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THE CHALLENGE OF THE FAMILY-SYSTEM OUTCOME MEDIATOR:
Using Multiple Family-Member Perspectives in a Confirmatory Evaluation Model
of a Family-Based Juvenile Court Diversion Program

A Dissertation

Presented in Partial Fulfillment of the Requirements for
The Degree Doctor of Philosophy in the Graduate
School of the Ohio State University

By

Deborah Wasserman

The Ohio State University
2002

Dissertation Committee:
Dr. Stephen M. Gavazzi, Adviser
Dr. Suzanne Bartle-Haring
Dr. Dawn Anderson-Butcher

Approved by

Dr. Stephen M. Gavazzi
Adviser
Department of Human Development and Family Science
College of Human Ecology
A review of existing evaluations of successful family-based programs revealed that few documented evaluations of family-based programs have demonstrated both improved family functioning and family contribution to reduced problem behaviors. These results can lead program developers to believe that resources focused on family-based interventions are better spent elsewhere.

Insignificant family functioning effect may be due, not to programming, but instead to the method of measurement and data analysis. Family researchers traditionally have utilized models that include either single-perspective variables or single variables calculated from multiple perspectives. Newer technology in the form of easily accessed computer programs for analyzing structural equation models (Cook & Goldstein, 1993; Kenny & Berman, 1980) has created a potentially viable and more accurate alternative in the form of latent variable models with correlated rater error.

The present study explored the potential advantage of utilizing such a model for evaluating a family-based program. Using existing data from a confirmatory family-based program evaluation (Reynolds, 1998), the study compared a model with both multiple perspectives and correlated rater error to more standard models seeking to
determine if the latent variable model would more explicitly reveal family functioning as a mediator of longer term outcomes. Three models were tested against the latent variable model: one with adolescent perspective only, another with parent perspective only, and the third with averaged perspectives.

Results demonstrated that the latent variable model revealed the family functioning variable (perception of family goal agreement) as a mediator far more strongly than the model with adolescent perspective alone and somewhat more strongly than the models with parent or averaged perspectives. The averaged-perspective model worked to establish the mediator only slightly better than the parent-only model. Correlated rater error somewhat tempered the mediating effect of the latent variable. In sum, with this diversion program data, analysis without the latent variable would lead to the conclusion that change in perception of goal agreement was insignificant to program effect. With the latent variable included, perception of goal agreement would emerge as a powerful change agent.

Despite non-parametric data that precluded the use of significance testing, this study demonstrated the importance of utilizing latent-variable models when evaluating family-based programs.
DEDICATION

To my loving and constant husband, Stephen, the engine in my Rolls Royce.

and to our daughter, Luisa who will one day drive her own.
ACKNOWLEDGMENTS

There has never been a more dedicated husband and father than Stephen Canneto. His constant encouragement, love and support for both myself and our daughter have catalyzed this work.

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VITA

December 29, 1954............................... Born - Buffalo, New York

1992 .................................................. B.A. Capital University

2001 - present................................. Evaluation Research Associate, The Center for Learning Excellence, The Ohio State University

1997 - present................................. Director, Persolutions: Program Evaluation and Research Solutions

6/96 - 7/2001................................. Program Coordinator and Research Associate, Growing Up FAST™, The Ohio State University Department of Family Relations and Human Development.

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INTRODUCTION

"... the family, to a greater extent than any other context, influenced the capacity of individuals at all ages to learn and to succeed in other settings, in preschool and school, in the peer group, in higher education and in the workplace, the community, in the nation as a whole." (Bronfenbrenner, 1987, p. xiii)

In the recent history of the study of social phenomena, both research and political opinion have continually identified the family as an important, and possibly the most important (Bronfenbrenner, 1987), contextual factor in child and adolescent behavior (Bailey, McWilliam, Darkes, Hebbeler, Simeonsson, Spiker, and Wagner, 1998; Bazemore, 1995; Bronfenbrenner, 1987, 1994; Dembo et al., 2000; Henggeger, 1996; Howell, 1995; Liddle, Bray, Levant, & Santisteban, 2000). The social services have responded with abundant programming in the form of family support programs for families with young children (Kagan, Powell, Weissbourd & Zigler, 1987; Kagan & Weissbourd, 1994); family-based juvenile delinquency prevention (Bazemore, 1995; Hogue & Liddle, 1999); family preservation, (Schuerman, Rzepnicki, & Littell, 1994;
Wells & Biegel, 1991; Yuan & Rivest 1990), and family therapy. Generally speaking, these programs and interventions seek to reduce problem behaviors by improving family functioning. However, a review of existing evaluations of successful family-based programs reveals that few have demonstrated both improved family functioning and family-contribution to reduced problem behaviors.

Various explanations exist for this lack of evidence for family change as an intermediate step toward longer-term outcome, despite theories that would predict otherwise. Some authors have concluded that family report measures are insufficient (Howard & Kendall, 1996; Walton, 1996). Others have considered that family outcomes are improperly identified and measured (Jones, 1991).

Recent family science advances reveal an alternative explanation: inadequate methods of data analysis fail to account for multiple family-member perspectives. These recent advances have come with the advent of easily accessed computer programs for analyzing structural equation models (Cook & Goldstein, 1993; Kenny & Berman, 1980). Such new models have helped family researchers deal with a long-standing problem: how to measure system-level constructs given reports by multiple family members. Problems with non-independent data and predictably high lack of correlation between family member reports (Cook & Goldstein, 1993; Deal, 1995; Gonzales, Cauce & Mason, 1996) have led researchers to solutions that involve calculating a single variable from the multiple perspectives or utilizing a single perspective. In either case, accuracy is lost.

Structural equation models may provide greater precision by allowing each perspective to remain intact as an indicator of a latent variable. Moreover, unique family
member bias can also be determined and predicted by correlating error terms that are a byproduct of constructing the latent variables. This correlated rater error has been found to be especially helpful in being able to approximate more closely a family trait (Cook & Goldstein, 1993; Kenny & Berman, 1980). Once each individual family member’s propensity to answer questions in a certain way is controlled by correlating error, a more predictable family score emerges. To date, although these newer methods of data analysis are gaining acceptance among family-science researchers (Bartle-Haring & Gavazzi, 1996; Bartle-Haring, Kenny, & Gavazzi, 1999; Day, Gavazzi, & Acock, 2001) no published evaluation studies have utilized them.

The present study explored the potential advantages of utilizing more sophisticated data analysis techniques to measure family-functioning outcomes in family-based program evaluation. The study addressed the question: Does more precise data analysis more firmly establish family-functioning as a mediator of positive long-term outcomes than a model with less precise analysis? More specifically, given existing data from a confirmatory family-based program evaluation, would a model that included both multiple perspectives and correlated rater error would more explicitly reveal family functioning as a mediator than would models without correlated error or multiple perspectives? For demonstration purposes, data from a Confirmatory Program Evaluation (CPE) (method established by Reynolds, 1998) of a family-based juvenile court diversion program was used to explore the question. Three models were tested against the latent variable model: one with adolescent perspective only, another with parent perspective only, and the third with averaged perspectives.
Although this research is based on evaluation data from a family-based program, its purpose is not to evaluate the program (although notes on the program evaluation can be found in Appendix B). Rather, the purpose was to compare methods of data analysis in order to find models that best fit the data and provide the most complete explanation of what the data are telling us about the role of family functioning in program outcome.

In the first chapter of this dissertation, the reader is provided with the rationale for this study, i.e. the background for understanding the problems faced by family-based program evaluators and for understanding why better accommodating for multiple perspectives is a potential solution. This chapter begins with a discussion of family functioning indicators in family-based program logic models. Next described is family functioning measurement theory methodology, and a schema for understanding relative precision of various measurement and analysis approaches is offered. Finally the chapter reviews published family-based program evaluations and family functioning measurement in these evaluations in order to demonstrate that these studies have been conducted and analyzed with limited precision and are therefore of questionable reliability.

The background presented in Chapter One familiarizes the reader with the problem this research addresses: from among family-based programs that have been shown to have successful longer-term impact, the family-functioning variables have seldom emerged as significant mechanisms of change, despite the fact that family-functioning change is integral to the program's logic. These results question the impact of family change on longer-term results and could lead policy makers and funding sources to
question the utility of the family-based aspects of programming. The background presented in Chapter One also sets the stage for the solution this study was designed to explore. A review of how family functioning has been operationalized and measured both by family scientists and family-based program evaluators, prepares the reader to understand how structural equation models with latent variables and correlated error could provide increased precision of evaluation results and therefore help establish family-based programming as integral to the social-service delivery system.

In the second chapter background for understanding the design of this study is provided. Models that account for both multiple perspectives and unique rater bias have been available to family scientists since 1980. The evolution and use of these models is reviewed. Next, to establish sound methodology, studies that have compared models for goodness of fit are reviewed, focusing particularly on those that have compared methods of aggregating multiple family member data.

In chapter three, this study's methodology is reviewed. First, the program from which the data were derived, its demographics, and its logic model is described, followed by an explanation of the variables involved and the instruments used to collect them. Finally the four models, how they were derived and how they were compared are described.

Results of both model fit and parameter estimates of the final models are reported in chapter four. Finally, in chapter five, the implications of the results, limitations of this research and implications for further study are addressed.
CHAPTER 1

RATIONALE FOR THE RESEARCH

The Challenges of Family-Based Program Evaluation

Family-based programming presents particular challenges to evaluators. Although long-term outcomes such as reduced recidivism, reduced teen pregnancy, improved school performance, etc., may be measurable in ways similar to non-family-based programs, measurement of intermediate outcomes of family-based programs, if not more necessary, is more complex. For example, in juvenile delinquency prevention programming, although reduced recidivism may be identified as the long-term outcome for all programs, family programs achieve reduced recidivism by affecting family functioning, defined as a family’s ability to devise strategies to meet family-members’ needs to carry out day-to-day tasks, maintain boundaries, manage emotional climate, and manage system stress (Sabatelli & Bartle, 1995). Measuring family functioning requires unique considerations because of the unique nature of family systems and their measurement. (addressed in depth later in this chapter). Family systems differ from other social systems (e.g. peer groups, or classrooms) because of their unusual distance-
regulation patterns are unique (Broderick, 1993), being extremely sensitive to individual family member exits, entries, and general developmental changes.¹

Contrary to what theory would predict, however, when evaluators have attempted to measure family functioning as a mediator of documented successful longer-term outcomes, the data has often revealed insignificant or mixed results. This phenomenon has occurred across disciplines including family preservation (Feldman, 1991; Jones, 1991; Schuerman et al., 1994; Walton, 1996); family therapy (Howard & Kendall, 1996); and family interventions with juvenile delinquents (Goldstein, et al., 1989; Tolan, Cromwell, and Braswell, 1986). It is possible, however, that evaluations showing little or insignificant family effect may not be due to programming per se, but instead to measurement and analysis methodology.

These insignificant findings of the effect of program on family functioning and in turn, family functioning on the outcome variable, call into question the importance of including family functioning in a program's theoretical model (Day, et al., 2001). As a result, attention (and funding) may become redirected to potentially less effective programming.

¹ Because of its placement on extreme ends of all of four defining continua, the family system is unique among social systems: first, relationships between members are more diffuse than situation-specific, spanning both space and time; second, system rules are more particularistic than universal, varying from member to member depending on membership configuration and relationships; third, social interactions between members are more affective than affect-neutral, sharing of personal feelings is highly appropriate; and fourth, relationships are more ascribed than achieved, with status of relationships existing independently of any voluntary action on the part of system members (Broderick, 1993, p. 54).
Family-functioning constructs (i.e. variables that reflect the family’s ability to create strategies for meeting tasks) are particularly difficult to measure because of the multiple perspectives that constitute them. More specifically, family functioning variables have come to be seen as system-level constructs that reside in no one person alone, nor in one individual perception of the system as a whole (Weinberg, 1975). In recent years, family researchers have made significant advances toward more accurate measurement of family functioning. These researchers have begun to understand the implications of neglecting to take non-independent multiple perspectives of family functioning into consideration. As they discover analytical methods that more realistically reveal patterns of family interaction, they question the validity of even their own prior research (Bartle-Haring & Gavazzi, 1996; Day et al., 2001).

It stands to reason that evaluation findings that have used similar simplistic approaches might also be questioned. To date, family-based program evaluations have relied on these over-simplified analyses, utilizing a single perspective or neglecting to take into account the redundancy of error that occurs when family member perspectives are averaged, multiplied, summed or subtracted. In contrast, the newer methods introduced by Kenny and Berman (1980), utilize structural equation modeling to analyze multiple perspectives in a way that accounts for each family member’s contribution to the perception of outcome while separating each perspective’s non-random measurement error from random error that goes unexplained.

This alternative explanation of error emerges from the covariance of responses within and/or between given perspectives. Covariance between error terms within a
perspective is thought to represent a family member's idiosyncratic way of responding to questions rather than random error in the measurement, while the covariance of error terms between perspectives is thought to represent idiosyncratic ways a family system responds to questions. (Bartle-Haring & Gavazzi, 1996; Bartle-Haring, Kenny, & Gavazzi, 1999; Day, et al., 2001).

Thus, these new techniques may prove to be an important tool for family-based program evaluators. This study sought to discover if the use of new methods of analyzing family data helped to elucidate the role of family-functioning in achieving longer-term program impact. Multiple-perspective data from a family-based court diversion program was used as a basis for comparing the simpler to more complex data analysis methodologies. This research sought to answer the question: Does accounting for multiple perspectives and allowing for the redistribution of error to family member perspectives improve the significance of family functioning as a mediator of program outcome?

As a way of understanding the importance of the research question, this introduction explores in more depth (1) the role of measuring family functioning in family-based program logic models, (2) family-process measurement theory, methodology and recent innovations, and (3) how more sophisticated family-functioning measurement may affect family-based program evaluation.
Family-Based Programming and the Role of Family Functioning Measurement in
Family-Based Program Logic Models

Family context has gained prominence as an important factor in understanding the functioning and progression of human development. In response, family-based social service programming has emerged in many arenas including early childhood education, social work, criminal justice, and counseling. In the arena of early childhood development, for instance, practitioners have wedded family support programs to early childhood education in programming such as Head Start (Kagan, et al., 1989; Kagan & Weissbourd, 1994). In social work, partially in response to the costliness and relative ineffectiveness of institutionalizing children or putting them in foster care, the family preservation movement has begun to explore ways of working with families to keep children at home while preventing future unmanageable behavior (Schuerman, et al., 1994; Wells & Biegel, 1991; Yuan & Rivest, 1990). The juvenile justice system likewise has come to understand the family as an important mediating factor in delinquency (Bazemore, 1995; Howell, 1995). In each of these fields, practitioners and funders seek to both evaluate programs both in terms of their long-term outcome as well as how they operate: i.e. their effect on families and the family's effect on the long-term outcome. In other words, family-based program evaluators need to be concerned about effect on family as a mediator (Baron & Kenny, 1986) of longer term outcomes.

An overview of the challenges evaluators face can be garnered from evaluation studies and discussions within these respective fields. These challenges have involved
first deciding whether to evaluate program impact on family functioning, second, how to
measure changes in family functioning, and third, how to measure if improved family
functioning has affected the targeted long-term behaviors (i.e. family preservation, drug-
alcohol abuse, juvenile delinquency, etc.).

Outside of parenting programs and family therapy per se, family-based programs
generally are not funded or designed to improve family functioning alone; they are
centered in the long run with such outcomes as delinquency prevention, educational
success, child health, etc. Improved family functioning is an intermediate step to these
longer-term outcomes. Program evaluators therefore ask, when is it appropriate to
measure intermediate vs. long-term outcomes?

To a greater or lesser extent, most program evaluations are based on logical
models of how program activities theoretically affect intended outcomes. In their simplest
form, there is an input and an outcome: a program and a result. A more sophisticated
logic model involves intermediate outcomes that serve not only to measure program
effectiveness but also provide feedback for program development. Evaluators of family-based programs have found various ways of dealing with the
question of long-term and intermediate outcomes. Often they have sought an effect on the
long-term outcome only, and if intermediate outcomes were measured, family
functioning wasn’t included (e.g., Barton, Alexander, Waldron, Turner, & Warburton,
1985; Dembo, 2000; Gordon, Arbuthnot, Gustafson, & McGreen, 1988; Henggeler,
Melton, Smith, Scheoenwald, & Hanley, 1993; Kadish, Glaser, Calhoun, Risler, 1999;
Mosier, et al., 2001; Short, 1998; Spath, Redmond, & Lepper, 1999; Spath, Redmond, &
It is possible in some of these cases, that family functioning outcomes may have been included in the research but omitted from the reporting because of insignificant findings.

Leaders in the field of family programming have encouraged evaluators who report solely on longer-term outcomes to pursue their investigations into program processes that caused the outcome (Jones, 1991; Smith, 1995). From the family support field, Powell (1987) wrote, “to say a program is effective prompts the obvious question, what was effective with what types of families? (p. 315). Five years later, he still found reason to report “there is no systematic attention to program effects on such usual program targets as family functioning” (Powell, 1994, p. 445). In an overview of family preservation evaluation, Schuerman, Rzepnicki, & Littell (1991), for instance, suggested that measures of family functioning should be on a par with the outcome measure (i.e., placement within or outside of the family).

Evaluators who have looked for an intermediate family effect to explain longer term outcomes have faced the challenges of measuring system level constructs, i.e. the whole family is an entity different than the description of its parts such that its uniqueness lies in the relationship between parts (Broderick, 1993; Sabatelli & Bartle, 1995). Some have dealt with the problem by abandoning family functioning variables in exchange for such variables as child-functioning behaviors (Powell, 1987; Smith, 1995) or parenting skills (Comer & Fraser, 1998; Powell, 1987). However, as previously mentioned and as will be shown in detail later in this chapter, those evaluators who have chosen to measure family functioning as the intermediate variable have met with mixed success, perhaps
because few have utilized the most recent advances in family-process measurement. As a preparation for understanding those studies and results, a discussion of family-functioning measurement theory, methodology and recent innovations follows.

**Family-Functioning Measurement Theory, Methodology and Recent Innovations**

The challenge of measuring program impact on families involves answering questions such as what is a family? What is family functioning? Who does the reporting? What is the unit of analysis?

**What is a Family?**

Generally speaking, the family is a social institution and system. More precise definitions vary according to their emphasis on system goals and processes and seek to avoid valuing one type of structure over another (Eshleman, 1994). Because this research seeks to understand evaluations of programs that affect the family’s effect on children, a focus on the inter-generational aspect of family seems appropriate. A recent definition (Day, et al., 2001) that permits a full range of potential intergenerational, on-going care-giving constellations will be used for purposes of this study. As such, family is defined as “a group of individuals joined by at least one intergenerational connection and characterized by a relatively high level of intergenerational commitment” p.6. Once a family is defined, the next challenge is to determine what is meant by “family functioning.”
What is Family Functioning?

As previously mentioned, family functioning refers to a family’s ability to devise strategies to meet family-members’ needs to carry out day-to-day tasks, maintain boundaries, manage emotional climate, and manage system stress (Sabatelli & Bartle, 1995). Thus, an operational definition of family functioning necessarily involves ways of measuring the effectiveness of these various strategies. Sabatelli and Bartle explain that researchers have utilized two measurement targets—behaviors and consequences. Behaviors refer to the strategies themselves, e.g. to levels of intrusiveness such as “my family tells me how to spend my money” or levels of cohesion such as “we often do things together.” Consequences, on the other hand, refer to how people feel about or respond to those behaviors: their personal level of distress, complaints about the family, or the reported presence of psychological and physical symptoms. A potential advantage to measuring consequences in addition to or instead of behaviors is the further freeing from the researcher’s value system that one particular behavior is “healthier” than another (Sabatelli & Bartle, 1995).

A variety of family-functioning constructs are available to the evaluator. Bray (1995), for instance, lists constructs as including communication, conflict, problem solving, bonding or cohesion, affect and emotion, intimacy, differentiation and individuation, triangulation, stress, and roles. Among these varying phenomena, certain themes emerge. For instance, Tolan, Gorman-Smith, Huesmann, & Zelli, (1997),
categorize available constructs as either beliefs (importance of family, developmental beliefs and shared, deviant values) or qualities of family relationships (adaptability, cohesion, intrusiveness, support, etc).

Constructs have been developed as a result of both theory and practice. For instance, studies measuring families with young children often focus on parenting styles and attachment. Those measuring families with adolescents tend to look at qualities that have been introduced theoretically as enhancing adolescent individuation. These qualities include family cohesion and flexibility or constructs believed to be associated with family differentiation levels such as tolerances for intimacy and individuality.

Who Does the Reporting and Who Do You Believe?

In addition to determining what constitutes a family and what might be measured, the evaluator also needs to determine the source of the information: outside observer or self report. If self report is used, whose report is to be privileged? Mother’s only? Father’s only? Child only? The literature provides a great deal of evidence that multiple perspectives are important, i.e., mother’s, father’s and children (Fisher, Kokes, Ransom, Phillips & Rudd, 1985; Mathijssen, Koot, Verhulst, DeBruyn, &Oud, 1997; Noller and Callan, 1986; Schwarz, Barton-Henry, & Pruzinsky, 1985; Tein, Roos, & Michaels, 1994; Welsch, Galliher, & Powers, 1998).

Some researchers (e.g. Hampton & Beavers, 1996; Gonzales, Cauce, & Mason, 1996) have utilized outside observers to gather “transactional” data, as defined by Fisher, et al. (1985), to be data that describes family products rather than separate contributions.
of family members. Other researchers have suggested that the outside observer is less privy to family dynamics that occur over time. Still others have used both insider and outsider views (Bray, 1995; Hampton and Beavers, 1996; Olson, 1977).

As researchers have collected multiple perspectives from "insiders", discrepancies have continued to surface. Mothers, for instance, tend to report more positive conditions than do their teenagers (e.g., Sawyer, Sarris, Baghurst, Cross, & Kalucy, 1988); teenagers tend to correlate more closely with outside observers (e.g., Feldman, Wentzel, & Gehring, 1989; Kolevzon, Green, Fortune, & Vosler, 1988). Moreover adolescent reports have been found to be significant when parent reports have not (e.g., Stern, Lynch, Oates, O'Toole, & Cooney, 1995). Thus some researchers have concluded that adolescent reports are more "accurate" than those from a parent. Researchers have utilized various methods for dealing with these discrepancies. Examples can be found of computing a single variable from multiple perspectives, i.e., adding, subtracting, multiplying, or averaging them (Mathijssen, et al., 1997, Schwarz, Barton-Henry, & Pruzinsky, 1985) and accounting for each perpspective individually in separate multiple regression models (e.g., Johnson, et al., 1996; McFarlane, Bellisimo, & Norman, 1995). As has been mentioned, because of computational sophistication more readily available in personal computers, more recently some researchers have considered the multiple perspectives all as indicators of latent variables in structural equation models, a technique that will be addressed in detail in Chapter 2. Aside from the latter, each of the earlier approaches has been utilized in program evaluation, as will be discussed below.

Day, et al. (2001) count as highly suspicious any data that favors one perspective
over another or that reduces multiple perspectives into a single score through a simple calculation. Instead these researchers advocate maintaining a focus on the family by considering family functioning indicators to be system level constructs indicated by multiple varying perspectives. Analysis utilizing latent variables and correlated error provides evidence that the relationship of the multiple perspectives to each other is possibly more important than any single perspective alone. (Cook and Goldstein, 1993; Bartle-Haring and Gavazzi, 1996; Bartle-Haring, et al, 1999).

Family researchers have argued for the importance of including multiple, albeit discrepant, family member scores by acknowledging that each perspective on the family system is a uniquely subjective view that contributes to the understanding of the sum that is greater than its parts (Sabatelli & Bartle, 1995). The question therefore becomes, not who’s perspective is important, but what to do with the data. The challenge lies in the fact that, by nature, multiple reporters on a single family cannot be treated as independent from each other, and correlations between members of same families have a different significance than correlations between members of different families. Also, as has been discussed, when data come from a single reporter on a family, the unit of analysis is questionable. Whereas the data appears to be describing the family, it is more accurately describing one person’s perspective on the family.
Assuring that “The Family” is the Focus of Analysis

In regard to attempts to establish focus on the family as the unit of analysis, such terms as “unit,” “level,” “source,” “target,” and “method of analysis” have been employed. Family literature makes use of these terms, but to what each refers often overlaps.

For instance, in his compendium of family measures, Grotevant & Carlson (1989) categorize “levels of analysis” as “individual,” “dyadic,” “nuclear,” or “extended family” and “units of study” as “family as whole” (e.g. “my family is good at solving problems”); “dyad” (e.g., in reference to mom’s relationship with adolescent: “we are good problem solvers”); or “individual within family” (e.g. “my family helps me solve problems”). They categorize some instruments as addressing just one unit of study; others involve all three. It is difficult to determine if “level of analysis” and “unit of study” define essentially the same or different constructs.

Still more confusing is the term, “unit of analysis” which presumably combines “unit of study” with “unit of analysis.” For instance, Day et al. (2001) use “unit of analysis” to distinguish the “individual” from the “family,” noting that sound measurement will always focus on the family. They go on to say that through collective individual perceptions from multiple family members, systemic traits or processes can be determined.

Presumably then, “level of analysis” refers to the object of the measurement instrument, i.e., the questions refer to family and/or, dyad, etc. and “unit of study” refers
to both the object referenced by the written questions along with how the measure is used and how the data are analyzed. For example, scale items may ask about whole family, but when given to only one family member, the unit of analysis becomes that individual; when given to multiple family members, the level of analysis becomes the family.

In addition to implying the need for multiple perspectives, Day et al. (2001) imply the need for further delineation of level of analysis. More specifically, individual reports from multiple family members such as “I help my family and my family helps me” provide less information than “my mom helps me, I help my mom; my dad helps me, I help my dad.” These latter statements might be considered in three ways: first, by the object to which they refer (family vs. dyad) and second, to direction (who does what to whom?) and third to participation (non-participation would be stated as “my mom helps my dad; my dad helps my mom”).

This further delineation reveals a thicker, richer understanding of measurement items that might appear on a family measurement tool. For present purposes, these combined traits of direction, object, and participation will be referred to as “depth of inquiry.” It seems to follow that the relative sophistication of three factors contributes to the success of a study’s focus on the family as the unit of analysis: (1) depth of inquiry, which includes object of inquiry, participation and non-participation in the object, and direction of affect within the object (2) number of perspectives and (3) method for calculating multiple perspectives.

In summary, the objective of family functioning measurement is to measure the family unit. Doing so requires multiple family-member perspectives on multiple dyadic
relationships as they are described bi-directionally. Therefore, the precision of a family functioning measurement—defined as the degree to which family emerges as the unit of analysis—improves with the complexity of information regarding what is happening between members both in terms of quality (what kind of family functioning exists) and distance (how much agreement exists between family members). Each stage of the measurement process—survey construction (the wording of the items), survey implementation (the number of respondents within the family) and data analysis (method of utilizing data from multiple family members)—contributes to establishing the family as a study's unit of analysis.

In Table 1, a Family Measurement Matrix, developed out of the literature reviewed is presented as a tool that organizes the three factors of family measurement (number of perspectives; how the perspectives are calculated; and depth of inquiry) in a matrix that, in turn, reveals how well a measure focuses on the family as unit of analysis. Each of these elements has been important to the description of the utility of family measures in the literature but, as has been shown, have utilized imprecise terminology, and little attention has been given to their interrelationships. This matrix utilizes the accepted elements but arranges them according to what might be termed the relative "precision" of a study. Because of the design of the matrix "precision" refers to the degree to which the family system, in all its intricacies, emerges as the unit of analysis.

The Family Measurement Matrix will be used in this rationale as a means for classifying the relative precision of evaluation studies of family-based programs, i.e. the extent to which they have focused on the family as opposed to a single family-member's
perception of family. The index combines elements from survey construction, implementation, and analysis to determine a study’s relative precision level (1 = least; VIII = most).

The X-axis of the matrix represents depth of inquiry which, as explained above, is comprised of both object and direction. Object is defined as either whole family or dyad and if dyadic, further defined by the status of the reporter’s participation in the dyad (e.g., an adolescent reporting on adolescent-mom dyad would be a dyad of participation; an adolescent reporting on the mom-dad dyad would be a dyad of non-participation). Direction refers to family members as both actors on and receivers from the object. One-way direction is referred to as uni-directional (my family gives me the support I need); two-way as bi-directional (my family gives me the support I need; I provide support to the members of my family.) Together, direction and object constitute depth of inquiry. Depth of inquiry depends on measuring instrument and the wording of the questions.
<table>
<thead>
<tr>
<th>Type of Calculation</th>
<th>Number of Perspectives</th>
<th>I</th>
<th>II</th>
<th>III</th>
<th>IV</th>
<th>V</th>
<th>VI</th>
<th>VII</th>
<th>VIII</th>
</tr>
</thead>
<tbody>
<tr>
<td>Latent variable</td>
<td>3 family members</td>
<td>V</td>
<td>VI</td>
<td>VII</td>
<td>VIII</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 family members</td>
<td>IV</td>
<td>V</td>
<td>VI</td>
<td>VII</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single variable</td>
<td>3 family members</td>
<td>III</td>
<td>IV</td>
<td>V</td>
<td>VI</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>calculated from</td>
<td>2 family members</td>
<td>II</td>
<td>III</td>
<td>IV</td>
<td>V</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>multiple observed</td>
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<td></td>
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<tr>
<td>variables (summed,</td>
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<tr>
<td>averaged)</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single observed</td>
<td>2 or 3 family members</td>
<td>II</td>
<td>III</td>
<td>IV</td>
<td>V</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>variable</td>
<td>1 family member</td>
<td>I</td>
<td>II</td>
<td>III</td>
<td>IV</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Roman numerals represent degree of precision: I = least and VIII = most*

Table 1. The Family Measurement Matrix: levels of precision (i.e. the extent to which the family emerges as unit of analysis) in self-report measures of family functioning.
Depth of inquiry is arranged along the X-axis of the matrix from least to most precise based on two assumptions. The first is that dyads of both participation and non-participation provide more detailed, and therefore more precise information than dyads of participation alone, which in turn, provide more precision than statements about whole families. The assumption is based on the fact that when answering a question about a whole family, a respondent has to consider various family relationships that could differ significantly and essentially perform a mental calculation to determine one single response. The lack of precision comes from the fact that the way one respondent chooses to “calculate” the multiple relationships may differ substantially from the method of another respondent. The second assumption is that information about bi-directional interactions provides more detailed, and therefore more precise information than unidirectional information. For example, one learns more about a family by knowing about Dad as actor (Dad helps the adolescent solve problems) and Dad as partner (but the adolescent doesn’t help Dad solve problems) than from knowing about Dad as actor alone.

The Y axis of the matrix consists of number of perspectives and type of calculation.

Number of perspectives refers to the number of various reporters, i.e. child, parent, sibling, second parent, outside observer, therapist, etc. The number of perspectives depends on survey implementation, i.e. which family members complete the survey.

Finally, type of calculation refers to the method used for statistically accommodating the multiple perspectives. Type of calculation depends on the data.
analysis methodology and determines the extent to which the unique contributions of individual family members' perspectives are preserved. As previously discussed, there are three ways of dealing with family members perspectives.

(1) Perspectives can be treated as observed variables in a model for each perspective.

(2) Perspectives can be calculated into a single variable that represents a sum, difference, product, or average. (An even more sophisticated calculation involves entering the data into a hierarchical linear model (e.g. Springer, Wright, & McCall, 1997) that, like averaging, can accommodate varying numbers of perspectives per family but with an error term at the individual level as well as the family level).

(3) Perspectives can be factored into a structural equation model with latent variables and error correlated for each perspective.

Each type of calculation, further subdivided by number of perspectives included in the calculation, constitutes a level on the Y axis of the matrix. The axis is arranged on the assumption that least precision would be found by utilizing a single variable with one perspective; more precise is to utilize multiple perspectives calculated into a single variable. Most precision would be found with multiple perspectives used as indicators of a latent variable in a structural equation model. This study was designed to find evidence to support the assumption.
Twenty-four cells are produced when the X axis and Y axis are combined to form the matrix. In essence, the matrix combines level, perspective and analysis to determine a precision level, i.e. a relative amount of “family” as unit of analysis.

Precision levels have been assigned to each cell with the attempt to incorporate the assumptions while retaining some amount of ambiguity. For example, it is difficult to determine if a study with single observed variables from multiple family members will be more precise than average variables from two family members. Both situations were given the same precision level across the matrix. However, consideration allows for the possibility that a single variable representing dyadic bi-directional information from a single family member (precision level III) could provide as much precision as unidirectional dyadic information averaged between two family members (precision level III), which might be equally as informative as whole-family information averaged from three family members (also a precision level (III). On the other hand, there is a graduation of precision level such that the most family members reporting on the most detailed dyadic information has been assigned the highest precision (VIII).

This Family Measurement Matrix has been used as the basis for comparing family-based evaluation studies described below.

**Family-Functioning Measurement in Program Evaluation**

From among published (and catalogued) evaluation studies over the past ten years, thirteen (only!) include both measures of family functioning and positive longer-term outcomes (see Table 2).
When placed on the Family Measurement Matrix (Table 3), all but one register at level three precision or below. Eight of the studies utilized measures that focused on whole family rather than dyads; three of the eight utilized data from a single family member (Feldman, 1991; Goldstein, Irwin, Pask-McCartney, & Rubama, 1989; Walton, 1996) used data from only one family member; two from multiple family members, but analyzed each member's relationship to the outcome variables in separate models (Howard and Kendall, 1995; Santisteban, et al., 1997), two aggregated data from two family members by summing (Henggeler, Melton, & Smith, 1992) and averaging (Harrison, Boyle, & Farley, 1999). The most sophisticated calculation of the whole-family studies (the first column in the matrix) averaged perspectives from three family members (Henggeler, Cunningham, Pickrel, Scheonwald, & Brondino, 1996). Analysis of family dyads reported by more than one family member appeared in the remaining five studies, thus pushing them to be considered at level three precision (Hostetler & Fisher, 1997; Johnson, et al., 1996; Spoth, Redmond, & Shin, 2000; Wolchik, et al., 2000). Although the authors are unclear in their description, it is possible that one study (Park, et al., 2000) included multiple perspectives on bi-directional participatory dyadic interactions. If so, it would be indexed (as it is here) with a level four precision.

Table 2 presents these studies, their authors, the family-functioning measurement tool, family member perspectives, type of calculation, the research design, object of analysis, precision level, and significance of the family functioning variable as a mediator of successful longer-term outcome. Two conclusions can be drawn from Tables 2 and 3. First, significant and consistent family-functioning changes can be documented in only 3
of the 14 evaluation studies (21%). Five show mixed family-functioning results (35%) and the remaining six (44%) show no family functioning effect of the program on the distal outcome.
Table 2. Precision levels of program evaluations that include family functioning as a potential mediator of positive long-term outcomes.

<table>
<thead>
<tr>
<th>No.</th>
<th>Author</th>
<th>Program</th>
<th>Measure</th>
<th>Per. Calculation</th>
<th>Design</th>
<th>Object of analysis</th>
<th>Research analysis</th>
<th>Significant family mediator</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Fieldman, 1991</td>
<td>Family preservation</td>
<td>FES</td>
<td>Pre-post t-test</td>
<td>Combined randomized</td>
<td>Whole family</td>
<td>no</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Godleski, et al., 1999</td>
<td>Multisystemic Therapy</td>
<td>FES</td>
<td>Pre-post t-test</td>
<td>Combined randomized</td>
<td>Whole family</td>
<td>no</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Walton, 1996</td>
<td>Family preservation</td>
<td>FES</td>
<td>Pre-post t-test</td>
<td>Combined randomized</td>
<td>Whole family</td>
<td>no</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Harrison, et al., 1999</td>
<td>Intensive family preservation services</td>
<td>FES</td>
<td>Pre-post t-test</td>
<td>Combined randomized</td>
<td>Whole family</td>
<td>no</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Henggeler, 1996</td>
<td>Multisystemic Therapy</td>
<td>FES</td>
<td>Pre-post t-test</td>
<td>Combined randomized</td>
<td>Whole family</td>
<td>no</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Santisteban, et al., 1997</td>
<td>Family preservation</td>
<td>FES</td>
<td>Pre-post t-test</td>
<td>Combined randomized</td>
<td>Whole family</td>
<td>no</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Howard &amp; Kendall, 1996</td>
<td>Brief behavioral therapy</td>
<td>FES</td>
<td>Pre-post t-test</td>
<td>Combined randomized</td>
<td>Whole family</td>
<td>no</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Henggeler, et al., 1992</td>
<td>Multisystemic Therapy</td>
<td>FES</td>
<td>Pre-post t-test</td>
<td>Combined randomized</td>
<td>Whole family</td>
<td>no</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Santisteban, et al., 1997</td>
<td>Multisystemic Therapy</td>
<td>FES</td>
<td>Pre-post t-test</td>
<td>Combined randomized</td>
<td>Whole family</td>
<td>no</td>
<td></td>
</tr>
</tbody>
</table>

*Significant family mediator is denoted by an asterisk (*) in the table.
<table>
<thead>
<tr>
<th>No.</th>
<th>Author</th>
<th>Program</th>
<th>Measure</th>
<th>Perspective</th>
<th>Calculation</th>
<th>Research Design</th>
<th>Object of analysis</th>
<th>Precision*</th>
<th>Significant family mediator</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>Hostetler, et al., 1997</td>
<td>Project CARE: Substance Abuse</td>
<td>FAD (family communication, family rules &amp; discipline, and communication with father and mother scales)</td>
<td>parent/ youth;</td>
<td>Separate models for each perspective</td>
<td>Randomized control vs. tx</td>
<td>Whole family/ Dyads</td>
<td>III</td>
<td>No</td>
</tr>
<tr>
<td>10</td>
<td>Johnson, et al., 1996</td>
<td>Creating Lasting Connections: AOD use</td>
<td>Hawkins &amp; Catalano: bonding; leveling; communication</td>
<td>parent/ youth;</td>
<td>Separate models for each perspective</td>
<td>Randomized control vs. tx manova</td>
<td>Dyads of participation: Uni-directional</td>
<td>III</td>
<td>Mixed</td>
</tr>
<tr>
<td>11</td>
<td>Wolchik et al., 2000</td>
<td>Program for children of divorce</td>
<td>Open Family Communication Scale</td>
<td>Parent/youth/ outside observer</td>
<td>Mother/youth averaged</td>
<td>Multiple linear regression analysis</td>
<td>Dyads of participation; Uni-directional</td>
<td>III</td>
<td>Mixed</td>
</tr>
<tr>
<td>12</td>
<td>Spath, et al., 2000</td>
<td>Strengthening Families Program</td>
<td>Aggressive and hostile behaviors in family interactions</td>
<td>Parent/youth/ observer</td>
<td>Averaged</td>
<td>Latent growth curve modeling</td>
<td>Dyads of participation; Bi-directional</td>
<td>IV</td>
<td>No</td>
</tr>
<tr>
<td>13</td>
<td>Park, et al., 2000</td>
<td>Preparing for the Drug-Free Years</td>
<td>Unspecified on family conflict</td>
<td>Parent/ youth</td>
<td>Averaged</td>
<td>Latent growth curve modeling</td>
<td>Dyads of participation; Bi-directional</td>
<td>IV</td>
<td>No</td>
</tr>
<tr>
<td>14</td>
<td>Springer, et al., 1997</td>
<td>Southwest Texas High-Risk Youth Cohesion Program</td>
<td>Family Environment Questionnaire on Multiple cohesion and adaptability, and family members</td>
<td>Parent/ youth</td>
<td>Hierarchical linear modeling</td>
<td>Hierarchical linear modeling</td>
<td>Whole family</td>
<td>IV</td>
<td>Mixed</td>
</tr>
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</table>

Table 2 continued.
<table>
<thead>
<tr>
<th>Type of Calculation</th>
<th>Perspective</th>
<th>I</th>
<th>II</th>
<th>III</th>
<th>IV</th>
<th>V</th>
<th>VI</th>
<th>VII</th>
<th>VIII</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual observed</td>
<td>family members</td>
<td>IV</td>
<td>V</td>
<td>VI</td>
<td>VII</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>variables as indices of a latent variable with correlated rater error</td>
<td>family members</td>
<td>III Henggeler, et al., 1996</td>
<td>IV</td>
<td>V</td>
<td>VI</td>
<td>VII</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single variable calculated from multiple observed variables (summed averaged, multiplier subtracted)</td>
<td>family members</td>
<td>III Harrison, 1992 Henggeler, 1992</td>
<td>IV</td>
<td>V</td>
<td>VI</td>
<td>VII</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depth of Inquiry</td>
<td>example Members of our family help each other solve problems My mom helps me solve problems My mom helps me I help my mom solve problems My mom helps me I help my mom My dad helps me I help my dad My mom helps my dad my dad helps my mom</td>
<td>Uni Whole family Uni Dyads of participation Bi Dyads of both participation and non-participation</td>
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<td></td>
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</tbody>
</table>

* Springer, et al., 1997, does not appear on the Table because the relative precision of HLM calculation of multiple perspectives is as yet undetermined.

Table 3. Precision levels of evaluations of successful family-based program.
In some studies, these counterintuitive findings have been explained by assuming that the family report measures were insufficient and unable to detect family change (Howard & Kendall, 1996; Walton, 1996). It can be seen from looking at the most recent studies (Park, et al., 2000, Spoth et al., 2000; Wochik, et al., 2000) and their placement on the matrix in Table 2 that evaluators have begun to address this problem by utilizing measurement instruments that gather multiple-perspective data on dyadic family relationships. Park et al. (2000) have achieved a precision level IV by doing so. Still, despite the increased precision, there is no consistency in finding family-functioning effect despite the fact that each of these programs has demonstrated distal effect.

There is a second, more disconcerting conclusion to the insignificant effects. It is possible that readers, if not researchers themselves, have concluded that the family aspect of programming is unproductive. In programs where family-based programming is only one aspect of a palette of interventions, it is tempting, if not judicious, to trim family-based efforts as being unnecessary.

This research has investigated a third explanation for the insignificance of family variables. Insignificant results may not be due to the measures themselves, but may instead lie in their use and in the methods of analyzing the data that results.

The most sophisticated of published studies of family-based programs (Park et al., 2000) has achieved its precision through the design of the measurement instrument and number of family-member perspectives considered. The increased precision was achieved through increased depth of inquiry, shown in Table ___ as extending further on the X

31
axis of the Family Measurement Matrix. No published study to date has achieved even that relatively modest precision by extending the Y axis into the area of utilizing family perspectives as indicators of a latent variable.
<table>
<thead>
<tr>
<th>Type of Calculation</th>
<th>Perspective</th>
<th>Depth of Inquiry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual observed variables as indicators of a latent variable with correlated rater error</td>
<td>3 family members</td>
<td>Members of our family help each other solve problems</td>
</tr>
<tr>
<td></td>
<td>2 family members</td>
<td>My mom helps me solve problems</td>
</tr>
<tr>
<td></td>
<td>IV</td>
<td>My mom helps me, I help my mom solve problems</td>
</tr>
<tr>
<td></td>
<td>V</td>
<td>My mom helps me, I help my mom, My dad helps me, I help my dad, my mom helps my dad, my dad helps my mom</td>
</tr>
<tr>
<td></td>
<td>VI</td>
<td>My mom helps me, I help my mom, My dad helps me, I help my dad, my mom helps my dad, my dad helps my mom</td>
</tr>
<tr>
<td></td>
<td>VII</td>
<td>My mom helps me, I help my mom, My dad helps me, I help my dad, my mom helps my dad, my dad helps my mom</td>
</tr>
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<td>Direction Uni Uni Bi Bi</td>
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<td>Object Whole family Dyads of participation Dyads of both participation and non-participation</td>
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<tr>
<td>Single variable calculated from multiple observed variables (summed, averaged, multiplied subtracted)</td>
<td>3 family members</td>
<td>Members of our family help each other solve problems</td>
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<td></td>
<td>Henggeler, et al., 1996</td>
<td>My mom helps me solve problems</td>
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<td>IV</td>
<td>My mom helps me, I help my mom solve problems</td>
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<td>Henggeler, 1992</td>
<td>My mom helps me, I help my mom, My dad helps me, I help my dad, my mom helps my dad, my dad helps my mom</td>
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<td>V</td>
<td>My mom helps me, I help my mom, My dad helps me, I help my dad, my mom helps my dad, my dad helps my mom</td>
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<td>VI</td>
<td>My mom helps me, I help my mom, My dad helps me, I help my dad, my mom helps my dad, my dad helps my mom</td>
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<td>Single observed variable</td>
<td>2 or 3 family members</td>
<td>Members of our family help each other solve problems</td>
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<td>Howard &amp; Kendell, 1996; Santisteban, et al., 1997</td>
<td>My mom helps me solve problems</td>
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<td>III</td>
<td>My mom helps me, I help my mom solve problems</td>
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<td>Hosteller, et al., 1997</td>
<td>My mom helps me, I help my mom, My dad helps me, I help my dad, my mom helps my dad, my dad helps my mom</td>
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<td>Single observed variable</td>
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<td>Goldstein, et al., 1989; Walton, 1996; Feldman, 1991</td>
<td>My mom helps me solve problems</td>
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Table 4. Placement of the most precise studies on the Family Measurement Matrix.
It is possible, therefore, that if the programs with long-term positive impact (listed in Table 2) had utilized greater calculation precision when determining family functioning, more may have been able to demonstrate family functioning effect.

In summary, it appears that evaluators of family-based programs, perhaps limited by considerations of feasibility, restrict the utility of their work by conducting studies of family-outcomes that neglect to focus on the family as the unit of analysis. This neglect has occurred in two directions, (1) depth of inquiry (object and direction of questions in the measurement tools) combined with number of family-member perspectives and (2) type of calculation. The first problem is being addressed by both researchers and evaluators as they develop and utilize new measurement instruments. This research has addressed the second problem by utilizing two family-member perspectives as indicators of a latent variable to describe an aspect of family functioning.

**Description of the Research**

The present research was designed to explore the benefits of extending evaluation of a family-based program to one higher level of precision. It investigated the potential advantages of analyzing multiple perspectives of uni-directional, data about dyads in which the respondents participate as indicators of latent variables with correlated family-member error (precision level IV). To do so, evaluation data from a family-based court diversion program, Growing Up FAST: Families and Adolescent Surviving and Thriving™ were used to explore and contrast evaluation results elicited from various approaches to analyzing pre- and post-test data.
The Growing Up FAST diversion program design (described in detail in Appendix A) was based on the successes of the Growing Up FAST prevention program (Gavazzi, 1995; Wasserman, Gavazzi, & Randall 1998). At its inception, a logic model was designed specifically for the intentions of theory-based evaluation (Gavazzi, Wasserman, Partridge, & Sheridan, 2000). This research has been based on the data collected from the results of that evaluation (as yet unpublished). Initially, as with the other evaluation studies reported, effect on distal outcomes was established. However, variables representing single, family-member perspectives were used individually in the model, family functioning variables appeared insignificant (see Appendix B). Because the evaluation gathered data from both parent and adolescent perspectives, the data was able to be reanalyzed utilizing latent variables indicated by the two types of raters (parent and adolescent) and error correlated to partial out error specific to each. Thus, the data provided the opportunity to explore the research question: does family functioning emerge as a significant factor in a program evaluation when multiple perspectives and correlated error are taken into account? More specifically this study addressed the following six questions:

(1) Does a model with multiple perspectives as indicators of a latent variable and correlated rater error better fit the data than a model with multiple perspectives averaged into a single variable?

(2) Do parameter estimates in a model with a latent family-functioning variable and correlated rater error explain more of the variance in family functioning and longer-term outcome than does the model with averaged
perspectives? In other words, in which model, does the family-functioning variable function as a better mediator of program effect?

(3) Does a model with multiple perspectives as indicators of a latent variable and correlated rater error better fit the data than ones with a single (either parent or adolescent) perspectives?

(4) Do parameter estimates in a model with a latent variable and correlated error explain more of the variance in family functioning and longer-term outcome than do the models with single perspectives (either parent or adolescent)?

(5) Does a model with multiple perspectives as indicators of a latent variable and correlated rater error better fit the data than the same model without correlated rater error?

(6) Do the parameter estimates in a model with a latent variable and correlated error explain more of the variance in family functioning and longer-term outcome than does a model without correlated rater error?

It is noted that research questions rather than hypotheses are presented here because non-normal distributions of the family functioning variables in this data precluded the use of an estimator that would provide confidence intervals and probabilities necessary for testing hypotheses. In depth explanation of estimator choice will be addressed in chapter 3.

To answer the research questions, five models were constructed and compared for both goodness of fit and parameter estimates. As background for understanding this method, in Chapter 2 literature will be reviewed concerning (1) comparison of methods
for analyzing multiple family-member perspectives, (2) how latent variable models have been constructed to represent family-system constructs and (3) how latent variable models have been used to both construct and test theory.
CHAPTER 2

REVIEW OF THE LITERATURE

This study compared three methods of analyzing multiple perspective data gathered from a confirmatory program evaluation of a family-based court diversion program. The first method was to utilize family-member perspectives as indicators of latent variables and then correlate family-member rater error in a structural equation model. In contrast, the second method averaged family member perspectives on a family trait into a single variable in a multiple regression equation. The third method utilized each perspective in separate models. Two bodies of literature have influenced this work. The first body of literature involves how prior research has compared methods for accommodating multiple family-member perspectives and how the use of multiple perspectives has become the method of choice. The second literature concerns those studies that have utilized the latent variable/correlated error method, with particular emphasis on model construction, evaluation, and interpretation.
Studies That Have Compared Methods For Analyzing Multiple Family-Member Perspectives

Researchers have compared various methods of analyzing multiple perspective data on family functioning. Many have compared single family-member to multiple perspectives utilizing scores computed (averaged or differed) from the various perspectives (e.g., Gonzales, Cauce, & Mason, 1996; Kenny & Berman, 1980; Mathijssen, Koot, Verhulst, DeBruyn and Oud, 1997; Schwarz, Barton-Henry, & Pruzinsky, 1985; Schwarz & Mearns, 1989). In each of these studies, researchers have constructed regression equations involving both singular perspectives and computed multiple perspectives. Factor coefficients were compared to determine which type of variable explained the greater proportion of variance in a dependent variable. In all cases, more perspectives explained more of the variance.

Kenny and Berman (1980) mathematically demonstrated why such findings are predictable. To approach accuracy, as the reliability of a particular rater decreases, the number of raters factored into a mean score needs to increase. In other words, inter-rater reliability decreases as family-members’ scores differ from one another (which can be expected). In order to accurately capture a family trait, the more that family members’ perspectives differ, the more perspectives need to be factored into a mean family score in order to approach the “true” family trait. Specifically, Kenny and Berman showed that for data with an average inter-rater reliability of .28 (which is not unusual and may be high for family data), to estimate the true correlation once rater bias is removed, and to do so...
with ± .02 accuracy, one would need to average ratings from 24.7 raters. Using the
formula offered by the authors, if the accuracy is dropped to ± .05, one needs only 8.35
raters, not readily available in a family of five.

As an alternative, Kenny and Berman (1980) introduced the notion of considering
the trait as a latent variable in a structural equation model that could be evaluated with
confirmatory factor analysis. By identifying the unique variance brought to a construct by
each family member (i.e. a member’s score less the correlation other family members)
and then correlating the family member’s unique difference scores, a researcher could
identify that family member’s bias and subtract it from the total correlation as well as
from the random error.

Although researchers have established the limited reliability of utilizing either
singular or averaged family member perspectives, few studies, if any, have compared
conclusions drawn from models with computed observed variables to models with latent
variables and correlated error, as this study has done. Because no evaluation studies have
been found that have utilized latent variables at all, it follows that none have compared
evaluation findings utilizing both methods.
The Use Of Structural Equation Models with Latent Variables And Correlated Error for Analyzing Multiple Family-Member Perspectives

The use of latent variables and structural equation models has been introduced as an important development in family-process measurement. For purposes of clarity, a simple example of this type of modeling will precede an in-depth review of these models' purpose, construction and analyses.

A Description and Example of a Structural Equations Model with Latent Variables and Correlated Error

As has been noted, Kenny and Berman (1980) provided the family science field with the notion that a score representing any single family member's perception of a family trait consists of three parts: a true representation of the family trait, a unique perspective brought by that family member (rater bias), and random error (measurement bias). They suggested that one way to partial out rater bias was through the use of confirmatory factor analysis utilizing latent variables and correlated error. Cook and Goldstein (1993) were among the first family researchers to apply this model to family research. The following description of their model provides a working understanding of the use of latent variables and correlated error in general.

In the Cook and Goldstein (1993) model, each family member's score on a particular trait (e.g. father-child negativity) individually contributed to a latent variable representing that trait. Thus, "father-child negativity" was described by a series of equations, one for each family member. Each equation was in a linear form \( Y = aX + b \)
where latent variable ($Y$), e.g. the "true" portion of Father's perception of father-child negativity, equaled some amount of $X$ (father's score on father-child negativity) plus error (the remainder of $Y$ after subtracting the portion that could be explained by $X$). This remainder, however, could be further understood, or partialled, when father's score on father-child negativity was correlated with father's score on mother-child negativity. The resulting “correlated error,” represented the predictable, or non-random part of the error term, and thus reduced the random error in the entire model. Similar correlated error terms were calculated for mother and child. Once correlated error for each family member was isolated, the covariance in the data not accounted for by the model was reduced to insignificant levels, thus creating a better “goodness of fit index,” the value used to designate the appropriateness of the model to the data.

This basic concept of utilizing latent variables and correlated error was initially introduced as a way to eliminate rater bias when evaluating convergent and divergent validity in multi-trait, multi-method matrices.

**History, Guidelines and Controversies in Model Construction**

The use of latent variables and correlated rater error has come to the family science field via two convergent pathways. The first, as has been described, was a concern for eliminating rater bias inherent in data collected from multiple perspectives on the family system (Cook & Goldstein, 1993; Kenny and Berman, 1980). Rater bias has been a troublesome confound when, as is the case with families, multiple non-independent sources provide data on the same variable of interest. Kenny and Judd (1986) expanded
on the latent variable alternative offered by Kenny and Berman, by suggesting the use of
this kind of modeling to reveal short term processes by modeling relationships within
non-independent groups (e.g. families) and then relating those processes to an outcome
variable.

The concurrent pathway was family scientists’ concern with analysis of multi-trait
multi-method (MTMM) matrices as described by Campbell and Fiske (1959). These
models were introduced and have continued to be used as a means for testing convergent
and discriminant validity of psychological measures, but they also closely model multiple
family members (i.e. multi-methods) rating various aspects of family functioning (i.e.
multi-traits) (Kenny and Kashy, 1992). When MTMM models describe family
conditions, variables represent a fixed number of methods (i.e. family-member
perspectives) evaluating a fixed number of traits. For example, in a family of three
members rating motivation, patience, and intelligence traits, there would be nine manifest
(measured) variables. These nine variables would be indicators of six latent (not
measurable) variables—three method or family-member variables, and three trait
variables. In this way, the “true” trait is considered to be that which is commonly
reported by all methods (family members). The method variable, one for each family
member, represents the family member’s unique perspective. Although the relevance of
divergent and convergent validity in these models is limited when describing families, it
is interesting to note that the common (true-trait) amount is considered as the convergent
validity of the measure (often a subscale). The fact that individual methods can be
identified as separate constructs is evidence of a measure’s discriminant validity.

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By applying the MTMM model to families, Kenny and Kashy extended its use beyond convergent and discriminant validity and used it instead to address the rater error problem, noted above, which had been a long-time concern of family scientists. The variance that is unexplained by the common reporting between family members is considered as measurement error—the head-scratching data that elicits the response, “you just don’t know who to believe.” Some of that “error” can be explained by an amount that is commonly reported within methods (i.e., family members). In other words, if Mom, Father and Son are all reporting on their family’s ability to problem solve, their agreement is considered the “true” trait. The rest is generally considered random and unpredictable measurement error. However, if each family member’s responses to multiple sets of questions, perhaps representing various aspects or “traits” of problem solving, can be compared, it might be found that Mom has a unique (predictable) way of answering questions, as does Father and Son. Thus, some of the measurement error is no longer unpredictable but predictable because of what can be known about the “method” or family member. In this way MTMM models partial measurement error into two parts: random and predictable error. The predictable error is determined by correlating the measurement error terms produced by the same rater.

Kenny and Kashy (1992) documented the development of the use of latent variables and confirmatory factor analysis to analyze MTMM models. They also showed that confirmatory factor analyses based on full MTMM models (as described above) were flawed because, as full models, they involved defining more parameters and covariances than the data was able to provide, i.e., the models were overspecified and underidentified. As a remedy, they suggested the correlated uniqueness model, an alternative that has
been adopted by family scientists (Cook & Goldstein, 1993; Greenbaum, Dedrick, Prange & Friedman, 1994; Melby, Conger, Ge, & Warner, 1995).

The correlated uniqueness model (Kenny and Kashy, 1992) eliminates method factors entirely. Instead, the remainder of the variable’s value after the “true” trait score is factored out (i.e. the unique value or the error term) is allowed to intercorrelate with the remainders from other trait scores. An additional advantage to the correlated uniqueness (i.e. correlated error) method, and one that has served family scientists well, is that a value is ascertained whereby the contribution of a given method (i.e. family member perspective) to a particular trait can be examined. In other words, it is possible to determine which family member’s perspective best defines a particular trait.

Family researchers have begun to recognize these advantages of correlated uniqueness models and, as described below, have reported their use in the literature.

Uses Latent Variable Models in the Literature

Latent variable models of family functioning are still fairly rare. In addition in their use with MTMM matrices they have been used to analyze Social Relations Models (SRMs). One study has used a multiple-perspectives latent variable as an outcome variable (Muller, 1996). Each of these studies will be described below. Although this research will be based on analysis of a correlated uniqueness model, it will be important to examine other variations in family-applications of latent variable models and how, in those cases, final models have been developed from proposed models. This current study has utilized some similar techniques for model development.
As has been described, MTMM models were initially used to establish convergent and discriminant validity. In addition, family researchers have found that latent variable analysis of MTMM models can detail other aspects of studying families, addressing questions of within and between family variation, resemblance, symmetry and bias (Teachman, Carver, & Day, 1995).

Specifically, MTMM models have been used to identify underlying constructs of typically-used family assessment tools (Jacob and Windle, 1999); to identify rater bias when reporting children's problem behaviors (Greenbaum, et al., 1994) or family cohesion (Bray, Maxwell, & Cole, 1995); to explain system-level functioning of family dyads (Bartle-Haring & Gavazzi, 1996; Bartle-Haring, et al., 1999; Bray, et al., 1995; Cole & Jordan, 1989; Martin & Cole, 1993); and to establish factors salient to family processes such as problem solving (Vuchinich & DeBaryshe, 1997).

Following Kenny and Kashy (1992), MTMM researchers have also related MTMM matrices to an outcome variable in order to understand short-term processes. For example, Melby, et al. (1995) related the MTMM matrix to an outcome variable, finding evidence that perception (husband and wife report) and behavior (observer report) function as two separate predictors of marital stability. Likewise, Vuchinich and DeBaryshe (1997) tested predictive validity of a best-fit family problem-solving model by relating it to outcomes of youth delinquency and self esteem.

Extra caution needs to be employed if the outcome variable is a system-level variable, i.e., describing a trait that can be interpreted differently by different family members. For instance, Muller (1996) assessed predictors of corporal punishment as reported by both parents and children. When the model included only parent report of the
corporal punishment outcome, two parent traits (parent life-time aggressiveness and parent history of being corporally punished) were the only significant predictors; when the model incorporated only adolescent report of corporal punishment, the adolescent's lifetime aggressiveness was the sole predictor. In contrast, the latent variable outcome involving both perspectives was predicted by both parent and adolescent factors. Muller concluded that “if the [system-level] criterion variable is not defined from multiple perspectives, conclusion regarding the magnitude of predictor variables may be a consequence of reporter bias, rendering invalid a comparison of predictor effect sizes.” (p. 483).

Another use for latent variables with correlated uniqueness has been to analyze social relations models. These models evaluate family systems as a combination of various interactive aspects of multiple dyadic relationships. Dyadic relationships can be partialed into actor, partner, relationship, and rater effects, thus revealing the effects within relationships within a family system. SRM models require at least three family members, each reporting on the 2-way interactions of the three dyads (Bray, et al., 1995; Kenny and La Voie, 1984). As with MTMM matrices, SRM analysis involves comparing rival theoretical models to find best fit. The process has been used to understand dyadic influence during marital therapy (Cook, 1998); family differentiation processes (Bartle-Haring, et al, 1999); family coerciveness processes, (Cook, 1994); and processes that affect parental affective style, (Cook, Kenny, & Goldstein, 1991).
The Confirmatory Factor Analysis Process: Model Specification and Interpretation

Each of the studies described above followed a confirmatory factor analysis process that compared the variance/covariance matrices implied by the model to the matrices observed in the data. This process consists of three basic steps: (1) specifying one theoretical and any number of alternative models; (2) comparing "goodness of fit" indices to select the best fitting model and (3) interpreting the results (Bollen, 1989; MacCallum and Browne, 1999).

Model specification involves specifying which observed variables will load onto (i.e. be indicators of) latent factors; which latent factors will correlate, and which error terms will correlate. Rival models utilize virtually any recombination of these elements and achieve various purposes. Among the latent-variable studies noted, a wide variety of intentions have driven model respecification, including theory or hypothesis testing (e.g. Jacob & Windle, 1999); theory construction, i.e. allowing theory to emerge from the data (e.g. Cook and Goldstein, 1993; Bartle-Haring and Gavazzi; 1996; Bartle-Haring, et al., 1999; Matthews, Wickrama, & Conger, 1996; Vuchinich and DeBaryshe, 1997); and concurrent and predictive validity (Cole & Jordan, 1989; Cook and Goldstein, 1993; Jacob & Windle, 1999; Matthews, et al., 1996; Vuchinich and DeBaryshe, 1997). Once the best fitting model is selected, it can be fit to the data allowing for interpretation of factor loadings (similar to beta-weights in a regression equation) and correlations. In this way models have been used for both confirmatory and exploratory purposes. The examples that follow will elucidate the model construction and data analysis process.
Use of a latent variable model to test theory.

One confirmatory application of latent variable models is to test pre-existing theory. In this case a model of the hypothesized theory is tested against rival models. Significant difference between models provides support for the hypothesized model. Jacob and Windle (1999), for instance, hypothesized that family functioning consists of three fundamental factors: family affect, control and activity. They constructed an MTMM model from six variables computed from responses to three different but routinely used family functioning measures taken from three family members about the two dyads in which they participated. A model that correlated all three traits as well as individual family member bias fit the data well and supported the three factor theory. Alternative models based on two factors and then one factor offered no improvement. Once the original model was accepted, parameters were analyzed for the contribution of each rater to each trait and each rater pair to each trait.

Another example of model confirmation can be found in the work of Matthews, et al. (1996) who hypothesized that marital hostility is composed of both observable behavior (measured by three variables: outside observation of husband, wife and dyad hostility) and spousal perception of behavior (each partner's report of spouse's behavior). In this case the data suggested a potential rival, one factor model which was tested and then discarded as being less viable than the originally hypothesize two-factor model. Specifically, the two-factor model showed a relatively high (.52) correlation between the two factors, indicating that a one factor model was possible. In response the authors fit the one factor model, indicated by all five manifest variables. This rival model produced
a goodness of fit of only .83. as compared to a fit index of .99 for the two factor model. Thus the authors found support for their original hypothesis.

Use of latent variable models to construct theory.

Latent variable models have also been used in a more exploratory way to construct theory. In this case, the hypothesized model may not provide adequate fit to the data. Changes are made until a new model is found that can be tested in the future on a new data set.

For example, similar to Matthews, et al., (1996), Bartle Haring, et al. (1999), conducted a test of convergent validity models. To answer a question about where in the family differentiation levels can be defined, four MTMM models of the family differentiation construct were composed from eighteen variables (six for each of three family members). Each model comprised progressively fewer latent variables—the first model was composed of six separate dyadic relationships; the second involved three dyads, the third involved parents and child (two factors); and the fourth, one whole-family construct. Each model utilized all 18 observed variables. In this way, factor definitions changed as they were constructed from increasingly more indicators. The fullest model included 6 latent variables; the simplest included only one. The best fit emerged from the six-variable model, and the results suggest a new theoretical understanding: although family differentiation is a family system-level construct, the dyadic relationships that comprise it are individually significant.
The second half of the Bartle-Haring et al. (1999) study illustrates a far more complicated use of modeling to construct theory (compare Bray, et al., 1995; Kashy & Kenny, 1990). The authors initially tested an SRM model constructed of 27 latent factors derived from the same 18 variables described above. Each variable contributed to (or was partialed into) four latent variables: an actor factor (9 latent variables describing the each family member's perception of each family member as a practitioner of differentiated behavior); a partner factor (9 latent variables describing each family member's perception of each family member as a receiver/elicitor of differentiated behavior); a relationship factor (6 latent variables describing differentiated behavior in the relationship of each family member toward the other); and a rater factor (3 latent variables consisting of two observed variables a piece). Once the data was fit to this initial model, parameters revealed relatively small contribution of relationship factors, thus they were removed in the subsequent model. Two more models were attempted before a model with good fit and interpretable results was achieved. Variables with weaker loadings continued to be eliminated and factors loading on the same variable were set to be equal. In this way, the ideal model was derived from methodically examining results and making relevant, and theoretically logical adjustments in order to achieve better fit. The final model provided a basis for new hypotheses about the direction of influence in the relationships that most affect family differentiation levels.
Latent variable models for concurrent or predictive validity.

Latent variable models have also been developed in order to be nested within a larger model to either predict or concur with other variables. Some researchers have developed a best-fit theoretical model and then utilized it in a larger model as a predictor of an outcome variable. For instance, after confirming their two-factor hypothesis, Matthews, et al. (1996, described above), utilized the better fitting two-factor model as a predictor of marital stability and were able to establish marital partners' perception of hostility as a mediator between hostile behavior observed by an outsider and marital status.

Vuchinich and DeBarysh (1997) similarly related their best fit model of family problem-solving to two outcomes (self esteem and delinquency), as a means for establishing predictive validity of the model. In addition, the model-fitting process involved comparing four theories represented by four widely varying models. Each was constructed from the same six variables (three family members rated the other two members on problem solving ability). In each alternative model, these observed variables were reassigned to latent trait variables according to family member as rater (perceptual model), family member as rated (behavioral model), family members rating each other in dyads (relationship model), and all variables loading on a single latent variable (family model). From this complicated set of variables and relationships, the authors were able to examine the data for more detailed understanding of the relationships that each factored as separate constructs in the MTMM analysis.
Use of latent variable models to combine theory confirmation, concurrent validity, theory construction, and convergent/discriminant validity.

Cook and Goldstein's (1993) study, partially described above, exemplifies a combination of an exploratory process extended by a fairly simple convergent/discriminant validity study. In this work, the authors addressed the question of reliability of family member self reports of family interactions. An initial MTMM model included mother, father, and child reports of both mother-child negativity and father-child negativity (six observed variables) that loaded on two latent variables (mother-child and father-child negativity) along with correlations between unique factors of each family member. This model fit the data well. To test family member validity as concurrent with outside observers, a second model, based on the first, included two additional observed variables garnered from outside observations. One was added to each latent variable and their residuals were correlated. The second model had eight observed variables, two latent variables and four unique-error correlations, one for each perspective. After analyzing the data, the researchers found unexpected relationships between the mothers' unique perspective and that of the outside observers as well as between mother-child negativity and the outside observer's unique perspective. In response, they constructed a third model that included these two relationships. This third model had even higher goodness of fit indices and was therefore utilized for subsequent convergent/discriminant validity analyses.

From their best-fit model the authors (Cook and Goldstein, 1993) could compare factor loadings (i.e. the numerical values or beta-weights) to determine the extent to which each variable contributed to the latent factor. All perspectives contributed
significantly to each factor, with moms’ perception contributing most to the mother-child latent variable and father’s score contributing most to the father-child variable. Thus, convergent validity was established. Low correlations between latent variables meant that the latent variables represented distinctly different factors, i.e. discriminant validity. Significant factor loadings of observed variables on all but one (father’s report of father-child negativity) established that, in all but that case, there was significant error associated with either the measure (random error) or the rater (predictable rater bias). Correlating rater error was only possible for mothers and children since one of the father’s residual ratings was insignificant. Of mothers and children, only children brought significant predictable bias to their scores; mothers’ error was not significantly correlated.

Summary of Modeling with Latent Variables and Correlated Error.

As can be seen from these examples, processes of modeling with latent variables and correlated error have been dynamic, exploratory, and informative. Theoretical models have been proposed and then altered to create better fit with the data. The process of altering models has, at times, revealed new theoretical ideas to be tested on future data sets. Once good-fitting models were found, their parameter estimates were utilized to draw conclusions about both the data and the models. As will be described in Chapter 3, this current study has used similar processes.
The literature reviewed generally confirms increased reliability with the use of models that account for both predicted and random error through the use of latent variables and correlated error. However, if such models are more reliable, in which direction do the poorer models err?

Predictions About Direction Of Error With And Without Latent Variables And Correlated Error.

A review of the literature generally confirms increased reliability with the use of. Bollen (1989) showed the effects of (only) one variable in a multivariate regression equation assumed to be perfectly measured when in reality it contained measurement error. As presumed measurement error increased, the regression coefficients in the remainder of the each changed in the same direction respectively, but the direction and magnitude was not readily apparent. Bollen concluded that “the direction of asymptotic bias [i.e. bias that exists even if the sample size is as large as the population] depends on the magnitude and sign of [all the other terms in the multiple equations]” (p. 162). Thus, it would appear that studies that have not accounted for rater bias may indeed have underestimated the effect of the family functioning variables.

The use of latent variables and correlated error is relatively new, and compared to methods used in the entire study of family processes, might even be considered rare. Yet based on the research reviewed in this chapter, one might conclude that any study of family process not accounting for rater multiple perspectives and rater bias through methods more sophisticated than averaging, includes a degree of unreliability that renders its conclusions suspect. Beyond increased precision, the studies reviewed have
demonstrated the multiple aspects of inquiry available to the researcher who employs these newer techniques. As described in Chapter 3, this study has used many of these techniques to explore this assumption that greater precision will emerge from the use of modeling with latent variables and correlated rater error.
CHAPTER 3

METHODOLOGY

Data from participants in a family-based juvenile court diversion program evaluation were used to explore this study’s overarching research question: Does the use of latent variables and correlated family-member error for the analysis of dual-perspective data allow the family functioning variable to emerge as a more significant mediator of long-term outcome than (1) analyzing either perspective individually or (2) averaging the perspectives into manifest variables that assume no measurement or rater error. The reader is reminded that this study is about data analysis methodologies for family-based program evaluations and is not a program evaluation in and of itself. Therefore more in-depth descriptions of program and the original program evaluation for which the data was collected are provided in Appendices A and B. In this chapter, the current study’s methodology is presented.

First, the data is described in terms of the program, the program participants, data collection procedures and the program’s evaluation model. Next, the theoretical confirmatory program evaluation model for analyzing the dual-perspective family-functioning data is presented. Then, four test models, each derived from the confirmatory evaluation model, are described.
The first model utilized latent variables and correlated family-member rater error; the second model involved the more commonly used and simpler method of averaging family member perspectives on a family trait into a single variable; the third and fourth represented another commonly used method—regression equations that treated each perspective individually. As might be expected, real-life limitations of the study—in this case, minimal sample size and the nature of the data—required working models that fell short of the theoretical ideal. Thus, the practical models—those used in this study—and their rationale are also presented. Finally, criteria used for comparing the working models are addressed.

Description of the Data

The Growing Up FAST Diversion program (Gavazzi, 1995; Gavazzi, Wasserman, Partridge, & Sheridan, 2000; Wasserman, Gavazzi, & Randall 1998) was implemented with court-referred families, with “family” defined as an adolescent offender—typically age 12 through 16—and at least one adult in a parent-like role. The program was designed as a linked series of five levels, with each level providing a set of opportunities for the family to achieve some modicum of accomplishment. Success could be experienced and measured upon the completion of each level, and each level built on the previous one such that the completion of each successive level was thought to indicate greater overall success. A description of the program levels and outputs is included in Appendix A.
The Sample

The evaluation data came from 103 families referred to the program from the Franklin County (Ohio) Juvenile Court Intake Department. Of the total 458 families referred by the court over a four-year period, only families available for both pre-test and one of two post-tests (2wk – 5 months; 6 months – 1 year) were included in the data set used for this study.

The adolescents in these 103 families were first and second time misdemeanant or status offenders. Sixty-six percent were referred for status offenses (incorrigible/unruly, truancy, or runaway); 9% for drug/alcohol possession or use; and 25% for delinquent offenses including disorderly conduct, minor property offense, carrying a concealed weapon, cruelty to animals, menacing/threatening/harassment, and felonious assault. Families either voluntarily brought their adolescents to the court or found themselves at the court as a result of an arrest. Adolescents ranged in age from 12 to 17 years ($\bar{X} = 14.7, s.d. = 1.5$). In terms of ethnicity, 88% were white, 13% black, and 9% other minority. Forty percent were from single parent families (31%, mom only; 9%, dad only); 25% from families with married, biological parents; 22% from stepfamilies; and the remaining 13% from other family structures (e.g. grandparents and other relatives). Adolescents came from a full range of household incomes: 24% less than 25,000 per year; 50% between 25,000 and 60,000, and 26% greater than 60,000.

Once at the court, a diversion counselor interviewed the family and determined whether to make a referral and the type of referral to be made. If the counselor selected the GFAST program as the referral, a referral sheet was sent directly to the program and...
the family received a phone call from the program’s intake interviewer within one week. After an initial telephone screening the program facilitator scheduled an initial assessment with the family. Informed consent and all pretest data were collected at this initial assessment (T1). Programming began with the following appointment. At the initial assessment the family agreed to participating in two additional phone interviews: the first, two weeks after the last in-person contact with the family, and the second, six months after the first. Families were told that the program was voluntary, but that if they did not attend this program, their intake counselor at the court would be sure they entered into another. Although families were told that follow-up interviews would be conducted at 2-week and 6-month time periods, in actuality the second follow-up typically occurred between 2wks and 5 months; and the third between 6 months and 12 months. In all but 7 cases, follow-up interviews occurred by phone. Otherwise they occurred at the 2-week follow-up visit, scheduled for all families completing the fifth program level.

Follow-up interviews for time-two (T2) data were identical at both time periods and were conducted by phone with the adolescent and one parent. Interviewers were trained to use a detailed protocol that standardized the questions to be asked and the order of questioning. In order to overcome the general resistance to telephone solicitors, each interview began by engaging the respondent in conversation with the statement, “We like to stay in touch with our clients and know how things are going” and the prompt to generally talk about recent events, including the positive ones. It was found that this initial engagement in conversation encouraged more attentive, thoughtful, and therefore perhaps, more honest responses, especially from the adolescents. In most cases, only one follow-up interview was conducted (47 in the first wave; 26 in the second). In the 30
cases when both post-tests were conducted, the longer-term data were used. In all cases, if data were available from both mother and father, for the sake of consistency, mother’s data were used.

The Growing Up FAST Evaluation Method

The data were collected in accordance with the requirements of a confirmatory program evaluation (Reynolds, 1998). The evaluation method relies heavily on a well-defined program logic model. Both the evaluation method and the program logic model influenced the models to be compared in this study and are described below.

Confirmatory Program Evaluation

Confirmatory program evaluation is an approach to theory-driven outcome evaluation that provides both formative and summative information without the use of a control group. Rather than relying on the probability that two randomly assigned groups will differ in the presence of program effect, this confirmatory method considers the probability of six conditions all unfolding concurrently if there is no program effect.

Thus evaluation results depend on data gathered to measure the presence or absence of the following conditions for causal inference:

Temporality refers to the very simple condition that program exposure happens prior to outcome.

Strength of association refers to the relative strength of the main effect of the program on the outcome. A program with large main effect has more chance of a causal relationship to outcome than one with a small effect.
Gradient effect describes the dosage/response relationship between programming and outcome. The chance of a causal relationship is strengthened if there is a positive relationship between amount of programming and outcome.

Specificity refers to how well the data reflect the program's logic. If program participation can be shown to have greater relationship to predicted short-term outcomes than non-predicted outcomes, causal relationship between program and longer term outcome can also be strengthened.

Consistency involves showing that causal relationships occur across varying populations.

The coherence criterion integrates the other five looking at how “the causal mechanisms and pathways from program participation to program outcome provide a coherent explanation of the main-effect findings and the theory of the program” (Reynolds, 1998, p. 210).

The chance of the program having no effect when each of these criteria are met would be small enough that the evaluator can conclude there is program effect. Moreover, the causal model provides information about the program theory and which aspects most strongly contributed to the main effect. Thus, the model depends greatly on the program’s logic.

Growing Up FAST Program Logic

The program’s logic, upon which the evaluation model was built is presented in Figure 1. Theoretically, each program level (program intervention) would result in a measurable output (see Appendix) that, in turn, was thought to contribute to perceived
parent/adolescent goal agreement (considered, in this case, as the family-functioning variable). Increased parent and adolescent awareness of and agreement on goals would result in reduced recidivism.

Figure 1. The Growing Up FAST Logic Model

For the purposes of this study of family functioning variables as mediators of longer-term outcomes, it is important to note the role of “goal agreement” as a family-functioning variable in this evaluation. While goal agreement does not, in and of itself, define family functioning, it is a quality that helps describe it. Although the construct of goal agreement is yet to be thoroughly investigated, to use Sabatelli and Bartle’s (1995) terminology described in Chapter One, the construct may be a non-value-laden “consequence” of family functioning rather than a “behavior.” In any case, as a variable, it behaves statistically like other family-system level variables, which is the essence of its
importance to this study. In other words, goal agreement can be modeled as a latent variable, reflecting three components of the family system: (1) adolescent unique perspective, (2) parent unique perspective, and (3) the “true” family trait that both parent and adolescent perceive.

Instrumentation and Data Description

Variables emerging from the logic model are listed in Table 5 and are described below. For the sake of convention, manifest variables (CAPITALIZED) are followed by their description; latent variables (in Title Case) are similarly followed by their description.
<table>
<thead>
<tr>
<th>Role in the Model</th>
<th>Manifest Variables</th>
<th>Manifest Variable Descriptor</th>
<th>Latent Variables</th>
<th>Latent Variable Descriptor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Longer-term Outcome</td>
<td>T2DEL</td>
<td>Delinquency since completing program</td>
<td>Recidivism</td>
<td>Recidivism rate per week</td>
</tr>
<tr>
<td>Family-functioning mediating variable</td>
<td>T2GAP</td>
<td>Parent perception of goal agreement at Time 2</td>
<td>T2 Family Goal Agreement</td>
<td>Family goal agreement at Time 2</td>
</tr>
<tr>
<td></td>
<td>T2GAA</td>
<td>Adolescent perception of goal agreement at Time 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>T2AVGA</td>
<td>Averaged parent and adolescent perception of goal agreement at Time 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Independent Variable</td>
<td>LEVEL</td>
<td>Program dose as defined by program level achieved</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Variables</td>
<td>T1GAP</td>
<td>Parent perception of goal agreement at Time 1</td>
<td>T1 Family Goal Agreement</td>
<td>Family goal agreement at Time 1</td>
</tr>
<tr>
<td></td>
<td>T1GAP</td>
<td>Adolescent perception of goal agreement at Time 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>T1AVGA</td>
<td>Averaged parent and adolescent perception of goal agreement</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>T1DEL</td>
<td>Delinquency history at Time 1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 5. Variable names, labels, and descriptors.

**Longer-term outcome**: Recidivism, indicated by a single manifest variable (T2DEL) was determined with the use of a Frequency and Severity Index of Illegal Behaviors developed for the project (Gavazzi, Partridge, & Schock, 2000; Partridge,
Interviewed for the posttest via phone, the parent was asked about delinquent behaviors, including behaviors both with and without police or court involvement ("Has your adolescent been involved with the police or juvenile system since your last program session?" and "Has he/she been involved with anything that could have been of concern to the police or juvenile justice system?"). Each incident was rated in terms of frequency and severity, the total ratings were summed and then standardized to a weekly delinquency score.

Specifically, a total delinquency score was assigned based on the sum of product of frequency times severity for each incident. The frequency multiplier was determined according to the scale: 1 = "once or twice", 2 = "a few times/sometimes", 3 = "many times". Likewise, each type of delinquent behavior was assigned a severity multiplier such that status offenses (incorrigible, truancy, curfew, runaway) = 1, minor non-violent offenses (drug/alcohol use, public disorder, shoplifting) = 4, major non-violent offenses (Drug trafficking, carrying a concealed weapon, = 7, minor violent offenses (domestic violence, cruelty to animals, menacing/intimidation) = 10 and major violent offenses (Gang fights, arson, aggravated burglary/robbery, manslaughter, etc.)= 13. The sum of the products of the two multipliers constituted the total delinquency score. The intentional skew toward higher values for more severe offenses established qualitative differences between status, non-violent and violent offenders and allowed for a fair classification of offenders who committed offenses throughout domains. To arrive at a standardized per-week delinquency rate, the total delinquency score was then divided by
the number of weeks lapsed since last programmatic contact with the program. The weekly recidivism rate ranged from 0.00 to 7.06. The distribution was non-normal with a mode of 0.00, and mean of .34.

The intermediate (family-functioning) outcome, perceived family goal agreement at Time 2 (T2 Family Goal Agreement), was measured from two family-member perspectives. Parents and adolescents were individually asked two questions: (1) “List all of the words you would use to describe what it is to be a successful adult” and (2) “List all of the words your adolescent (parents) would use to describe what it is to be a successful adult.” As discussed by Law and Gavazzi, 1999, responses to these questions lead to a list of goals, agreement on which is presumed to be a consequence of family functioning. In order to determine agreement between family member responses, each response was coded by two raters according to themes (see Appendix C) derived from qualitative analysis of this and previous data sets (Law & Gavazzi, 1999). Inter-rater reliability on the first 230 coded families was .96. For each response, the number of words or phrases were counted, and together provided a total score. Then, words and/or phrases common to the respondents’ view (question 1) and the prediction of the other family member’s response (question 2) were counted in order to derive an “in-common” score. A final goal agreement proportion was assigned by dividing the total score by the in-common score. Thus, the goal agreement scores (T2GAP from parent; and T2GAA from adolescent) were continuous variables. Because each family member described their own ideas of success in relation to another family member’s, the scale is considered dyadic and uni-directional on the index in Figure 4. It was theorized that reduced
recidivism would be enhanced by increased perception of parent/adolescent agreement on (and therefore, awareness of) goals.

It is important to note here that the data was not analyzed for actual goal agreement (i.e. concensus or concordance) between adolescent and parent. As has been discussed, actual agreement would be predictably low. In contrast, the proportions were designed to measure perception of goal agreement. It was believed that increased perception on the part of either adolescent or parent would be a consequence of better family functioning.

Although perception of goal agreement is only one aspect of the multi-faceted construct of family functioning, goal agreement served in this study as a family-functioning variable that could be represented by a latent variable as well as by averaged and individual family-member perspectives. As a variable, goal agreement had characteristics typical of other family-functioning variables: it described a family dynamic, the correlation between perspectives was low (mothers to fathers, $r=-.04$, $p = .84$; mothers to adolescents, $r=-.12$, $p = .29$; fathers to adolescents $r=.07$, $p = .69$) and, despite its non-normal distribution, it significantly correlated with other family-functioning measures. For instance, adolescent perception of goal agreement correlated with adolescent perception of family differentiation ($r=.253$, $p = .014$) and mother’s perception of goal agreement correlated with mother’s report of unpleasant family events ($r = -.371$, $p <.001$).

As with the recidivism variable, both the parent and adolescent goal agreement scores were not normally distributed. Being based on a proportion of common responses to total responses, the scores ranged from 0 to 1 with mean adolescent score of .56 and
parent score of .30. The adolescent scores were bi-modal with frequencies high at both the lowest end of the range (no agreement, n=27) and highest end of the range (full agreement, n=35) and a fairly normal distribution of scores in between. The range of parent scores were similar but far less bi-modal. Fifty-six parents perceived no agreement, 14 perceived full agreement.

**Independent variable: Program involvement and dose,** i.e., the number of completed program levels, was indicated by a single variable (LEVEL), ranging from 0 = pretest only (no programming) to 6 = completion (participation through level five of the program). Frequencies for each program level are given in Table 6.

<table>
<thead>
<tr>
<th>Program Level</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-test only</td>
<td>20</td>
<td>19.4</td>
</tr>
<tr>
<td>Level 1</td>
<td>27</td>
<td>26.2</td>
</tr>
<tr>
<td>Level 2</td>
<td>15</td>
<td>14.6</td>
</tr>
<tr>
<td>Level 3</td>
<td>8</td>
<td>7.8</td>
</tr>
<tr>
<td>Level 4</td>
<td>7</td>
<td>6.8</td>
</tr>
<tr>
<td>Level 5</td>
<td>26</td>
<td>25.2</td>
</tr>
<tr>
<td>Total</td>
<td>103</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Table 6. Frequencies of participants completing each program level

**Control variables (T1).** Pretest measures on both delinquency and family goal agreement were used to control for both intermediate and longer-term outcome measures. The frequency/severity index (Gavazzi, et al., 2001; Partridge, et al., 2000) described above was used to assess an adolescent’s delinquency history (T1Del). In the presence of the entire family, a history of illegal behaviors, both type and frequency, with
and without justice-system involvement, was taken at T1. To arrive at a standardized weekly rate, the product of frequency times severity was divided by 50 weeks, the average length of time adolescents had been involved with delinquent behavior.

As with the recidivism score, the delinquency history score was highly skewed toward the less delinquent offender ranging from less than .01 (in the cases of a one-time status offender) to 2.54. The mode of the non-normal distribution (n=30) fell between .06 and .13. The mean was .36 (sd=.43)

Goal agreement also was controlled at time one (T1GA). The same goal-agreement questions were asked at pretest as posttest and scored identically. Non-normally distributed adolescent scores ranged from 0 to 1, X=.42, sd=.40. As with the post-test scores, the distribution was bimodal with 40 adolescents perceiving no goal agreement and 23 perceiving full agreement. Scores between the two modes were skewed toward full agreement. Parent scores were uni-modal and highly skewed toward no agreement (mode = 0, n = 63) with a mean of .16, sd=.25.

Growing Up FAST Confirmatory Program Evaluation Model

Following the CPE method, the Growing Up FAST evaluation model emerged from the program’s logic model and five of the six CPE criteria as described in Chapter 2 (consistency could not be tested do to sample size).
Figure 2. Growing Up FAST confirmatory program evaluation conceptual model.

Figure 2 illustrates, with unobserved variables, the model's underlying structure that tests each of the CPE criteria as follows (variable names from the measurement models illustrated in Figures 3 through 5 appear in parentheses):
Temporality. "Delinquency History" (T1DEL) represented the delinquency that occurred prior to program participation. "Program level" (LEVEL) indicated the amount of programming and occurred prior to any behaviors measured as indicators of the recidivism variable (T2DEL).

Strength of association referred to the effect of program participation (Program level>0) on recidivism, (controlling for delinquency history (T1DEL).

Gradient effect. Because program level was a continuous variable, a dosage/response relationship could be measured between programming and outcome.

Specificity. The program's logic was represented by Goal Agreement (T2GAP and T@GAA) as the intermediate family-functioning outcome and recidivism (T2DEL) as the distal outcome. Each posttest (T2) variable was controlled by a pretest (T1) variable. In order to test if intermediate outcomes predicted by the program logic (i.e. family goal agreement) had a greater relationship to recidivism than variables not in the program logic, the evaluation model included the non-predicted outcomes of parent somaticism (T2SomP) and parent depression (T2DepP), as described in Appendix B.

Coherence. Taken as a whole, model fit and individual parameter estimates would provide evidence of coherence.

Data Analysis

Five Test Models

Five test models, each derived from the confirmatory evaluation model, were developed to answer this study's research question: Does the use of a latent variable and
correlated family-member error for the analysis of dual-perspective data allow the family functioning variable to emerge as a more significant mediator of distal outcome than any of the three alternative methods: (1) analyzing either perspective individually, (2) averaging the perspectives into manifest variables that assume no measurement or rater error, and (3) analyzing the data with a latent variable but without correlated error. The first model utilized latent variables and correlated family-member rater error; the second involved the more commonly used and simpler method of averaging family member perspectives on a family trait into a single variable; the third and fourth represented another commonly used method—regression equations that treated each perspective individually. Minimal sample size \(n=103\) required this study to be based on test models modified from the confirmatory evaluation model; a larger sample size would have allowed test models to include latent rival variables in addition to the family functioning (goal-agreement) variable. While rival variables served a purpose in the program evaluation, they had little relevance to this study and, as a result, were dropped from the test models. The revised structural model is illustrated in Figure 3.
Figure 3. Growing Up FAST confirmatory program evaluation model.

From this revised structural model, four measurement models were prepared for comparison of goodness of fit and parameter estimates. The fullest model (A as illustrated in Figure 4) utilized latent family-functioning variables and error correlated within two perspectives—parent and adolescent.
The full model was operationalized into three basic measurement models: one with a latent variable, (Models A1 and A2 as illustrated in Figures 5 and 6), another with averaged variables (Model B, Figure 7), the third with adolescent or adult perspectives only (Models C1 and C2, Figures 8 and 9).

Model A1 (Figure 5) was created in response to the data which, due to the poor and inverse correlation between adult and adolescent goal agreement at pretest ($r = -.10$, $p = .34$), precluded the use of a latent T1 goal agreement variable. The model was used as the comparison model to explore each of the six research questions listed at the conclusion of Chapter 1. Model A2 (Figure 6) was exactly the same as A1 but assumed...
no correlation between rater error terms. This nested model was designed to address research questions five and six. Model A1 was compared to Model B, the averaged-variable model, to explore research questions 1 and 2; it was compared with Models C1 and C2, the single-perspective models to explore research questions 3 and 4. In Figure 7, the averaged goal agreement variables for Time 1 and Time 2 are labeled as “T1AVGA” and “T2AVGA” respectively.

Figure 5. Revised measurement model A1: T2 latent variable indicated by two family-member perspectives with correlated rater error.
Figure 6. Measurement model A2: T2 latent variable indicated by two family-member perspectives without correlated rater error.
Figure 7. Measurement model B: averaged perspectives of two family members; no latent family variables or correlated error terms.
Figure 8. Figure 9. Measurement model C1: adolescent perspective only.

Figure 9. Measurement model C2: parent perspective only.
Model Comparison

Each model was estimated and then compared with the others, first for goodness of fit, and second, for the extent to which it rendered parameter estimates that revealed goal agreement as a mediating variable. As with all structural equation modeling, the nature of the data required careful selection of the estimator which consequently affected the conclusions that could be drawn.

The non-normal nature of the goal-agreement and T2 delinquency variables necessitated the use of the unweighted least squares (ULS) estimator (McCallum and Browne, 1999), a less precise estimator than might otherwise be used. The distributions of both variables were non-normal with the mode at 0.00 (in all cases except the adolescent’s T2 goal agreement which was bi-modal) with no negative values. As a result, these variables were unable to be transformed into normal distributions. The specific nature of each of these non-normal distributions are described in Chapter Four. Essentially, the ULS estimator treated the data as non-parametric and ordinal. McCallum and Browne recommend the root means square residual (RMSR) as the fit index of choice with the ULS estimator and rendered a fit index of root mean square residuals (McCallum and Browne, 1999). The RMR fit index ranges from 0 to 1, with 0 indicating perfect fit (Arbuckle & Wothke, 1999). Use of the ULS estimator had the unfortunate disadvantage that no means, confidence intervals, or probabilities could be estimated. Other fit indices are also limited, although the goodness of fit index (GFI), the adjusted goodness of fit index (AGFI) which takes degrees of freedom into consideration, and the parsimonious goodness of fit index (PGFI), a second approach to considering the degrees
of freedom can be calculated. GFI and PGFI range from zero to one with one representing perfect fit. The AGFI estimator also is a perfect fit at a one, but with no baseline of zero. Estimation of means and probabilities would have required a sample size ten times as large, enabling the use of an asymptotically distribution-free (ADF) estimator.

Also, statistical comparison of models requires that each comparison model be nested within the full model (Bollen, 1989; McCallum and Browne, 1999), i.e. each model is based on the same variables. With these models, because averaging perspectives required the creation of entirely new variables (T1AVGA and T2AVGA) the models are not nested within each other, and therefore standard statistical comparisons between them are unavailable. Instead, the models were compared grossly for the degree to which the goal agreement variable functioned as a mediator between program level and recidivism. For the purposes of this study, i.e. an exploration of the general behavior of a latent variable as compared to manifest variables and not the specific amount of difference, the sacrifice of specific statistical inference was acceptable.

Determination of the role of goal-agreement as a mediating family-functioning variable was based on the three criteria for mediating variables established by Baron and Kenny (1986). A variable functions as a mediator when (1) variations in the independent variable (in this case, program level) significantly account for variations in the presumed mediating variable (goal agreement), (2) variations in the presumed mediating variable (goal agreement) significantly account for variations in the outcome variable (recidivism), and (3) when the described paths 1 and 2 are included in the model, a previously significant relation between the independent (program level) and outcome
variable (recidivism) is no longer significant. The strongest evidence of mediation occurs when the direct effect of the independent variable on the outcome variable is reduced to 0.00.

Based on this definition, despite the lack of precise parameter estimates and probabilities, it was possible to explore the relative strength of the family-functioning variable as a mediator in each model.
CHAPTER 4

RESULTS

As has been described, each of the five test models was designed and estimated with the purpose of understanding the family functioning variable as a mediating variable. The results of these models—the goodness of fit indices and then the standardized parameter estimates—are described in this chapter, primarily in relation to the role of the family-functioning variable as mediator of program dose (LEVEL) on recidivism (T2DEL). The parameter estimates of the models will be addressed in the order of their precision levels as predicted by the index offered in chapter one, from simplest to most inclusive of individual multiple perspectives. As expected, the results followed the predictions. First however, the direct effect of level on recidivism will be addressed.

Direct Effect of Level on Recidivism

According to the criteria for mediating variables established by Baron and Kenny (1986) described above, a variable functions as a mediator to the extent that its inclusion in the model reduces the direct effect (not controlled by the mediator) of the independent
variable on the outcome variable to 0.00. It was therefore necessary to establish the direct effect of program level, the independent variable (labeled as LEVEL), on recidivism, the outcome variable (labeled as T2DEL), prior to assessing the role of a potential mediator. With this data, the direct effect of level on recidivism was \(-0.21\) \((X^2 = 0, df = 00, rmr = .00)\), as shown in Figure 10.

While the direct effect is modest, it is present enough to explore the effect of the various configurations of goal agreement as mediating influences.

Figure 10. Direct effect of program level (LEVEL) on recidivism (T2DEL), controlled by delinquency history (T1DEL), \((X^2 = 0, df = 00, rmr = .00)\).
Model Fit

As discussed in chapter three, the RMSR is the fit-index of choice when using the ULS estimator. All models fit well with no model's RMSR exceeding .010, chi-squares were all less than .2, and AGFI indices ranged from .999 to 1.0 (see Table 7).

<table>
<thead>
<tr>
<th>Model</th>
<th>A1 Latent Variable</th>
<th>A2 LV without correlated error</th>
<th>B Average</th>
<th>C1 Adolescent only</th>
<th>C2 Parent only</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>X²</td>
<td>df</td>
<td>RMSR</td>
<td>GFI</td>
<td>AGFI</td>
</tr>
<tr>
<td></td>
<td>.172</td>
<td>8</td>
<td>.008</td>
<td>1.00</td>
<td>.999</td>
</tr>
<tr>
<td></td>
<td>.34</td>
<td>10</td>
<td>.011</td>
<td>1.00</td>
<td>.999</td>
</tr>
<tr>
<td></td>
<td>.077</td>
<td></td>
<td>.007</td>
<td>1.00</td>
<td>.999</td>
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<td>.070</td>
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<td>.007</td>
<td>1.00</td>
<td>.999</td>
</tr>
<tr>
<td></td>
<td>.149</td>
<td></td>
<td>.010</td>
<td>1.00</td>
<td>.999</td>
</tr>
</tbody>
</table>

Table 7. Fit indices of the four models.

It should also be noted that because recidivism is a manifest, not latent, variable and therefore functions in the model with the assumption that there was no measurement error (i.e. with perfect reliability). To test the effect of that assumption all models were also run with the contrasting assumption that the measure was only 50% reliable, a far more liberal reliability estimate. As can be seen in Table 6, fit indices were unaffected by the less reliable outcome measure. Where parameter estimates differed, they did so in the direction of supporting the hypotheses; therefore the more conservative reliability...
estimates, those based on perfect reliability, have been reported. (Parameter estimates based on the less reliable outcome variable can be found in Table 6 at the end of the chapter.)

Adolescent Perspective Only: Model C1

The adolescent perspective-only model (C1) fit well ($\chi^2 = .070$, $df = 3$, $rmr = .007$, $agfi = .1$, $pgfi = .2$), but revealed adolescent perception of goal agreement (T2GAA) as having only slight mediating effect between program level and recidivism (Figure 11), reducing the direct effect size from explaining 21% of the variance of recidivism to 15%. Consideration of the adolescent perspective alone revealed only a small effect of the program on goal agreement (standardized $\beta = .21$) and an equally small effect of goal agreement on recidivism ($\beta = -.19$).
Figure 11. Standardized parameter estimates for the adolescent-perspective model (C1) using ULS estimator ($X^2 = 0.070, df = 3, RMSR = 0.007, AGFI = 1$).

**Parent Perspective only: Model C2**

Goal agreement (T2GAP) emerged as a slightly better mediator in the parent-only (C2) model (Figure 12), although the model demonstrated slightly poorer fit ($X^2 = 0.149, df = 3, RMSR = 0.010, AGFI = 0.999$), with the RMSR being 0.003 less and the AGFI being 0.001 less than the adolescent model. Although these differences are minuscule, they may be more significant in a model with greater power. The direct effect of program participation on recidivism was reduced from explaining 28% of recidivism to 11%.

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Although the effect of program level increased to explaining 33% of goal agreement from 21% in the adolescent model (C1), the effect of parent perception of goal agreement on recidivism ($\beta = -.18$) was equally low in both models.

![Diagram](image_url)

Figure 12. Standardized parameter estimates for the parent-perspective model (C2) using ULS estimator ($\chi^2 = .149$, $df = 3$, $RMSR = .010$, $AGFI = .999$).

**Averaged Parent and Adolescent Perspectives: Model B**

As was predicted by the precision index, goal agreement in the averaged model (T2AVGA) fared better than goal agreement in the single-perspective models (C1&2), if only slightly better than the parent-only model (C2). In terms of mediating effect, the
model's parameter estimates (Figure 13) demonstrated minuscule improvement over the parent-only model (recidivism on level $\beta = -.10$; recidivism on goal agreement $\beta = -.20$; goal agreement on level $\beta = .34$). Coupled with the fact that model fit ($\chi^2 = .077$, $df = 3$, $RMSR = .007$, $AGFI = .999$) was also slightly better (improved RMSR of .003), it is possible that taken together these two differences may reflect a trend toward increased precision, one that could be more pronounced with a more powerful model.

Figure 13. Standardized parameter estimates for the averaged-perspective model (B) using ULS estimator ($\chi^2 = .077$, $df = 3$, $RMSR = .007$, $AGFI = .999$).
Evidence of the family-functioning variable (T2 Family Goal Agreement) as a mediator appeared more clearly in the latent variable model (Figure 14). With a fit equally as good as the other models ($\chi^2 = .172, df = 8, RMSR = .008, AGFI = .999$), the effect of program participation reduced to explaining only 1% of the variance in recidivism while the effect of goal agreement increased to explaining 31%. The effect of level on goal agreement also increased ($\beta = -.48$). Removal of the correlated uniqueness terms rendered a slightly poorer fit and virtually the same parameter estimates. Explanation of goal agreement by level rose from 48% to 50%; explanation of recidivism by goal agreement dropped to 30% from 31%.
Figure 14. Parameter estimates for the latent variable model (A1) using ULS estimator \( X^2 = .172, df = 8, RMSR = .008, AGFI = .999 \).
Figure 15. Parameter estimates for the latent variable model without correlated error (A2) using ULS estimator ($\chi^2 = .350$, df = 10, $RMSR = .011$, $AGFI = .999$).

Because of this study's relatively small sample size, the power of the model to detect differences was extremely low (less than 15%, calculated according to estimates given by McCallum, Browne, & Sugawara (1996). Therefore, the differences detected may have been more pronounced had there been more power from a larger sample.

Viewed side-by-side (Table 8), fits and parameter estimates of the four basic models more clearly show the progression toward greater substantiation of family
function as a mediating variable as the method for accounting for multiple family
member perspectives moves toward greater sophistication. As noted above, Table 9
illustrates the same progression but with a less reliable (.50) outcome indicator. Because
these less reliable values showed greater program effect, only parameter estimates from
the more conservative model have been reported.

<table>
<thead>
<tr>
<th></th>
<th>Model C1: Adolescent perspective only</th>
<th>Model C2: Parent perspective only</th>
<th>Model B: Average of parent and adolescent perspectives</th>
<th>Model A1: Latent Variable indicated by parent and adolescent perspectives</th>
<th>Model A1: LV with correlated error indicated by parent and adolescent perspectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>RMSR</td>
<td>.007</td>
<td>.010</td>
<td>.007</td>
<td>.008</td>
<td>.011</td>
</tr>
<tr>
<td>Degrees of freedom</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>β of Goal Agreement on Program Level</td>
<td>.21</td>
<td>.33</td>
<td>.34</td>
<td>.48</td>
<td>.50</td>
</tr>
<tr>
<td>β of Recidivism on Goal Agreement</td>
<td>-.15</td>
<td>-.18</td>
<td>-.20</td>
<td>-.31</td>
<td>-.30</td>
</tr>
<tr>
<td>β of Recidivism on Program level</td>
<td>-.12</td>
<td>-.11</td>
<td>-.10</td>
<td>-.01</td>
<td>-.01</td>
</tr>
</tbody>
</table>

Table 8. Parameter estimates of models A1, B, C1, & C2 with perfect reliabilities
of outcome measure.
<table>
<thead>
<tr>
<th>Model C1: Adolescent perspective only</th>
<th>Model C2: Parent perspective only</th>
<th>Model B: Average of parent and adolescent perspectives</th>
<th>Model A1: Latent Variable indicated by parent and adolescent perspectives</th>
<th>Model A1: LV with correlated error indicated by parent and adolescent perspectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>RMSR</td>
<td>.007</td>
<td>.010</td>
<td>.007</td>
<td>.008</td>
</tr>
<tr>
<td>Degrees of freedom</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td>$\beta$ of Goal Agreement on Program Level</td>
<td>.21</td>
<td>.33</td>
<td>.34</td>
<td>.48</td>
</tr>
<tr>
<td>$\beta$ of Recidivism on Goal Agreement</td>
<td>-.19</td>
<td>-.28</td>
<td>-.32</td>
<td>-.50</td>
</tr>
<tr>
<td>$\beta$ of Recidivism on Program level</td>
<td>-.23</td>
<td>-.17</td>
<td>-.16</td>
<td>-.02</td>
</tr>
</tbody>
</table>

Table 9. Parameter estimates of models A1, B, C1, & C2 with .50 reliabilities of outcome measure.
CHAPTER 5

DISCUSSION

This study's results have important meaning and implications for family-based program evaluators, developers, and practitioners as well as for the family-science field in general. This discussion of the results first includes a brief review of the problem the study was meant to address, the four potential solutions compared in the study, and the results of those comparisons. Next, limitations of the study are listed. Not only do those limitations help qualify the results, but equally important, provide direction for future research. Perhaps most important to the discussion is its conclusion: this study's implications for future decisions to be made about social-service programming that addresses the well-being of young people and families.

Summary of Rationale, Methodology, and Pertinent Results

The study was conducted in response to a problem faced by evaluators of family-based programs: even when family-based programs have been shown to have successful longer-term outcomes, family-functioning variables have seldom emerged as significant causal factors. This problem was illustrated by a survey of family-based program-evaluation results presented in chapter one; only four of 12 successful programs could
conclusively show that family functioning played an intermediary role. The study reported here was designed to explore the possibility that the inconsistent results found in the survey may not have been due to inadequate programming or even poor measurement instrumentation, as some evaluators have surmised, but instead to the methods used for analyzing family-family functioning data.

It was also shown in the first chapter that family scientists view family functioning as a system-level construct that, by definition of "system," is different than the sum of its parts, i.e. the way a family functions is comprised of the interactions between the individual family members which can augment or diminish any single member or dyad alone. Any one family-member perspective on a particular aspect of family functioning will provide just that: one perspective. Researchers have agreed that (1) correlations between family member perspectives will be relatively low, representing the fact that family members perceive their family functioning differently and (2) it is important to consider multiple family-member perspectives to understand a family’s functionality.

When measuring family functioning, researchers and evaluators have averaged, subtracted, multiplied, and added perspectives in order to include multiple perspectives and avoid the problem of utilizing non-independent observations in statistical calculations. More recently some researchers (but few, if any, published evaluators) have utilized multiple family-member perspectives as indicators of latent family-functioning variables in structural equation models.

As a premise for this study, an index was offered (Figure 1) that suggested eight "precision" levels for studying family functioning. Levels were determined by a matrix delineated by number of perspectives and type of calculation on one axis vs. the extent to
which the family system was addressed by the measurement instrument on the second axis. The matrix was based on the assumption that multiple family-member perspectives as indicators of an unmeasurable “latent” construct would more precisely reveal the role of family functioning as a mediator of distal outcomes than a manifest variable (i.e. one that is assumed to be perfectly measured) calculated from multiple perspectives, or a manifest variable representing any one single perspective. The purpose of the present study was to explore the validity of that assumption: would a model with a latent variable indicated by two family-member perspectives better fit the data and reveal more significant parameter estimates than models with manifest variables? Of four models for the same evaluation data—one with latent variables, one with averaged variables, and one each with parent or adolescent perspectives alone, which would best fit the data, in which would the family functioning variable explain the most variance in the outcome measure? Another way of asking the same question was to explore the degree to which the family-functioning variable functioned as a mediator between programming and recidivism.

Results of the four different approaches to analyzing data from a family-based court diversion program for delinquent adolescents and their families supported the logic of the matrix. All models fit well, but the latent variable model explained more of the variance in the outcome variable than the other three models. More specifically, following the Baron and Kenny (1986) definition of a mediating variable as meeting three essential conditions, the inclusion of a latent variable (indicated by parent perception of goal agreement and adolescent perception of goal agreement) reduced the correlation between program participation and recidivism from -.21 to .01 and thus met the first criterion for being considered a mediating variable. The second two conditions

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were also met: the correlation between the latent variable and program participation was seemingly significant (.48) as was the correlation between the latent variable and improvement in delinquency severity (.31). (The term, "seemingly" is used here because the non-parametric nature of the data precluded the use of an estimator that enabled probability testing.) Thus it is possible to conclude that in the latent variable model, following the logic of the program, the family-functioning variable emerged as a mediator. In the adolescent perspective only (model C1), there was no mediating effect at all; the correlation between program participation and delinquency remained virtually the same (-.23). The parent-only model (C2) and the averaged-perspective model (B) behaved somewhat better, although the goodness of fit of the parent-only model (C1) was not quite as good as that of either B or C1. The averaged-perspective model (B) revealed some mediating effect, but little influence of the family-functioning variable on the outcome variable (18%).

In this study, correlated rater error exerted virtually no effect on the model. It is possible that this lack of correlated uniqueness (rater error) may have reflected the program's effect on each rater's ideas of goals. In other words, because the variables from which the rater error was extracted were those affected by the program, the lack of rater influence may have had to do with the change of the rater's unique interpretation of the questions from pretest to posttest. This finding was contrary to those of other researchers who have found rater error to have significant effect on model fit and parameter estimates.
Limitations

When viewing these results, it is important to keep in mind the limitations under which this study was conducted. Of primary concern was that the study was based on pre-existing evaluation data and therefore inherited less desirable conditions than would have existed with data collected from an evaluation designed with this study’s specific aims in mind. Inherent to the data were family-functioning variables with non-normal distributions and indirect linkage to what is typically understood as family functioning. In addition, small sample size, along with its inherent problem of low power, precluded the use of the full confirmatory program evaluation model. Each of these limitations and their implications will be addressed below.

As was noted in Chapter 3, there were also limitations in the method for obtaining the pre-existing evaluation data. Those included high attrition; a wide range of times (two weeks to 12 months) between pre-test and post-test; and a modified CPE model. However, while these evaluation limitations may have reduced the amount of direct effect of program level on recidivism, they would not have affected the differences found between the methods for analyzing the data that were explored in this study. Therefore the evaluation limitations will not be addressed.

Non-Parametric Family Functioning Variables and Limitations of the ULS Estimator

As has been noted in Chapter 3, although the family functioning variables were linked to the short-term program outcomes, they were not ones typically associated with
operationalizing family functioning. Future replications of this study should consider the use of both short term (closely related to programming) and intermediate (more typical of family functioning) variables.

Also noted in Chapter 3 were the non-normal distributions of the both the goal agreement and the recidivism variables required the using unweighted least squares (ULS) estimation with the consequent sacrifice of confidence intervals and probabilities. As a result, only tendencies and trends could be reported and significance of the findings only surmised. Future research design should utilize measures that will render normally distributed variables which will in turn allow for using maximum likelihood estimation, revealing more specific fit indices and parameter estimates along with their probabilities.

Sample Size And Power

The second important limitation of this study was the models' extremely low power (less than .15, based on McCallum, et al.'s (1996) tables of power estimation) due to small sample size. If the sample is too small, it is possible to accept as a good fit a poor model, i.e. one that, given the sample data, poorly estimates the population, even though the variances and covariances derived from the model come very close to those formed by the given data. This close fit, or "goodness of fit" is reflected in a close-to-zero RMSR value. It is therefore important to consider that this small sample may have failed to reject poorly fitting models. If indeed poor fit went undetected, considering the similar results of the RMSR's and Chi Squares, the models were all equally inadequate. In that latter
case however, there is still validity in noting what appear to be significant differences in the function of the family variable as a mediator of program and outcome.

Another implication of this inability of low-powered models to fail to reject poorly-fitting models is that the differences between the models' RMSR values could have been more pronounced with more power. If so, the minute differences between the parent-only perspective and the averaged-perspectives models may have been more pronounced.

A more conclusive study would be to conduct similar comparisons with a more complicated model (necessitating more perspectives and better family-functioning measures than were available with from this evaluation design) and a larger sample size.

Perhaps most important is to note that increased power will necessitate increased expense. Programmers who have recognized the importance of working with families have come to understand the greater financial commitment necessary for funding the greater demands on time, resources, and service worker expertise. This study has shown that programmers need to also commit extra financial resources to the evaluation as well. All the way around, family programming is more expensive. Once methods are found to adequately measure family program effects, it will be important to conduct cost-benefit analyses to determine if the added expense is worth the benefit.

Model Complexity

In this study, a more complicated, and therefore more powerful, model could have been utilized if data had been collected on more usable variables. For instance, the data
supplied only one usable family-functioning indicator (goal agreement) from both pretest and post test. More family-functioning indicators (e.g. intrusiveness and/or support) at both time periods would have allowed for either more indicators on the existing family-functioning latent variable or perhaps a second mediating variable. A secondary advantage of greater numbers of family-functioning variables would have been to better identify unique rater bias. As was discussed above, the only variables available to identify correlated uniqueness were pre- and post-test measures of the same variable. Additional family-functioning variables would have allowed for more precise determination of rater bias.

Another source for increased complexity would have been the inclusion of a third family-member perspective. This third option, while extremely viable and possibly necessary for family scientists conducting family research, is virtually impossible for program evaluators. To employ a design with three perspectives precludes two-person families from the research. Most program-evaluation results would be considered highly biased if they were based on data from only two-parent families or only families with more than one child available for interview. One potential alternative to an MTMM model might be a structural equation model based on hierarchical linear (HLM) modeling as employed by Springer et al. (1997). The HLM approach allows for inclusion of various numbers of family-members per family, but sacrifices the calculation of correlated rater error.
Mixed Mother & Father Perspectives: A Source of Random Error within the Models

Another limitation of the data—one that increased the random error within the models, thereby reducing the relative amount of variance explained by the program—was the nature of the parent-perspective variables. Because both mother and father perspectives were merged into a single parent-perspective variable, the documented differences between mothers and fathers was obscured. A larger sample size would have allowed for separate analyses of father-adolescent and mother-adolescent models. Aside from being able to address the many issues related to differences between mother-adolescent and father-adolescent relationships, division of the sample into two groups would have compensated for some of the limitations of the two-perspective variable.

Conclusion: Implications for Future Research

This research marks one of the first attempts to further an important family science innovation—the use of latent variables and multiple perspectives—into the evaluation field. Moreover, it has important practical application for both evaluators and decision makers. For program evaluators, these results provide evidence and rationale for designing studies that can utilize latent variables.

This research was based on the notion that evaluations of family-based programs can be conducted at various levels of precision. Based on the matrix offered in Chapter 1, precisions can be increased both by the measurement tools utilized (x-axis) and by the number of family-member informants and how their joint perspectives are aggregated (y-
axis). This research has contributed to an understanding of the benefits available from pushing evaluations to further heights on the y-axis. As a result evaluators of family-based programs should be encouraged to seek the highest level of precision feasible on at least the y-axis, if not on both axes. The resources required to gather data from more than one family-member perspective and from enough families to be make a structural equation model possible (at least 100), are well worth the return.

This study has also introduced the use of Confirmatory Program Evaluation into the literature on family-based program evaluation. The method provides the family field with a non-control group avenue for evaluation, and one that fits well with the use of latent variables for defining family functioning.

For decision-makers in the practical world—program developers, practitioners, and policy makers—this study presents evidence that conclusions based on existing evaluations of family-based programs need to be drawn with caution: models that calculate multiple family-member perspectives into a single manifest family-functioning variable should be suspected of underestimating the effects of family functioning on the program outcome.

In addition to showing the importance of increasing measurement precision by analyzing multiple perspectives with latent variables, this study along with its limitations and those of evaluation study that produced the data inform some practical guidelines for evaluators of family-based programs using a confirmatory program evaluation model. The practical application of this body of work culminates in a checklist for evaluators shown in Table 10.
Checklist for Conducting a Family-based Confirmatory Program Evaluation

**Instrumentation**

☑ Data is collected from at least two family members at a minimum of two time periods.

☑ Family questionnaire items address dyads rather than whole family and include dyads of non-participation.

☑ Variables have been selected that have the potential to result in normal distributions.

☑ Rival variables for the CPE model have been selected to have no correlation with programming and no relation to each other.

**Data Collection**

☑ The study is designed so that at least one post test is a part of programming.

☑ Follow-up procedures are in place prior to initiation of programming with one person responsible for both intake and follow-up.

☑ Follow-up procedures are equally high priority to programming procedures.

☑ The study is large enough to allow for at least 100 2-parent families, thus also providing the ability to look at father-perspective and mother-perspective only models.

☑ There is a large enough sample size to allow for at least one moderating variable.

☑ There are enough variables in the model to create sufficient model complexity (degrees of freedom) to accommodate a relatively small (n=approx. 150) sample size.

**Data Analysis**

☑ Multiple perspectives are analyzed with latent variables and correlated rater error.

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Table 10. Checklist for conducting a confirmatory program evaluation of family-based programs.

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Careful planning based on documented evidence such as that which has been presented here will result in more precise and useful evaluation results of family-based programs. As program evaluators design evaluations that better track the effects of programs on families and of family changes on longer-term outcomes, programs will benefit and so too will the young people and families the programs are meant to serve.
REFERENCES


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APPENDIX A: GROWING UP FAST PROGRAM HISTORY, LOGIC, AND DESCRIPTION

The Growing Up FAST diversion program was developed according to a logic-model (Julian, 1995; United Way, 1996) that could be used for program evaluation (Gavazzi, et al., 2000). This type of model organizes programmatic events into levels of inputs, activities, outputs, and outcomes (see Figure 16; this program development model is the fuller form of the more simplified evaluation model presented in Chapter 3).
Figure 16. Growing Up Fast program development logic model.

Program activities are thought to be causally linked to both short-term outcomes which are causally linked to longer-term outcomes. By definition, outcome refers to a participant's experience of benefit or change that logically relates to the program's purpose. Outcomes derive from program outputs, defined as quantifiable products of
program activities. The difference between outcomes and outputs lies in the utility of their measurement. Information about outputs informs programmers about program functioning and efficiency. Information about outcomes informs both programmers and outside stakeholders about the contribution a program is making toward a problem's solution. Thus, through data regarding outputs, an evaluation based on a logic model provides formative, process-focused information and, through data regarding outcomes, provides summative results-focused information as well.

Following this logic-model concept, the Growing Up FAST diversion program's development began with a thorough review of the juvenile crime prevention literature (Gavazzi, Wasserman, Partridge, & Sheridan, 2000) in order to assure the developers that all program activities would be logically linked to the longer-term outcome: reduced recidivism. Current trends in juvenile justice supported the link between the program's intermediate outcome--increased family functioning--and its longer-term outcome. Adolescent developmental literature (Steinberg, 1996) as well as programming literature (Blumenkrantz & Gavazzi, 1993; Gavazzi, 1995; Gavazzi & Law, 1997) support the link between the program activities and short-term outcome--increased awareness of goals for successful adulthood as well as between increased goal agreement and stronger family functioning.

This program logic was also based the program's initial standard implementation in existence prior to its modification as a diversion program. Initially the standard implementation began as a single-session family-strengthening primary-prevention program (Gavazzi, 1995). In other words, initially the program was designed and implemented not as an intervention for problem behaviors, but as a means for
strengthening family relationships and general functioning for typically-functioning families navigating their way through the challenges presented by moving through younger family members’ adolescent years. The single session of this initial prevention program consisted of family members jointly defining the elements of successful adulthood and listing what each adolescent was already to become a successful adult along with what each parent was already doing to help their adolescent(s) become successful adults. This single session eventually became Level II of the diversion program (Gavazzi, et al., 2000) and of a related program for parolees and their families (Partridge, Gavazzi, & Rhine, 2001).

Formative evaluation of the initial one-session program (Wasserman, et al., 1998) suggested the need for (1) program length; that is, the program was either too long or, alternatively, more time was needed to accomplish all of the steps outlined in the program’s initial inception, (2) more assistance with practical day-to-day application of the Growing Up FAST experience, and (3) a follow-up session to practice using what was learned. In response, a second session was created. In this second session, family members jointly applied their definition of successful adulthood to an issue they were facing. The application of agreement on adolescent goals involved reframing the issue or problem as one of many options for achieving one of the goals for successful adulthood. A basic problem solving model of brainstorming options followed by weighing costs and benefits ensued. This second session became Level III of the diversion program and is described in more detail below.

In response to the need to modify the program as an intervention program for families being diverted from court involvement, the two existing sessions were modified
and three others were added. Thus the diversion program consists of five program levels. Each results in measurable output which is described below:

**Level One Output: The Risk Factor/Protection Factor Ratio**

The first level of the diversion program begins with a psychoeducational approach to delinquent activity, and is based on other psychoeducationally-based programming for youth and families. Information gleaned from family responses to questions posed in the intake assessment is fed back to family members in order to begin the process of helping them to understand themselves as a functioning group of interconnected individuals who share both a) risk factors that have lead them to contact with the court system, as well as b) protective factors they can draw on to deal with the crisis and beyond. Risk factors include the identification of co-occurring difficulties such as academic problems and substance use; the relationship between delinquent activity and peer group association, and the impact of family, neighborhood and community environment factors on delinquent behavior. Protective factors include identification of the family’s social support network; family members’ sense of future orientation; their personal assets; level of parental support, and school system responsiveness to the adolescent’s academic needs.

The goal of this first level is to help family members move away from positions of blame, anger, and stigma and toward a position of shared responsibility, support and respect. Successful completion of Level 1 involves completing a chart with risk and
protective factors listed in each of six areas: family history, community factors, neighborhood characteristics, stressors and strains, specific youth behaviors, and the family environment.

**Level Two Output: A Family Definition with Personal and Family Resources**

Having largely addressed illegal activity and its associated at-risk behaviors in Level 1, family members are asked to put their concerns about illegal activity temporarily aside during Level 2, which instead focuses primarily on the family's strengths and protective factors. While the program facilitator acknowledges that incorporating definitional components which include the prevention of future illegal activity is extremely important to the family and to the success of the program, this portion of the family's work is set aside until Level 3. There are two important reasons for postponing discussion of illegal activity. First, it is believed that, in general, it is best for families to begin to identify their own strengths instead of starting out with what is wrong or what is not working well in their family. Second and more specifically, it is believed that families containing a youth offender are in danger of defining themselves solely in terms of the illegal behavior committed by the youth, and in doing so may put themselves at risk of becoming disconnected from their resources.

More specifically, Level 2 involves the family members' joint creation of their own unique definition of successful adulthood in an almost exact fashion as is done in the program's standard implementation (Gavazzi, 1995; Gavazzi & Law, 1997). With the assistance of the program facilitator, family members co-create a definition of what they as a family believe to be their working definition of successful adulthood. These
components delineate various roles, responsibilities, and behaviors they mutually and consensually believe to be necessary to successful adulthood.

Following the family's initial attempts to define successful adulthood by themselves, the PF then uses a series of prompt questions in order to assist family members' recognition of how certain specific topic areas may contribute to their definition of successful adulthood. Four "essential prompts" (so chosen because they have formed the core of most families' definitions) include questions concerning how a family's (a) cultural heritage; (b) community of residence; (c) current relationships (family, friends, etc.) and (d) problem solving and decision-making skills all may contribute to their definition of successful adulthood.

Following the initial creation of the family's definition of successful adulthood (typical examples of definitional components include "getting an education," "being able to support yourself financially," "being a good family member," etc.), the program facilitator helps the family identify current strengths, defined here as those already existing behaviors on the part of the adolescent and parents that support the adolescent achieving the various components of the family's definition of successful adulthood. This becomes the family's asset list, with the young person's behavior representing internal resources, and the adult members' behaviors representing the means of supporting those behaviors as part of their family's resources. Thus, successful completion of Level 2
involves the recording of the family’s definition of successful adulthood and the behaviors that both the adolescent and the participating adults are already doing to support this definition.

Level Three Output: Decision Making Skills

Level 3 begins with the adolescent and the program facilitator meeting one-on-one, and involves skill-building activities associated with the following six concrete steps of needs assessment and decision-making: (1) identifying the target of the decision as an element belonging in the definition of successful adulthood; (2) brainstorming options; (3) weighing costs and benefits of each option; (4) choosing an option to try; (5) using the choice and (6) evaluating how well it worked.

Following the instructional portion of this level, the program facilitator and adolescent examine the youth’s illegal behavior in this step-by-step analysis. The adult members are then brought back into the session, and the adolescent is given the responsibility of co-teaching, with the facilitator, the steps of problem-solving/decision-making to the adults, as well as taking responsibility for explaining all that was uncovered in the step-by-step analysis of the illegal behavior itself.

Level Four Output: The Restorative Justice Grid, Plan and Closure on the Illegal Activity

In Level four family members devise a plan for making amends for the illegal activity. In the context of understanding that successful adults identify and repair harm caused by poor decisions, family members help the adolescent complete a grid that
delineates for each party involved (victim, family, community, offender) who has been harmed, what has already been done to repair the harm, and what remains to be done. A plan for repairing the harm emerges from the process of completing the grid.

At the completion of the plan for repairing harm, family members are given the chance to ask any remaining questions about the illegal behavior and its surrounding events, with the express agreement that at the completion of this level, the discussion of this illegal activity will be complete and not referred to again in the future. This is done in order to give all family members a sense of closure about the illegal activity, and the explicit message that it is time for the family to put that event aside and move on.

Once all questions have been asked, family members review their definition to make sure it includes a statement about how successful adults deal with their mistakes, including how to remain assured that the mistake will not happen again. If a new component needs to be added to the definition, family members simultaneously identify what they already do to meet that part of the definition (see level 2 above).

Successful completion of Levels 3 and 4 result in the understanding and use of shared goals in the decision-making process.

**Level Five Output: Resource Map and Action Plan.**

In Level 5, family members list their internal resources by reviewing their family definition and what they are already doing to meet it. They then turn their attention to external resources, i.e. their social support network. Family members complete a resource map by identifying persons and organizations available for helping the teen remain on the path toward successful adulthood. Each family member identifies at least
one person on the map who may be able to help the teen stay focused on the path to 
success, or, who may be able to help the parent(s) stay focused on assisting the teen to 
remain on this path. Family members agree to share the family definition with their 
respective identified persons, as well as to share a short list of instructions on how family 
members as a group believe they can use that definition when they are experiencing road 
blocks.

Next, the family practices using the map by selecting a new issue they currently 
face in their lives together. They use their family definition to reframe the issue as it 
relates to successful adulthood. They also use their asset list and resource map to identify 
all possible options for dealing with that issue. Following the decision-making model 
learned in level three, they develop a plan to deal with the issue. Both the young person 
and the adults identify what the young person will do, what the adults will do to support 
the young person's efforts, and how they will involve external resources to support their 
plan. The completion of the map and this explicit plan marks the successful completion 
of Level 5.
APPENDIX B: GROWING UP FAST EVALUATION METHOD AND RESULTS

Method

Program evaluation, designed after pre and post-test data-collection tools had been selected and implemented, was based on the Confirmatory Program Evaluation (CPE) model as described in Chapter 3. As prescribed by the CPE method, the evaluation model utilized available rival mediating variables in addition to the logical variables (described in Chapter 3). The illogical intermediate variables, Parent depression at time 2 (T2ParentDepress) and parent somaticism at time 2 (T2ParentSomat) were taken from subscales of the Brief Symptom Inventory (Derogatis, 1993) and were selected because, theoretically, they would be unaffected by programming.

Of the 103 families in the dataset for the latent-variable study described addressed by the current study of multiple perspectives, rival variable data was available from only 85. This sample was thought to be too small to use latent variables; consequently the confirmatory program evaluation utilized manifest, parent-perspective variables only. As described in Chapter 3, the CPE model is illustrated in Figure 17, below.
Figure 17. Growing Up FAST confirmatory program evaluation working model.
Because of the high correlation between parent somaticism and parent depression ($r = .705, p < .001$), both variables could not be used in the same model. Thus, separate models were run to test each rival variable against family functioning as mediators of programming on recidivism.
Results

Parameter estimates and goodness of fit indices of both rival models are shown in figures 18 and 19 below.

![Diagram](https://via.placeholder.com/150)

Figure 18. Standardized parameter estimates for the working Growing Up FAST CPE model with Time 2 Parent Somaticism as a rival mediating variable, based on ULS estimator ($X^2 = .510$, df = 10, RMSR = .015, AGFI = .97).

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Figure 19.  Standardized parameter estimates for the working Growing Up FAST CPE model with Time 2 Parent Depression as a rival mediating variable, based on ULS estimator ($X^2 = 2.439, df = 10, RMSR = .038, AGFI = .989$).
Model fit indices showed that both models fit relatively well, although the somaticism model with an $RMSR$ of .015 appears to have fit better than the depression model with an $RMSR$ of .038. In both cases, the regression of the rival variable (depression or somaticism) on Level was seemingly less significant (note that significance testing was impossible due to the necessity of the non-parametric ULS indicator) than the regression of the logical variable (goal agreement) level on the logical variable (somaticism on level standardized $\beta = .09$; depression on level standardized $\beta = .05$; goal agreement on level in both models: standardized $\beta = .28$).

Thus evaluation results showed that the program had, as logically predicted, more of an effect on goal agreement than on parent psychological symptoms. However, the effects of both program on goal agreement and goal agreement on recidivism were relatively small, if not negligible in the latter case; goal agreement explained only 18% of recidivism in the somaticism model and 19% of recidivism in the depression model.

These standard regression-type models lead to the conclusion that programming had little effect on family goal agreement and goal agreement had even less effect on recidivism. This conclusion is not dissimilar to those reached by some of the authors of the studies indexed in Chapter One: Although there appeared to be both direct effect of programming on longer-term outcome and direct effect of level on intermediate family-functioning outcome, there was little or no evidence of program effect on family functioning. It is not surprising that the evaluation results from this study were in line with others that utilized single (non-latent) variables to represent family functioning.
As explained in Chapter One, these confusing results were the basis for the study presented in this thesis. The results of this current inquiry into the use of latent variables and correlated error to account for multiple family-member perspectives provide evidence for the superiority of the latent variable over single-variable models such as those used in this Growing Up FAST evaluation. These weak results of the non-latent variable evaluation of the Growing-Up FAST program further strengthen the rationale for the hypothesis upon which the reported study is based: that an evaluation model utilizing a latent variable and correlated would more accurately show more impressive program effects than the evaluation models reported here.
## APPENDIX C: GOAL AGREEMENT THEMES AND CODES

### Career Development

<table>
<thead>
<tr>
<th>Theme</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Occupation/have a job</td>
<td>c-oc</td>
</tr>
<tr>
<td>Education</td>
<td>c-ed</td>
</tr>
<tr>
<td>Financial security/support family</td>
<td>c-fi</td>
</tr>
<tr>
<td>Ambition</td>
<td>c-am</td>
</tr>
<tr>
<td>Famous</td>
<td>c-fam</td>
</tr>
<tr>
<td>Motivation</td>
<td>c-mo</td>
</tr>
<tr>
<td>Hardworking</td>
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</tr>
<tr>
<td>Success</td>
<td>c-s</td>
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<tr>
<td>Productivity</td>
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### Independence

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<tr>
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<tbody>
<tr>
<td>Capability</td>
<td>i-c</td>
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<tr>
<td>Leadership</td>
<td>i-l</td>
</tr>
<tr>
<td>Organizational skills</td>
<td>i-or</td>
</tr>
<tr>
<td>Self awareness</td>
<td>i-sa</td>
</tr>
<tr>
<td>Attention to priorities</td>
<td>i-sp</td>
</tr>
<tr>
<td>Power</td>
<td>i-p</td>
</tr>
<tr>
<td>Life skills</td>
<td>i-is</td>
</tr>
<tr>
<td>Self sufficiency</td>
<td>i-ss</td>
</tr>
<tr>
<td>Quality of live</td>
<td>i-q</td>
</tr>
<tr>
<td>Self-employed</td>
<td>i-se</td>
</tr>
<tr>
<td>Independent</td>
<td>i-i</td>
</tr>
<tr>
<td>Punctual</td>
<td>c-pu</td>
</tr>
<tr>
<td>Hobbies</td>
<td>i-h</td>
</tr>
<tr>
<td>Self Discipline</td>
<td>I-sd</td>
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</table>

### Internal focus

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<th>Code</th>
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<tbody>
<tr>
<td>Place to live</td>
<td>If-l</td>
</tr>
<tr>
<td>Religion</td>
<td>If-r</td>
</tr>
<tr>
<td>Emotional health</td>
<td>If-emo</td>
</tr>
<tr>
<td>Physical health</td>
<td>If-ph</td>
</tr>
<tr>
<td>Money</td>
<td>If-m</td>
</tr>
<tr>
<td>Material possessions</td>
<td>If-mp</td>
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</tbody>
</table>

### External focus

<table>
<thead>
<tr>
<th>Theme</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Happiness, contentment</td>
<td>If-h</td>
</tr>
<tr>
<td>Self respect/confidence/care</td>
<td>If-sr</td>
</tr>
<tr>
<td>about self/self- fulfilled</td>
<td></td>
</tr>
<tr>
<td>Peaceful</td>
<td>If-p</td>
</tr>
<tr>
<td>Meet basic needs</td>
<td>If-bn</td>
</tr>
<tr>
<td>Beautiful/look good</td>
<td>If-b</td>
</tr>
<tr>
<td>Morale</td>
<td>If-ml</td>
</tr>
<tr>
<td>Humorous</td>
<td>If-hm</td>
</tr>
<tr>
<td>Pride</td>
<td>If-pr</td>
</tr>
<tr>
<td>Good citizenship</td>
<td>e-c</td>
</tr>
<tr>
<td>Conflict management</td>
<td>e-cm</td>
</tr>
<tr>
<td>Interpersonal skills</td>
<td>e-is</td>
</tr>
<tr>
<td>Family life – general</td>
<td>e-fg</td>
</tr>
<tr>
<td>Family life - parenting</td>
<td>e-fp</td>
</tr>
<tr>
<td>Family life - spouse</td>
<td>e-sp</td>
</tr>
<tr>
<td>Friendship</td>
<td>e-f</td>
</tr>
<tr>
<td>Intimate relationship</td>
<td>e-ir</td>
</tr>
<tr>
<td>Open minded/able to listen</td>
<td>e-om</td>
</tr>
<tr>
<td>Communication</td>
<td>e-ct</td>
</tr>
<tr>
<td>Generosity</td>
<td>e-gen</td>
</tr>
<tr>
<td>Kind/helpful/considerate/caring</td>
<td>e-con</td>
</tr>
<tr>
<td>Manners</td>
<td>e-man</td>
</tr>
<tr>
<td>Social network</td>
<td>e-net</td>
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Continued
**Basic Underlying Qualities**

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<tr>
<th>Quality</th>
<th>Initials</th>
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<tbody>
<tr>
<td>General good character</td>
<td>b-gc</td>
</tr>
<tr>
<td>Enthusiastic</td>
<td>b-enth</td>
</tr>
<tr>
<td>Courageous</td>
<td>b-c</td>
</tr>
<tr>
<td>Responsibility</td>
<td>b-r</td>
</tr>
<tr>
<td>Wisdom</td>
<td>b-w</td>
</tr>
<tr>
<td>Patient/Understanding</td>
<td>b-p</td>
</tr>
<tr>
<td>Strong</td>
<td>b-s</td>
</tr>
<tr>
<td>Honesty</td>
<td>b-h</td>
</tr>
<tr>
<td>Trustworthy</td>
<td>b-t</td>
</tr>
<tr>
<td>Respect for others</td>
<td>b-ro</td>
</tr>
<tr>
<td>Ethics/values and morals</td>
<td>b-e</td>
</tr>
<tr>
<td>Maturity</td>
<td>b-m</td>
</tr>
<tr>
<td>Respectable</td>
<td>b-rc</td>
</tr>
<tr>
<td>Reliable/dependable/loyal</td>
<td>b-rel</td>
</tr>
<tr>
<td>Optimistic</td>
<td>b-opt</td>
</tr>
<tr>
<td>Intelligence</td>
<td>b-it</td>
</tr>
<tr>
<td>Realistic</td>
<td>b-rea</td>
</tr>
<tr>
<td>Humble</td>
<td>b-um</td>
</tr>
<tr>
<td>Be like another family member</td>
<td>b-fa</td>
</tr>
<tr>
<td>Problem solving and decision making skills</td>
<td>b-ps</td>
</tr>
<tr>
<td>Goal-oriented</td>
<td>b-g</td>
</tr>
<tr>
<td>Control</td>
<td>b-cn</td>
</tr>
<tr>
<td>Well-adjusted</td>
<td>b-wa</td>
</tr>
<tr>
<td>Consistent/stable</td>
<td>b-cs</td>
</tr>
<tr>
<td>Loving</td>
<td>b-l</td>
</tr>
<tr>
<td>Law-abiding</td>
<td>b-la</td>
</tr>
<tr>
<td>Use common sense</td>
<td>Ab-cs</td>
</tr>
<tr>
<td>Use skills</td>
<td>b-us</td>
</tr>
<tr>
<td>Lucky</td>
<td>b-lk</td>
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**Negative Words**

<table>
<thead>
<tr>
<th>Negative Term</th>
<th>Initials</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hanging out</td>
<td>n-h</td>
</tr>
<tr>
<td>Responsible only to self</td>
<td>n-sr</td>
</tr>
<tr>
<td>No sense of purpose</td>
<td>n-sp</td>
</tr>
<tr>
<td>Freedom, Get whatever you want</td>
<td>n-f</td>
</tr>
<tr>
<td>No responsibility</td>
<td>n-nr</td>
</tr>
<tr>
<td>Have wimpy kids (like they want me to be)</td>
<td>n-k</td>
</tr>
<tr>
<td>Stern/imposing</td>
<td>n-si</td>
</tr>
<tr>
<td>The other person would say “I don’t know”</td>
<td>n-dk</td>
</tr>
<tr>
<td>Football/sports (i.e. this is what you get to do)</td>
<td>n-st</td>
</tr>
<tr>
<td>Busy</td>
<td>n-b</td>
</tr>
<tr>
<td>Not happy</td>
<td>n-ha</td>
</tr>
<tr>
<td>Grouch</td>
<td>n-g</td>
</tr>
<tr>
<td>Tired</td>
<td>n-t</td>
</tr>
<tr>
<td>Not like parent</td>
<td>n-np</td>
</tr>
<tr>
<td>Stress</td>
<td>n-s</td>
</tr>
<tr>
<td>Boring</td>
<td>n-bor</td>
</tr>
<tr>
<td>No bad language</td>
<td>n-lang</td>
</tr>
<tr>
<td>Cool</td>
<td>n-c</td>
</tr>
<tr>
<td>Perfect</td>
<td>n-per</td>
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