship. While the nature of the attachment between a mother and child has not been predictive of the attachment a child may form with another caregiver such as a teacher, there have been many similarities between the two relationships. Both parents and teachers have formed bonds with children through proximity, investment, mutual bonds, emotional, social, and cognitive stimulation, and the desire to see children succeed. However, it has been helpful to keep in mind that children may form attachments with teachers that differ from those formed with their parents. A different attachment scenario could be a protective factor for children who do not have secure and maximally beneficial attachments with their parents.

One further context of child development that has become increasingly important is that of the home-school connection. This may be viewed as a higher order factor with implications

for child development. Potentially, it may have been this connection between environments that was the umbrella beneath which the parent-child and teacher-child relationships were held, mutually and reciprocally influencing one another. The home-school connection may be an alterable variable in a child's life. The school could do much to strengthen and build a bond with families, and families could do much to strengthen and build a bond with the schools. Therefore, this potential for a higher order factor, and scientific inquiry designed to explore it, are of utmost importance. The potential for change, for strengthening both parents' and schools' relationships with children via this relationship, has served to build strong frameworks within which children develop.

As our methodological ability to research the highly complex and multi-level relationships between the individuals and systems that impact child development evolved, so too must the theory of child development. While the traditional theories have attempted to paint a complete picture of child development, studying the complexity of child development as a whole has remained complex. Components have been examined and compiled; however, the larger picture as a dynamic whole has remained methodologically difficult.

Statistical methods such as structural equation modeling (SEM) and the associated procedure of latent growth curve modeling (LGCM) have offered methodology suited to yielding much information regarding child development. They allow for greater flexibility in examining multiple components of child development at once and over time (Duncan et al., 2006). They also do not rely on straight line growth but allow the flexibility of watching large data sets grow in any shape over time. Therefore, it is incumbent upon researchers of child development to utilize these available methods to refine and integrate the current knowledge of child development and to contribute to future discoveries in this area of study.

Growth and development over time is highly individual and can be observed to take many different trajectories based on numerous factors. One of the many questions in developmental research addresses the shape of change, individual and group variations, and the antecedents and consequences of change (Preacher et al., 2008). Development is a process. It occurs intra-individually as a function of biologically and environmentally based processes. It also occurs inter-individually as a function of individual factors, environmental factors exerted on the individual, and the interactions between the individual and their environment (Duncan et al., 2006; Preacher et al., 2008). This complex pattern of development has been studied since the beginnings of research questions about development but the methodology used to design inquiry into developmental processes has lagged behind in the capability of honoring the full complexity.

The study of change over time has been a key component to understanding development. Recent research resoundingly suggested the use of static data, or comparison between two different groups of interest at one point in time, was insufficient to study development (Card & Little, 2007; Duncan et al., 2006). Particularly when researching the developmental processes of children, it is crucial to utilize statistical methods that allow the examination of the same children over time. Of particular importance are research questions that examine how much children change over time, factors that explain the change, and the differences in change from one child to the next. When describing development, not only a single child's trajectory should be examined but also individual children's differences in trajectories over time (Duncan et al., 2006). The individual experience should be maintained as it provides important information.

The parent-child relationship and the teacher-child relationship share many commonalities. Children spend on average between 175-180 days or 900-1,000 hours per year in school (Hull & Newport, 2011). Teaching strategies used in school often mimic practices used in

the home by parents. The transactional nature of the teacher-child relationship has also been shown in recent years to rest on many of the theoretical foundations already well established in the literature on the parent-child relationship (Hamre & Pianta, 2001; O'Connor et al., 2011; Rudasill, 2011; Rudasill & Rimm-Kaufman, 2009). The underlying complexity of these relationships necessitated longitudinally designed research.

Longitudinal inquiry of development is necessary because when examining development, a temporal sequence is insufficient to imply causality (Cliff, 1983). When considering a model to examine longitudinal growth, there are many considerations to be made. First, the contribution of intervening variables and autoregression in the trajectory of development must be accounted for (Duncan et al., 2006). Issues of time in the design must also be addressed. In addition, another area commonly lacking in research using static data or data with too few time points included is the inclusion of covariance and modeling error (McCoach et al., 2007).

Methods such as analysis of variance (ANOVA) and regression models vary from structural equation and LGCM in important ways. Analysis of variance and regression models are limited to examining group differences (Weston & Gore, 2006). All individual information is reduced to a group mean and then compared to another group mean. Individual trajectories are not accounted for (Duncan et al., 2006). Another limitation of these models is their linearity. Variables of interest are assumed to be linearly related even when this may not be the case according to the a priori theory driving the inquiry (DeRoche, 2009; Weston & Gore, 2006). Structural equation modeling, a family of statistical techniques itself subsumed within the general linear model, has begun to gain solid footing as a research tool used to study change over time in both the psychological literature as well as in school-based applications (DiStefano & Kamphaus, 2008; MacCallum & Austin, 2000).

The strengths of structural equation modeling include offering a parsimonious test of hypothesized relationships among variables as well as a highly organized a priori grounding of the specified model in theory (Duncan et al., 2006). Latent growth curve modeling, an advanced modeling procedure, allows the observation of growth over time on more than one variable simultaneously and is, therefore, a dynamic, rather than static, procedure: "With multivariate longitudinal growth curve models, it is possible to determine whether development in one behavior covaries with development in other behaviors" (Duncan et al., 2006, p. 63). When change is of interest, it must be viewed in the form it takes and over time. Researchers have noted that LGCM has been underutilized, though the benefits for its use in developmental inquiry abound (Meredith & Tisak, 1990).

Perhaps the most important difference between static, group oriented, research methods such as ANOVA and regression and individual and dynamic methods such as structural equation modeling and latent growth curve modeling is the shift in focus. Analysis of variance and regression models focus on the average rate of change for the overall sample, assume that change is linear, and error variances are equal and independent. Structural equation modeling and latent growth curve modeling allow for both group and individual means and covariances. Latent growth curve modeling also accounts for measurement error in the model across repeated measures (Murphy et al., 2014).

The benefits of focusing on alterable variables are numerous. Children live in a dynamic world (Bronfenbrenner, 1986; Sameroff, 2009). From the home environment to the school environment, children's lives are reciprocally shaped by intra-individual factors and the interactions between them and their environments. Bronfenbrenner (1986) described development as occurring through progressively more complex exchanges between children and

their environment. Sameroff (2009, 2010) described developmental outcomes as not merely a function of the individual or the context alone but as a combination of both. The transactional model of development indicates scientific inquiry must also honor this complexity and change over time while honoring the uniqueness of each individual's interaction within their own environment. By using research methods focusing on alterable variables, inquiry into development could offer insight into not only the process of development but also potential naturalistic interventions in a child's environment.

Psychology as a science has had a rich tradition of considering the person and the personal experience or phenomena as critical and foundational to all inquiry and study of people. Beginning with Mary Whiton Calkins and her psychology of the self and William James who hypothesized a pluralistic psychology in which there were many truths and the acknowledgment and valuation of the individual experience, psychology has at its foundation the person (Calkins, 1908; James, 1909/1977, 1902/1979). The study of child development has progressed in many ways over time and transactional models of development are now standard. It is important to revisit the foundation of this focus, rooted in Calkins (1908) and James (1909/1977, 1902/1979), as a means to understand and value the methods we now use to inquire about developmental processes.

Methodologically, the consideration of the individual as important has also had a lengthy history. Rao (1958) and Tucker (1958) introduced methodological research practices that included the preservation of individual differences rather than reduction to a shared or reduced experience. Meredith and Tisak (1990) and McArdle and Epstein (1987) have extended their work into LGCM as it is used today. Latent growth curve modeling considers development dependent on the passage of time. Latent growth curve modeling also considers the individual

experience as important because it can give meaningful information about developmental processes by maintaining individual-level information while also considering relationships in these trajectories over time as they relate to predictors and sequelae of change (Mehta et al., 2005). Latent growth curve models yield useful, practical research methodology that is flexible in examining change as it occurs, shows the practical influences and outcomes of change, and reveals the individual experience of change. When inquiring about the shape of change over time, it is methodologically sound to utilize pragmatic approaches (Molenaar & Campbell, 2008).

The roots of pragmatism extend to Husserl, Russell, Dewey, and Pierce, William James, and Mary Whiton Calkins. A pragmatic philosophical and theoretical orientation provided a solid foundation for the nature of the current inquiry by giving a foundation for the methodology as well as the necessity of an a priori theory as an approach to scientific inquiry into development. Pragmatism is the philosophical orientation of utilizing sound but flexible methodology to research hypotheses with the practical implications of such inquiry in mind (James, 1909/1977). Pragmatism elegantly relates to LGCM. Latent growth curve modeling provides a means to examine development as superimposed over time (Duncan et al., 2006). Individual data are considered from several angles in LGCM: all of the angles hinging on the theory that "change is systematically related to the passage of time" (Duncan et al., 2006, p. 5).

William James (1909/1977) proposed a pluralistic universe in which individuals have different and equally valuable experiences and build their own truths from these experiences. Dewey (1910) described experience as a process during which individuals interact with their contexts and create meaning and experience through this bi-directional interaction. Latent growth curve modeling considers individual differences in growth trajectories, thereby honoring James'

and Dewey's pragmatic roots of multiple truths. An individual's growth curve trajectory over time is the focus. A single trajectory is then compiled with other trajectories to make associations among and between individual growth trajectories. This combination allows insight into not only the individual but how that individual relates to other individuals (Duncan et al., 2006). At its core, LGCM is a pragmatic methodological approach. The focus on a priori theory guiding inquiry is akin to the pragmatic principle of experience dependent on an individual's interaction with his or her environment.

The current study utilized a voluminous database compiled by the U.S. Department of Health and Human Services (HHS) under the auspices of the National Institutes of Health (NIH). The specific NIH institute that collected and compiled the data was the Eunice Kennedy Shriver National Institute of Child Health and Human Development (NICHD). The name of the database is NICHD Study of Early Childcare and Youth Development (SECCYD). The custodian of the database is the Inter-university Consortium for Political and Social Research (ICPSR.) This database was consistent with the current study's framework of examining change over time and the complexity between relationships and environments present across a child's development (HHS 2018a, 2018b, 2018c, 2018d). Numerous longitudinal studies have been conducted using the SECCYD data that indicated the important contributions of parental and other childcare providers during the first few years of life, before entry into formal schooling (Shonkoff et al., 2000). Acknowledgement of the variations of parental relationships and the variations of caregiver relationships prior to school entry offered a solid platform from which to pursue the current study.

Designing the current inquiry into child development, it was critical to understand how research has been conducted in the past, how research has been refined over time, and what the

currently accepted practices in methodology are. The Gestalt movement may have represented the most complete, dynamic, and solid foundation for the use of sophisticated methodologically sound research designs such as LGCM. The combination of the theoretical framework laid by Gestalt principles combined with the advantages of the sophistication of LGCM that accounts for the dynamic nature of relationships between parents and children, teachers and children, and the ability to account for predictors of change such as age, allows for flexible inquiry, such as the present study.

Given the argument for the elegant fusion of the Gestalt tradition and LGCM, it is important to revisit why Gestalt theory largely fell out of favor as a well-defined school of thought. World War I and World War II had a disorganizing, to say the least, effect on the pioneers of Gestalt psychology. Wertheimer, Koffka, and Kohler were driven from their work by the chaos in Europe during World War I, the time period immediately following that war, and also during World War II. Germany, which had enjoyed a zeitgeist of learning through an abundance of opportunities for higher education in all subjects, lost that valuable contribution to the world and to psychology. None of the founders was able to continue their work and, as perhaps an example of the whole losing meaning beyond the parts, Gestalt theory and inquiry were lost to the legacy of war. Importantly, the theory was not given adequate time to grow, develop, and permeate psychological research as were other theories such as behaviorism. There has remained much to learn, test, and explore within Gestalt theory. Methodology has now developed to the point that the Gestalt theories could be rigorously investigated (Fergusson, 1997). Now is a prime opportunity to utilize both the theory and methodology available to examine child development.

With pragmatic methodology and a priori theory as the groundwork and individually meaningful and contextual experience over time as the question of focus, the current inquiry into child development utilized transactional models of development to examine children's growth in both their relationships with caregivers in the home as well as teachers in the school. Therefore, an overview of transactional models of development is warranted. Transactional models of development have advanced over time and incorporated many different, though equally important, theories of child development (Gottfried & Gottfried, 1986).

Theories that only consider the influence of the environment on the child are limited in many ways. Such theories were designed with emphasis on group means, the exclusion of individual data, the exclusion of the consideration of covariance, and the comparison of single points in time across groups. This type of inquiry also considers change to be linear, thereby limiting conclusions about the potentially nonlinear course of development over time. This simplified inquiry fails to account for the mechanism, shape, and course of development. Methodology that allows for broadened factors must be utilized because as theories of child development have been refined over time, it has become apparent that child development is not universal (Grimm et al., 2011; Marsh & Hocevar, 1985). Child development is instead heavily dependent on the individual's characteristics as well as the context of interaction and development.

Research has begun to accept this refinement in methodology. More recent literature has suggested it is common to accept child development as a structural process and inquiry has begun to utilize methodology more apt to capture this complexity (Bassett et al., 2012; Lemery et al., 1999). It is becoming clear that a nonlinear approach to examining children and the relationships within which they develop is standard (Blozis et al., 2007; Martin, 2011).

Statement of the Problem

Childhood and the dynamics of child development have been a focus of inquiry for centuries. Childhood is a unique period which is complex and lends itself to significant questions and research efforts. A great number of historical theorists and contemporary researchers have been inspired to study this unique developmental period. Understanding child development, in all its complexity, has helped to unlock a deeper understanding of human experience. While it has been widely accepted that parental relationships are foundational in childhood, researchers have begun to understand the expansion of theory related to parenting into other domains of child development. The teacher-child relationship has come to light as a parallel but unique contributory relationship during childhood (Hamre & Pianta, 2006).

Research is beginning to shed light on the dynamic relationships of childhood. However, the combination and direct comparison of these relationships and the environments they existed within as interdependent have yet to be fully explored. In part, methodology has failed to account for the transactional and dynamic interplay between components impacting development. For children, schools, and families to support children adequately in all relevant spheres, research must be designed to study the transactional nature among these spheres of influence. More parsimonious and pragmatically focused research can be utilized to understand the complex structures within childhood development. By focusing on alterable variables, accounting for the dynamic and transactional nature of the child-parent, student-teacher, and home-school connections, in the present inquiry I studied the interrelated nature these relationships hold for children.

Purpose of the Study

The purpose of this study was to use LGCM to increase understanding of the dynamics of the child-parent, student-teacher, and home-school relationships as they interact, influence, and shape one another. Past research focused almost exclusively on each of these relationships as separate spheres of influence. However, it is the study of the dynamic, transactional, interrelatedness of these relationships that offers the most pragmatic approach to understanding child development in all its complexity. Only when individual growth over time in each of these relationships is fully explored and then placed within the larger context of the interplay between the relationships will the question of how best to understand child development become more fully clarified. Through examining these relationships within child development as interacting and influencing one another, a richer picture of the true nature of child development will be acquired. In consequence, efforts to intervene and support children may become more evidence based. Without attempts to produce a fuller and more flexible understanding of how these unique yet intertwined relationships impact child development, efforts at understanding and, therefore, intervening with positive outcomes will remain limited.

Research Questions

Q1 What is the shape of growth over time of child-mother closeness from kindergarten to fifth grade?

Q2 What is the shape of growth over time of child-mother conflict from kindergarten to fifth grade?

Q3 What is the shape of growth over time of student-teacher closeness from kindergarten to fifth grade?

Q4 What is the shape of growth over time of student-teacher conflict from kindergarten to fifth grade?

Chapter Summary

Given the complexity of child development, the numerous theories surrounding the various aspects of child development and the known interactions that influence outcomes, it is pivotal to examine child development from a new statistical perspective. Latent growth curve modeling allows for such a perspective. Describing the growth curve while exploring and accounting for alterable variables will lead to more targeted, naturalistic interventions that may be used in the home as well as school. The goal of the current study was to begin this process.

Definitions of Terms

Analysis of variance (ANOVA). A statistical method that provided a test of whether the means of several groups were equal.

Behaviorism. A psychological school of thought that arose from the theories of B. F. Skinner, J. B. Watson, and Pavlov which dismissed the individual experience and focused solely on the role of the environment in development.

Child Behavior Checklist (CBCL). A diagnostic tool designed to measure children's behavioral and emotional problems.

Child-Parent Relationship Scale (CPRS). A parent's report questionnaire for use by mothers or fathers of children between 3- and 12-years-old measuring their perception of conflict and closeness with their child.

Chi-square (χ^2). As used in growth curve models, a nonsignificant χ^2 value indicates the model does not differ significantly from the data. The chi-square result must be interpreted along with other goodness of fit indices based on sample sizes.

Cronbach's alpha. In statistics, a lower bound estimate of the reliability of a psychometric test.

Fit indices. Indices that indicated the degree to which a pattern of fixed and free parameters specified in the model were consistent with the pattern of variances and covariances from a set of observed data.

Fixed parameters. Parameters not estimated from the data.

Free parameters. Parameters estimated from the data.

Freudian psychosexual stage theory. A psychological theory developed by Sigmund Freud that included five stages of sexual development.

Functional magnetic resonance imaging (fMRI). An experimental medical tool for imaging the metabolic function.

General linear model (GLM). A generalization of multivariate linear regression models in statistics to the case of more than one dependent variable.

Gestalt psychology. A psychological movement present during the behaviorist movement that was the basis for the humanistic movement (included dynamic relationships, a transactional give and take).

Hierarchical linear modeling (HLM). Another name for MLM.

Humanistic psychology. A psychological movement which theorized that control and power over an individual's experience and any resultant learning or growth was contributed completely by the individual.

Identification. The statistical study of conditions to obtain a single, unique solution for each and every free parameter specified in the model from the observed data.

Kurtosis. Measure of whether data are heavy-tailed or light-tailed relative to a normal distribution.

Latent variable (LV). A common variable that represents individual differences over time and viewed as being free of error or measurement.

Latent variable growth curve model (LGCM). A statistical method that allows for a comprehensive and flexible approach to research design and data analysis.

Leptokurtic. More values in the distribution tails and more values close to the mean.

Likert-type scale. A questionnaire developed by Rensis Likert in which respondents specified their level of agreement or disagreement on a symmetric agree-disagree scale for a series of statements.

Maximum likelihood estimation with robust standard errors (MLR). Maximum likelihood parameter estimates with standard errors and a chi-square test statistic (when applicable) that are robust to non-normality and non-independence of observations. An MLR is an extension of MLM that can include missing data.

Measured variable (MV). A variable that was directly measured and which was viewed as being subject to measurement error.

Meta-analysis. A statistical method for contrasting and combining results from different studies in the hope of identifying patterns among study results, sources of disagreement among those results, or other interesting relationships that may come to light in the context of multiple studies.

Missing completely at random (MCAR). A statistical term referring to values in a data set that were missing due to factors not dependent on observed or unobserved measurements, e.g., accidentally destroying a sample.

Model. A statistical statement about the relations among variables.

M*plu*s version 8.2. Statistical software program used to analyze structural equation modeling theories.

Multilevel modeling (MLM). A statistical technique for analyzing data with repeated measurements or organized in nested levels.

Multivariate latent growth curve modeling (MLGCM). A statistical method that allows for a comprehensive and flexible approach to research design and data analysis of more than one variable.

NICHD study of early child care and youth development (SECCYD). A landmark study performed by the U.S. Department of Health and Human Services (HHS 2018a, 2018b, 2018c, 2018d) that produced the database used in the current study.

Parameters. Regression coefficients for paths between variables and variances/covariances for independent variables with parameters that may have been either fixed or free.

Parsimonious. A statistical principal that, given two models with similar fit to the same data, the simpler model was preferred assuming that the model was theoretically plausible.

Path diagram. A pictorial representation of a model.

Positron emission tomography (PET) scan. A medical imaging test that utilizes radioactive tracers to check for disease.

Psychoanalysis. A school of thought led by Sigmund Freud that was the first to view childhood as a distinct time of life.

Pragmatism. A reasonable and logical way of doing things or of thinking about problems based on dealing with specific situations instead of on ideas and theories.

Regression model. In statistics, regression analysis is a statistical process for estimating the relationships among variables.

Relationships between variables. Interactions of three types: association (correlation, covariance), direct effect (a directional relation between two variables), and indirect effect (the effect of an independent variable on a dependent variable).

Root mean square error of approximation (RMSEA). A statistical method widely used in structural equation modeling to provide a mechanism for adjusting for sample size where chi-square statistics are used.

Self-renewing partnership model. A home-school model designed to fully involve families in children's education both in the home and at school as opposed to families merely supporting the school.

Skewness. Measure of the lack of symmetry to the left and right of center.

Sociocultural theory. A psychological theory espoused by Lev Vygotsky that explained child development over time as a dynamic interaction between an individual and the culture.

Socratic method. A pedagogical technique in which a teacher did not give information directly but instead asked a series of questions with the result that the student came either to the desired knowledge by answering the questions or to a deeper awareness of the limits of knowledge.

Specification. In statistics, formulating a statement about a set of parameters and stating a model.

Standardized parameter estimates. Transformations of unstandardized estimates that removed scaling information and could be used for informal comparisons of parameters throughout the model.

Structural equation modeling (SEM). A statistical technique that tests and estimates causal relations using a combination of statistical data and qualitative causal assumptions.

Student-Teacher Relationship Scale (STRS). A teacher report questionnaire for use by teachers of children between 3- and 12-years-old measuring a teacher's perception of conflict, closeness, and dependency.

Tabula rasa. A theory developed by John Locke, which proposed that children were born as "blank slates." Therefore, all knowledge was derived from sensory experience.

Values of fixed parameters. Values generally defined based on requirements of model specification.

Teacher-Child Rating Scale (TCRS). Rating scale developed by A. Dirk Hightower et al. in 1986 designed as a socio-emotional measure.

Transactional model of development. An extremely useful model for understanding the interplay of nature and nurture in explaining the development of positive and negative outcomes for children.

Zone of proximal development (ZPD). A theory developed by Lev Vygotsky (1978) that proposed that a collaboration with a more knowledgeable other, potentially a parent or teacher, extended a child's knowledge base due to the transactional partnership between the two individuals.

CHAPTER II

LITERATURE REVIEW

Theories of Child Development

Beginnings

Child development theory began as early as the ancient Greek culture with the Socratic method of education. In this method, Socrates engaged a young boy in a dialogue about a difficult math problem and guided the boy's thinking toward an answer. The boy left on his own was unable to achieve this result. Child development theory continued to progress as evidenced by John Locke's 17th century theory of tabula rasa (Locke, 1693, 1700). In this theory, Locke proposed that children were born as "blank slates," waiting to be inscribed upon by the world. Both Socrates and Locke made valuable contributions to child development theory. They both recognized the importance of the environment in a child's development. Where these eminent men were limited was in considering either an individual child's contribution to development or the interaction between an individual and his or her context.

Freud

Sigmund Freud's (1905) work advanced the study of child development substantially. His school of thought, called psychoanalysis, was the first to view childhood as a distinct time of life. Freud separated childhood from adulthood in important ways. He recognized that childhood experiences held implications for perceptions later in life. This observation offered a platform for considering a child's development over time. It acknowledged that childhood experiences could, and did, influence adulthood experience (Freud, 1905). Further refinement of the recognition of

the importance of childhood led to his theory of psychosexual development. This developmental theory postulated that personality was established within the first few years of life. It emphasized that early childhood experiences lead to completion of sequential stages culminating in a resolved and integrated personality in adulthood. Failure to successfully move through a stage, Freud theorized, resulted in a conflict that would later manifest in adulthood as behaviors related to the particular developmental tasks of that stage (Freud, 1905). Freudian theories gave rise to future psychological considerations of childhood as a distinct and valuable time and to the consideration that early experiences had a profound impact on adult experience. Freud opened the door to a child's interaction with the world as a realm of interest to researchers. However, his focus remained largely within the child, researching the child's internal drives and needs. The Freudian stage theory was viewed as a universal theory in that it was expected to answer any and all questions about development. However, it failed to acknowledge the contribution of the individual and the individual's environment and any potential value that they may have had upon development.

Carl Jung Versus Behaviorism

Carl Jung (1971) broke with Freudian theory and expanded the study and inquiry of child development significantly. Jung studied the process of individuation—a process through which a person completes development by the differentiation of himself/herself as an individual. Relating to child development, Jung introduced the importance of different personality traits, e.g., introversion and extraversion, as factors related to development. His introduction of personality as a differentiating factor in a person's interaction with the world gave rise to the consideration of the role of the individual in the process of development.

In direct opposition to the Jungian school of thought, behaviorism arose from the theories of B. F. Skinner (1971), J. B. Watson (1913), and Ivan Pavlov (1927). The tenets of the behaviorist school of thought included complete dismissal of the individual experience. Whereas psychoanalysis and Jungian theory had given credence to internal factors important to development, behaviorism focused solely on the role of the environment. While behaviorism recognized that individuals must interact with their environments, individual thoughts and perceptions were deemed not to contribute to development. Behavior, regardless of age, was thought to be shaped through methods such as behavioral modification, systematic sensitization, and shaping. Methods utilized in behaviorist inquiry were reductionist and laboratory based. Behavior and the shaping of behavior were documented in a sterile manner, such that the individual experience was lost to the documentation of deterministic steps and reactions to outside stimuli.

The behaviorists' simplistic view of child development resulted in the reduction of psychology and scientific inquiry to behaviors and reinforcement. Psychological inquiry began to be designed in a restrictive manner such that individuals were compiled into groups or compared to one another based on indicators of behaviors. An example of an indicator was counting the number of trials to reinforce a behavior. There are many limitations to the efficacy of the behaviorist theory. While reinforcement and conditioning were factors, they were not solely responsible for the individual's development. Methodology based only on environmental factors was at best restrictive and, at worst, oversimplified and unable to be generalized. Skinner (1971) was fully aware of the limitations of the behavioristic approach. He stated, "It is in the nature of an experimental analysis of human behavior that it should strip away the functions previously assigned to autonomous man and transfer them one by one to the controlling environment"

(Skinner, 1971, p.198). Behavioristic inquiry denied a child's free will, feelings, capacity to think, and individuality.

Gestalt and Humanistic Psychology

Gestalt psychology was a parallel movement in Germany during the heyday of the behaviorist movement in the United States. It was primarily begun by Carl Stumpf (Ash, 1995) and continued and expanded by Max Wertheimer (Wertheimer & Riezler, 1944), Wolfgang Kohler (1969), and Kurt Koffka (1924). The Gestalt psychology laws of perceptual organization had many similarities to the phenomenological stance of William James (1909/1977) and Mary Whiton Calkins (1908) as well as the humanistic psychology movement. In fact, Kurt Goldstein (1939/1995) and his theories of self-actualization later influenced Carl Rogers (Rogers et al., 1967) and Abraham Maslow (1943), thereby rooting the humanistic movement solidly in the Gestalt tradition.

Humanistic psychology reintroduced the ideas of free will, individual interpretation of experience, and indeterminism. Control and power over an individual's experience and any resultant learning or growth were attributed completely to the individual. Perhaps one weakness of the humanistic tradition was the devaluation of methodologically sound research. The humanistic psychology movement tended to undervalue scientific inquiry because of the focus on existential phenomenology (Maslow, 1943; Rogers et al., 1967). Taking the humanistic tradition of valuing lived experience as well as principles of the whole giving function and definition to the parts, the acceptance of the intricacies of interrelationships and the solid foundation in rigorous methodology placed Gestalt psychology and the humanistic tradition as a firm foundation for the current trends in developmental research.

Wertheimer (Wertheimer & Riezler, 1944) questioned perception and the oversimplification of experience reduced to mere parts. He proposed that oversimplification of complex and functional interrelations came at the price of understanding and acknowledging the whole rather than merely the parts. The parts, argued Gestalt psychologists, were given roles and definition by the whole that transcended them. Therefore, the whole governed the interrelationships between the parts, and the intricacy of the whole is not simply valuable but it is the key to understanding how the subsumed parts of the whole function. Gestalt principles presented relationships as dynamic as a transactional give and take between two people, similar to the laws of physics. Relationships, rather than motivations, were based in valences or attractions and repulsions. Gestalt psychologists proposed that the study of this dynamic and fluid relationship between parts within a system was necessary to the scientific study of human experience.

Gestalt principles were particularly significant with respect to the study of child development. Environment, individuals, and interrelations between these parts of a whole were given significance (Wertheimer & Riezler, 1944). The interactions between the parts of the whole, as they were defined by the whole, were considered worthy of scientific inquiry. Natural sciences, phenomenological principles, as well as open questioning of intricate relationships and pursuit of rigorous methodology designed to examine these relationships were all critical components of the Gestalt psychology movement. Experience in the Gestalt tradition was just that: experienced. Individuals and their behaviors could not be separated lest the physical facts, the behaviors that were observed, lost their direction of influence and, therefore, their meaning.

Methodology, in particular, represented a challenge for Wertheimer, Kohler, and Koffka as well as later Gestalt psychologists. Frustrated with the available methods, they experimented

with new methods to explore the dynamic nature of lived human experience. Gestalt principles clashed with methods that were designed to examine and document behaviors as isolated from the lived experience. Grounded in phenomenological principles as well as pragmatist ideals, the Gestalt psychologists sought methodology that allowed access to the lived experience of the individual. While at the time methods of inquiry were limited, the philosophical foundation of Gestalt psychology could be found in the current trends of flexible but rigorous statistical analyses. When the subject matter was human experience, pragmatic, applied, and lived experience was of utmost importance.

Neuroscientific Advances

A brief word about neuroscientific advances in the study of child development is warranted. In the last 20 years, pediatric neuroscience has advanced immensely. Through imaging techniques such as functional magnetic resonance imaging and positron emission tomography scans, more and more has been learned about the living, functioning brain. Several new theories of development have emerged from this blossoming field. The intricacies with which relationships have shaped not only the architecture of the brain, but also the inherent attributes of a person, have been revealed at the neuronal level (Lewis & Todd, 2007). Siegel (1999) and Gauvain (2001) examined the dance that occurred between a caregiver and an infant's mind that resulted in the development of many factors having implications for later learning and schooling. From birth until entry into school, relationships with caregivers structure a child's brain through experience-dependent development into the bases for memory, cognition, emotions, relationship expectation, and regulation (Barnett & Ratner, 1997; Carlson & Wang, 2007; Lewis & Todd, 2007). These basic formulations from interaction with the world have been the foundation children have brought with them into a school environment. To honor these

already complex individuals once they reach school age, one must look more closely at their beginnings in addition to accounting for individual change over time.

It is vital to the field of child development, however, that neuroscientific inquiry not become reductionistic. Mapping the brain and understanding neurodevelopment are reductionistic or molecularistic, i.e., without the understanding of the lived experience of each brain as it interacts with its environment. The potential to map out a lived experience, even if mapped to each specific neural pathway, could never replace the individual interpretations experienced by living, thinking humans.

Summary of Child Development Theories

Clearly theories of child development are complex and have changed dynamically over time. This complexity as well as dynamic changes even at the meta-level of theory created by human experience and thought could be viewed as further evidence of the necessity to view scientific inquiry of development over time. Inquiry must retain a healthy respect for the knowledge that even theory about human development was created by humans as they develop and experience the world.

Psychoanalysis and behaviorism reduced experience to either within a person or outside a person. However, as reductionistic as their approach was, it contributed significantly to the study of child development. Attending to both within-person factors and environmental factors was important and valuable to the study of child development, especially when considered in combination. Humanistic psychology expanded the valuation of free will, the individual as powerful and capable of self-determined change, and an interest in consideration of alterable factors within an individual's life. Indeed, in the humanistic tradition, all factors were alterable because interpretation of a lived experience was within the individual's control.

Theories of Child Development Related to the Home and School Environments: Building a Transactional Model of Development

Introduction

Many theories of child development relate to the home and school environments. Jean Piaget's (Inhelder & Piaget, 1955) stages of cognitive development and Lawrence Kohlberg's (1963) stages of moral development are two such theories and have much in common. Piaget focused on the child's understanding of the world through successive stages of cognitive development. Kohlberg focused on a child's stage-wise development of morality. Both theories reduced development and change over time to a universal process. While these stage theories tended to overlook the wide variation among individual children and did not account for the role of the environment, both individual variation and environment offered critical insight into development.

Piaget (Inhelder & Piaget, 1955) focused on development, not specifically learning, though his theories have been applied to learning more recently. The stages of cognitive development outlined by Piaget offered a framework for a child's thinking to develop over time. As a constructivist theorist, Piaget proposed successive stages rather than a developmental continuum.

Prior to entry into school, caregivers shape a child's interactions with the world (Pianta, 2011). For instance, Spinrad and Stifter (2002) demonstrated the bidirectional nature of the parent-child relationship in that patterns of emotional expression and mother's interaction style were significantly related at five months of age and, moreover, the infant's pattern of emotional expression was predictive of the mother's interaction style several months after five months of

age. Early home environment has been found to be a significant predictor of the need for special education when assessed at age three (La Paro et al., 2002).

Another theory related to the home and school environment was proposed by Lev Vygotsky (1978). His sociocultural theory explained child development over time as a dynamic interaction between an individual and his or her culture. Central to this theory is the bidirectional nature of growth, which was the foundation for future transactional models of development. Individuals influence their culture just as culture influences individuals. Echoes of the Gestalt tradition are clearly present in this theory. Vygotsky also proposed the zone of proximal development, which suggests that collaboration with a more knowledgeable other, potentially a parent or teacher, extends a child's knowledge base due to the transactional partnership between the two individuals.

Impacts of the home environment and the home-school connection can be seen in children's social behaviors. In a meta-analysis examining parental play with preschool-aged children with disabilities, Childress (2011) found collaborative play and scaffolding play techniques supported learning of social communication, daily routines, and generalized learning. In the same vein, play with adults that included teaching of emotional expression was related to future emotional knowledge in preschool (Denham & Kochanoff, 2002). Play with peers in preschool also had a significant impact on children's social behavior. Social competence in preschool as rated by peers, teachers, and parents was related to insecure attachment with parents and externalizing tendencies (Lunkenheimer et al., 2013). These attributes predicted which children would be found in playgroups characterized by anger and aggressive behaviors (Denham et al., 2001). Social behavior was even found to be related to interactions with teachers in the preschool years. Teachers' response patterns toward socially bold children have been

related to more adaptive classroom behaviors (Rimm-Kaufman et al., 2002). Relating all these findings to the integration of developmental theory, social interactions and developmental stages have had a large impact on the acquisition of social skills as have the influence of parents and teachers. As social cognition was found to be inter-related with academic functioning at early ages, consideration of these influences across not only the school domain but also the home and the home/school connection is vital.

A debate has long raged over whether cognition and emotion could be separated (Ochsner & Phelps, 2007; Storbeck & Clore, 2007). Fortunately, this debate may have been resolved by a reciprocally regulatory view (Barnett & Ratner, 1997). Both Piaget and Vygotsky offered theories as to the development of children (Glassman, 1994; Inhelder & Piaget, 1955; Shayer, 2003). Piaget focused on a stage theory, defining boundaries and cognitive frames from which children interact with their world. Vygotsky placed utmost importance on the social context of both emotional and cognitive development (Shayer, 2003). The apparent dichotomy between the two theories can be tempered by considering that both theories are at play at the same instance for a child. So, on one level, children are interacting with their environment and absorbing cultural and social knowledge through that interaction. On another level, concurrently, children interpret cultural and social knowledge through the cognitive and emotional boundaries of their particular developmental stage. Integration, from neural to cognitive and emotional, is the ultimate goal of development and is supported by the home, school, and home-school collaboration (Siegel, 1999).

Piaget focused on the stages of cognitive development and, therefore, did not address many areas relevant to child development such as the environment. However, Vygotsky, who conducted his research in the 1920s and 1930s but was not known in Western literature until the

late 1970s, addressed the social environment and he also addressed learning. Vygotsky (1978) theorized that strategies for learning were dictated by the culture of the child. He proposed that all learning takes place within a greater social environment and the interactions that take place within a specific culture outline not only what was learned but also how information was learned. The theories of Piaget and Vygotsky, when combined under the umbrella of constructivism, pragmatism, and Gestalt principles, provided a platform for further inquiry into the processes of child development. Finally, the conjunction of cognitive and emotional development theories was justified by recognizing that even though the home environment tends to focus more heavily on emotional development and the school environment tends to focus more on cognitive development, there is significant crossover within the two environments. Parents support cognitive as well as emotional development as do teachers.

Another pertinent theory was proposed by Urie Bronfenbrenner (1986). He proposed a theory of ecological systems. This theory followed easily from Piaget and Vygotsky. Bronfenbrenner proposed a nested system within which the child interacts and learns from the environment and culture. This theory was appealing because it was both simple and highly complex. The different and concentric contexts of a child's world influence development both directly and indirectly through interaction between the contexts. While the majority of development occurs in the interaction between the systems, Bronfenbrenner did not deny that the child also interacts within the various contexts. Also included in the ecological theory of child development was the chronosystem of a child's environment. This system acknowledges the growth and change of subsumed systems over time.

Originally proposed in 1979 and expanding the ecological theory further, Sameroff (2009) considered the development of nature through nurture. Development not only occurs over

time but is being shaped by time by the ongoing and changing interactions between children and their environments. Personality and temperament were thought to play an ongoing role in development because, as a part of the individual, these factors influenced how the child interacted with an environment as well as how the environment interacted with the child (Sameroff, 2009).

Vygotsky, Bronfenbrenner, and Sameroff saw child development taking place through increasingly complex exchanges between the child and his or her environment. Research from 1970 to today has examined the complexity of the relationships of parents and teachers with children. These relationships have had significant predictive power on many child outcomes such as academic success, emotion regulation, adjustment to school, social interaction, and overall life adjustment.

Children's lives are divided between time spent in school and time spent with familial support systems. The combination of these environments formed the foundation for development. Many developmental models have shed light on the processes by which children develop. Cognitive and socio-emotional development are now viewed to be indivisible, intertwined processes, and reciprocally regulatory (Barnett & Ratner, 1997). Therefore, a transactional, pluralistic, and pragmatic approach to the study of development is scientifically and theoretically necessary.

Child-Parent Interaction

John Bowlby, and later Mary Ainsworth, extended child development theory into the area of attachment. Bowlby (1951), in an address to the World Health Organization, posited that children benefitted from a close relationship with their mother. He also included the caveat that both mother and child should find satisfaction and enjoyment in the relationship, thereby

acknowledging the bidirectional nature of the relationship. Bowlby also focused on the contribution of attachment over time. Underpinning Bowlby's research was the theme of children developing a sense of security in the world through close and loving relationships with their mothers (Bowlby, 1958). Bowlby worked with Mary Ainsworth (Ainsworth & Bowlby, 1965) and influenced her work on the further definition of attachment theory.

Ainsworth et al. (1978) expanded attachment theory into an operationalized and measurable format. Ainsworth et al.'s creation of, and subsequent research utilizing the "strange situation" assessment, extended Bowlby's attachment theory by yielding further information about maternal and child attachment styles. They concluded that three main styles of attachment existed: secure, anxious-avoidant, and anxious-resistant. The differentiation of types of attachment led to further research into what style of attachment had the most positive outcomes and later, interventions, if a style was found to be lacking. Ainsworth's work also influenced other researchers such as Diana Baumrind who was interested in parenting style. Built on the foundation of attachment style, research then moved toward the differences in parenting styles likely to influence the attachment between mother and child. Across Bowlby, Ainsworth, and Baumrind, the outcomes of the attachment and parenting styles were considered and included as indicators of the parenting style. Their research maintained the theoretical stance of a transactional relationship.

Diana Baumrind (1967) extended the work of Ainsworth and Bowlby by defining originally three, then later, four parenting styles: authoritative, authoritarian, permissive, and neglectful (Baumrind, 1991). Baumrind proposed that attachment varied between parent-child dyads, that attachment was significant in child development, and that we could understand the general attributes of attachment that resulted in the most positive outcomes.

Attachment as a construct has been expanded in recent years. Howes and Spieker (1999) proposed that attachment need not be limited to the relationship between a parent and child. Attachment more generally was defined by a relationship consisting of three general concepts: physical and emotional care, continuity and consistency of care, and emotional investment of the child. Attachment in this sense captures the investment in the child rather than focusing solely on the adult in the caregiver role. Considering attachment and its importance to development in this manner, it was quite easy to consider other figures of attachment within a child's context.

The home environment prior to entry into formal schooling offered the foundation for a child's social and emotional development as well as early learning and future attitudes toward learning (Thompson, 1999). Some longitudinal research has acknowledged early attachments as setting the stage for future relationships (Bretherton & Munholland, 1999; Thompson, 1998a). It was hypothesized by some researchers that as children developed attachments with early caregivers through reciprocally regulatory interactions, mental representations and generalized expectations for interactions in the broader environment were formed (Kochanska & Aksan, 2004).

Attachment within the parenting context provides children many benefits and has been shown to continue to be mutually rewarding. Parent and child attachments that provide a "mutual orientation of positive reciprocity" (Shonkoff et al., 2000, p. 238) become a positive feedback loop in which children are more receptive to the parent, the parent then becomes more receptive to the child, and the mutual attachment is further strengthened. It is clear that the child-parent relationship, as well as other familial relationships, set the foundation for future relationships for a child. Through transactional, positive, consistent, and loving interactions, children learned to form a mental representation and definition of relationship.

While variations within the securely attached parenting relationship naturally exist, parents who demonstrate high levels of involvement by knowing their child well and continually investing in challenging and supporting the child's growth, and high levels of warmth by responding positively and supportively to their child's ever-changing and ongoing needs, tend to have children who demonstrate the most positive outcomes over time (Coplan et al., 2009; Hart & Risley, 1995; Shonkoff et al., 2000). Relating to Vygotsky's (1978) sociocultural theory, high levels of involvement and warmth are necessary to consistently maintain interactions that are within the child's zone of proximal development.

It is also important to note that attachments are changeable over time. The child-parent attachment must have been nurtured, supported, and maintained for the child to benefit from the many positive aspects of a secure attachment (Shonkoff et al., 2000). The potential for change in the attachment relationship offers several insights. First, it is important to note that the parenting relationship is highly influential and must have been maintained and supported to provide the most positive outcomes for children. Second, children could form secure and protective attachments with caregiving figures outside the home and these relationships are also protective and predictive of positive outcomes (Sabol & Pianta, 2012a). Finally, secure attachments with caregivers both within and outside the home provide children with the most optimal context for success in life (Webster et al., 2013). Therefore, these relationships with children between a parent and a caregiver could be expanded outside the home and are worthy of further investigation, intervention, and refinement through well-designed and flexible scientific inquiry. Parents lay the foundation for a child's representation of relationship that the children carries with them as children develop relationships with friends, teachers, and other people as they grow.

The transactional, reciprocally regulatory relationship formed between parents and children appeared to be foundational across the first few years of life (Hart & Risley, 1995). The attachment style developed within the same first few years was predictive of cognitive, emotional, motivational, and educational outcomes (Shonkoff et al., 2000). The first attachments formed appeared to build a child's mental representation of relationships with other adults, peers, and people as they grew and moved within different contexts in life (Feldman et al., 2013). The process by which children formed these relationships, and the underlying theory of transactional relationships in general, then led to the questions of other adult-child relationships such as the student-teacher relationship. If the attachments formed between parents and children were transactional and reciprocally regulatory, if these relationships held immense weight on all areas of a child's overall functioning, it was reasonable to wonder if the student-teacher relationship may have developed over time similarly or may have varied in unique ways.

Student-Teacher Interaction

Examining both the child-parent relationship and the student-teacher relationship over time could yield important information not only about the child-parent relationship and the student-teacher relationship but also about how these relationships may be similar or different for different children. The student-teacher relationship has risen in recent years as a parallel area of research that was important in its own right (Schuengel, 2012). The student-teacher relationship has also become one in which the foundations of attachment theory apply and inform inquiry (Verschueren & Koomen, 2012). Recent trends in research on student-teacher relationships have begun to focus on the connection between the child-parent relationship, the moderating role of teachers' relationship with at-risk children, and the training of teachers from an attachment perspective (Sabol & Pianta, 2012b).

While the attachment relationship between children and parents in the first few years of life has been widely researched and was believed to be relatively stable, as well as to influence future attachment relationships (Howes et al., 1998; Pianta et al., 1989; Thijs et al., 2008), less is known about the stability of teacher attachment across the elementary school years (Jerome et al., 2009). Childhood functioning should be considered within a cognitive and emotional stage framework, overlaid by the environmental context. If it is assumed that this relationship formed relational models that the child carried forward into other contexts, it is insufficient to examine child development with an artificial boundary between other environmental and relational contexts such as the student-teacher relationship.

Student-teacher relationships vary from child-parent relationships in important ways (Hamre & Pianta, 2006; Spilt & Koomen, 2009). The school environment is one of constant flux. Children move from one teacher to another, possibly several times within one day, not to mention from year to year. Children are exposed to multiple teaching and attachment styles among various teachers. Peer groups vary; curriculum and teaching standards vary (Jerome et al., 2009). Children also experience a reduction in one-to-one contact with teachers over the years of elementary school as well as proportional increases in the number of children per classroom. While children enter formal schooling with attachment models developed over the first few years within the home, the variations from the home environment to the school environment are considerable (Hamre et al., 2014). Perhaps most salient is the fact that child-parent relationships exist between one caregiving figure and the child, while student-teacher relationships exist between multiple caregiving figures and the child (Jerome et al., 2009).

Children themselves are more complex, developed, and capable of negotiating complex environments once they reach school age, according to all known theories of development. They

bring with them foundational models for relationships, but the relationships formed within the school environment are unique and worthy of inquiry in many areas (Denham et al., 2002; Eisenberg et al., 2007). As children enter formal schooling, they are developmentally changing. Attachments within the home prior to schooling are typically characterized by adult control because young children depend on adults to guide their behavior and inquiry and to structure their environment. As children grow, they shift toward control of their own behavior and self-monitoring (Bowlby, 1969; Cicchetti et al., 1991; Kopp, 1989). Longitudinally, children's relationships with teachers likely differ from the parental relationships in important ways, though they are still rooted in the relational models formed early in the home (Denham et al., 2014).

Some similarities exist between the parenting and teaching relationship. Student-teacher relationships high in closeness and low in conflict, similar to parent relationships high in warmth and involvement, have been shown to be predictive of academic as well as social outcomes (Burchinal et al., 2002; Howes et al., 1994, 1998; Pianta et al., 1997, 2002). Interestingly, the child-parent relationship has been found to be less predictive of student-teacher relationships than previously thought (Jerome et al., 2009). Longitudinally designed research indicated that teacher ratings of closeness were not dependent on maternal education, race of the child, maternal sensitivity, attachment to mothers, behavioral problems, or hours of non-maternal care (Jerome et al., 2009).

Where child-parent relationships appear to influence the student-teacher relationship strongly is in initial levels of conflict and closeness. However, once the child enters formal schooling, the student-teacher relationship is somewhat independent of the prior familial relationships (Jerome et al., 2009). Initial levels, or perhaps initial internal relational models, of attachment and relationship that children bring with them into formal schooling appear to set the

starting point for the student-teacher relationship but do not influence its rate of growth or decrease (Jerome et al., 2009). The student-teacher relationship appears to be independent of the child-parent relationship in significant ways (Pomerantz et al., 2007; Thijs & Koomen, 2009), and yet is still intimately tied to the early internal relational models established in the years prior to entry into formal schooling (Downer et al., 2007; Gregory & Rimm-Kaufman, 2008). Perhaps children of school age have already begun to internalize relational models and perhaps begun to use these models flexibly in various contexts and with various individuals beyond the home (Denham et al., 2012).

Also important to note is that, while the child-parent relationship certainly factors into the future student-teacher relationship, the lack of correlation between the two styles of relationship indicates that children who did not have secure attachments with their parents may go on to develop these relationships with teachers (Jerome et al., 2009; Merritt et al., 2012). This is especially salient when considering intervention efforts in the school environment. Children who may not have had the opportunity to develop secure attachments in the home prior to entry into formal education may have been able to form a secure attachment with a teacher or other school figure (Brock et al., 2008). These secure attachments attenuate some of the known detriments of insecure attachment and build up resilience, fostering the ability to achieve socially, academically, and interpersonally (Ponitz et al., 2009; Shonkoff et al., 2000). This is a safeguard for children, a double layer in a sense, of protection and care. It has been hypothesized that children could build a protective and productive attachment and, thereby, relational model that would aid them in achieving (Hamre & Pianta, 2006; Rimm-Kaufman et al., 2007).

Ideally, longitudinal research methodology could account for the unique contribution of the home and school environments and relationships formed within them over time, as well as

consider the individual child within these different frameworks. Centering inquiry on the individual child's experience allowed scientific inquiry to examine trends of relationships in different environments over time as experienced by the individual children themselves. However, again returning to the transactional and reciprocally regulatory nature of child development, it became apparent that research remained insufficient if it only considered child development in terms of the child-parent relationship and the student-teacher relationship in isolation from one another. Development must be considered in all its complexity.

The child-parent relationship is founded in a transactional give and take that occurs over time and across cognitive and emotional developmental stages. It is flexible, open, and ongoing. Similarly, the student-teacher relationship is unique in its own ways and presents its own challenges for the child but remains transactional and flexible in nature and based in developmental stages over time. Both relationships and the contexts in which they develop are vitally important to child outcomes (Hemmeter et al., 2006; O'Connor et al., 2012; Reynolds et al., 2010). For this reason, the two contexts must be considered in concert with one another, suggesting the existence of a higher order factor. In line with the Gestalt principles, it is highly theoretically possible for a generalized relational pattern to develop, for children's relationships in different contexts and with different adult figures to be guided by an over-arching factor that subsumes, gives function to, and guides the development of both the parent-child and teacher-child relationships. Therefore, the potential for a higher order factor, in which the home and school reciprocally regulate each other as well, is highly possible and must be accounted for. The home environment and the school environment likely work together in complex ways (Fantuzzo et al., 2005), and it is insufficient to fail to account for this interrelationship between larger environments.

Home-School Connection

Collaboration between the home and school is a unique third component of childhood education that bears as much weight on development and education as the home or school in isolation (El Nokali et al., 2010). Returning once again to the transactional theory of development and Gestalt principles, the overarching factor of the connection between the home and school environments may well be the unifying component that gives function and meaning to both the child-parent relationship and the student-teacher relationship as mutually central and salient factors in child development (Eisenberg et al., 1997; Stright et al., 2008). Consideration of this higher order factor must also take on a different tone for its maximum benefit to be realized. The tone should be one of collaboration and intervention, the building up of the connection between the two environments founded in mutual acknowledgement of the importance they hold for positive child development (Downer & Pianta, 2006). Therefore, the home-school connection should focus less on the conflict or closeness present within either of the environments in isolation and should take on the larger lens of focus on the presence of closeness or conflict between the two environments themselves. The attributes that promote the most positive outcomes for children within either the child-parent relationship or the student-teacher relationship could be expanded and considered the key to forming positive relationships between environments. Building a relationship between the home and school environments based on closeness and lack of conflict is exciting. Interventions abound for building positive and close connections between home and school environments and, once again, the tone of positivity and focus on alterable variables rather than controlling for intervening variables could be found and used. Home school connection is a pragmatic, transactional, and flexible approach that is complex and accounts for the development of relationships over time (Welsh et al., 2001). These

complex interrelationships shed light on a child's development and thereby offer avenues of potential intervention within these multifaceted contexts.

The stage for the connection between home and school was set by the knowledge that teacher education alone was insufficient to consistently predict high achievement (Early et al., 2007). Clearly, the teacher does not act alone to encourage achievement (Estell & Perdue, 2013). Contact between the home and school has been found to be more positive and more often parent initiated during the preschool years than in kindergarten (Rimm-Kaufman & Zhang, 2005). The tone of communication between school and home in kindergarten was found to be more negative in focus and was more often school initiated (Rimm-Kaufman & Pianta, 1999). Hypotheses for this shift in focus from preschool to kindergarten include the notion that the shift may have been evidence of a trend of parental pulling back from children's education as they got older. Such a distancing of the parental role would be unfortunate, given the breadth of knowledge supporting an ongoing collaboration. Rimm-Kaufman and Pianta (1999) discussed the need for school psychologists to maintain more informal contact with families, invite parents' contact, and maintain positive school feedback with the parents.

Several models have come to light that support, enhance, and scaffold the ongoing collaboration and respect for all three components of early childhood education: home, school, and home/school collaboration. One of these models is family systems intervention. Family systems intervention offers several strengths as does the subsumed notion of parents as equal experts on their children's education. Aligning teaching and parenting styles is another supportive practice that offers continuity across environments. Finally, a self-renewing partnership model was presented as a broad, inclusive practice that honors all three vital arenas of early childhood education: the home, the school, and the child (Lueder, 2005).

Family systems intervention was built on the premise that family concerns, priorities, strengths, supports, and resources could support positive parent-child interactions (Trivette et al., 2010). Along the same line of thought was Reedy and McGrath's (2010) proposal that parents be included in educational spheres as equal partners and as bearers of a different and vital source of expertise on their children. Gallagher et al. (2004) also discussed the need to honor the contribution of teachers and parents. These authors, and others, considered the weight of the information provided by each as equally important and bearing the same responsibility for the course of a child's education (Sheridan et al., 2012).

This line of thought was exceedingly positive. For children to be supported on all fronts, home and school, and for those forces to be equal in their power to shape the educational experience of children may represent the most complete picture of childhood education. Moreover, if this positive interaction between home and school could support more positive child-parent interactions and student-teacher interactions, then the outcome may well be a self-renewing chain of support for young children. The potential is inherent in this type of model to influence child-parent relationships where learning begins and supports that relationship all the way through formal schooling. A continuous environment of educational support from birth through the end of school may be possible and ideal.

Another component of this continuum of educational support that demanded addressing was the alignment of teaching and parenting styles to be founded in what literature supported as the most optimal style for supporting development of all types. High expectations and high involvement have demonstrated over time and situations to provide the most optimal support to children (Barbarin et al., 2010; Baumrind, 1971; Maccoby & Martin, 1983).

Finally, to consider a true continuum of educational and developmental support for children from birth through schooling, a self-renewing partnership model may be adopted. This model, ecological in nature, would involve not only families and schools but communities as well. Based in an energy-out/energy-in paradigm, the self-renewing model of partnership was vastly different from most models (Lueder, 2005). The author of the model acknowledged barriers to home/school collaboration and advocated for a new understanding of partnership that did not rest in one type of interaction but respected and utilized all types of interaction. For instance, roles played by parents could take the form of nurturer, communicator, teacher, supporter, learner, advisor, advocator, or collaborator. The school's roles would be to connect, communicate, coordinate, and coach (Lueder, 2005).

By respecting the different types of contribution and support, this model was preferable to others because it was inclusive of all families and all situations (Serpell & Mashburn, 2012). Those families that were considered at-risk, or otherwise non-traditional in their ability to support their children, would benefit from this model and be able to participate in an equal and vital partnership with their children's school to promote healthy developmental and educational outcomes for their children (Lueder, 2005). This should be the goal of any educational system, and it is incumbent upon those responsible for policy within schools to begin to consider the body of knowledge on the value of a continuum of supports both temporal and across contexts.

Age as a Static Factor in Child Development

An important consideration when examining childhood development in both the home and school environments, is age. Inhelder and Piaget (1955), Erikson (1963), and Vygotsky (1978) all considered there to be significant shifts in development both prior to and during the early school years. Therefore, to ignore, or to automatically assume the passage of time, would

be to ignore a vital component of longitudinal child development and inquiry designed to better understand it. During the preschool years, approximately age two to five, children's developmental foci are on exploration and building a sense of separateness from parents, though they are still unable to differentiate their own perspective from others (Inhelder & Piaget, 1955). At approximately age six to seven, children undergo a shift in development and developmental focus. Their cognitive ability becomes concrete, and they can use basic logical principles to understand that their own perspective may differ from others. They also shift significantly from exploring their world to building and creating their own work within their world and becoming capable of task-oriented behavior (Erikson, 1963; Vygotsky, 1978).

The passage of time, as represented by age, therefore, carries much weight when considering parent, teacher, and child relationships as well as interrelationships between home and school over the early schooling years. The passage of time must not be relegated to the background as an assumption because it may contribute unique understanding of longitudinal variance in behaviors and relationships. It may be that we would expect to see shifts in all of these interrelationships logically placed around key developmental points in time, such as age six to seven years.

Chapter Summary

Over time, many theories have been developed and refined, and research has then followed to explore the complexity of child development. From the understanding of individual development, to the expansion into the individual within their environment and the interplay that is salient to outcomes, child development is now understood to be highly dynamic (Shonkoff et al., 2000). As understanding of the complexity has grown, methodology to better encapsulate and expand that understanding has followed.

Researchers of child development have always sought to explain one thing: change as a process. Change can be positive, negative, linear, or non-linear. It can be influenced by outside factors, and can be rapid, or plateau. Longitudinal data have been used for years to study change. However, with latent growth curve modeling, it is possible to go beyond static, piecemeal, data and begin to understand the dynamic process as a more integrated whole.

CHAPTER III

METHODOLOGY

Institutional Review Board

The University of Northern Colorado Institutional Review Board granted exempt status according to federal regulations for the current research on November 16, 2018 to expire on November 16, 2022 (see Appendix A).

The National Institute of Child Health and Human Development Early Child Care and Youth Development Database

Participants

The current study utilized data collected by the U.S. Department of Health and Human Services (HHS) under the auspices of its National Institutes of Health (NIH). The Eunice Kennedy Shriver National Institute of Child Health and Human Development (NICHD) was the specific institute in the NIH that collected the data. The title of the database used in the current study is NICHD Study of Early Child Care and Youth Development (SECCYD). The custodian of the database is the Inter-University Consortium for Political and Social Research (ICPSR). The primary purpose of the SECCYD was to examine longitudinally the differential developmental trajectories of children across three major domains: cognitive, social-emotional, and physical growth and health (HHS 2018a, 2018b, 2018c, 2018d). Initially data were collected from 1,364 families in four phases at 10 locations across the United States (Phase I, birth through three years; Phase II, 54 months through first grade; Phase III, second through sixth grade; Phase

IV, seventh through ninth grade). Data collection began in 1991 and concluded in 2007. Due to predictable attrition, the final phase included only 1,009 families.

Findings from numerous studies utilizing the SECCYD data were consistent with the current study's framework of examining change over time and the perceived complexity between relationships and environments present across a child's development. Those previous studies were conducted using the SECCYD data that indicated the important contributions of parents and other childcare providers during the first few years of life, before entry into formal schooling (National Institute of Child Health and Human Development [NICHD], 2006). Acknowledgement of variations of parental relationships as well as the variations of caregiver relationships prior to school entry offered a solid platform from which to pursue the current study. Cumulatively, findings to date utilizing the SECCYD data indicated that children's experiences prior to entry into formal schooling were variable, that the trajectories of development followed by children over time was variable, and that there were significant relationships between different components of a child's world (NICHD, 2006).

Procedures for Data Collection

Across multiple sites, research assistants underwent training to facilitate the collection and entering of data. The training included required certification on each procedure to ensure reliable administration and consistency across sites (NICHD, 2006). The steps taken to train research assistants included identical training materials and manuals, meeting as a group for centralized training workshops, submitting videotaped examples of several test administrations before certification, and receiving telephone and email feedback for any questions arising before or during data collection.

Enrollment in the study involved a three-step process occurring over 11 months during 1991 (NICHD, 2006). A total of 8,986 possible families were screened during 24-hour periods at 10 selected hospitals within 48 hours of a birth. Potential study participants were screened while in the hospital chiefly to identify barriers to participation as well as multiple exclusionary criteria. A telephone interview was conducted with potential participants two weeks after the birth, at which time families were again screened for exclusionary criteria.

A specific sampling plan was utilized to enroll participants. Participants were selected in accordance with a conditionally random sampling plan, which was designed to ensure that the recruited families (a) included mothers who planned to work or to go to school full-time (60%) or part-time (20%) in the child's first year as well as some who planned to stay at home with the child (20%) and (b) reflected the demographic diversity (economic, educational, and ethnic) of the sites. Both two-parent and single-parent families were included. The major exclusionary criteria used were (a) mothers younger than 18 years of age at the time of the child's birth, (b) families who did not anticipate remaining in the catchment area for at least three years, (c) children with obvious disabilities at birth or who remained in the hospital more than seven days postpartum, and (d) mothers not sufficiently conversant in English.

Analyses have indicated that the data did reflect the natural distributions of these factors in the catchment (NICHD, 2006). Therefore, inferences from these data could be made directly to the catchment without back-weighting for the sampling factors. In addition, analyses have shown that the NICHD data reflected to a large degree the natural distributions of certain factors measured in the 1990 census data (NICHD, 2006). However, the NICHD data are not representative in the statistical sense and, therefore, inference to the nation as a whole is not possible. Comparisons to other databases, national or otherwise, should be made with extreme

caution (NICHD, 2006). The current study utilized the number of participants for whom data were present across phases II and III (HHS 2018b, 2018c).

Male or female identification of child subjects was not provided in the requested data subsets, phase II and phase III (HHS 2018b, 2018c). That information was contained in a different subset and was not carried over through any other subsets. This division of the data was unknown prior to application for use and was discovered only after significant portions of data cleaning and analysis had taken place. Therefore, the reported results do not include breakdowns by gender as that information was unavailable due to the extensive time required to gain access initially, and then because the request for the file including the demographic information was delayed further by Inter-university Consortium for Political and Social Research (ICPSR) time constraints.

Instruments Used for Data Collection

The SECCYD utilized numerous measures across different environments. Measures of social-emotional, cognitive, linguistic, academic growth, as well as physical and health measures were used to examine the development of children within the various contexts of home, school, and childcare (NICHD, 2006). Instruments were selected based on numerous criteria including the psychometric properties of scores obtained from those instruments, applicability to diverse populations, and time to complete each instrument (NICHD, 2006). Also, the measures used were evaluated for their developmental importance and the ability to demonstrate change in development based on context (NICHD, 2006). Two of the instruments used in the SECCYD yielded data that were used in the current study: the Child-Parent Relationship Scale and the Student-Teacher Relationship Scale.

Child-Parent Relationship Scale

The child-parent relationship was measured in kindergarten, first, third, fourth, and fifth grade by administration of the Child-Parent Relationship Scale (CPRS) displayed in Appendix B (Pianta, 1992). The CPRS was selected for use in the SECCYD based on a review of literature dealing with child-parent relationships, as well as various theories of attachment, parenting, and child development (Slade & Aber, 1992; Thompson, 1998b). The CPRS is a parent report questionnaire for use by mothers or fathers of children between 3- and 12-years-old (Driscoll & Pianta, 2011; Pianta, 1992). The CPRS measures parents' perception of their relationship with their child. The scale consists of 15 items, all rated on a 5-point Likert-type scale ranging from 1 = *definitely does not apply* to 5 = *definitely applies*. The ratings were differentiated into two subscales measuring conflict and closeness, with eight items measuring conflict, and seven items measuring closeness. Possible scores for the child-parent closeness subscale on the CPRS ranged from 7 to 35 with a higher number overall indicating the perception of more closeness. Possible scores for the child-parent conflict subscale on the CPRS ranged from 8 to 40 (Driscoll & Pianta, 2011; Pianta, 1992).

The closeness subscale consists of seven items measuring parental perception of warmth, affection, and communication in their current relationship with their child. Cronbach's alpha for maternal closeness was .64 at first grade, and paternal closeness was .74. Participants included 294 boys and 269 girls. Children of color represented seven per cent of the sample. Participants completed the measure at ages 54 months and first grade. All participants in the norming sample were also participants in the SECCYD (Driscoll & Pianta, 2011; HHS, 2018a).

The conflict subscale consisted of eight items measuring parental perception of negativity in their current relationship with their child. Cronbach's alpha for maternal conflict was .84 at

first grade, and paternal conflict at first grade was .78 in the normative sample of 563 children enrolled in the SECCYD (Driscoll & Pianta, 2011).

The distinct contribution of both the conflict and closeness subscales to the overall relationship scale was indicated by a low correlation between the subscales (r = .16). Reliability of scores from the CPRS was demonstrated by Driscoll and Pianta (2011) through inter-rater reliability (r = .83).

Validity of scores from the CPRS were also examined across participants in Driscoll & Pianta, 2011. Maternal and paternal perceptions of closeness were found to be dependent both on time, $F(1, 562) = 116.11$, $p < .01$, and participant, $F(1, 562) = 137.63$, $p < .01$, with both mothers and fathers reporting higher levels of closeness with their children at first grade (Driscoll & Pianta, 2011). Mothers in the Driscoll and Pianta (2011) study reported higher perceptions of closeness than fathers, $F(1, 562) = 5.13$, $p < .05$, and fathers reported a significant increase in the perception of closeness at first grade (Driscoll & Pianta, 2011). Maternal and paternal perceptions of conflict were also found to be dependent on time, $F(1, 562) = 74.64$, $p < .01$, and participant, $F(1, 562) = 12.61$, $p < .01$. Mothers and fathers reported less conflict with their children at first grade. Mothers reported more perceived conflict at 54 months and first grade, and with both male and female children, than fathers reported (Driscoll & Pianta, 2011).

Convergent and divergent validity of scores from the CPRS was examined with respect to similarities and differences in the constructs measured by the Child Behavior Checklist (CBCL; Achenbach, 1991). The CBCL was designed to measure children's behavioral and emotional problems. Correlations between the subscales of the CPRS with the CBCL indicated statistically significant relationships between scores from the measures, and these relationships were in the expected direction at $p < .01$, supporting convergent validity (Driscoll & Pianta, 2011). At first

grade, the closeness scale of the CPRS was weakly but negatively correlated with both the CBCL externalizing and CBCL total problems subscales (r = -.26 and -.29, respectively, for mothers, and r = -.19 and -.25, respectively, for fathers). The closeness subscale of the CPRS and the externalizing and total problem subscales of the CBCL were weakly negatively related, suggesting that the constructs measured by the two were unique. At first grade, the conflict subscale of the CPRS was positively correlated with both the CBCL externalizing and total problems subscales (r = .69 and .62, respectively, for mothers, and r = .59 and .55, respectively, for fathers. The strong positive correlation between the conflict subscale of the CPRS and the externalizing and total problems subscales of the CBCL suggested that the construct measured by the two is similar.

Data from the CPRS closeness and conflict subscales were used in the statistical analysis for Research Questions 1 and 2 in the current study.

Student-Teacher Relationship Scale

Student-teacher relationships were measured in kindergarten, first, third, fourth, and fifth grade by administration of the Student-Teacher Relationship Scale (STRS) which is displayed in Appendix C (Pianta, 2001). The STRS was selected for use in the SECCYD based on a review of literature on student-teacher relationships, as well as attachment theory (Shonkoff et al., 2000). The STRS is a teacher report questionnaire for use by teachers of children between 3- and 12-years-old measuring a teacher's perception of conflict, closeness, and dependency (Pianta, 2001). The scale consists of 28 items, all rated on a 5-point Likert-type scale ranging from 1 = *definitely does not apply* to 5 = *definitely applies*. The ratings were summed into three subscales measuring conflict, closeness, and dependency. The STRS dependency subscale data were not used in the current study since the CPRS did not include a dependency subscale. The conflict

subscale consists of 12 items, and the closeness subscale includes 11 items. Possible scores for the student-teacher closeness subscale on the STRS range from 11 to 55 with a higher number overall indicating the perception of more closeness. Possible scores for the student-teacher conflict subscale on the STRS ranged from 12 to 60 with higher numbers overall indicating the perception of more conflict (Pianta, 2001).

In pilot testing, Pianta and Nimetz (1991) reported test-retest reliability of scores on the STRS for the closeness subscale of .88, and .92 for the conflict subscale for children ages 3 to 12. Internal consistency reliability for scores on the conflict subscale was .92 for the normative sample and for scores on the closeness subscale was .86 for the normative sample of 563 children. The relationship between scale and subscale scores for the STRS was reported by Pianta and Nimetz (1991) based on the Pearson product-moment correlation between the conflict and closeness subscales (r = -.45, p < .001). This indicated that the contribution of both the conflict and closeness subscales was somewhat distinct. Evidence supporting the reliability and validity of scores from the STRS was also verified by Doumen et al. (2009).

Convergent and divergent validity analysis of scores on the STRS was conducted on a normative sample of 1,535 students comparing scores on the STRS with scores reported by teachers on the Teacher-Child Rating Scale (TCRS; Hightower et al., 1986) and on a measure of behavioral problems and competencies in the classroom (Pianta, 2001). Correlations between the subscales of the STRS and the TCRS indicated statistically significant relationships between the measures, and these relationships were in the expected direction at p < .01 (Pianta, 2001). The conflict subscale of the STRS and the behavior problems subscale of the TCRS from kindergarten to first grade for the same child were positively correlated, indicating that the construct measured by the two was similar (r = .54), while the conflict and competence subscales

were negatively correlated indicating that the constructs measured by the two were inversely related (r = -.44). The closeness subscale of the STRS and the behavior problems subscale of the TCRS were negatively correlated, and because the correlation was low, this indicated the subscales were not measuring similar constructs (r = -.31), while the closeness and competence subscales were positively correlated, but low, indicating that the constructs measured by the two were not similar (r = .28). This confirms the necessity of using subscale data for the current inquiry.

Data from the STRS closeness and conflict subscales were used in the analysis for Research Questions 3 and 4 in the current study. The same data were used in the current statistical analysis of Research Questions 3 and 4 with the covariate of parental involvement.

Latent Growth Curve Modeling

Latent growth curve modeling (LGCM) requires the specification of a statistical model based on theory and research. Traditional techniques require the use of a pre-defined model to which the data are fitted (Hoe, 2008). An integrated a priori model to examine development was vital to the use of LGCM (Kline, 2011). An integrated model allows examination of individual differences in trajectories over time rather than simply describing a single trajectory without consideration of the differences among trajectories (Anderson & Gerbing, 1988; Duncan & Duncan, 2009). Latent growth curve modeling also allows for the study of predictors of individual differences captured within the models. An assumption of childhood development is that there are numerous variables that influence the rate and level of growth over time (Duncan & Duncan, 2009). By direct examination of these variables, development can be better understood within all of its complexity. The visual presentation of LGCM modeling also allows

for a clearer understanding of a proposed model and theory being tested and aids in understanding this complex and powerful research method.

The use of LGCM as a special case of SEM was applicable to the current study because it requires specification of a model prior to testing that model, based on theory and research. In addition, it is a multivariate technique that incorporates both measured variables and latent constructs within a theory, and explicitly accounts for measurement error that traditional statistical techniques do not (Lei & Wu, 2007; McArdle, 1988). Honoring the precepts laid out by centuries of theorists within child development, and justified as a technique by the Gestalt theoretical principles that the whole of a study is more than the sum of the parts, LGCM was well suited to answer this study's research questions. Latent growth curve modeling accounts for the individual and group level analysis that was imperative to the current research (Liu et al., 2012).

Accounting for the passage of time is another assumption of the study of child development. While time was sometimes explicitly accounted for in prior research, LGCM incorporates the passage of time both implicitly, and, within the current study, explicitly. Child development, child-parent relationships, student-teacher relationships, and the potential relationship between these two, the home-school connection, are assumed to be systematically related to the passage of time. To ignore change within the child would likely be to ignore a potentially potent predictor of change over time in children's external relationships. The simple but powerful premise was that who we are, and how we think internally, directly influences who we are and how we interact externally.

Visual representations of latent growth curve models include many commonly used components (Acock & Lind, n. d.; Kline, 2011). These commonly used components were used in

the preliminary research models for the current study. The boxes that contain Vs, represent the measured variables. The variables were measured at five different points in time. At the bottom of each of the boxes indicating measurement variables, are Es. The Es represent measurement error, for which latent growth curve modeling is unique in its tolerance. In latent growth curve models, measurement error occurring at each time point the variable was measured is acceptable and accounted for (Kline, 2011). Other traditional statistical analyses assume no measurement error but are unable to account for the presence of measurement error. The two ovals are the intercept, the initial level at the start, and the slope, the rate of change. The four lines from the intercept to the variables are labeled with the number 1. The number 1 indicates that the intercept is the "constant," i.e., the level of the relationship expected if there were no growth. The four lines from the slope to the variables are labeled with a zero, three Ls, and a 1 at the final measured variable. These designations are where latent growth analysis shines. Zero and 1 are the initial and final slope constraints which allow the three slope factors to be estimated as proportions (McArdle & Hamagami, 1991). Therefore, the data indicate the shape of growth. The shape could be linear or non-linear. Non-linear shapes could increase, decrease, or exhibit several increases followed by decreases. The unique ability to have five data points also allows freedom for the shape of growth to emerge.

There are additional components of the visual model of a latent growth curve analysis. The M_i and D_i are the mean of the intercept and the variance of the intercept, respectively. The M_s and D_s represent the average slope, and the variance of the slope. The variance of the slope demonstrates that different individuals have different rates of growth. The final component of a latent growth curve model is the line between the intercept and slope ovals. The line between the intercept and slope ovals represents the covariance of the two variances, or the correlation

between the two variances. The covariance indicates any pattern indicating a relationship between an individual's starting point (the intercept) and where the individual ended (the slope). In the current research, that might have meant that a child who began with a more positive relationship with their parent or teacher, increased more in their positive relationship over time than a child who began with a less positive relationship with their parent or teacher. Conversely, it may have shown that children who began with a more negative relationship had an increasingly negative relationship over time compared with children who began with a less negative relationship. Latent growth curve modeling was used in the current research because it allowed for covariance between slope and intercept. The addition of covariance between slope and intercept was vital to understand why some children appear to have started and ended high on any given variable or why those who started high ended up low. Covariance between slope and intercept also explains any combination of relationship between starting and ending points.

Another reason latent growth curve modeling is a powerful and appropriate tool for the current research is that it also accounts for measurement error. Latent growth curve modeling estimates initial levels (intercepts) of both observable (measured) variables and latent (unmeasured theoretical) constructs. Latent growth curve modeling also estimates the rate of change (slope) and variance (Muthén, 2002). An LGCM model allows for specifying relationships between variables, and, thereby, testing the plausibility of the model's fit with the underlying theory. Latent growth curve modeling requires an a priori theory. One further consideration with the LGCM approach is that it provides multiple indices for determining model fit (Muthén & Curran, 1997). Multiple tests of fit were examined in the current study to assess model fit and to determine specific modification of the overall model (Hoyle, 1995).

Within the current research, unspecified LGCMs were tested initially. Unspecified LGCMs were used due to the shape of the trajectories over time being unknown. The use of an unspecified model meant that the data indicated the shape of growth, and the shape of growth was not limited to straight-line trajectories. Of particular significance in the current research was the opportunity to allow five separate time points to be used to estimate the shape of growth over time. Including five time points was highly unique. Most research includes two time points and rarely includes more than three or four. The benefit to including five time points and allowing for three time points to remain free to be estimated by the data was that highly complex patterns of growth could emerge (Duncan & Duncan, 2009; Welch, 2007).

Longitudinal growth curve modeling in the current study allowed for the estimations of variances, and covariances for the growth factors of child-parent and student-teacher relationships. Using age as a static predictor of change within the LGCMs allowed for the specific examination of relationship-by-time effects if any were present (Duncan & Duncan, 2009).

Preliminary Research Models and Modifications

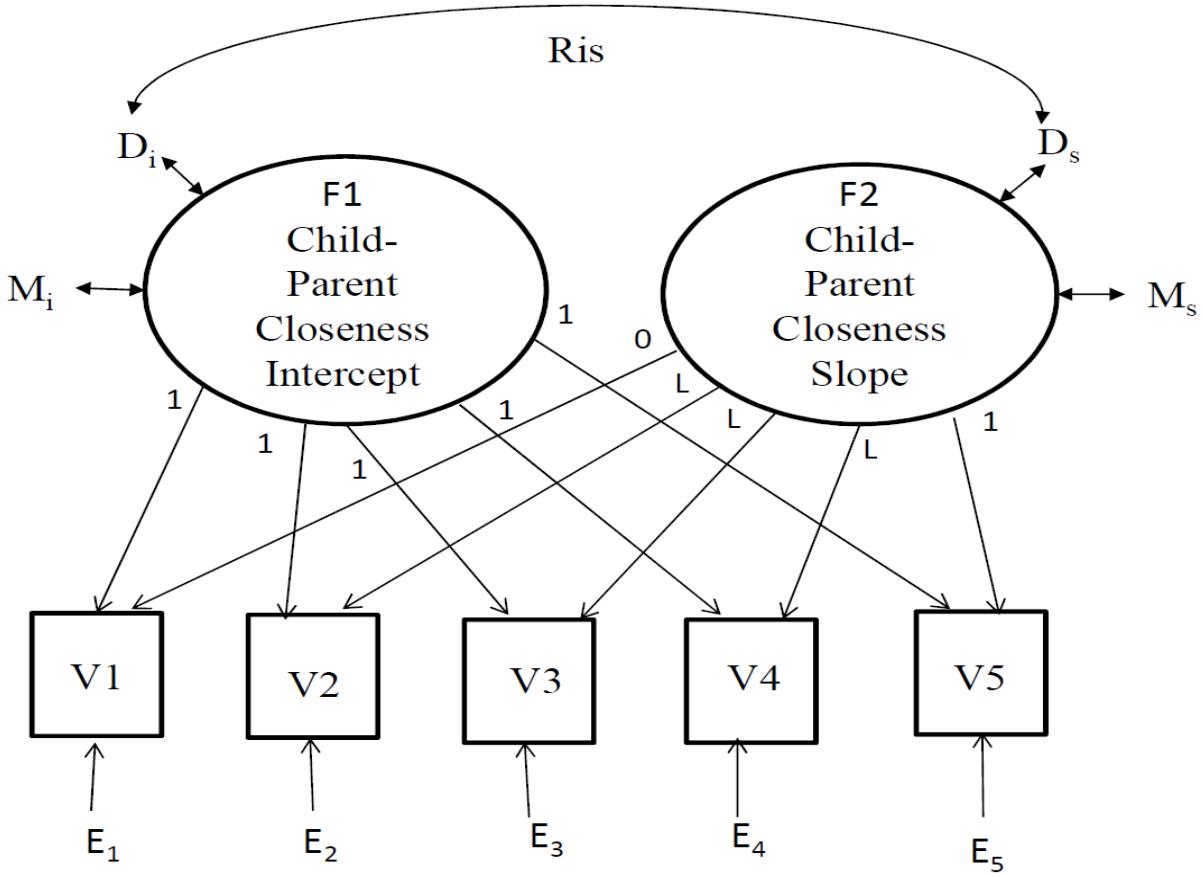
The four models discussed in this section were the originally hypothesized models studied using LGCM. They represented the unspecified models. When the statistical analysis was conducted, not all of the unspecified models produced results. See Chapter IV for the final models.

Model 1

Preliminary Model 1 set all intercepts at 1, indicating the initial level of child-parent closeness. The V(1-5) in Figure 1 indicates the measurement of child-parent closeness at five time points. Time point 1 on the slope factor was set to 0. Time point 5 on the slope factor was set to 1. The other three slope parameters (loadings) were left free to be estimated by the data. The freedom to vary allowed the shape of growth to be estimated. The shape of change in child-parent closeness over time was of primary interest. Therefore, the freedom to vary was appropriate. Nine parameters were estimated in this model, leaving six degrees of freedom.

Figure 1

Preliminary: Child-Parent Closeness Unspecified Two Factor Latent Growth Curve Model



Note.. R_{is} = Covariance between D_i and D_s. D_i = Intercept variance. D_s = Slope variance. M_i = Mean of the intercept. M_s = Mean of the slope. F1 = Child-Parent Closeness Intercept. F2 = Child-Parent Closeness Slope. V(1-5) = Measured variables at 5 time points: kindergarten, first, third, fourth and fifth grades. E(1-5) = Measurement error at 5 time points: kindergarten, first, third, fourth and fifth grades. Lines from F1 to V(1-5) = Intercept constants with value of 1. Line from F2 to V1 = Initial slope constraint (0). Line from F2 to V5 = Final slope constraint (1). Lines labeled "L" from F2 to V2, V3 and V4 = Slope factors left free to vary (see Appendix G for definitions of terms).

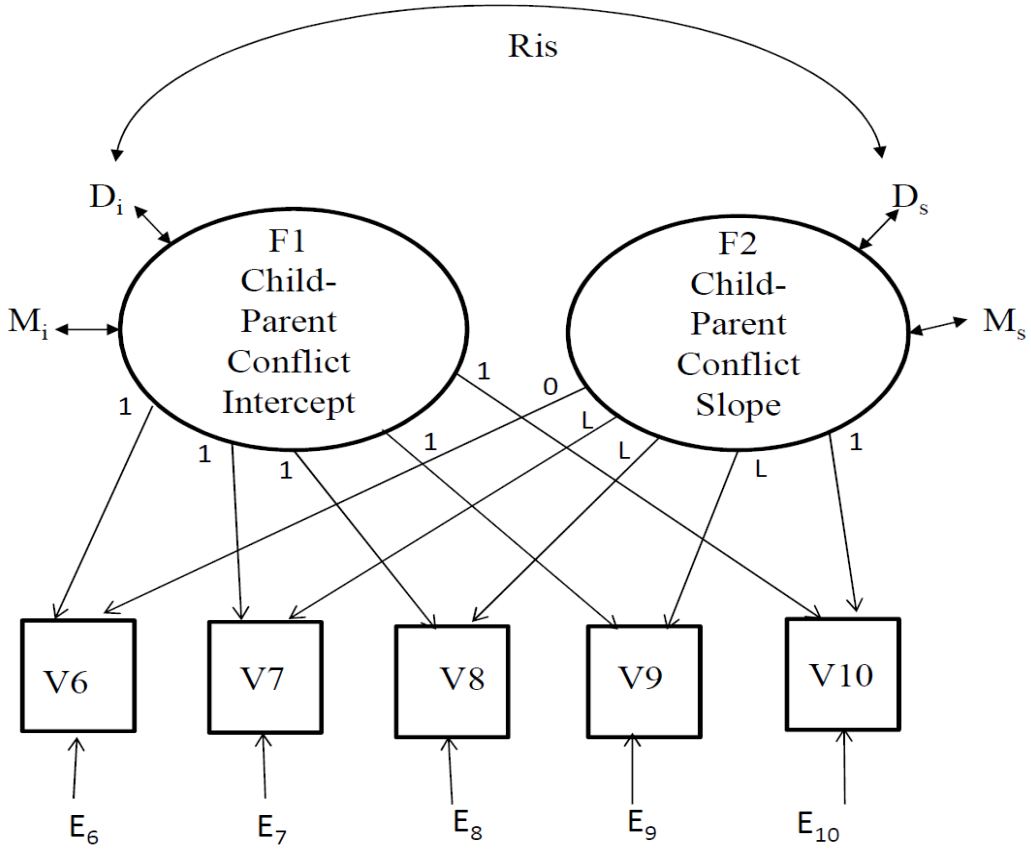
Model 2

Preliminary Model 2 set all intercepts at 1, indicating the initial level of child-parent conflict. The V(6-10) shown in Figure 2 indicates the measurement of child-parent conflict at five time points. Time point 1 on the slope factor was set to 0. Time point 5 on the slope factor

was set to 1. The other three slope loadings were left free to be estimated by the data. The freedom to vary allowed the shape of growth to be estimated. The shape of change in child-parent conflict over time was of primary interest. Therefore, the freedom to vary was appropriate. Nine parameters were estimated in this model, leaving six degrees of freedom (see Figure 2).

Figure 2

Preliminary: Child-Parent Conflict Unspecified Two Factor Latent Growth Curve Model



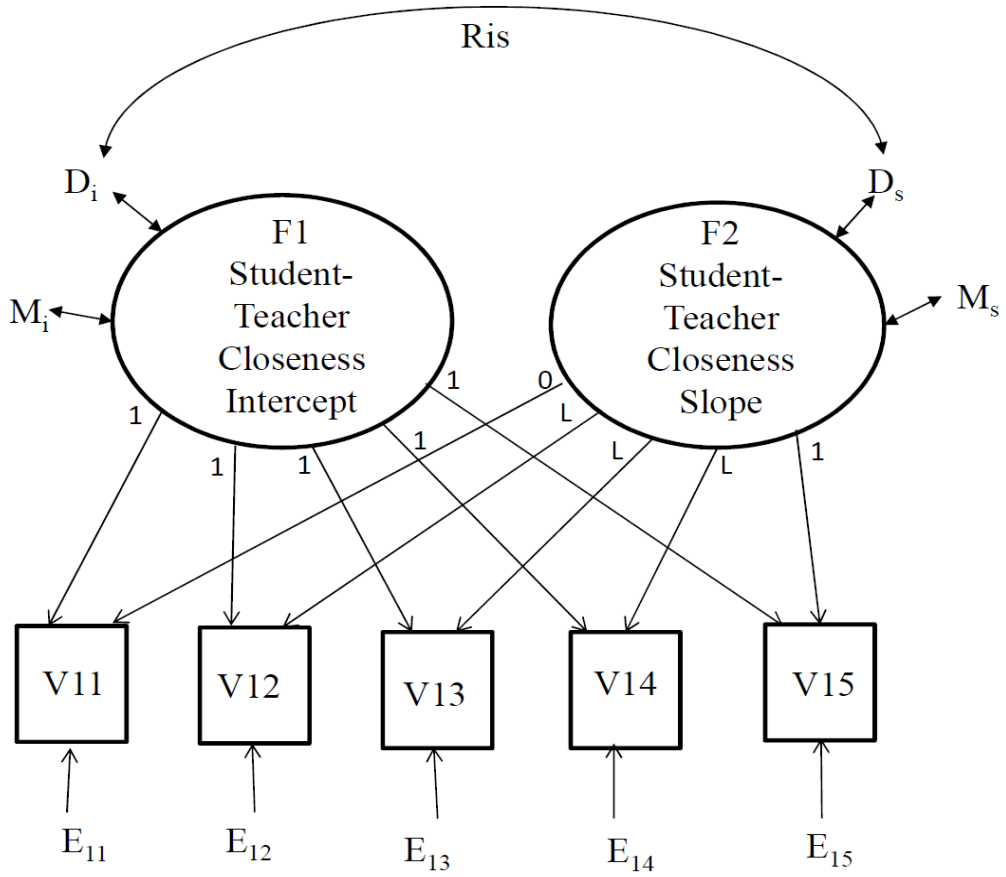
Note. R_{is} = Covariance between D_i and D_s. D_i = Intercept variance. D_s = Slope variance. M_i = Mean of the intercept. M_s = Mean of the slope. F1 = Child-Parent Conflict Intercept. F2 = Child-Parent Conflict Slope. V(6-10) = Measured variables at 5 time points: kindergarten, first, third, fourth and fifth grades. E(6-10) = Measurement error at 5 time points: kindergarten, first, third, fourth and fifth grades. Lines from F1 to V(6-10) = Intercept constants with value of 1. Line from F2 to V6 = Initial slope constraint (0). Line from F2 to V10 = Final slope constraint (1). Lines labeled "L" from F2 to V7, V8 and V9 = Slope factors left free to vary (see Appendix G for definitions of terms).

Model 3

Preliminary Model 3 set all intercepts at 1, indicating the initial level of child-parent conflict. The V(11-15) shown in Figure 3 indicates the measurement of student-teacher closeness at five time points. Time point 1 on the slope factor was set to 0. Time point 5 on the slope factor was set to 1. The other three slope loadings were left free to be estimated by the data. The freedom to vary allowed the shape of growth to be estimated. The shape of change in student-teacher closeness over time was of primary interest. Therefore, the freedom to vary was appropriate. Nine parameters were estimated in this model, leaving six degrees of freedom (see Figure 3).

Figure 3

Preliminary: Student-Teacher Closeness Unspecified Two Factor Latent Growth Curve Model



Note. R_{is} = Covariance between D_i and D_s. D_i = Intercept variance. D_s = Slope variance. M_i = Mean of the intercept. M_s = Mean of the slope. F1 = Student-Teacher Closeness Intercept. F2 = Student-Teacher Closeness Slope. V(11-15) = Measured variables at five time points: kindergarten, first, third, fourth and fifth grades. E(11-15) = Measurement error at five time points: kindergarten, first, third, fourth and fifth grades. Lines from F1 to V(11-15) = Intercept constants with value of 1. Line from F2 to V11 = Initial slope constraint (0). Line from F2 to V15 = Final slope constraint (1). Lines labeled "L" from F2 to V12, V13 and V14 = Slope factors left free to vary (see Appendix G for definitions of terms).

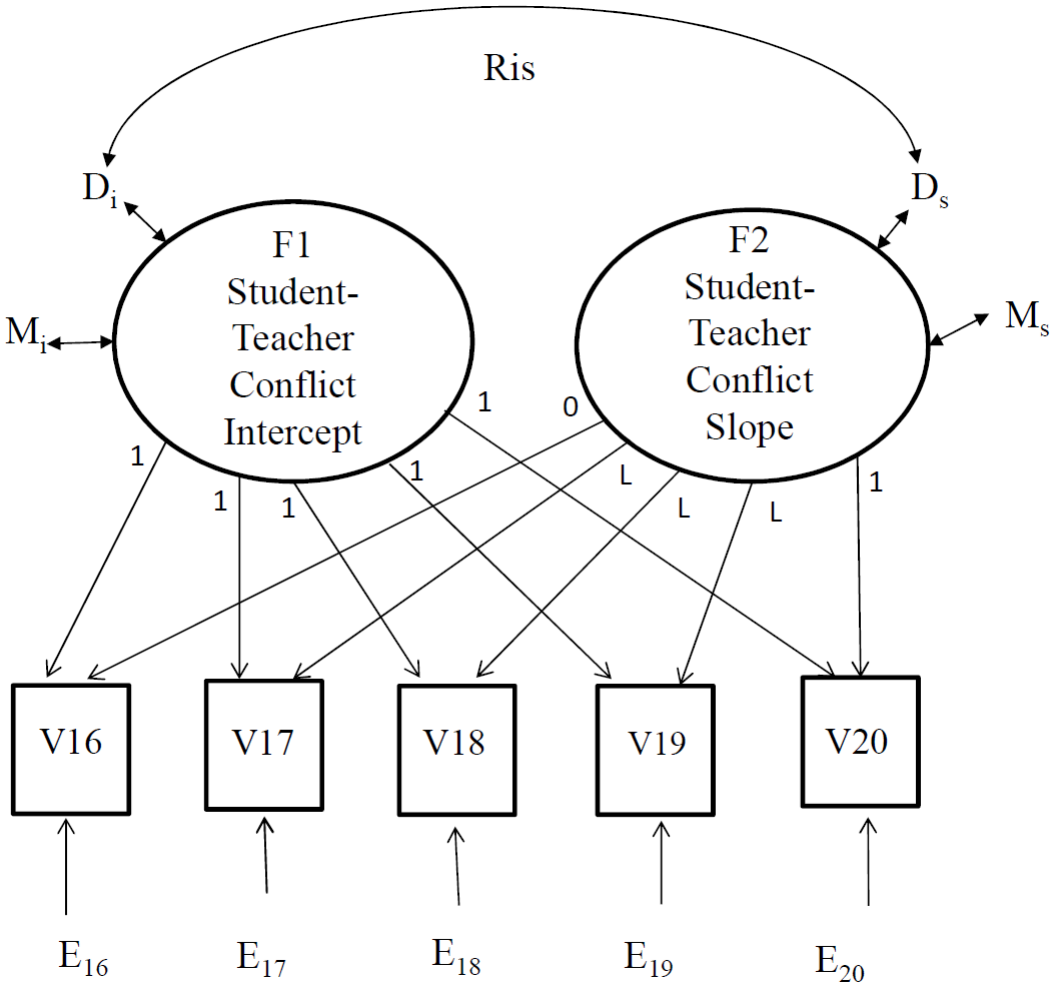
Model 4

Preliminary Model 4 set all intercepts at 1, indicating the initial level of student-teacher conflict. The V(16-20) in Figure 4 indicated the measurement of student-teacher conflict at five

time points. Time point 1 on the slope factor was set to 0. Time point 5 on the slope factor was set to 1. The other three slope loadings were left free to be estimated by the data. The freedom to vary allowed the shape of growth to be estimated. The shape of change in student-teacher conflict over time was of primary interest. Therefore, the freedom to vary was appropriate. Nine parameters were estimated in this model, leaving six degrees of freedom (see Figure 4).

Figure 4

Preliminary: Student-Teacher Conflict Unspecified Two Factor Latent Growth Curve Model



Note. R_{is} = Covariance between D_i and D_s. D_i = Intercept variance. D_s = Slope variance. M_i = Mean of the intercept. M_s = Mean of the slope. F1 = Student-Teacher Conflict Intercept. F2 = Student-Teacher Conflict Slope. V(11-15) = Measured variables at 5 time points: kindergarten, first, third, fourth and fifth grades. E(16-20) = Measurement error at 5 time points: kindergarten, first, third, fourth and fifth grades. Lines from F1 to V(16-20) = Intercept constants with value of 1. Line from F2 to V16 = Initial slope constraint (0). Line from F2 to V20 = Final slope constraint (1). Lines labeled "L" from F2 to V17, V18 and V19 = Slope factors left free to vary (see Appendix G for definitions of terms).

Modifications to Preliminary Models

The four preliminary models were unspecified models. It was assumed that the unspecified model approach might reveal shapes of growth in the data set. However, in the unspecified models for Research Questions 1, 2, and 4, the unspecified approach failed to converge. As more constraints were specified in models for Research Questions 1, 2, and 4, the easier it became for the software to identify shapes of growth. See Chapter IV, Results, for more detailed discussions of the constraints that were set for these three research question analyses.

In the preliminary model for Research Question 3, the unspecified model shown in Figure 3 converged and therefore revealed a shape of growth, and no further boundaries needed to be set to achieve that result.

For Research Questions 3 and 4, student-teacher closeness and conflict, respectively, further analysis utilizing a covariate of parental involvement was conducted. The purpose of the current research was to study home and school relationships. Home relationships were defined as child-parent closeness and conflict (Research Questions 1 and 2.) School relationships were defined as student-teacher closeness and conflict (Research Questions 3 and 4). Including a covariate of parental involvement into the analysis of Research Questions 3 and 4 allowed the influence of the parent on the student-teacher relationships to be analyzed. See Chapter IV for detailed discussions of the results of the covariate analysis on Research Questions 3 and 4.

Procedures for Data Analysis

IBM SPSS Statistics (Version 25) was used to examine descriptive statistics and distributional characteristics of the data. M*plus* (Version 8.2), developed by Muthén and Muthén in 2018, was used to conduct final statistical analyses. The number of cases used for each analysis was dependent on several steps. Data collection for the measures utilized in the current

study occurred across two phases of data collection, with Phase II including kindergarten and first grade information and Phase III including third, fourth, and fifth grade information. All cases who completed the CPRS and STRS were identified and consolidated into a separate data set. Based on the total number of mother and father participants, only mother's data were used for analysis due to the number of fathers who participated being less than 50.

The minimum suggested number of participants required for LGC models is 200 (MacCallum et al., 1996; Murphy et al., 2014). In the current study the number of mother participants (*N*) for each research question was over 1,000. For the covariate analyses for Research Questions 3 and 4, the number of participants was over 650 in each model. These numbers exceeded the required minimum of 300 to 500 participants. Therefore, sample size was adequate for conducting the analyses using LGC models.

The number of research participants for each research question and the covariate analyses were:

- Research Question 1, Child-Mother Closeness. N = 1,103.
- Research Question 2, Child-Mother Conflict. N = 1,104.
- Research Question 3, Student-Teacher Closeness. N = 1,153.
- Research Question 4, Student-Teacher Conflict. N = 1,153.
- Covariate Analysis for Research Question 3. N = 703.
- Covariate Analysis for Research Question 4. N = 658.

Data were reviewed using standard data cleaning procedures as indicated by Tabachnick and Fidell (2012). Skewness and kurtosis were examined. Skewness < -1 or > +1 and kurtosis < -1 or > +2 indicated non-normality. Descriptive statistics for two of the four models studied indicated non-normality in the data set. Therefore, all latent growth curve analyses were

conducted using robust maximum likelihood estimation (MLR) as MLR accounts for non-normality in the data set (West et al., 1995).

Multivariate latent growth curve modeling (MLGCM) included several steps. The first step was the associative LGCM, from which correlations between development parameters for pairs of behaviors were observed (Duncan & Duncan, 2009). Since the associative model, as the first order MLGCM depended on the univariate models included in the associative model, further analysis of associative models as suggested in Chapter V would only be explored if significance was found at the first order. The current research was designed to examine if there was such significance at the first order. As a benefit of the current research's use of five data points over time, nonlinear growth trajectories were estimated (Duncan & Duncan, 2009). Two data points were required for the identification of the model, and, in the current research, the other three data points were left unspecified, or free to vary (Meredith & Tisak, 1990). The first (kindergarten) and last (fifth grade) slope estimates were set to 0 and 1, respectively; the second, third, and fourth waves of data were freely estimated. However, in the final models (see Chapter IV) the unspecified models were not always successful.

According to Welch (2007), in simulation studies, the unspecified approach to LGCM results in better model fit than the quadratic approach. The quadratic approach allows for a nonlinear approach to the data. The use of the unspecified approach in the current research was warranted since the use of five data points with the child-mother and student-teacher factors had not been previously researched using LGCM. Therefore, utilizing a procedure in which the data indicated the shape of the growth trajectories over time is a good starting place from which to begin an examination of the model and theory. From the results of the unspecified approach,

models using the quadratic approach could be tested if desired, since the shape of the trajectories are informed by the data themselves rather than by researcher-imposed factor loadings.

To assess the adequacy of the model fit to the data for each of the models tested, several model fit statistics were analyzed (Song, 2011; Song et al., 2009; Tian & Takane, 2009).

The Chi-Square Test

The chi-square test was used to examine the amount of difference between expected and observed covariance matrices for each model tested. A chi-square value close to zero will indicate that there is minimal difference between the expected and observed covariance matrices, which, in turn, suggests good model fit (Hu & Bentler, 1999). A statistically significant chi-square indicates poor model fit; however, the chi-square test is also highly sensitive to sample size (Ullman & Bentler, 2012). The larger the sample size, the more likely a significant chi-square occurs (DeRoche, 2009). The probability level .01 was chosen for conducting the chi-square test in the current research, based on the sample size and number of models tested. The chi-square statistic should be found nonsignificant in order to indicate adequate model fit because a significant chi-square indicates that the model does not reflect the data; however, the sample size must also be a consideration if significance is found (DeRoche, 2009). A number of alternative fit indices have been developed and are often used because of the chi-square test's sensitivity to sample size.

The Comparative Fit Index

The comparative fit index (CFI) is the discrepancy function that is adjusted to account for variation in sample (Bentler, 1990). Whereas the chi-square test is highly sensitive to sample size, the comparative fit index has been found to be more robust to sample size (Bentler, 1990; Hu & Bentler, 1999). The CFI ranges from 0 to 1 with a larger value indicating better model fit.

Acceptable model fit was indicated in the current study by a CFI value of .95 or greater (Hu & Bentler, 1999).

Root Mean Square Error of Approximation

In general, root mean square error of approximation (RMSEA) values range from zero to one with a smaller value indicating better model fit. Acceptable model fit in the current study was indicated by a value of .06 or less (Hu & Bentler, 1999). The RMSEA analyzes the discrepancy between the hypothesized model and the population covariance matrix.

Standardized Root Mean Square Residual

The standardized root mean square residual (SRMR) ranges between zero and 1.0. In the current study values of .08 or smaller were considered indicative of adequate fit (Hu & Bentler, 1999). The SRMR is a number that quantifies the average discrepancy between observed and model-based correlations, (Asparouhov & Muthén, 2018) where smaller values indicate better fit.

Parameter Estimates

If overall model fit was found to be acceptable using the four statistics above, then parameter estimates were evaluated. The significance test of each parameter estimate was statistically significant at the .05 level if the ratio of a parameter estimate to its standard error exceeded 1.96 and at the .01 level if the ratio of a parameter estimate to its standard error value exceeded 2.58 (Bollen & Curran, 2006). The .01 level was used in the current research.

If unacceptable model fit or nonconvergence were found using the four statistics above in the univariate LGCMs, then modifications were made that were theoretically plausible. Model modifications included either freeing parameters that were fixed to zero and/or fixing parameters

that were free to be estimated. See Chapter IV for further discussion of modifications made for specific models.

Covariate Analyses

The covariate of parental involvement was added to explore Research Questions 3 and 4 because the overarching purpose of the current research was to initiate further understanding of the relationships between home and school environments. Home, in the form of mothers, was already included in the analyses for research questions one and two.

The covariate analyses for Research Question 4 included parental involvement at kindergarten while the analyses for Research Question 3 did not include parental involvement at kindergarten. While performing the analyses for Research Question 4 it was discovered that the measure of parental involvement at kindergarten was based on a completely different measure or scale than all the other time points. This discrepancy was discovered upon analyzing the descriptive statistics shown in Chapter IV for the analysis of the covariate on Research Question 4. The kindergarten measurement of parental involvement appeared to have been on an approximately 30-point scale as indicated by a mean of 15.80 and a standard deviation of 2.46. The scale used for all other time points on parental involvement in this analysis was a 5-point scale as indicated by means ranging from 3.58 to 3.93 and standard deviations ranging from .85 to .89. Comparing the kindergarten mean and standard deviation to the means and standard deviations for the measure of parental involvement at all other time points appeared to indicate that a completely different scale was used for kindergarten. Therefore, the measure of parental involvement at kindergarten was omitted from the RQ3 covariate analyses.

Chapter Summary

The NICHD Early Childcare and Youth Development Data Base was utilized in the current study. Hundreds of variables were collected and compiled in this database. The data were accessed through ICPSR, the custodian of the data base. Participants were recruited from across the United States from 1991 to 2007. Across four age phases of data collection the number of participants decreased from 1,364 to 1,009. The current study utilized the number of participants for whom data were collected across Phases II and III only. Data from two measures were extracted for use in the current study. An exploratory longitudinal growth curve modeling analysis was used to study mother-child and teacher-student closeness and conflict from kindergarten to fifth grade. The statistical software program M*plus* Version 8.2 was used to analyze four preliminary growth curve models related to each of the four research questions. Modifications were made to three of the preliminary models, and covariates were added to two of the preliminary models. All models, preliminary and modified, were analyzed using various statistical fit indices.

CHAPTER IV

RESULTS

Introduction

The home-school relationship was the ultimate focus of this research. In order to study the home-school relationship it was necessary to identify measurable components within that relationship. Mothers and teachers and their relationships with children were identified as the key measurable components. Within the mothers' and teachers' relationships with the children, there were two measurable elements. One element measured positive aspects of the relationships, i.e., closeness. The other element measured negative aspects of the relationships, i.e., conflict. These were the four research areas: child-mother closeness, child-mother conflict, student-teacher closeness, and student-teacher conflict. Each time closeness and conflict were examined in the current study, three main criteria were observed: (a) the level of a child at entry into kindergarten (the intercept), (b) the change in the relationship over time from fifth grade (slope), and (c) the influence that the starting point contributed to the change over time. Additional modifications to include a covariate were also examined in two of the four models. One other major component for all four areas in the current study was to decide if the pattern of change that was found over time, i.e., a linear or a quadratic model, represented the data well. Important patterns were found in the study of all four research areas.

Results Related to Research Questions

Research Question 1: Child-Mother Closeness

In the current study, the child-mother closeness relationship showed that children and mothers had very high levels of closeness beginning at kindergarten. As explained in Chapter II children and mothers tend to be very close when the children enter into formal schooling. The children are coming from the nuclear family setting and have been developmentally dependent on the nuclear family for emotional development (Bronfenbrenner, 1986; Piaget, 1923/1955; Vygotsky, 1978). In the current research the child-mother closeness relationship tended to start at a very high level, there was still statistically significant variation in starting points at kindergarten. The contributing factors for variation in starting points were not explored in the current study. The negative linear trend for closeness may be interpreted as showing that all children released dependence on the mother over time as discussed in Chapter II.

Descriptive statistics for the data studied in Research Question 1, "What is the shape of growth over time of child-mother closeness from kindergarten to fifth grade?" are shown in Table 1.

Table 1

Descriptive Statistics for Imposed Negative Linear Model of Child-Mother Closeness

Grade	*M*	*SD*	Variance	Skewness	Kurtosis
Kindergarten	38.04	2.58	6.64	-2.47	9.39
First	38.00	2.50	6.23	-1.92	5.40
Third	37.24	2.76	7.62	-1.66	4.43
Fourth	37.01	3.29	10.84	-2.10	7.47
Fifth	36.60	3.21	10.28	-1.36	2.47

The skewness and kurtosis values in Table 1 showed extremely high non-normality. The negative skew and leptokurtosis, i.e., very tall, asymmetric, means that the distribution of child-mother closeness for each year from kindergarten to fifth grade indicates that most children reported very high levels of closeness with their mothers and relatively few reported low levels of closeness at each of the five grade levels. This result could be anticipated based on the variable in question which is child-mother closeness from kindergarten to fifth grade. As discussed in Chapter II, most children are close to their mothers (Denham et al., 2002; Denham & Kochanoff, 2002). The skewness and kurtosis values for these five distributions necessitated the use of robust maximum likelihood parameter estimates (MLR) to account for the non-normality when testing the latent growth curve models.

Initially there was an unknown shape of growth for the child-mother closeness relationship from kindergarten to fifth grade. The means of child-mother closeness from kindergarten to fifth grade showed a clear negative linear pattern, indicating that as the child aged across the five time points, the reported closeness with their mother decreased. As children expanded their close relationships into a school environment, the very high levels of closeness with the mother present in kindergarten tended to decrease. Children were not as developmentally dependent on only the mother in fifth grade as the children were in kindergarten.

Given the failure to converge of the unspecified preliminary model for RQ 1, I proceeded to impose a negative linear structure on the data. In the imposed negative linear model, the kindergarten slope value and the fifth grade slope value were defined to allow the identification of a linear trend that indicated decreasing closeness with the mother across the five measurement

waves. The kindergarten slope estimate was set at 4 and the fifth grade slope estimate was set at 0. Therefore, the slope was analyzed with path coefficients between 4 and 0.

The correlation matrix in Table 2 indicates the relationships between the variables across the different waves of measurement. The correlations were moderate, approaching +1, which meant that each measurement was closely related to another. The pattern further indicated that each year's score was highly related to the prior year's score.

Table 2

Correlation Matrix for Imposed Negative Linear Model of Child-Mother Closeness

Grade	Kindergarten	First	Third	Fourth	Fifth
Kindergarten	1.00				
First	.58	1.00			
Third	.47	.48	1.00		
Fourth	.48	.51	.66	1.00	
Fifth	.43	.48	.58	.64	1.00

As shown in Table 3, the mean slope was statistically significant (Mean S = .33, $p <$ .001) indicating that the measure of closeness at each time point for each child decreased from the measurement at the previous time point. The mean intercept was also significant (Mean I = 36.72, $p < .001$) indicating that the scores for initial level of closeness with the mother were non-zero, i.e., the measure indicated some level of closeness with the mother on the measure ranging from 7 to 35. The slope variance was statistically significant (Variance S = .20, $p < .001$) indicating that there was significant variation in the shape of the trajectories from kindergarten to fifth grade. This meant that some children differed in the rate of change as they grew over time.

The intercept variance was also statistically significant (Variance I = 6.98, p <.001) indicating that there was variation in the initial starting points within the levels of closeness reported. The significant negative correlation between the slope and intercept (S with I = -.82, p <.001) indicated that higher initial levels of closeness were associated with lower rates of change, while lower initial levels of closeness led to higher rates of change. In other words, the children who started relatively higher in this measure demonstrated the least change over time.

Table 3

Path Coefficients for Imposed Negative Linear Model of Child-Mother Closeness

		M		*M* Significance		Variance		Variance Significance	
S with I	S with I Significance	S	I	S	I	S	I	S	I
-.82	< .001	.33	36.72	< .001	< .001	.20	6.98	< .001	< .001

Note. S = Slope. I = Intercept.

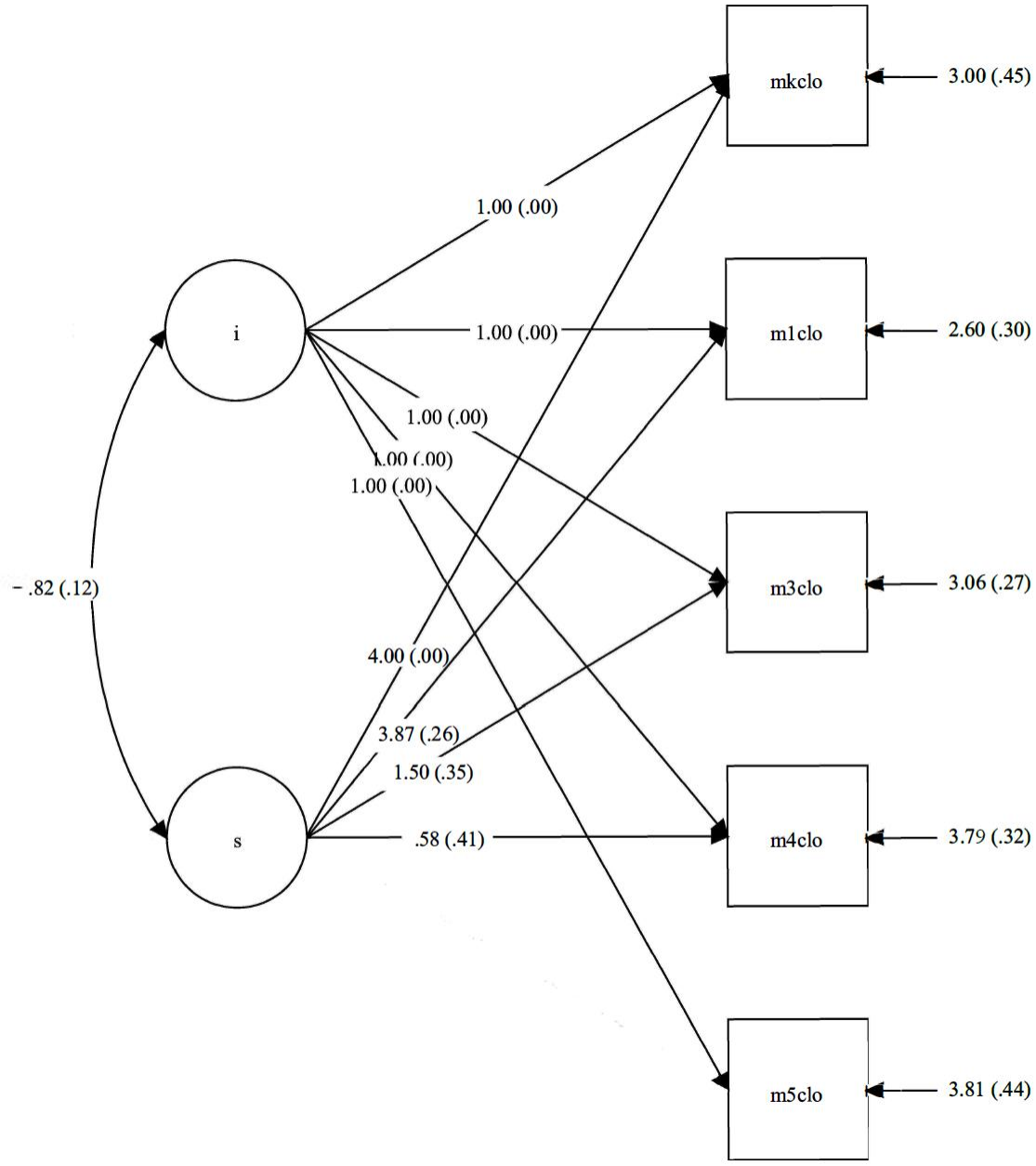
The model indicated adequate fit as suggested by the goodness of fit indices (Curran et al., 2010). Caution must be exercised in drawing conclusions from the chi-square value of 25.96 (df = 7, N = 1,103, p < .001) alone since the value increases as sample size increases, and, as discussed in Chapter III, a non-significant value indicates better model fit (Bentler & Bonett, 1980). Another goodness of fit index is the root mean square error of approximation (RMSEA). The RMSEA value of .05 with a CI of .03 to .07 suggests adequate model fit (Hu & Bentler, 1999; Sharma et al., 2005; Tanaka, 1987). The SRMR of .16 indicates a high level of difference between the observed correlation matrix and the model-specified correlation matrix, which suggests poor model fit (Asparouhov & Muthén, 2018). The large discrepancy suggests the

model failed to adequately explain important relationships among these variables. The Comparative Fit Index (CFI = .98) and Tucker-Lewis Index (TLI = .97) indicated good fit.

The imposed negative linear model indicated that child-mother closeness over time decreased as age increased from kindergarten to fifth grade. Figure 5 illustrates the relationships in this model.

Figure 5

Child-Mother Closeness Imposed Negative Linear Two Factor Latent Variable Growth Curve Model Across Five Measurement Waves



Note. m(k, 1, 3, 4, 5)clo = mother's closeness in kindergarten, first, third, fourth, or fifth grade. Robust maximum likelihood parameter estimates. Standard errors are presented in parentheses. All intercepts set to one. Slope at first measurement wave set to 4. Slope at fifth measurement wave set to zero. Slope at second, third, and fourth measurement waves free to vary. s = slope. i = intercept. Path from s to i = slope-intercept covariance (see Appendix G for definitions of terms).

Research Question 2: Child-Mother Conflict

In the current study the statistical analysis of the child-mother conflict relationship showed that children and mothers exhibited a non-linear conflict relationship from kindergarten to fifth grade. There was statistically significant variation in starting points at kindergarten. However, the contributing factors to starting point variation were not examined in the current study.

Descriptive statistics for the data studied in Research Question 2, "What is the shape of growth over time of child-mother conflict from kindergarten to fifth grade?" are shown in Table 4. Given the failure to converge of the unspecified preliminary model for RQ 2, I proceeded to impose a quadratic structure on the data. The means clearly indicate a non-linear pattern of change over time. The pattern appears to be curvilinear, i.e., there are two distinct drops in values at first and fourth grade, with three higher points in between those grades. The skewness and kurtosis values in Table 4 showed a relatively normal distribution of child-mother conflict from kindergarten to fifth grade. In the imposed quadratic model, slope values were set at kindergarten = 0, first grade = 1, third grade = 2, fourth grade = 3, and fifth grade = 4. The quadratic values were set at squared values of the linear slope coefficients, i.e., kindergarten = 0, first grade = 1, third grade = 4, fourth grade = 9, and fifth grade = 16. The intercepts for all five age points were set at 1.

Table 4

Descriptive Statistics for Imposed Quadratic Model of Child-Mother Conflict

Grade	*M*	SD	Variance	Skewness	Kurtosis
Kindergarten	16.35	5.84	34.02	.50	-.39
First	15.21	5.86	34.30	.53	-.42
Third	16.09	6.04	36.46	.48	-.53
Fourth	15.94	5.87	34.45	.41	-.49
Fifth	16.40	5.98	35.76	.40	-.61

As shown in Table 5, the mean slope was statistically significant (Mean S = -.63, $p <$ .001), indicating the measure of conflict at each time point for each child decreased. The mean intercept was statistically significant (Mean I = 16.27, $p < .001$) indicating that the scores for initial level of conflict with the mother were non-zero, i.e., the measure indicated children had some level of conflict with the mother at kindergarten, with scores on the measure ranging from 8 to 40. The slope variance was statistically significant (Variance S = 7.58, $p < .001$) indicating that there was significant variation in the shape of the trajectories from kindergarten to fifth grade. Not all children exhibited the same pattern of change across time in level of conflict with their mothers. The intercept variance was also significant (Variance I = 29.3, $p <.001$) indicating that there was variation in the initial levels of conflict in kindergarten. The significant negative covariance between the slope and intercept (S with I = -5.92, $p < .001$) indicated that higher initial levels of conflict were associated with lower rates of change, while lower initial levels of conflict led to higher rates of change. The significant quadratic variance (Q = .23, $p <.001$) indicated the non-linear trajectory of the children's conflict with mothers varied across at least

some children. Highest levels of conflict occurred at kindergarten, third, and fifth grades. Lower levels of conflict occurred at first and fourth grades. Based on developmental stages as well as the increased demands of formal schooling the elevations in conflict with the mother at kindergarten, third, and fifth grade could be explained.

When the imposed quadratic model was applied to the data, the goodness of fit indices indicated a well-fitting model (Curran et al., 2010). Caution must be exercised in drawing conclusions from the chi-square value of 56.35 (df = 6, N = 1,104, p < .001) alone given that the value increases as sample size increases. However, as previously mentioned, a non-significant chi-square is required for a well-fitting model (Bentler & Bonett, 1980). Therefore, I interpreted the chi-square test along with other goodness of fit indices. As noted above, another goodness of fit index is the RMSEA. The RMSEA values of .09 with a CI of .07 to .11 were within the cutoffs for a poor to moderately well-fitting model (Hu & Bentler, 1999; Sharma et al., 2005; Tanaka, 1987). The CFI and TLI (.98/.96) indicated a well-fitting comparative model, as did the SRMR (.03; Asparouhov & Muthén, 2018).

The imposed quadratic model indicated that child-mother conflict over time showed a curvilinear trend with lower levels of conflict at kindergarten, increasing levels of conflict toward third grade, and decreasing levels of conflict at fifth grade. Figure 6 illustrates the relationships in this model.

Table 5

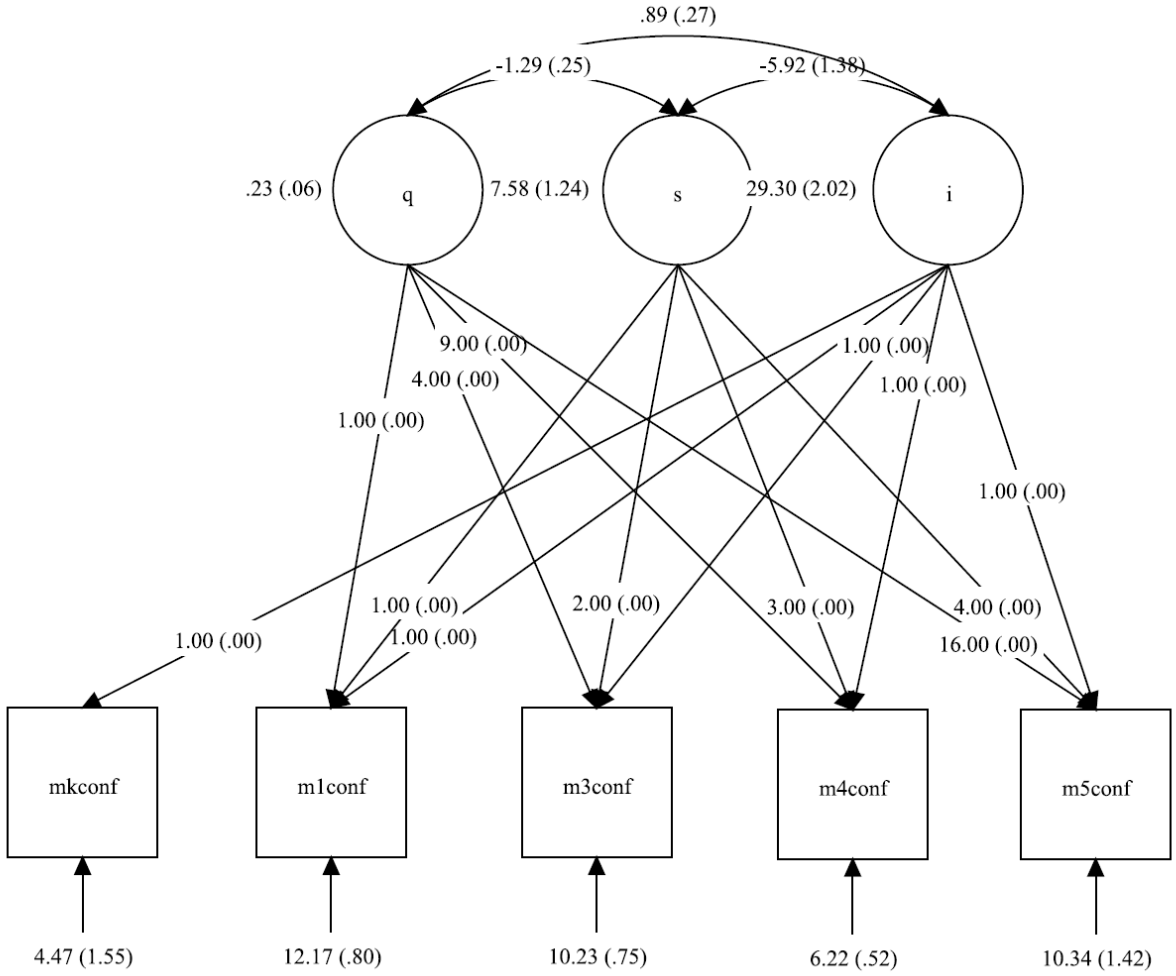
Path Coefficients for Imposed Quadratic Model of Child-Mother Conflict

Quadratic				*M*			*M* Significance			Variance			Variance Significance		
with I	with S	S with I	S with I Significance	S	I	Q	S	I	Q	S	I	Q	S	I	Q
.89	-1.29	-5.92	< .001	-.63	16.27	.17	< .001	< .001	< .001	7.58	29.30	.23	< .001	< .001	< .001

Note. S = Slope. I = Intercept. Q = Quadratic.

Figure 6

Child-Mother Conflict Imposed Quadratic Two Factor Latent Variable Growth Curve Model Across Five Measurement Waves



Note. m(k, 1, 3, 4, 5)conf = mother's conflict in kindergarten, first, third, fourth or fifth grade. Robust maximum likelihood parameter estimates. Standard errors are presented in parentheses. All intercepts set to one. Quadratic factor loadings set to the squared value of the linear slope factor loadings. s = slope. i = intercept. q = quadratic. Path from s to i = slope-intercept covariance. Path from q to s = quadratic-slope covariance. Path from q to i = quadratic-intercept covariance (see Appendix G for definitions of terms).

Research Question 3: Student-Teacher Closeness

In the current study the statistical analysis of the student-teacher closeness relationship showed that students and teachers exhibited relatively higher levels of closeness beginning at kindergarten that linearly decreased over time to lower levels at fifth grade. There were statistically significant variations in starting points at kindergarten. However, the contributing factors to starting point variation were not examined in the current study. The students who started relatively higher in closeness on this measure showed the least decrease over time. This change may be interpreted, as noted in Chapter II, that a student's closeness of relationship with the teacher represents an important relationship in a child's life.

Descriptive statistics and correlations between scores at each time point for the data studied in Research Question 3, "What is the shape of growth over time of student-teacher closeness from kindergarten to fifth grade?" are shown in Tables 6 and 7, respectively. The means clearly indicated a negative linear pattern of change over time. The skewness and kurtosis values in Table 6 showed a relatively normal distribution in student-teacher closeness from kindergarten to fifth grade.

Table 6

Descriptive Statistics for Unspecified Model of Student-Teacher Closeness

Grade	*M*	*SD*	Variance	Skewness	Kurtosis
Kindergarten	34.25	5.33	28.34	-1.08	.69
First	33.96	5.06	25.56	-1.11	1.28
Third	33.08	5.17	26.71	-.97	.63
Fourth	32.54	5.12	26.17	-.71	.13
Fifth	31.89	5.36	28.65	-.67	-.13

Table 7

Correlation Matrix for Unspecified Model of Student-Teacher Closeness

Grade	Kindergarten	First	Third	Fourth	Fifth
Kindergarten	1.00				
First	.31	1.00			
Third	.27	.34	1.00		
Fourth	.20	.23	.38	1.00	
Fifth	.18	.27	.34	.33	1.00

Initially there was an unknown shape of growth for the student-teacher closeness relationship. However, analysis of the data showed that as students moved from kindergarten to fifth grade, the level of closeness with their teachers decreased linearly. This linear decrease could be interpreted as indicating that as students emotionally and socially developed, even taking into account different teachers in different grades, the levels of closeness with teachers tended to decrease.

The correlation matrix in Table 7 reports the relationships between the variables across different waves of measurement. The correlations were relatively low, indicating that the measurement of student closeness with a teacher in one year was not highly related to the measurement of closeness with a teacher in a different year. Given that students typically change teachers each school year, this lack of correlation with each subsequent year was expected. Each year, and with each new teacher, students would be establishing a new relationship that may or may not have any similarities with either the previous or subsequent experiences.

As shown in Table 8, the mean slope was statistically significant (Mean S = -2.39, p <.001) indicating that the measurement of closeness at each time point decreased over time. The

mean intercept was also significant (Mean I = 34.28, $p < .001$) indicating that the scores for initial level of closeness with the teacher were non-zero on the measure ranging from 11 to 55. The slope variance was significant (Variance S = 9.27, $p < .001$) indicating that there was significant variation in the shape of children's trajectories from kindergarten to fifth grade. This variation meant that at least some children differed in the rate of change as they grew over time. The intercept variance was also significant (Variance I = 9.20, $p < .001$) indicating there was variation in the initial starting points within the levels of closeness reported. The significant negative covariance between the slope and intercept (S with I = -3.40, $p < .02$) indicated that higher initial levels of closeness were associated with lower rates of change and that lower initial levels of closeness led to higher rates of change over time. The children who started relatively higher on this measure demonstrated the least change over time.

Table 8

Path Coefficients for Unspecified Model of Student-Teacher Closeness

		M		*M* Significance		Variance		Variance Significance	
S with I	S with I Significance	S	I	S	I	S	I	S	I
-3.40	.02	-2.39	34.28	< .001	< .001	9.27	9.20	< .001	< .001

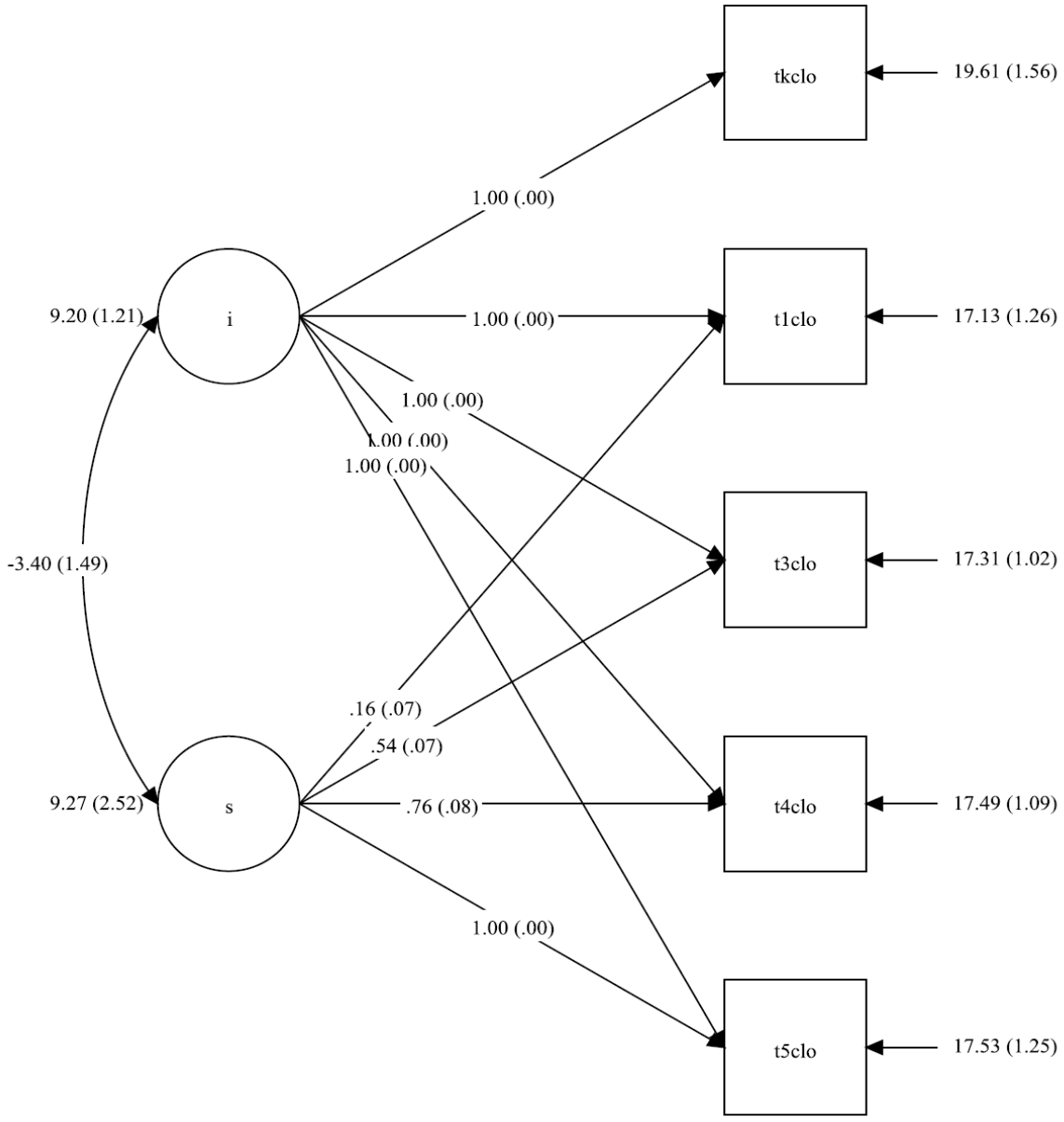
Note. S = Slope. I = Intercept.

The goodness of fit indices indicated a well-fitting model (Curran et al., 2010). The chi-square of 11.76 was non-significant (df = 7, N = 1,153, p =.11) indicating that the model did not significantly differ from the data (Bentler & Bonett, 1980). The RMSEA of .02 with a CI of .00 - .05 also suggested a well-fitting model (Hu & Bentler, 1999; Sharma et al., 2005; Tanaka, 1987). The SRMR of .04 was indicative of a low level of difference between the observed correlation matrix and model-implied correlation matrix, which suggested good model fit (Asparouhov & Muthén, 2018).

The unspecified model indicated that student-teacher closeness over time decreased from kindergarten to fifth grade. Figure 7 illustrates the relationships in this model.

Figure 7

Student-Teacher Closeness Unspecified Two Factor Latent Variable Growth Curve Model Across Five Measurement Waves



Note. t(k, 1, 3, 4, 5)clo = teacher's closeness in kindergarten, first, third, fourth or fifth grade. Robust maximum likelihood parameter estimates. Standard errors are presented in parentheses. All intercepts set to one. Slope at fifth measurement wave set to 1. Slope at first measurement wave set to zero. Slope at second, third and fourth measurement waves free to vary. s = slope. i = intercept. Path from s to i = slope-intercept covariance (see Appendix G for definitions of terms).

Research Question 3 with Covariate of Parental Involvement

The covariate of parental involvement was added to test whether more variance in student-teacher closeness intercept and slope could be explained. Table 9 reports the descriptive statistics for the addition of the covariate. Higher parental involvement scores were reported at third and fifth grade. Lower scores were reported at first and fourth grades.

Table 9

Descriptive Statistics for Unspecified Model of Student-Teacher Closeness with Covariate of Parental Involvement

Grade	*M*	*SD*	Variance	Skewness	Kurtosis
S-T Closeness-Kindergarten	34.48	5.15	26.54	-1.17	1.11
S-T Closeness-First	34.27	4.84	23.43	-1.06	1.12
S-T Closeness-Third	33.28	5.06	25.57	-.93	.49
S-T Closeness-Fourth	32.80	4.92	24.24	-.67	.01
S-T Closeness-Fifth	32.16	5.28	27.85	-.71	-.03
First PI	3.92	.89	.72	-1.02	.30
Third PI	3.63	.88	.77	-.65	-.30
Fourth PI	3.61	.85	.69	-.65	-.21
Fifth PI	3.57	.88	.76	-.74	.08

Note. S-T = Student-Teacher. PI = Parental Involvement.

The correlation matrices in Tables 10 and 11 report the relationships between variables across different waves of measurement. The correlations in Table 10 were relatively low, indicating that the measurement of student closeness with a teacher in one year was not highly

related to the measurement of closeness with a teacher in a different year. Given that students typically change teachers each school year, this lack of correlation with each subsequent year was expected. Each year, and with each new teacher, students would be establishing a new relationship that may or may not have any similarities with either the previous or subsequent experiences. The correlation matrix in Table 11 indicated that the correlations among the parental involvement covariate scores across different waves of measurement were moderate, approaching +1. This pattern of correlation from one year to the next indicated that parental involvement over time was relatively stable, i.e., parents who were involved in lower grades tended to maintain their involvement through fifth grade.

Table 10

Correlation Matrix One for Unspecified Model of Student-Teacher Closeness with Covariate of Parental Involvement

Grade	Kindergarten	First	Third	Fourth	Fifth
Kindergarten	1.00				
First	.27	1.00			
Third	.26	.34	1.00		
Fourth	.22	.21	.36	1.00	
Fifth	.19	.26	.33	.33	1.00
First PI	.15	.32	.22	.09	.14
Third PI	.11	.14	.35	.17	.12
Fourth PI	.15	.11	.20	.29	.12
Fifth PI	.09	.15	.20	.17	.36

Note. PI = Parental Involvement.

Table 11

Correlation Matrix Two for Unspecified Model of Student-Teacher Closeness with Covariate of Parental Involvement

Grade	First PI	Third PI	Fourth PI	Fifth PI
First PI	1.00			
Third PI	.56	1.00		
Fourth PI	.49	.52	1.00	
Fifth PI	.52	.51	.53	1.00

Note. PI = Parental Involvement.

The coefficients reported in Table 12 display the effect of parental involvement on student-teacher closeness at each time point. The effect of the covariate as shown by the coefficients was non-linear. The results of this study showed that no matter where a child starts in a relationship with a teacher, the starting point has no bearing on changes over time. Parental involvement was positively related to closeness in the student-teacher relationship across all grades and statistically significant at all time points. This result showed that the more parental involvement at every grade, the higher the closeness a teacher had with a student at all time points.

Table 12

Path Coefficients for the Unspecified Model of Student-Teacher Closeness with the Time Varying Covariate of Parental Involvement

Covariate	Coefficient	*SE*	Significance
T1CLO on PI1	1.68	.21	< .001
T3CLO on PI3	2.01	.22	< .001
T4CLO on PI4	1.87	.24	< .001
T5CLO on PI5	2.12	.22	< .001

Note. SE = Standard Error, PI(1, 3, 4, 5) = Parental Involvement in the indicated grade. T(1, 3, 4, 5) CLO denotes student-teacher closeness in the indicated grade.

Once the contribution of parental involvement was controlled for, the intercept variance was no longer statistically significant at alpha .01 (Variance I = 9.96, p =.05). Also, the slope variance was no longer statistically significant (Variance S = 9.60, p = .12). These variances indicated that parental involvement explained starting point variation and trajectory variation as shown in Table 13.

Table 13

Path Coefficients for Unspecified Model of Student-Teacher Closeness with Covariate of Parental Involvement

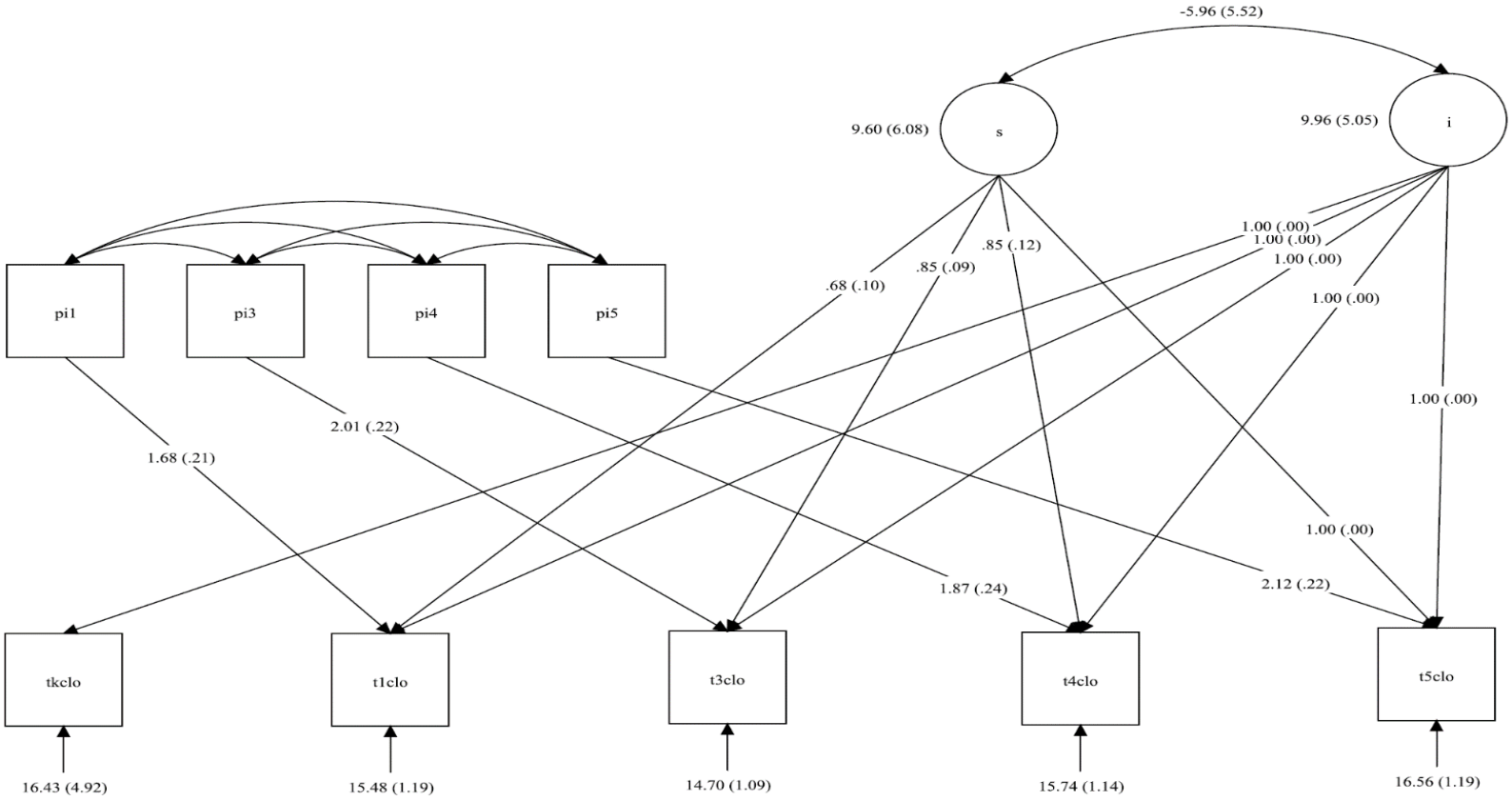
		M		*M* Significance		Variance		Variance Significance	
S with I	S with I Significance	S	I	S	I	S	I	S	I
-5.96	.28	-9.95	34.49	< .001	< .001	9.60	9.96	.12	.05

Note. S = Slope. I = Intercept. PI = Parental Involvement.

When the covariate of parental involvement was applied to the data, the goodness of fit indices and parameter estimates indicated a well-fitting model (Curran et al., 2010). The chi-square was statistically significant, $\chi^2(23, N = 703) = 51.06$, $p < .001$ (Bentler & Bonett, 1980). Other goodness of fit indices indicated a well-fitting model. The root mean square error of approximation (RMSEA) of .04 with a confidence interval of .03 to .06 was within the cutoffs for a well-fitting model (Hu & Bentler, 1999; Sharma et al., 2005; Tanaka, 1987). The CFI (.95) and TLI (.94) as well as the SRMR (.06) were also indicative of a well-fitting model (Asparouhov & Muthén, 2018). The covariate of parental involvement explained variation over time of student-teacher closeness from kindergarten to fifth grade. Figure 8 illustrates the relationships in this model.

Figure 8

Student-Teacher Closeness Unspecified Two Factor Latent Variable Growth Curve Model Across Five Measurement Waves with Covariate of Parental Involvement Across Four Measurement Waves



Note. t(k, 1, 3, 4, 5)clo = teacher's closeness in kindergarten, first, third, fourth or fifth grade. pi(1, 3, 4, 5) = parental involvement in first, third, fourth or fifth grade. Robust maximum likelihood parameter estimates. Standard errors are presented in parentheses. All intercepts set to one. Slope at fifth measurement wave set to 1. Slope at first measurement wave set to zero. Slope at second, third, and fourth measurement waves free to vary. s = slope. i = intercept. Path from s to i = slope-intercept covariance (see Appendix G for definitions of terms).

Research Question 4: Student-Teacher Conflict

In the current study the statistical analysis of the student-teacher conflict relationship showed that students and teachers exhibited a non-linear relationship from kindergarten to fifth grade. There was statistically significant variation in starting points at kindergarten indicating that the students had differing initial levels of conflict. However, the contributing factors to starting point variation were not examined in the current study.

Descriptive statistics for the data studied in Research Question 4, "What is the shape of growth over time of student-teacher conflict from kindergarten to fifth grade?" are shown in Table 14. The means clearly indicated a non-linear pattern of change over time. The pattern appeared to be curvilinear, i.e., there were two distinct drops in values at first and fourth grade, with three higher points in between those grades. The skewness and kurtosis values in Table 14 showed a moderately non-normal distribution of student-teacher conflict from kindergarten to fifth grade. In the imposed quadratic model, linear slope values were set at kindergarten = 0, first grade = 1, third grade = 2, fourth grade = 3, and fifth grade = 4. The quadratic values were set at squared values of the linear slope coefficients, i.e., kindergarten = 0, first grade = 1, third grade = 4, fourth grade = 9, and fifth grade = 16. The intercepts for all five age points were set at 1.

Table 14

Descriptive Statistics for Imposed Quadratic Model of Student-Teacher Conflict

Grade	*M*	*SD*	Variance	Skewness	Kurtosis
Kindergarten	10.58	5.37	28.76	1.82	2.87
First	10.91	5.18	26.77	1.63	2.43
Third	11.62	6.04	36.39	1.53	1.70
Fourth	11.08	5.69	32.30	1.74	2.51
Fifth	11.43	5.71	32.58	1.51	1.70

Initially there was an unknown shape of growth for the student-teacher conflict relationship. As shown in Table 15, the mean slope was statistically significant (Mean S = .53, $p < .001$) indicating the measure of conflict at each time point for each child increased. The mean intercept was also statistically significant (Mean I = 10.65, $p < .001$) indicating that the scores for initial level of conflict between students and teachers were non-zero, i.e., the measure indicated some level of conflict between the students and teachers on the measure ranging from 12 to 60. With regard to the variances, only the intercept variance was statistically significant (Variance I = 11.45, $p < .001$) indicating that there was significant variation in the initial levels of student-teacher conflict in kindergarten. The lack of statistical significance of the slope variance (Variance S = 3.31, $p = .15$) indicated that the trajectories from kindergarten to fifth grade followed a relatively similar path. The patterns of change across time did not statistically significantly differ across students from kindergarten to fifth grade. The statistically significant positive slope may be attributable to the pattern of a fairly strict stability in the trajectories over time, except for the stair-step increase between first and third grade.

Table 15

Path Coefficients for Imposed Quadratic Model of Student-Teacher Conflict

Quadratic		Quadratic Significance				*M*			*M* Significance			Variance			Variance Significance		
with I	with S	with I	with S	S with I	S with I Significance	S	I	Q	S	I	Q	S	I	Q	S	I	Q
-.26	-.51	.51	.30	.44	.83	.53	10.65	-.08	< .001	< .001	.03	3.31	11.45	.09	.15	< .001	.46

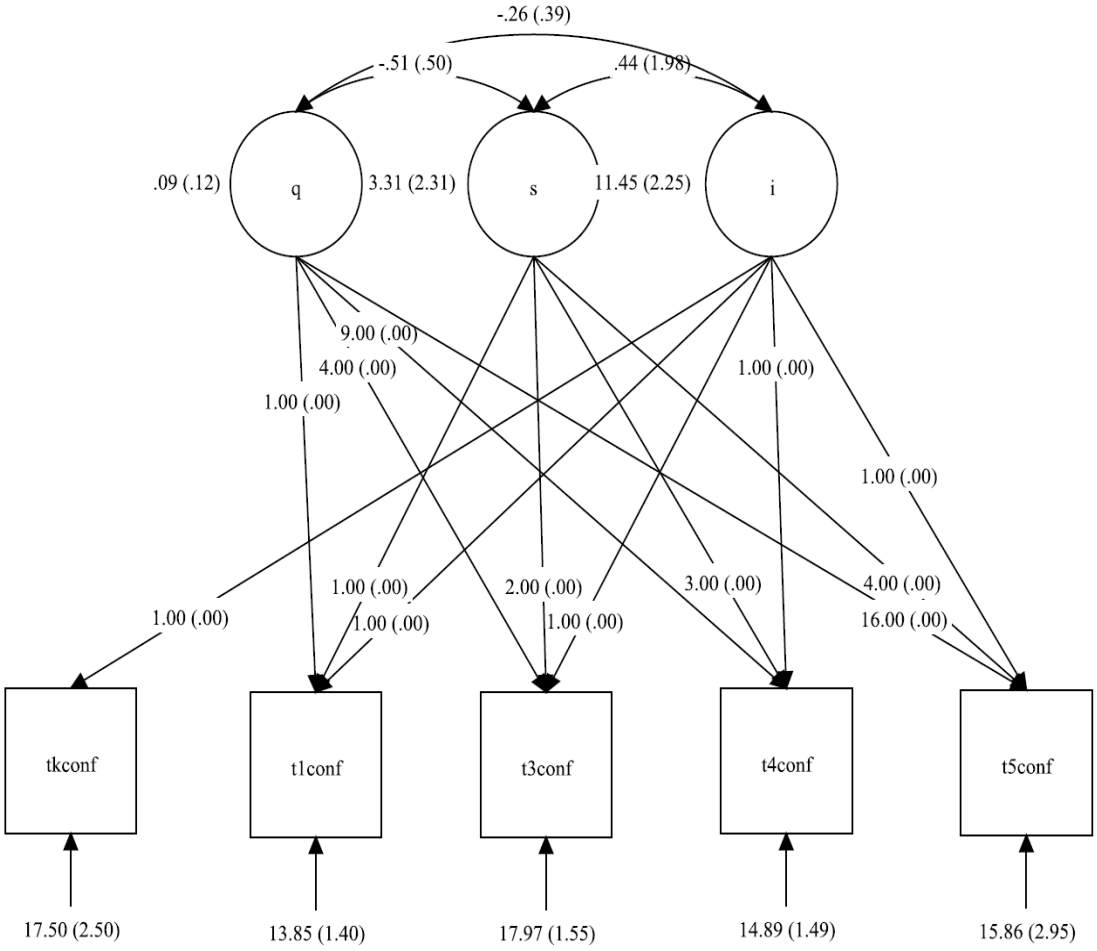
Note. S = Slope. I = Intercept. Q = Quadratic.

When the imposed quadratic model was applied to the data, the goodness of fit indices and parameter estimates indicated a well-fitting model (Curran et al., 2010). The non-significant chi-square, 12.16 (6, N = 1,153), p = .06, is indicative of a well-fitting model (Bentler & Bonett, 1980). The RMSEA value of .03 with a confidence interval of .00 to .05 was within the cutoffs for a well-fitting model (Hu & Bentler, 1999; Sharma et al., 2005; Tanaka, 1987). The CFI (.99) and TLI (.98) as well as the SRMR (.02) are also indicative of a well-fitting model (Asparouhov & Muthén, 2018).

The imposed quadratic model indicated that student-teacher conflict over time showed a nonlinear trend with lower levels of conflict at kindergarten and first grade with a stair step increase at third grade that appeared relatively stable through fifth grade. Figure 9 illustrates the relationships in this model.

Figure 9

Student-Teacher Conflict Imposed Quadratic Two Factor Latent Variable Growth Curve Model Across Five Measurement Waves



Note. t(k, 1, 3, 4, 5)conf = teacher's conflict in kindergarten, first, third, fourth or fifth grade. Robust maximum likelihood parameter estimates. Standard errors are presented in parentheses. All intercepts set to one. Quadratic factor loadings set to the squared value of the linear slope factor loadings. s = slope. i = intercept. q = quadratic. Path from s to i = slope-intercept covariance. Path from q to s = quadratic-slope covariance. Path from q to i = quadratic-intercept covariance (see Appendix G for definitions of terms).

Research Question 4 with Covariate of Parental Involvement

The covariate of parental involvement was added to test whether more intercept variance in student-teacher conflict could be explained. Table 16 reports the descriptive statistics for the addition of the covariate. It should be noted that the measure of parental involvement at kindergarten was based on a completely different measure or scale than all the other time points. The coefficients reported in Table 17 estimated the effect of parental involvement on student-teacher conflict. The effect of the covariate as shown by how the coefficients grew in strength across the first four time points from kindergarten to fourth grade, and decreased somewhat at fifth grade. The covariate was significantly related to teacher conflict at all four time points. The negative coefficients indicate that as student-teacher conflict increased parental involvement decreased. From first through fifth grade, the covariate of parental involvement means decreased. As reported in Table 18, the mean intercept was statistically significant (Mean I = 15.94, $p <$ .001) indicating that the scores for initial level of conflict with the teacher were non-zero, i.e., the measure indicated some level of conflict with the teacher on the measure ranging from 12 to 60. Once the contribution of parental involvement was controlled for, the intercept variance remained statistically significant (Variance I = 9.96, $p <$.001) indicating that parental involvement did not fully explain starting point variation, as shown in Table 18.

Table 16

Descriptive Statistics for Imposed Quadratic Model of Student-Teacher Conflict with Covariate of Parental Involvement

Grade	*M*	*SD*	Variance	Skewness	Kurtosis
Kindergarten	10.37	5.16	26.64	1.91	3.26
First	10.70	5.01	25.13	1.67	2.54
Third	11.20	5.73	32.82	1.65	2.12
Fourth	10.77	5.47	29.96	1.81	2.91
Fifth	10.92	5.17	26.72	1.55	1.82
Kindergarten PI	15.80	2.46	5.92	-1.47	1.97
First PI	3.93	.89	.71	-1.05	.38
Third PI	3.64	.88	.77	-.62	-.35
Fourth PI	3.60	.85	.69	-.63	-.25
Fifth PI	3.58	.88	.76	-.74	.12

Note. PI = Parental Involvement

Table 17

Path Coefficients for the Imposed Quadratic Model of Student-Teacher Conflict with the Time Varying Covariate of Parental Involvement

Covariate	Coefficient	*SE*	Significance
TKCONF on PIK	-.35	.08	< .001
T1CONF on PI1	-1.47	.18	< .001
T3CONF on PI3	-1.56	.18	< .001
T4CONF on PI4	-1.60	.17	< .001
T5CONF on PI5	-1.41	.22	< .001

Note. SE = Standard Error. PI(K, 1, 3, 4, 5) = Parental involvement in the indicated grade. T(K, 1, 3, 4, 5)CONF denotes teacher conflict in the indicated grade.

Table 18

Path Coefficients for Imposed Quadratic Model of Student-Teacher Conflict with Covariate of Parental Involvement

Quadratic		Quadratic Significance				*M*			*M* Significance			Variance			Variance Significance		
with I	with S	with I	with S	S with I	S with I Significance	S	I	Q	S	I	Q	S	I	Q	S	I	Q
.03	-.83	.95	.10	-.99	.64	.81	15.94	-.20	.51	< .001	.45	4.27	9.96	.18	.07	< .001	.13

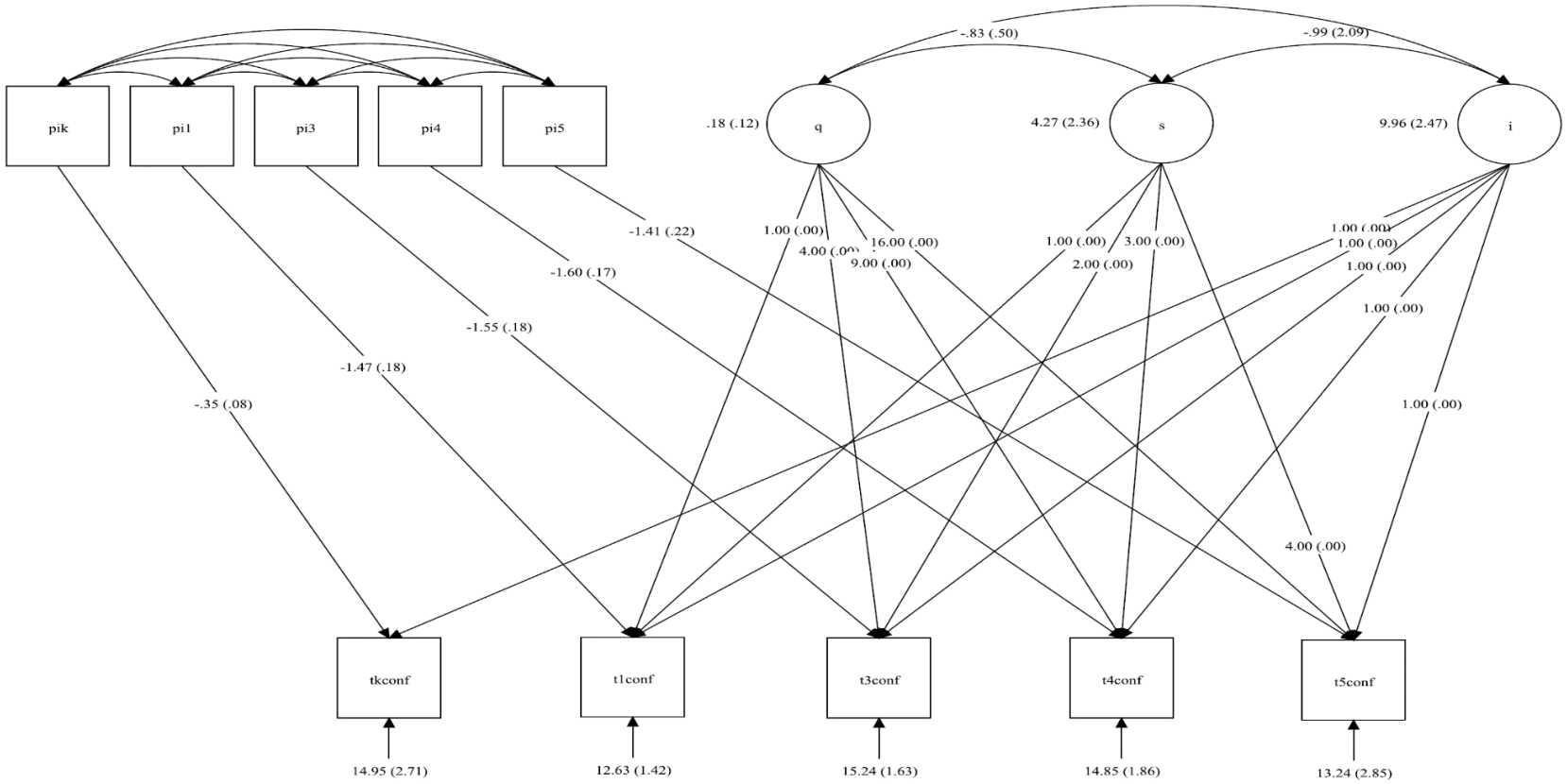
Note. S = Slope. I = Intercept. PI = Parental Involvement.

When the covariate of parental involvement was applied to the data, the goodness of fit indices and parameter estimates indicated a well-fitting model (Curran et al., 2010). The chi-square was statistically significant χ^2 (26, N = 658) = 63.82, p < .001. Other goodness of fit indices indicated a well-fitting model (Bentler & Bonett). The root mean square error of approximation (RMSEA) of .05 with a confidence interval of .03 to .06 was within the cutoffs for a well-fitting model (Hu & Bentler, 1999; Sharma et al., 2005; Tanaka, 1987). The CFI (.95) and TLI (.93) as well as the SRMR (.09) were also indicative of a well-fitting comparative model (Asparouhov & Muthén, 2018).

The covariate of parental involvement explained variation over time of student-teacher conflict from kindergarten to fifth grade. Figure 10 illustrates the relationships in this model.

Figure 10

Student-Teacher Conflict Imposed Quadratic Two Factor Latent Variable Growth Curve Model Across Five Measurement Waves With Covariate of Parental Involvement Across Five Measurement Waves



Note. t(k, 1, 3, 4, 5)conf = teacher's conflict in kindergarten, first, third, fourth or fifth grade. pi(k, 1, 3, 4, 5) = parental involvement in kindergarten, first, third, fourth or fifth grade. Robust maximum likelihood parameter estimates. Standard errors are presented in parentheses. All intercepts set to one. Quadratic factor loadings set to the squared value of the linear slope factor loadings. s = slope. i = intercept. q = quadratic. Path from s to i = slope-intercept covariance. Path from q to s = quadratic-slope covariance. Path from q to i = quadratic-intercept covariance (see Appendix G for definition of terms).

Chapter Summary

Statistical analyses were conducted to answer Research Questions 1 through 4. Two of the shapes of growth of the relationships from kindergarten to fifth grade were found to be linear. Two of the shapes of growth of the relationships from kindergarten to fifth grade were found to be non-linear. Subsequent analyses were conducted for Research Questions 3 and 4 to include a covariate. In the analysis of three of the four research questions, the unspecified models failed to converge. The preliminary models were then modified. Goodness of fit indices and parameter estimates were interpreted for model fit.

The first research question was "What is the shape of growth over time of child-mother closeness from kindergarten to fifth grade?" The goodness of fit indices and parameter estimates indicated that the data for Research Question 1 fit well using the imposed negative linear model. The shape of growth indicated a straight line with a negative slope.

The second research question was "What is the shape of growth over time of child-mother conflict from kindergarten to fifth grade?" The goodness of fit indices and parameter estimates indicated that the data for Research Question 2 fit well using the imposed quadratic model. The shape of growth was non-linear.

The third research question was "What is the shape of growth over time of student-teacher closeness from kindergarten to fifth grade?" The goodness of fit indices and parameter estimates indicated that the data for Research Question 3 fit well using the unspecified model. The shape of growth indicated a straight line with a negative slope.

The fourth research question was "What is the shape of growth over time of student-teacher conflict from kindergarten to fifth grade?" The goodness of fit indices and parameter

estimates indicated that the data for Research Question 4 fit well using the imposed quadratic model. Therefore, the shape of growth was non-linear.

The covariate of parental involvement was added to the analyses of Research Questions 3 and 4. The purpose of the addition of a covariate was to attempt to explain further variation in student-teacher closeness and conflict relationships. The covariate of parental involvement explained variation in both the closeness and conflict relationships.

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

Introduction

The goal of the current study was to begin the process of exploring growth curves for children from kindergarten through fifth grade. Latent growth curve (LGC) modeling allows for an examination of alterable variables that will lead to more targeted and naturalistic interventions in the home as well as school. Based on the complexity of child development, the numerous theories about various aspects of development and known interactions that influence outcomes, this study's goal was to begin the process of identifying growth curves for closeness and conflict within the child-mother and student-teacher relationships.

Discussion of Results

Research Question 1: Child-Mother Closeness

The analysis for Research Question 1: "What is the shape of growth over time of child-mother closeness from kindergarten to fifth grade?" fit a negative linear trend. The closeness between child and mother decreased linearly over time. Several conclusions were indicated by the results.

Theoretically, a negative linear trend from kindergarten to fifth grade aligns with prior research showing that the mother and child dyad is highest in closeness at younger ages, and that closeness tends to decrease as the child enters into a formal schooling environment (Gauvain, 2001; Lewis & Todd, 2007; Siegel, 1999). A nuclear family tends to be the primary source of

caregiving for children prior to formal schooling. Therefore, a dynamic such as closeness tends to be confined within the child's nuclear family or primary caregiver. Upon entry into formal schooling, children expand their closeness into a larger environment that includes other caregivers (Sabol & Pianta, 2012a; Webster et al., 2013). Development at fifth grade typically indicates that children are in the process of separating from their parents emotionally (Jerome et al., 2009; Vygotsky, 1978). Children are then more open to outside relationships and become less dependent solely on their in-home caregivers. The negative linear trend of reduction in closeness over time demonstrated this decrease in dependency (Bronfenbrenner, 1986; Denham et al., 2012).

The negative linear trend in closeness over time with the mother indicates that, as other important figures enter children's lives, children begin to bond with those figures as caregivers in addition to their mothers. This expansion of closeness relates to the one caregiver theory which states that in order to thrive, children require only one bonded and invested caregiver (Bronfenbrenner, 1986). Caregivers within a school environment can become a buffer for children who may not have optimal closeness within their nuclear family (Jerome et al., 2009; Merritt et al., 2012; Sabol & Pianta, 2012b).

Research Question 2: Child-Mother Conflict

The analysis for Research Question 2: "What is the shape of growth over time of child-mother conflict from kindergarten to fifth grade?" fit a quadratic trend. Beginning at a low level, conflict increased toward the middle grades and then decreased toward fifth grade. Several conclusions can be reached from the quadratic result.

Most children tend to enter kindergarten with low levels of conflict with their mother (Denham & Kochanoff, 2002; Lunkenheimer et al., 2013). As children enter formal education

and begin to bond with outside caregivers, conflict between the child and mother tends to increase as their relationships expand beyond the nuclear family. The increase in conflict toward the third grade is suggested in prior research and theory as being representative of the demands of the school at that age level. These demands can include the change in curriculum from learning to read to reading for knowledge (National Research Council, 1998). When children are confronted with these higher expectations conflict tends to increase for a period of time (Neece et al., 2012). As children progress toward fifth grade, conflict decreases as they adjust to higher expectations within the school environment. The conflict between child and mother tends to reflect the stress a child is under within their school environment (Neece et al., 2012).

Research Question 3: Student-Teacher Closeness

The analysis for Research Question 3, "What is the shape of growth over time of student-teacher closeness from kindergarten to fifth grade?" fit a negative linear trend using an unspecified model. Teacher closeness started at a relatively higher level and decreased over time. Theoretically it is expected that higher closeness with an outside caregiver in the younger years relates to the similarities between teaching and parenting practices in kindergarten (Döge & Keller, 2014). As children grow and develop emotionally and socially, and as educational demands on them increase, children naturally tend to decrease in closeness with their teachers (Birch & Ladd, 1997; Ladd & Burgess, 2001). This may be a function of alternating to a new teacher each year as well, although that was not specifically examined in this study. One further contributing factor to the decrease in closeness over time may be due to the tone of the home-school communication becoming more negative and school-initiated beginning after preschool (Rimm-Kaufman & Pianta, 1999; Rimm-Kaufman & Zhang, 2005).

The covariate of parental involvement was explored as it related to student-teacher closeness. When students entered formal schooling, they had complex variance in levels of closeness with their teachers,indicating that some students were closer with their teachers and some students were lower in closeness with their teachers initially. The addition of parental involvement explained the differences in initial levels of student-teacher closeness.

After entry into formal schooling the variance in student-teacher closeness over time from kindergarten to fifth grade was also more fully explained by teachers' perception of parental involvement. Students who started with a higher level of closeness and parental involvement in kindergarten demonstrated less of a loss in closeness with their teachers through fifth grade. Students who started with a lower level of closeness and parental involvement in kindergarten demonstrated an increased rate of loss of closeness with their teachers through fifth grade. The negative relationship may be due to the presence of a higher order relationship between the home and school, which would be indicative of the necessity for practices that foster close working relationships between the home and school (Lueder, 2005).

Research Question 4: Student-Teacher Conflict

The analysis for Research Question 4: "What is the shape of growth over time of student-teacher conflict from kindergarten to fifth grade?" fit a quadratic trend. The curve initially was at a lower level, then increased to third grade, then plateaued through fifth grade. Theoretically, this trend can be explained by the similarities in parenting and teaching styles at very young ages, followed by difficulty in adjusting to differences in relationships outside the primary caregiver's influence (Hamre et al., 2014; Jerome et al., 2009). The increasing level of conflict with teachers is both developmental as well as ecological. Children from birth to about third grade are dependent on their caregivers for interpretation of the world, and do not understand how their

perspective is separate from their caregiver (Erikson, 1963; Inhelder & Piaget, 1955; Vygotsky, 1978). As children become accustomed to the expectations of the school environment and their age increases, and as their socio-emotional development increases over time, student-teacher conflict increases (Denham et al., 2012; Piaget, 1955).

The covariate of parental involvement was explored. When students entered school, there was complex variance, indicating that some students were higher in conflict with their teachers and some students were lower in conflict with their teachers initially. After entry, variance in levels of teachers' conflict with students was more fully explained by teachers' perception of parental involvement. As conflict with the teacher increased, the level of parental involvement decreased or vice versa. As with the question of student-teacher closeness, the level of conflict is a complementary construct that may be explored more fully when considering the connection between home and school as it pertains to child outcomes. It is clear that the connection is an important one for children as they progress through formal schooling.

Limitations

National Institute of Child Health and Human Development Study of Early Child Care and Youth Development

The SECCYD data set is older, as it was collected from 1991 to 2007. This limits the generalization of any results obtained in several ways. First, family structures have evolved to include alternative caregivers such as fathers, grandparents, and other primary adults that were underrepresented in the SECCYD data collection. Second, the measures used were also older, published in 1991. While the constructs of closeness and conflict may be expected to be stable, and, therefore, not subject to change in measurement, newer measures may be available to

accurately measure the differences between caregivers and alternative caregivers, and also teachers' perceptions of parental involvement.

While noting the age of the SECCYD data, there are also many reasons the findings utilizing the data remain relevant. For example, due to the overall size of the data set and the number of data points included, the SECCYD remains the most complete data set for latent growth curve modeling as used in the current research. The constructs measured by the SECCYD link to studies and theories that were established decades ago and represent current foundations for statistical analyses, especially in latent growth curve modeling. Latent growth curve modeling requires an a priori theoretical basis for the models that are tested. Therefore, the trends that emerge can be considered salient to date (Winerman, 2009).

Child Perspective

The current research did not include any measures of the child's perspective on either closeness or conflict with their mothers or teachers. This is another valuable dimension that should be considered for inclusion in future research. Returning to William James' (1977) and Mary Whiton Calkins' (1908) theories of the value of the "independent person" and unique perspectives in psychology, it would bring another layer of understanding the relationships between children and their various caregivers to explore their unique perspective. If the home-school connection is to be more fully understood, and a transactional model of development (Barnett & Ratner, 1997; Sameroff, 2009) is to be both integrated into and used to intervene within the connection, the child's perspective and contribution must be accounted for.

Mothers Only

If data were collected in the future, additional participation of alternate caregivers such as fathers, grandparents and members of other family structures should be included. The SECCYD

did not include sufficient numbers of alternate caregivers to meet the minimum required for the current research. The lack of participants other than mothers limits the scope of the conclusions and the potential for generalization of the current findings. Future research could extend the current findings to explore the relationships with caregivers other than mothers. The addition of information about how they differ or are similar to mothers' relationships may ultimately lead to further areas for intervention in the home and school environments.

Data Access Limitations

Extremely strict procedures for protecting the privacy of the participants were imposed by ICPSR (Inter-university Consortium for Political and Social Research), the custodian of the data. These procedures included

- Restriction of data access and its usage to individuals who signed Restricted Data Use Agreement (see Appendix D) as well as Data Security Plan (see Appendix E).
- Prior approval of all study results before publication.
- Required use of software provided by ICPSR through a Virtual Data Enclave (VDE) was downloaded onto my personal computer. This software shuts down all outside access to the Internet, software, etc. during its use.
- I was required to be alone in a locked room at a specified location with no access to the Internet or phone when working with the data. Rooms with glass walls were not acceptable as persons outside the room might be able to view displays in use. Guest logins were disabled, and the screen locked automatically after 12 minutes. Any accidental or willful violations of these and other provisions were required to be reported to ICPSR within five days.

- Prior review by ICPSR employees of all statistical outputs was required before I could discuss or collaborate with any other person on the information contained therein. This vetting process sometimes took considerable time to accomplish as it was performed by only one individual. That individual was unavailable for a period of time due a medical procedure during my interaction with ICPSR.
- Publication or dissemination to other members of my committee that included output was automatically denied if any number of records was less than 10 for any variable (see Appendix F, page 4, F). The ICPSR representative stated to me verbally that this rule was established because it was assumed that having frequencies of less than 10 could possibly allow identification of the participants.
- Acknowledgement by me that statistical output derived from the data was the property of ICPSR and could be reported only in ways acceptable to ICPSR was required.
- That due to the confidentiality procedures as outlined by ICPSR, no information about the content of the data was publicly provided prior to following ICPSR procedures to obtain access to the data. The SECCYD data included such a long timeframe and so many variables that ICPSR divided it into sets for manageability. Access for the current study was provided only to Data Sets 2 and 3. Those sets did not include any demographic information about participants such as gender, age, race, teaching experience, or other descriptive information. Second grade data was not collected using the measures used for the current study.These limitations were not known prior to access being provided.

Methodological and Software Limitations

The study design of using five time point latent growth curve modeling (LGCM) resulted in methodological and software limitations. These limitations included

- The number of cases in the database for father's closeness and conflict as well as caregivers other than mothers did not meet the minimum number of cases required for LGCM. Therefore, all model results are biased toward mother-only data.
- The ICPSR allowed only the software program M*plus* Version 8.2 through the virtual data enclave. Software such as LISREL was not permitted.
- Initial intercepts on mother and teacher closeness and conflict were reported but not studied in the current research. Therefore, variation in initial intercepts was not explained or discussed in this study.
- Due to the age of the data, generalizing to the general population should be applied with caution.

Implications of the Current Study

Developmental and Curriculum Shift at Third Grade

Explicitly including age as represented by the grade level of children allowed the consideration of the indirect effect of developmental stages as an important dimension within the passage of time. The significant shift in cognitive, emotional, social, and moral development that occurs at approximately age six to seven should reasonably be included in any developmental research. The shift potentially represented a variable that directly influences the shape of growth over time (Erikson, 1963; Inhelder & Piaget, 1955; Kohlberg, 1963; Vygotsky, 1978). Children at this age undergo a cognitive and emotional shift in the development of their perspective as

different from others as well as the use of basic logical principles to create ownership of their task-oriented behaviors (Erikson, 1963; Vygotsky, 1978).

Future research may consider this specific change in delivery of curriculum at third grade (National Research Council, 1998). Traditionally, the delivery of reading curriculum changes at third grade from a focus on learning how to read to a focus on reading comprehension (National Center to Improve the Tools of Educators, 1996; National Research Council, 1998). Children and their relationships may experience important shifts due to the change within children that occurs particularly in the third grade. This time point may be examined more closely in isolation or longitudinally due to this somewhat unique characteristic.

Intercept Variance

Intercept variance could be explored by examining the maternal levels of closeness and conflict prior to entry into schooling as a predictor of levels at kindergarten. Although it has been shown that teacher ratings of closeness with students donot depend on many factors outside and prior to entry into school such as maternal education, behavioral issues, or hours of non-maternal care, attempting to identify any predictive factors for the relationship between children and teachers inherent to the child upon entry into school, would be valuable (Jerome et al., 2009). Examination of prior patterns would expand the present research by giving understanding of the intercept variances found herein and also aide in differentiating to what degree maternal factors, other than teacher's perception of involvement, may or may not influence the direction of growth in conflict or closeness after entry into formal schooling. When attempting to understand variance associated with the family, multiple levels of influence are introduced such as children's culture prior to entry into formal schooling (Bronfenbrenner, 1986).

Slope Variance

After entry into formal schooling, teacher variances across closeness and conflict with the student were better explained by including the teacher's perception of parental involvement (see Chapter IV). When explaining the closeness relationships, parental involvement accounted for some of the finding that children who began with higher levels of closeness tended to retain higher levels of closeness over time, and children who began lower in closeness tended to experience the highest decrease over time. In relation to the levels of conflict over time, parental involvement decreased as student-teacher conflict increased.

There may be several theoretical reasons for the importance of parental involvement to teachers' perception of students. Teachers and students interact within a smaller sphere, i.e., a more closed system. The school and family are within a child's microsystem, and, therefore, it is likely more straightforward to explain variance in the child and teacher relationships within only one level of influence.

A worthwhile avenue of future research could include examination of how parental involvement in the schools can be fostered and supported. Since it is a major factor in students' relationships with teachers, it is important to determine ways to maximize levels of parental involvement. Lueder (2005) proposed the family systems intervention model, which includes several components such as parents as equal partners in education, aligning teaching and parenting styles, and a self-renewing partnership between the home and school. If these components could be operationalized and implemented in a longitudinal, experimental format, further evidence may be produced for the importance of the home and school connection on the outcomes for children over time.

Closeness Relationships

It is valuable to look at both teacher and mother closeness with children in relationship to each other. As stated in the above discussions for Research Questions one and three, as mother's closeness decreased over time, teacher's closeness also decreased. While child and teacher relationships develop somewhat independently of one another, the optimal level may be somewhere in the middle of both relationships (Jerome et al., 2009; Lueder, 2005). It has been noted that communication between the teacher and parent tends to be more positive and parent-initiated in preschool, becoming more negative and school-initiated upon entry into kindergarten (Rimm-Kaufman & Pianta, 1999; Rimm-Kaufman & Zhang, 2005). It is plausible that this more negative, school driven tone of communication contributes to the decrease in closeness between mothers and children over time. When the covariate of teacher's perception of maternal involvement was added to the current research, it accounted for the majority of the variance in closeness between the teacher and student. The connection between teachers and mothers demonstrates the need for ongoing, positive, and bidirectional relationship between the home and school.

It has also been found that children who do not have optimal relationships with their parents during their formal schooling years may benefit greatly from increased close relationships with their teachers (Bronfenbrenner, 1986; Hamre & Pianta, 2006; Merritt et al., 2012; Rimm-Kaufman et al., 2007; Sabol & Pianta, 2012a). While having a close relationship with either a teacher or a parent can be a protective factor for a child, the most optimal outcomes would include both caregivers and teachers. Within a family systems intervention model, the parents and the school work together to align communication, parenting and teaching strategies, and a supportive framework to support students from year to year (Gallagher et al., 2004;

Lueder, 2005; Reedy & McGrath, 2010; Sheridan et al., 2012; Trivette et al., 2010). The alignment of parents and teachers can greatly benefit children who may then have both a home and school environment that best support their development over time.

Conflict Relationships

It is also valuable to examine the current study results of student-teacher and child-mother conflict in relation to each other. Research Questions 2 and 4 addressed conflict relationships. Child-mother conflict analysis showed peaks at kindergarten, third, and fifth grade with slight reductions in conflict at first and fourth grades. The analysis of student-teacher conflict showed low levels of conflict at kindergarten with increases at first and third grade and a plateau at fourth and fifth grades.

This nonlinear shape of growth over time may be due to numerous factors. Children tend to have different teachers every year, which inherently invokes relational variability. When beginning formal schooling, children were shown to be higher in levels of closeness with both mothers and teachers, which is theoretically opposed to high levels of conflict. As children grew in conflict with their teachers over time to a high point in the third grade, mother's conflict mirrored the high point in third grade also. When including the teacher's perception of parental involvement, conflict increased over time and parental involvement decreased.

Recommendations for Future Research

Future researchers may want to pursue the following recommendations. Figures are provided to illustrate proposed models that may be studied.

Associative Growth Curve Models

The current study utilized four single variable growth curve models. Based on the results of the current models, future researchers could combine the four models from the current study

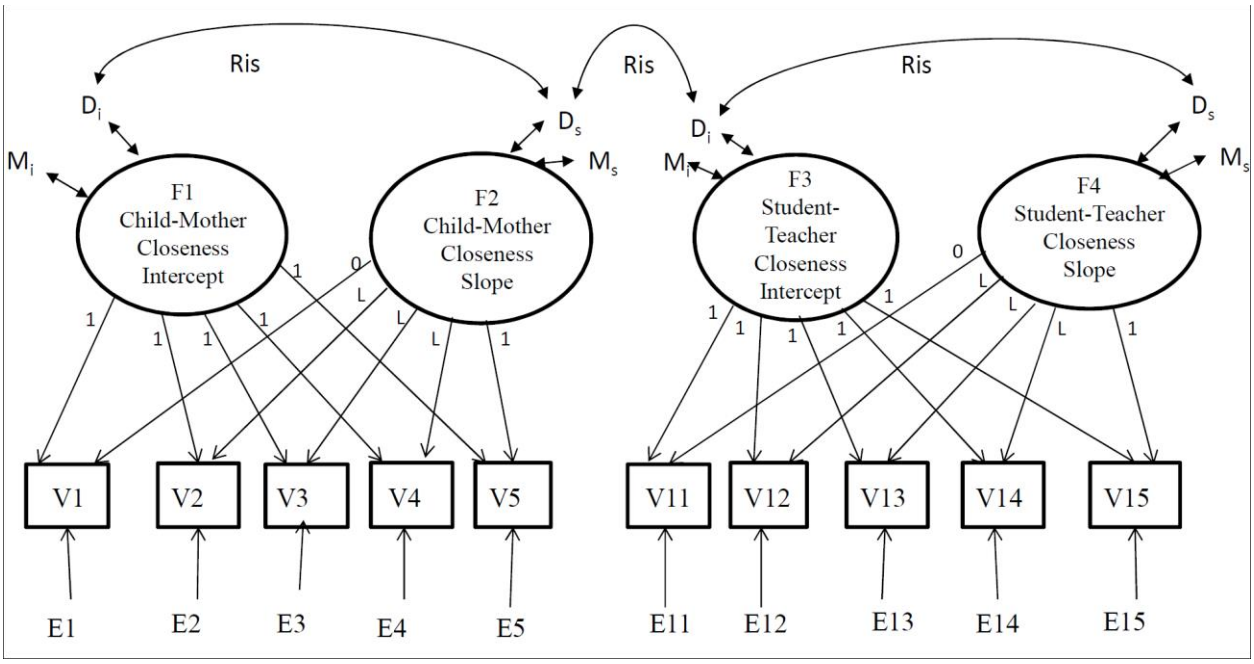
into two models. These combined models are called associative growth curve models. The two proposed associative growth curve models in Figures 11 and 12 would combine the constructs of closeness and conflict across mothers and teachers.

Proposed Associative Model 1

Using LGCM the current constructs could be further examined. One method would be to combine an examination of child-mother closeness with student-teacher closeness in order to examine statistically the inverse relationship that was observed in the current study. An associative growth curve model such as the one recommended in Figure 11 would allow for an estimation of means, variances, and covariances for the construct of closeness.

Figure 11

Child-Mother and Student-Teacher Closeness. Associative Multivariate Latent Growth Curve Model



Note. R_{is} = Covariance between D_i and D_s. D_i = Intercept variance. D_s = Slope variance. M_i = Mean of the intercept. M_s = Mean of the slope. F1 = Child-Mother Closeness Intercept. F2 = Child-Parent Closeness Slope. V(1-5) = Measured variables at 5 time points: kindergarten, first, third, fourth and fifth grades. E(1-5) = Measurement error at 5 time points: kindergarten, first, third, fourth and fifth grades. Arrows from F1 to V(1-5) = Intercept constants with value of 1. Arrow from F2 to V1 = Initial slope constraint (0). Arrow from F2 to V5 = Final slope constraint (1). Arrows labeled "L" from F2 to V2, V3 and V4 = Slope factors left free to vary. F3 = Student-Teacher Closeness Intercept. F4 = Student-Teacher Closeness Slope. V(11-15) = Measured variables at 5 time points: kindergarten, first, third, fourth and fifth grades. E(11-15) = Measurement error at 5 time points: kindergarten, first, third, fourth and fifth grades. Arrows from F3 to V(11-15) = Intercept constants with value of 1. Arrow from F4 to V11 = Initial slope constraint (0). Arrow from F4 to V15 = Final slope constraint (1). Arrows labeled "L" from F4 to V12, V13, and V14 = slope factors left free to vary (see Appendix G for definition of terms).

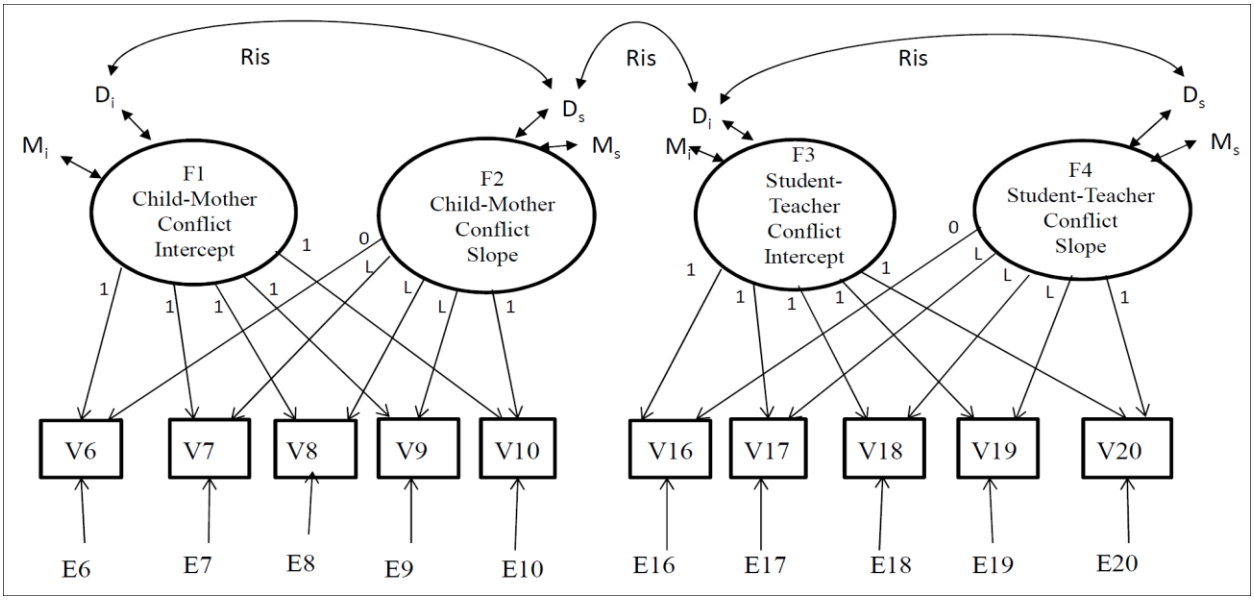
Proposed Associative Model 2

In addition to the associative growth curve model in Figure 11, another associative growth curve model of conflict could be tested as in Figure 12. This examination of child-mother

conflict with student-teacher conflict would allow statistical examination of an estimation of means, variances, and covariances for the construct of conflict.

Figure 12

Child-Mother and Student-Teacher Conflict. Associative Multivariate Latent Growth Curve Model



Note. R_{is} = Covariance between D_i and D_s. D_i = Intercept variance. D_s = Slope variance. M_i = Mean of the intercept. M_s = Mean of the slope. F1 = Child-Mother Conflict Intercept. F2 = Child-Mother Conflict Slope. V(6-10) = Measured variables at 5 time points: kindergarten, first, third, fourth and fifth grades. E(6-10) = Measurement error at 5 time points: kindergarten, first, third, fourth and fifth grades. Arrows from F1 to V(6-10) = Intercept constants with value of 1. Arrow from F2 to V6 = Initial slope constraint (0). Arrow from F2 to V10 = Final slope constraint (1). Arrows labeled "L" from F2 to V7, V8 and V9 = Slope factors left free to vary. F3 = Student-Teacher Conflict Intercept. F4 = Student-Teacher Conflict Slope. V(16-20) = Measured variables at 5 time points: kindergarten, first, third, fourth and fifth grades. E(16-20) = Measurement error at 5 time points: kindergarten, first, third, fourth and fifth grades. Arrows from F3 to V(16-20) = Intercept constants with value of 1. Arrow from F4 to V16 = Initial slope constraint (0). Arrow from F4 to V20 = Final slope constraint (1). Arrows labeled "L" from F4 to V17, V18, and V19 = slope factors left free to vary (see Appendix G for definition of terms).

Factor of Curves Longitudinal Growth Curve Models

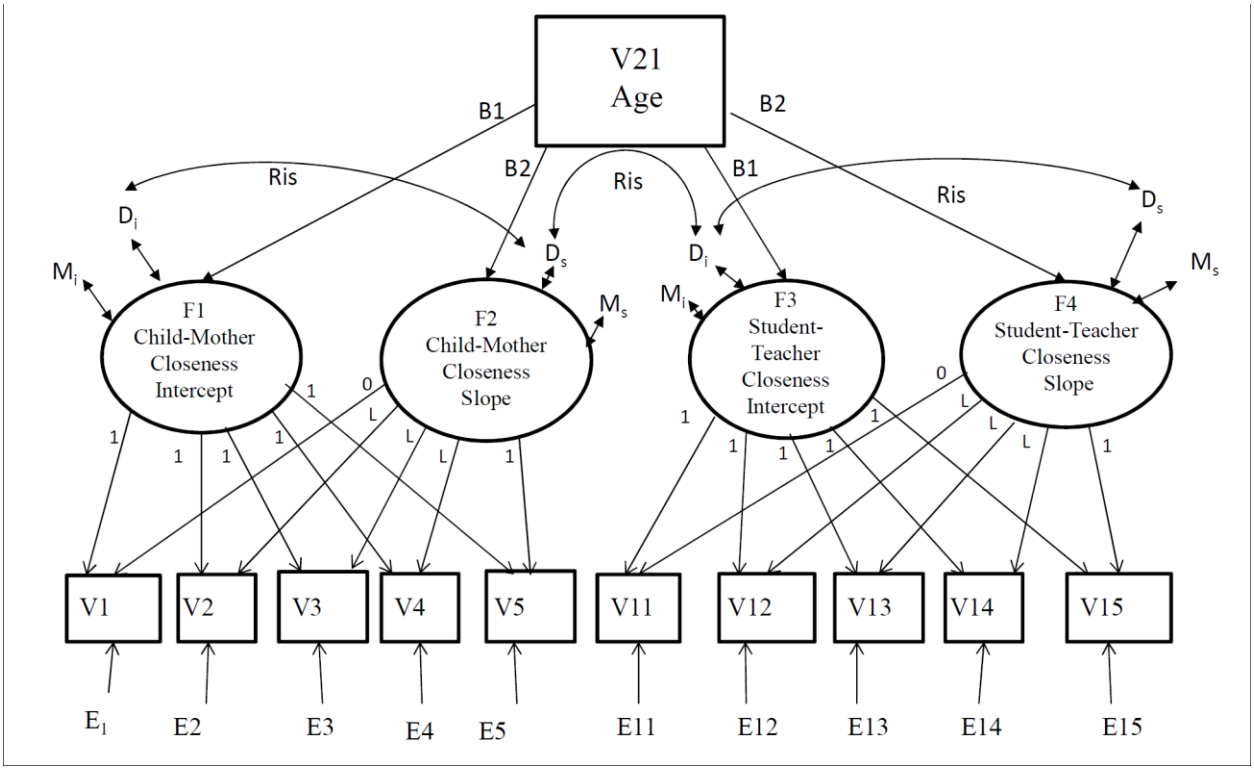
If the two proposed associative models in Figures 11 and 12 are found to have significant relationships then future researchers may use a factor of curves analysis. A factor of curves LGM would examine whether age of the child as a static predictor better explains the relationship between mother and teacher closeness and mother and teacher conflict with the child. These higher order models may be used to specifically examine the influence of age and therefore developmental stages on mother and teacher closeness and conflict with the child.

Proposed Factor of Curves Model 1

A factor of curves model could be estimated as in Figure 13. In this model, age could be used as a static exogenous predictor of change. The advantage to this approach would be that age could be used to identify developmentally important milestones in closeness over time. Theoretically, children from kindergarten to grade five move through age defined developmental stages (Piaget, 1955; Vygotsky, 1978). This would be one further level of insight into the complex behavioral outcomes of child-mother and student-teacher relationships.

Figure 13

Child-Mother Closeness and Student-Teacher Closeness with Age as a Static Predictor. Associative Multivariate Latent Growth Curve Model



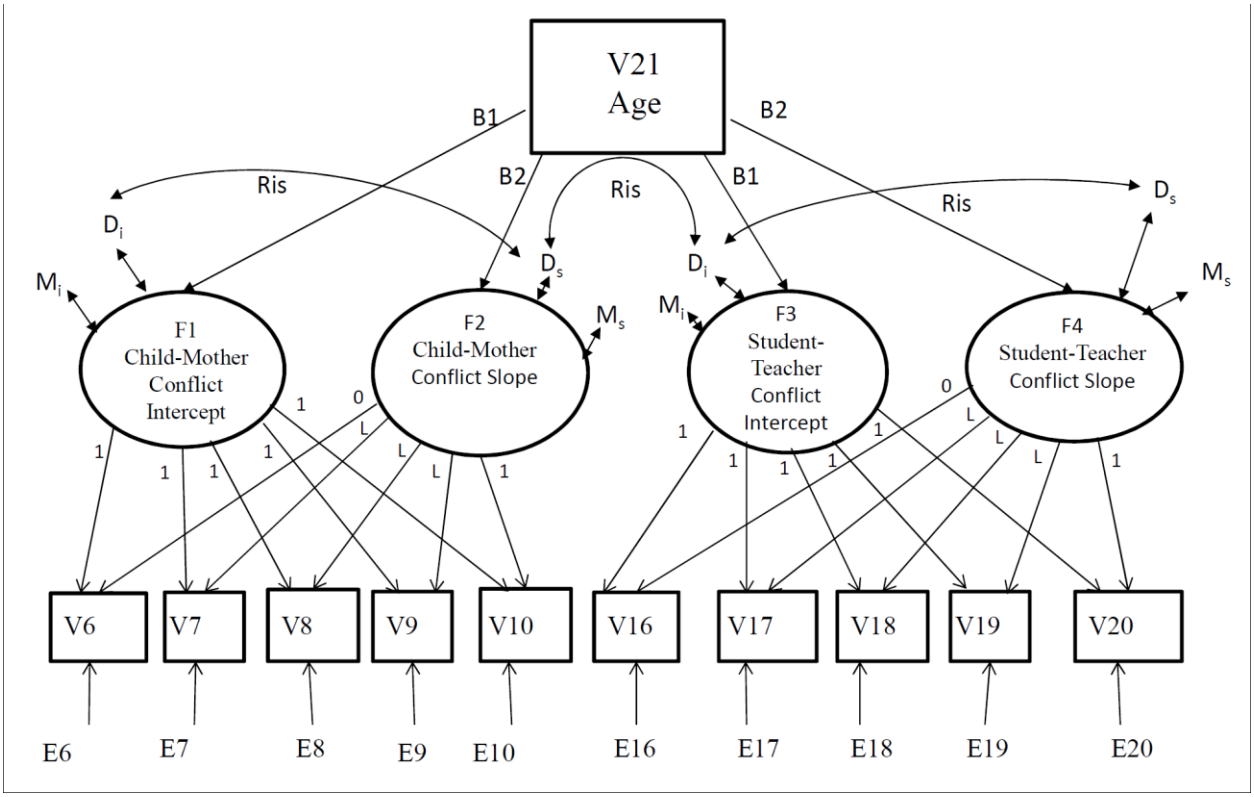
Note. V21 = Age of Child. B(1-2) = Regression Coefficients. R_{is} = Covariance between D_i and D_s. D_i = Intercept variance. D_s = Slope variance. M_i = Mean of the intercept. M_s = Mean of the slope. F1 = Child-Mother Closeness Intercept. F2 = Child-Mother Closeness Slope. V(1-5) = Measured variables at 5 time points: kindergarten, first, third, fourth and fifth grades. E(1-5) = Measurement error at 5 time points: kindergarten, first, third, fourth and fifth grades. Arrows from F1 to V(1-5) = Intercept constants with value of 1. Arrow from F2 to V1 = Initial slope constraint (0). Arrow from F2 to V5 = Final slope constraint (1). Arrows labeled "L" from F2 to V2, V3 and V4 = Slope factors left free to vary. F3 = Student-Teacher Closeness Intercept. F4 = Student-Teacher Closeness Slope. V(11-15) = Measured variables at 5 time points: kindergarten, first, third, fourth and fifth grades. E(11-15) = Measurement error at 5 time points: kindergarten, first, third, fourth and fifth grades. Arrows from F3 to V(11-15) = Intercept constants with value of 1. Arrow from F4 to V11 = Initial slope constraint (0). Arrow from F4 to V15 = Final slope constraint (1). Arrows labeled "L" from F4 to V12, V13, and V14 = slope factors left free to vary (see Appendix G for definition of terms).

Proposed Factor of Curves Model 2

A second factor of curves model could be estimated as in Figure 14. Again in this model, age could be used as a static exogenous predictor of change. The advantage would be that age could also be used to identify developmental milestones in conflict between children and their mothers and teachers. This would add to the insight into the complex behavioral outcomes of child-mother and student-teacher relationships.

Figure 14

Child-Mother and Student-Teacher Conflict with Age as a Static Predictor. Associative Multivariate Latent Growth Curve Model



Note. V21 = Age of Child. B(1-2) = Regression Coefficients. R_{is} = Covariance between D_i and D_s. D_i = Intercept variance. D_s = Slope variance. M_i = Mean of the intercept. M_s = Mean of the slope. F1 = Child-Mother Conflict Intercept. F2 = Child-Mother Conflict Slope. V(6-10) = Measured variables at 5 time points: kindergarten, first, third, fourth and fifth grades. E(6-10) = Measurement error at 5 time points: kindergarten, first, third, fourth and fifth grades. Arrows from F1 to V(6-10) = Intercept constants with value of 1. Arrow from F2 to V6 = Initial slope constraint (0). Arrow from F2 to V10 = Final slope constraint (1). Arrows labeled "L" from F2 to V7, V8 and V9 = Slope factors left free to vary. F3 = Student-Teacher Conflict Intercept. F4 = Student-Teacher Conflict Slope. V(16-20) = Measured variables at 5 time points: kindergarten, first, third, fourth and fifth grades. E(16-20) = Measurement error at 5 time points: kindergarten, first, third, fourth and fifth grades. Arrows from F3 to V(16-20) = Intercept constants with value of 1. Arrow from F4 to V16 = Initial slope constraint (0). Arrow from F4 to V20 = Final slope constraint (1). Arrows labeled "L" from F4 to V17, V18, and V19 = slope factors left free to vary (see Appendix G for definition of terms).

Chapter Summary

Throughout the history of research and theory on child development, both the family of origin and the environment that interacts with the child have continually been central to the understanding of how children learn and grow. More recently, the transactional interrelationships between children and the people they interact with have been recognized as a critical component in understanding the development of children. This component is the foundation for establishing interventions to influence a child's world and support the most positive outcomes for a child. Research methodology in this area has tended to follow the predominant theory of the time. The complexity of child development has been difficult to capture using traditional statistical methods that assumed linear change over even several time points. Current transactional theory necessitates the use of longitudinal and complex but flexible approaches, such as latent growth curve modeling (LGCM). Latent growth curve modeling allows for many individual trajectories to determine the overall shape of growth over time, and permits interpretation in a linear or nonlinear pattern.

The current research was unusual due to the inclusion of five time points following the same children and mothers, and teachers. Examining child-mother and student-teacher closeness and conflict from kindergarten to fifth grade yielded important information about the transactional and dynamic relationships between dyads over time. In the data set utilized in the current study, children's relationships tended to begin high in closeness with both groups of adults, then decreased over time. Those children whose mothers were high in involvement with their teachers in kindergarten tended to lose less closeness with subsequent teachers through fifth grade. Those children whose mothers were lower in involvement with their teachers in kindergarten tended to lose closeness at a higher rate with subsequent teachers through fifth

grade. Although closeness decreased from kindergarten to fifth grade with both mothers and teachers, the level of parental involvement with the teacher accounted for the rate of decrease.

When considering the levels of conflict between children and their teachers and mothers, additional trends of importance were found. Although mothers and teachers tended to report lower conflict with children in kindergarten and first grade, conflict increased for both mothers and teachers at the third grade year. Conflict then plateaued for the teachers and dropped for mothers in fourth grade before increasing again in fifth grade. When parental involvement with the teacher was factored in, involvement was found to decrease over time as conflict increased.

The current findings were designed as an initial step in using latent growth curve modeling to examine the relationships between children and mothers, and students and teachers, from kindergarten to fifth grade. Given the complexity of the theories of child development across the home and school influences in a child's life, this method of analysis was optimal to begin to explore how the theories translate into evidence-based practice. Persons who work with families, whether in the schools, community, or private sector, could benefit from the results. The results include the documentation of longitudinal patterns of the child-mother and student-teacher parallel relationships as future researchers as well as professionals who work with children seek to understand, explain, and then develop evidence-based intervention programs such as family systems intervention (Lueder, 2005). Best practices may be advanced with research such as the current study, as well as the future avenues for research proposed. The goal of all research pertaining to children and their relationships within the home and school is to develop evidence-based practices that unite the two driving forces of child-parent and student-teacher relationships in a child's life to support optimal outcomes for all children as they grow.

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APPENDIX A

INSTITUTIONAL REVIEW BOARD APPROVAL

UNIVERSITY OF
NORTHERN COLORADO

Institutional Review Board

DATE:	November 16, 2018
TO:	Karyn Poole
FROM:	University of Northern Colorado (UNCO) IRB
PROJECT TITLE:	[1345354-1] Latent Growth Curve Modeling of Parent/Child and Teacher/Child Relationships from Kindergarten to Fifth Grade
SUBMISSION TYPE:	New Project
ACTION:	APPROVAL/VERIFICATION OF EXEMPT STATUS
DECISION DATE:	November 16, 2018
EXPIRATION DATE:	November 16, 2022

Thank you for your submission of New Project materials for this project. The University of Northern Colorado (UNCO) IRB approves this project and verifies its status as EXEMPT according to federal IRB regulations.

Best wishes with this verified/approved exempt IRB application to use existing data for the purposes of the research described.

Sincerely,

Dr. Megan Stellino, UNC IRB Co-Chair

We will retain a copy of this correspondence within our records for a duration of 4 years.

If you have any questions, please contact Nicole Morse at 970-351-1910 or nicole.morse@unco.edu. Please include your project title and reference number in all correspondence with this committee.

This letter has been electronically signed in accordance with all applicable regulations, and a copy is retained within University of Northern Colorado (UNCO) IRB's records.

APPENDIX B

CHILD-PARENT RELATIONSHIP SCALE

CHILD-PARENT RELATIONSHIP SCALE

Robert C. Pianta

Child:_____ Age:_____

Parent:_____

Please reflect on the degree to which each of the following statements currently applies to your relationship with your child. Using the scale below, circle the appropriate number for each item.

Definitely does not apply 1	Not really 2	Neutral, not sure 3	Applies somewhat 4	Definitely applies 5

1.	I share an affectionate, warm relationship with my child.	1	2	3	4	5
2.	My child and I always seem to be struggling with each other.	1	2	3	4	5
3.	If upset, my child will seek comfort from me.	1	2	3	4	5
4.	My child is uncomfortable with physical affection or touch from me.	1	2	3	4	5
5.	My child values his/her relationship with me.	1	2	3	4	5
6.	My child appears hurt or embarrassed when I correct him/her.	1	2	3	4	5
7.	My child does not want to accept help when he/she needs it.	1	2	3	4	5
8.	When I praise my child, he/she beams with pride.	1	2	3	4	5
9.	My child reacts strongly to separation from me.	1	2	3	4	5
10.	My child spontaneously shares information about himself/herself.	1	2	3	4	5
11.	My child is overly dependent on me.	1	2	3	4	5
12.	My child easily becomes angry at me.	1	2	3	4	5
13.	My child tries to please me.	1	2	3	4	5
14.	My child feels that I treat him/her unfairly.	1	2	3	4	5
15.	My child asks for my help when he/she really does not need help.	1	2	3	4	5
16.	It is easy to be in tune with what my child is feeling.	1	2	3	4	5
17.	My child sees me as a source of punishment and criticism.	1	2	3	4	5
18.	My child expresses hurt or jealousy when I spend time with other children.	1	2	3	4	5
19.	My child remains angry or is resistant after being disciplined.	1	2	3	4	5
20.	When my child is misbehaving, he/she responds to my look or tone of voice.	1	2	3	4	5
21.	Dealing with my child drains my energy.	1	2	3	4	5
22.	I've noticed my child copying my behavior or ways of doing things.	1	2	3	4	5
23.	When my child is in a bad mood, I know we're in for a long and difficult day.	1	2	3	4	5
24.	My child's feelings toward me can be unpredictable or can change suddenly.	1	2	3	4	5
25.	Despite my best efforts, I'm uncomfortable with how my child and I get along.	1	2	3	4	5
26.	I often think about my child when at work.	1	2	3	4	5
27.	My child whines or cries when he/she wants something from me.	1	2	3	4	5
28.	My child is sneaky or manipulative with me.	1	2	3	4	5
29.	My child openly shares his/her feelings and experiences with me.	1	2	3	4	5
30.	My interactions with my child make me feel effective and confident as a parent.	1	2	3	4	5

APPENDIX C

STUDENT-TEACHER RELATIONSHIP SCALE

STRS Student-Teacher Relationship Scale™ Response Form

Teacher's name _____ Gender: M F Ethnicity ____ Date / /

Child's name _____ Grade Gender: M F Ethnicity Age

Please reflect on the degree to which each of the following statements currently applies to your relationship with this child. Using the point scale below, CIRCLE the appropriate number for each item. If you need to change your answer, DO NOT ERASE! Make an X through the incorrect answer and circle the correct answer.

1 Definitely does not apply	2 Does not really apply	3 Neutral, not sure	4 Applies somewhat	5 Definitely applies

1.	I share an affectionate, warm relationship with this child.	1	2	3	4	5
2.	This child and I always seem to be struggling with each other.	1	2	3	4	5
3.	If upset, this child will seek comfort from me.	1	2	3	4	5
4.	This child is uncomfortable with physical affection or touch from me.	1	2	3	4	5
5.	This child values his/her relationship with me.	1	2	3	4	5
6.	This child appears hurt or embarrassed when I correct him/her.	1	2	3	4	5
7.	When I praise this child, he/she beams with pride.	1	2	3	4	5
8.	This child reacts strongly to separation from me.	1	2	3	4	5
9.	This child spontaneously shares information about himself/herself.	1	2	3	4	5
10.	This child is overly dependent on me.	1	2	3	4	5
11.	This child easily becomes angry with me.	1	2	3	4	5
12.	This child tries to please me.	1	2	3	4	5
13.	This child feels that I treat him/her unfairly.	1	2	3	4	5
14.	This child asks for my help when he/she really does not need help.	1	2	3	4	5
15.	It is easy to be in tune with what this child is feeling.	1	2	3	4	5
16.	This child sees me as a source of punishment and criticism.	1	2	3	4	5
17.	This child expresses hurt or jealousy when I spend time with other children.	1	2	3	4	5
18.	This child remains angry or is resistant after being disciplined.	1	2	3	4	5
19.	When this child is misbehaving, he/she responds well to my look or tone of voice.	1	2	3	4	5
20.	Dealing with this child drains my energy.	1	2	3	4	5
21.	I've noticed this child copying my behavior or ways of doing things.	1	2	3	4	5
22.	When this child is in a bad mood, I know we're in for a long and difficult day.	1	2	3	4	5
23.	This child's feelings toward me can be unpredictable or can change suddenly.	1	2	3	4	5
24.	Despite my best efforts, I'm uncomfortable with how this child and I get along.	1	2	3	4	5
25.	This child whines or cries when he/she wants something from me.	1	2	3	4	5
26.	This child is sneaky or manipulative with me.	1	2	3	4	5
27.	This child openly shares his/her feelings and experiences with me.	1	2	3	4	5
28.	My interactions with this child make me feel effective and confident.	1	2	3	4	5

APPENDIX D

RESTRICTED DATA USE AGREEMENT FOR RESTRICTED DATA FROM THE INTER-UNIVERSITY CONSORTIUM FOR POLITICAL AND SOCIAL RESEARCH

Restricted Data Use Agreement for Restricted Data from the Inter-university Consortium for Political and Social Research (ICPSR)
Page 1 of 9

Restricted Data Use Agreement
for Restricted Data from
the Inter-university Consortium
for Political and Social Research (ICPSR)

I. Definitions

A. "Investigator" is the person primarily responsible for conducting the research or statistical activities relative to the Research Description of the Online Application (the "Research Description"), or supervising the individuals conducting the research or statistical activities relative to the Research Description, for which Restricted Data are obtained through this Agreement.

B. "Research Staff" are all persons at the Investigator's Institution, excluding the Investigator, who will have access to Restricted Data obtained through this Agreement, including students, other faculty and researchers, staff, agents, or employees for which Institution accepts responsibility.

C. "Institution" is the university or research institution at which the Investigator will conduct research using Restricted Data obtained through this Agreement.

D. "Representative of the Institution" is a person authorized to enter into binding legal agreements on behalf of Investigator's Institution.

E. "Restricted Data" are the research dataset(s) provided under this Agreement that include potentially identifiable information in the form of indirect identifiers that if used together within the dataset(s) or linked to other dataset(s) could lead to the re-identification of a specific Private Person, as well as information provided by a Private Person under the expectation that the information would be kept confidential and would not lead to harm to the Private Person. Restricted Data includes any Derivatives.

F. "Private Person" means any individual (including an individual acting in an official capacity) and any private (i.e., non-government) partnership, corporation, association, organization, community, tribe, sovereign nation, or entity (or any combination thereof), including family, household, school, neighborhood, health service, or institution from which the Restricted Data arise or were derived, or which are related to a Private Person from which the Confidential Information arise or were derived.

G. "ICPSR" is the Inter-university Consortium for Political and Social Research.

H. "Online Application" includes all information entered into the ICPSR web-based data access request system, including Investigator information, Research Staff information, Research Description, Data Selection specifying which files and documentation are requested, Confidentiality Pledge signed by the Investigator, Supplemental Agreement and Confidentiality Pledge signed by each Research Staff, Data Security Plan, and a copy of a document signed by the Institution's Institutional Review Board (IRB), or equivalent, approving or exempting the research project.

I. "Data Security Plan" is a component of the Agreement which specifies permissible computer configurations for use of Restricted Data and records what the Investigator commits to do in order to keep Restricted Data secure.

J. "Deductive Disclosure" is the discerning of a Private Person's identity or confidential information through the use of characteristics about that Private Person in the Restricted Data. Disclosure risk is present if an unacceptably narrow estimation of a Private Person's confidential information is possible or if determining the exact attributes of the Private Person is possible with a high level of confidence.

K. "Derivative" is a file or statistic derived from the Restricted Data that poses disclosure risk to any Private Person in the Restricted Data obtained through this Agreement. Derivatives include copies of the Restricted Data received from ICPSR, subsets of the Restricted Data, and analysis results that do not conform to the guidelines in Section VI.F.

II. Responsibility to Address Disclosure Risk

Deductive Disclosure of a Private Person's identity from research data is a major concern of federal agencies, researchers, and Institutional Review Boards. Investigators and Institutions who receive any portion of Restricted Data are obligated to protect the Restricted Data from Deductive Disclosure risk, non-authorized use, and attempts to identify any Private Person by strictly adhering to the obligations set forth in this Agreement.

III. Requirements of Investigator

A. The Investigator assumes the responsibility of completing the Online Application and any other required documents, reports, and amendments.

B. The Investigator agrees to manage and use Restricted Data, implement all Restricted Data security procedures per the Data Security Plan, and ensure that all Research Staff understand their requirements per this Agreement and follow the Data Security Plan.

C. Investigators must meet each of the following criteria:

1. Have a PhD or other research-appropriate terminal degree; and
2. Hold a faculty appointment or have an appointment that is eligible to be a principal investigator at Institution.

IV. Requirements of Institution

The Institution represents that it is:

A. An institution of higher education, a research organization, a research arm of a government agency, or a nongovernmental, not-for-profit, agency.

B. Not currently debarred or otherwise restricted in any manner from receiving information of a sensitive, confidential, or private nature under any applicable laws, regulations, or policies.

C. Have a demonstrated record of using sensitive data according to commonly accepted standards of research ethics and applicable statutory requirements.

V. Obligations of ICPSR

In consideration of the promises made in Section VI of this Agreement, and upon receipt of a complete and approved Online Application, ICPSR agrees to:

A. Provide the Restricted Data requested by the Investigator in the Restricted Data Order Summary within a reasonable time of execution of this Agreement by Institution and to make the Restricted Data available to Investigator via download or removable media.

B. Provide electronic documentation of the origins, form, and general content of the Restricted Data sent to the Investigator, in the same time period and manner as the Restricted Data.

ICPSR MAKES NO REPRESENTATIONS NOR EXTENDS ANY WARRANTIES OF ANY KIND, EITHER EXPRESSED OR IMPLIED. THERE ARE NO EXPRESS OR IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, OR THAT THE USE OF THE RESTRICTED DATA WILL NOT INFRINGE ANY PATENT, COPYRIGHT, TRADEMARK, OR OTHER PROPRIETARY RIGHTS. Unless prohibited by law, Institution assumes all liability for claims for damages against them by third parties that may arise from the use, storage, disposal, or disclosure by the Institution of the Restricted Data, except to the extent and in proportion such liability or damages arise from the negligence of ICPSR.

VI. Obligations of the Investigator, Research Staff, and Institution

Restricted Data provided under this Agreement shall be held by the Investigator, Research Staff, and Institution in strictest confidence and can be used or disclosed only in compliance with the terms of this Agreement. In consideration of the promises in Section V of this Agreement, and for use of Restricted Data from ICPSR, the Institution agrees:

A. That the Restricted Data will be used solely for research or statistical purposes relative to the project as identified in the Research Description of the Online Application (the "Research Description"), and for no other purpose whatsoever without the prior written consent of ICPSR. Further, no attempt will be made to identify Private Person(s), no Restricted Data of Private Person(s) will be published or otherwise distributed, the Restricted Data will be protected against Deductive Disclosure risk by strictly adhering to the obligations set forth in this Agreement, and precautions will be taken to protect the Restricted Data from non-authorized use.

B. To comply fully with the approved Data Security Plan at all times relevant to this Agreement.

C. That no persons other than those identified in this Agreement or in subsequent amendments to this Agreement, as Investigator or Research Staff and who have signed this Agreement or a Supplemental Agreement, be permitted access to the contents of Restricted Data files or any Derivatives from the Restricted Data.

D. That within five (5) business days of becoming aware of any unauthorized access, use, or disclosure of Restricted Data, or access, use, or disclosure of Restricted Data that is inconsistent with the terms and conditions of this Agreement, the unauthorized or inconsistent access, use, or disclosure of Restricted Data will be reported in writing to ICPSR.

E. That, unless prior specific, written approval is received from ICPSR, no attempt under any circumstances will be made to link the Restricted Data to any Private Person, whether living or deceased, or with any other dataset, including other datasets provided by ICPSR.

F. To avoid inadvertent disclosure of Private Persons by being knowledgeable about what factors constitute disclosure risk and by using disclosure risk guidelines, such as but not limited to, the following guidelines[1] in the release of statistics or other content derived from the Restricted Data.[2]

1. No release of a sample unique for which only one record in the Restricted Data provides a certain combination of values from key variables.
2. No release of a sample rare for which only a small number of records (e.g., 3, 5, or 10 depending on sample characteristics) in the Restricted Data provide a certain combination of values from key variables. For example, in no instance should the cell frequency of a cross-tabulation, a total for a row or column of a cross-tabulation, or a quantity figure be fewer than the appropriate threshold as determined from the sample characteristics. In general, assess empty cells and full cells for disclosure risk stemming from sampled records of a defined group reporting the same characteristics.
3. No release of the statistic if the total, mean, or average is based on fewer cases than the appropriate threshold as determined from the sample characteristics.
4. No release of the statistic if the contribution of a few observations dominates the estimate of a particular cell. For example, in no instance should the quantity figures be released if one case contributes more than 60 percent of the quantity amount.
5. No release of data that permits disclosure when used in combination with other known data. For example, unique values or counts below the appropriate threshold for key variables in the Restricted Data that are continuous and link to other data from ICPSR or elsewhere.
6. No release of minimum and maximum values of identifiable characteristics (e.g., income, age, household size, etc.) or reporting of values in the "tails," e.g., the 5th or 95th percentile, from a variable(s) representing highly skewed populations.

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[1] For more information, see the U.S. Bureau of the Census checklist. *Supporting Document Checklist on Disclosure Potential of Data, at http://*www.census.gov/srd/sdc/S14-1_v1.3_Checklist.doc; *NCHS Disclosure Potential Checklist* at http:// http://www.cdc.gov/nchs/data/nchs_microdata_release_policy_4-02A.pdf; and *FCSM Statistical Policy Working Paper 22 (Second Version, 2005)* at http:// http://www.hhs.gov/sites/default/files/spwp22.pdf

[2] If disclosure review rules were established for a specific Restricted Dataset, they will be included in the dataset's documentation and are covered by this Agreement.

7. No release of ANOVAs and regression equations when the analytic model that includes categorical covariates is saturated or nearly saturated. In general, variables in analytic models should conform to disclosure rules for descriptive statistics (e.g., see #6 above).
8. In no instance should data on an identifiable case, or any of the kinds of data listed in preceding items 1-7, be derivable through subtraction or other calculation from the combination of tables released.
9. No release of sample population information or characteristics in greater detail than released or published by the researchers who collected the Restricted Data. This includes but is not limited to publication of maps.
10. No release of anecdotal information about a specific Private Person(s) or case study without prior written approval.
11. The above guidelines also apply to charts as they are graphical representations of cross-tabulations. In addition, graphical outputs (e.g., scatterplots, box plots, plots of residuals) should adhere to the above guidelines.

G. That if the identity of any Private Person should be discovered, then:
   1. No use will be made of this knowledge;
   2. ICPSR will be advised of the incident within five (5) business days of discovery of the incident;
   3. The information that would identify the Private Person will be safeguarded or destroyed as requested by ICPSR; and
   4. No one else will be informed of the discovered identity.

H. Unless other provisions have been made with ICPSR, all originals and copies of the Restricted Data, on whatever media, shall be destroyed on or before completion of this Agreement or within 5 days of written request from ICPSR. Investigator will complete and notarize an Affidavit of Destruction, attesting to the destruction of the Restricted Data. Investigators requiring the Restricted Data beyond the completion of this Agreement should submit a request for continuation three months prior to the end date of the agreement. This obligation of destruction shall not apply to Investigator's scholarly work based upon or that incorporates the Restricted Data.

I. That any books, articles, conference papers, theses, dissertations, reports, or other publications that employed the Restricted Data or other resources provided by ICPSR reference the bibliographic citation provided by ICPSR and be reported to ICPSR for inclusion in its data-related bibliography.

J. To provide annual reports to ICPSR staff (through ICPSR's online data access request system), which include:
   1. A copy of the annual IRB approval for the project described in the Research Description;
   2. A listing of public presentations at professional meetings using results based on the Restricted Data or Derivatives or analyses thereof;
   3. A listing of papers accepted for publication using the Restricted Data, or Derivatives or analyses thereof, with complete citations;

4. A listing of Research Staff using the Restricted Data, or Derivatives or analyses thereof, for dissertations or theses, the titles of these papers, and the date of completion; and
5. Update on any change in scope of the project as described in the Research Description.

K. To notify ICPSR of a change in institutional affiliation of the Investigator, a change in institutional affiliation of any Research Staff, or the addition or removal of Research Staff on the research project. Notification must be in writing and must be received by ICPSR at least six (6) weeks prior to the last day of employment with Institution. Notification of the addition or removal of Research Staff on the research project shall be provided to ICPSR as soon as reasonably possible. Investigator's separation from Institution terminates this Agreement.

L. Upon Investigator's change in institutional affiliation, all electronic and paper Restricted Data will be securely destroyed with a notarized affidavit of destruction submitted to ICPSR. ICPSR will, at the request and cost of Investigator, store these files and transfer them to Investigator's new Institution upon submission and approval of an Online Application by the new Institution. Although the Restricted Data will be stored in a secure location, ICPSR assumes no responsibility for the Restricted Data or associated files and Institution and Investigator shall not be liable for any damages arising from any suits or claims arising from the storage of the Restricted Data or associated files by ICPSR. ICPSR makes no guarantees and provides no warranty that the exact same Restricted Data or associated files can be or will be provided to Investigator after such storage, or that any files or Restricted Data forwarded to Investigator after such storage will be free from defect or fit for any particular purpose.

M. That use of the Restricted Data will be consistent with the Institution's policies regarding scientific integrity and human subject's research.

N. To respond fully and in writing within ten (10) working days after receipt of any written inquiry from ICPSR regarding compliance with this Agreement.

VII. Violations of this Agreement

A. The Institution will investigate allegations by ICPSR or other parties of violations of this Agreement in accordance with its policies and procedures on scientific integrity and misconduct. If the allegations are confirmed, the Institution will treat the violations as it would violations of the explicit terms of its policies on scientific integrity and misconduct.

B. In the event of a breach of any provision of this Agreement, Institution shall be responsible to promptly cure the breach and mitigate any damages. The Institution hereby acknowledges that any breach of the confidentiality provisions herein may result in irreparable harm to ICPSR not adequately compensable by money damages. Institution hereby acknowledges the possibility of injunctive relief in the event of breach, in addition to money damages. In addition, ICPSR may:

1. Terminate this Agreement upon notice and require return of the Restricted Data and any derivatives thereof;
2. Deny Investigator future access to Restricted Data; and/or

3. Report the inappropriate use or disclosure to the appropriate federal and private agencies or foundations that fund scientific and public policy research.
4. Such other remedies that may be available to ICPSR under law or equity, including injunctive relief.

C. Institution agrees, to the extent not prohibited under applicable law, to indemnify the Regents of the University of Michigan from any or all claims, losses, causes of action, judgments, damages, and expenses arising from Investigator's, Research Staff's, and/or Institution's use of the Restricted Data, except to the extent and in proportion such liability or damages arose from the negligence of the Regents of the University of Michigan. Nothing herein shall be construed as a waiver of any immunities and protections available to Institution under applicable law.

D. In the event of a violation, the Investigator must:
1. Notify ICPSR within five (5) business days;
2. Stop work with the Restricted Data immediately;
3. Submit a notarized affidavit acknowledging the violation to ICPSR;
4. Inform the Representative of Institution of the violation and review security protocols and disclosure protections with them.
   i. The Representative of Investigator's Institution must submit an acknowledgment of the violation and security protocols and disclosure protections review to ICPSR; and
5. Reapply for access to the Restricted Data.

VIII. Confidentiality

To the extent the Restricted Data are subject to a Certificate of Confidentiality, the Institution is considered to be a contractor or cooperating agency of ICPSR; as such, the Institution, the Investigator, and Research Staff are authorized to protect the privacy of the individuals who are the subjects of the Restricted Data by withholding their identifying characteristics from all persons not connected with the conduct of the Investigator's research project. "Identifying characteristics" are considered to include those data defined as confidential under the terms of this Agreement.

IX. Incorporation by Reference

All parties agree that the information entered into the Online Application, including the Data Security Plan, IRB approval, and any Supplemental Agreements and Confidentiality Pledges, are incorporated into this Agreement by reference.

X. Miscellaneous

A. All notices, contractual correspondence, and return of Restricted Data under this Agreement on behalf of the Investigator shall be made in writing and delivered to the address below:

Attn: DSDR
ICPSR
P.O. Box 1248
Ann Arbor, MI 48106-1248
-or-
DSDR-restricted-data@umich.edu

B. This agreement shall be effective for 24 months from execution or until the IRB expires.

C. The respective rights and obligations of ICPSR and Investigator, Research Staff, and Institution pursuant to this Agreement shall survive termination of the Agreement.

D. This Agreement and any of the information and materials entered into the Online Application may be amended or modified only by the mutual written consent of the authorized representatives of ICPSR and Investigator and Institution. Both parties agree to amend this Agreement to the extent necessary to comply with the requirements of any applicable regulatory authority.

E. The Representative of the Institution signing this Agreement has the right and authority to execute this Agreement, and no further approvals are necessary to create a binding agreement.

F. The obligations of Investigator, Research Staff, and Institution set forth within this Agreement may not be assigned or otherwise transferred without the express written consent of ICPSR.

Restricted Data Use Agreement for Restricted Data from the Inter-university Consortium for Political and Social Research (ICPSR)
Page 9 of 9

Investigator and Institutional Signatures

Read and Acknowledged by:

Investigator		**Institutional Representative**	
SIGNATURE	DATE	SIGNATURE	DATE
NAME TYPED OR PRINTED		NAME TYPED OR PRINTED	
TITLE		TITLE	
INSTITUTION		INSTITUTION	
BUILDING ADDRESS		BUILDING ADDRESS	
STREET ADDRESS		STREET ADDRESS	
CITY, STATE ZIP		CITY, STATE ZIP	
EMAIL		EMAIL	

APPENDIX E

DATA SECURITY PLAN FOR THE USE OF RESTRICTED-USE DATA

Data Security Plan for the Use of Restricted-Use Data through the VDE from the Data Sharing for Demographic Research (DSDR) Project through the Regents of the University of Michigan, on behalf of its Inter-University Consortium for Social and Political Research (ICPSR)

Data Security Plan for the Use of Restricted-Use
Data through the VDE from
the Data Sharing for Demographic Research
(DSDR) Project through the Regents of the
University of Michigan, on behalf of its Inter-University
Consortium for Social and Political Research (ICPSR)

Please check each statement to affirm. If affirmation is not possible, explain why in the section, "Requests for alternative specification"; requests will be reviewed and may not be approved.

"The client computer" refers to the computer that accesses restricted-use data.

Client Computer location

- ☐ The client computer will be located in the following location that includes an office with a door:

  _____

  _____

  _____

- ☐ The location of the client computer will be restricted to the above, specified location; arbitrary locations are not allowed.
- ☐ While accessing the restricted-use data, the office door will be closed.
- ☐ All individuals who share the office will sign a confidentiality pledge.
- ☐ If a guest or student who did not sign the confidentially pledge is in the office, the restricted-use data will not be accessed.
- ☐ The client computer's monitor will be positioned to minimize the possibility that others could see the screen.

Data Security Plan for the Use of Restricted-Use Data through the VDE from the Data Sharing for Demographic Research (DSDR) Project through the Regents of the Universit of Michigan, on behalf of its Inter-University Consortium for Social and Political Research (ICPSR)

Client Computer

- ☐ The client computer has a currently supported Operating System:
  - ☐ Microsoft Windows Version 8 or higher
  - ☐ OS X Version 10.12 or higher
  - ☐ Ubuntu Version 16.04 or higher
  - ☐ RHEL Version 7 or higher
  - ☐ Other:_____
- ☐ Guest logins to the computer will be disabled.
- ☐ Only computer accounts for authorized users will be enabled.
- ☐ Computer account credentials will not be shared.
- ☐ The computer screen will automatically lock after 12 minutes of inactivity.
- ☐ Users will manually lock the screen when leaving the computer temporarily unattended.

Semi-annual audit

- ☐ The Restricted Data Investigator or designated person will conduct semi-annual checks of adherence to security protocols.

Request for alternative (if line unchecked):

_____
_____
_____

_____ _____
Signature Date

_____
Name typed or printed

_____
Title

APPENDIX F

PLEDGE OF CONFIDENTIALITY FOR THE USE OF RESTRICTED-USE DATA

Pledge of Confidentiality
for the Use of Restricted-Use Data from the
Data Sharing for Demographic Research
(DSDR) Project through the Regents of the
University of Michigan, through its Inter-
university Consortium for Political and Social
Research (ICPSR)

By virtue of my affiliation with this research project I have access to Confidential Data identified in this Agreement. I understand that access to this Confidential Data carries with it a responsibility to guard against unauthorized use and to abide by the Data Security Plan. To treat information as confidential means to not divulge it to anyone who is not a party to the Agreement for the Use of Confidential Data, or cause it to be accessible to anyone who is not a party to that Agreement.

I agree to fulfill my responsibilities on this research project in accordance with the following guidelines:

1. I agree not to permit Confidential Data access to anyone not a party to the Agreement for the Use of Confidential Data, in either electronic or paper copy.

2. I agree to not attempt to identify private persons as defined in the Agreement for the Use of Confidential Data.

3. I agree that in the event an identity of any private person is discovered inadvertently, I will (a) make no use of this knowledge, (b) report the incident to ICPSR, (c) safeguard or destroy the information after consultation with ICPSR, and (d) not inform any other person of the discovered identity.

_____
Signature Date

_____
Name typed or printed

_____
Title

APPENDIX G

DEFINITIONS OF TERMS IN FIGURES

DEFINITIONS OF TERMS IN FIGURES

CHAPTER

III. METHODOLOGY

Figures 1 through 4.	Preliminary Unspecified Models
0(on slopes)	Set time scale beginning at 0
1(on intercepts)	A constant “starting point” for any individual across time
1(on slopes)	Set time scale to a proportion from 0 to 1
D_i	Variance of latent intercepts
D_s	Variance of latent slopes
E(1-20)	Error in measurement in observed variables
F(1-2)	Latent (unobserved) variables
L(on slopes)	Free to vary as estimated by data
M_i	Mean of latent intercepts
M_s	Mean of latent slopes
Ris	Covariance between latent variables
V(1-5)	A child-parent closeness subscale of an observed variable
V(6-10)	A child-parent conflict subscale of an observed variable
V(11-15)	A student-teacher closeness subscale of an observed variable
V(16-20)	A student-teacher conflict subscale of an observed variable

CHAPTER

IV. RESULTS

Figures 5 through 8.	Final models
i	Intercept
mkclo	Mother-Kindergarten-Closeness
m (1-5)clo	Mother-(First through Fifth) Grade-Closeness
mkconf	Mother-Kindergarten-Conflict
m(1-5)conf	Mother-(First through Fifth) Grade-Conflict
pi (1-5)	Parental Involvement, Grades 1, 3, 4, 5
q	Quadratic
s	Slope
tkclo	Teacher-Kindergarten-Closeness
t(1-5)clo	Teacher-First through Fifth Grade-Closeness
tkconf	Teacher-Kindergarten-Conflict
t(1-5)conf	Teacher-First through Fifth Grade-Conflict

V. DISCUSSION AND CONCLUSIONS

All terms used in Chapter V figures are the same as those shown above in this Appendix for Chapter III figures except for these additional terms:

B(1-2)	Regression coefficients
V21	Age of child