

MODELING CHANGE IN BEHAVIORAL AND EMOTIONAL
SYMPTOMS OF SERIOUS EMOTIONAL DISTURBANCE IN CHILDREN AND
ADOLESCENTS: A TWO-LEVEL GROWTH CURVE ANALYSIS

By

JOHN W. GILFORD JR.

(Under the direction of Thomas P. Holland)

ABSTRACT

Traditionally, outcome studies in the behavioral sciences have focused primarily on determining the degree to which specific behaviors change as a result of intervention (amount of change). Equally significant, however, is the question of how behaviors change over the course of the assessment and which factors significantly influence change. This study seeks to model change in symptomatology over a 24-month period of 514 children and adolescents with severe emotional disturbance who received services from a federally funded collaborative mental health system. Two principal research questions were addressed. The first question addresses within groups growth: Does symptomatology change over time in children with severe emotional disturbances who receive services through the federally funded system of care? The second question addresses growth between groups: Are changes in symptomatology systematically related to selected characteristics of child background and treatment?

A growth curve method of modeling individual change was used in order to answer these questions. This study modeled the rate and direction of change as well

as differences in change rates based upon individual-level characteristics assessed at the time of entry into the study.

INDEX WORDS: Children's mental health, Serious emotional disturbance, Hierarchical linear modeling, Predictors of change

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by

JOHN W. GILFORD JR.

B.A., The University of Cincinnati, 1991

M.S.W., University of Georgia, 1997

A Dissertation Submitted to the Graduate Faculty of The University of Georgia in Partial
Fulfillment of the Requirements for the Degree

DOCTOR OF PHILOSOPHY

ATHENS, GEORGIA

2002

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by

JOHN W. GILFORD JR.

Approved:

Major Professor: Thomas P. Holland

Committee: Maurice Daniels
Cheryl Dozier
Larry Nackerud
Bruce A. Thyer

Electronic Version Approved:

Gordon L. Patel
Dean of the Graduate School
The University of Georgia
May 2002

DEDICATION

To my grandfather,
Mr. George Mitchell

ACKNOWLEDGEMENTS

Without the support of many people this study would not have been possible. In particular, I am grateful to my doctoral committee Dr. Thomas Holland, Dr. Maurice Daniels, Dr. Cheryl Dozier, Dr. Larry Nackerud, and Dr. Bruce Thyer. Your support and guidance have been invaluable. I would also like to thank my employer ORC Macro and the Center for Mental Health Services, Child and Family Branch for making the data used in this study available and for providing me with much appreciated technical assistance. Finally, I would like to thank my family, especially my parents, for supporting, encouraging and inspiring me, and to whom I am forever indebted.

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CHAPTER 1

INTRODUCTION AND OVERVIEW OF STUDY

Mental, emotional and behavioral problems are most often thought to be adult disorders. However, studies have shown that these disorders are also prevalent among children and adolescents and can be a debilitating source of stress for the child, their family, school, and community (Center for Mental Health Services, 1998).

Epidemiological research has found that at any given time, at least one in five children and adolescents has some type of diagnosable mental disorder. Approximately 7% of all children between 4 and 18 years of age have a serious emotional disturbance that impairs their ability to function at an age-appropriate level (Brandenberg, Friedman & Silver, as cited in Stroul, 1996). Prevalence studies have shown that over three million U. S. children suffer from some form of mental health disorder. These studies have also suggested that the prevalence of serious emotional disturbance continues to increase at a rapid rate (Center for Mental Health Services, 1996).

As a result, many of the children and adolescents with serious emotional disturbance are unable to access the services and supports they need. In 1982, the Children's Defense Fund published Knitzer's *Unclaimed Children*. Based on a survey of state mental health departments and interviews with public officials, caregivers, and public and private sector child serving professionals, this study revealed that of the three million children and adolescents with serious emotional disturbance residing in the U.S., approximately two thirds were not receiving the services they needed and many more

were receiving inappropriate care. More specifically, the study identified four key problem areas. The first being the lack of state level policy mandating the development of services specifically designed to meet the needs of children and youth with emotional and behavioral problems and their families. The status of children's mental health suggested that meeting the mental health needs of children and youth was a low priority for many states. In fact Knitzer's study found that less than half of the states had staff, mental health treatment facilities or units dedicated to addressing the needs of children and youth. The second key problem identified was the lack of collaboration among the core public child serving agencies. Despite the fact that many of the children receiving or in need of mental health services were also receiving services from child serving agencies such as education, juvenile justice, public health, and child welfare, collaboration among these agencies was found to be either poor or non-existent.

The third problem area was insufficient service capacity. Knitzer's study noted a significant gap between epidemiological projections of need and the actual ability of service systems to adequately meet these needs. As stated, an estimated two thirds of the children and adolescents who needed mental health services were found to have either not received services at all or in those instances where care was provided, services were often found to be inappropriate. The fourth problem area emphasized inappropriate level of care as well. Over half of the youth receiving care within an inpatient psychiatric setting were found to have been more appropriate for a less restrictive level of care (Knitzer, 1982). Due to the lack of available services in the community, children were often forced to receive services in overly restrictive service environments. As a result of the problems discussed above, families were often overwhelmed by complex, confusing

and disconnected service systems that were insufficiently equipped for meeting their needs or seemingly did not place a high priority on meeting the needs of children and families. As a result of Knitzer's study, several public and privately funded initiatives were developed and implemented to promote system reform in children's mental health.

The largest effort to date to address the unique needs of children with serious emotional disturbance and their families has been the Comprehensive Community Mental Health Services for Children and their Families Program. This program, funded by the Center for Mental Health Services (CMHS) at the Substance Abuse and Mental Health Services Administration (SAMHSA), has supported the development of 67 local systems of care across the United States. Since its inception in 1984, the program has provided over \$460 million in federal support towards system of care development (Holden, Friedman, & Santiago, 2001). The primary goal of the program is to "improve the delivery of mental health services and supports to children and adolescents with serious emotional disturbance and their families who need help from more than one service system" (Center for Mental Health Services, 1996). According to the system of care logic model, children with serious emotional disturbance are best served through a service delivery system that not only offers a wide array of individualized services that have been developed and administered according to the unique needs of each client, but also ensures that these services have sufficient capacity to meet the needs of the children and families for whom they are intended. The model suggests that the service system should be community-based with an emphasis on family involvement in both service planning and provision. In addition, the system should be capable of meeting the multicultural needs of its target population and should strive to serve children in the least

restrictive yet clinically appropriate service setting. By definition, children with serious emotional disturbance are actively involved with multiple child-serving agencies. Therefore the model also emphasizes the importance of interagency collaboration and service coordination. Ultimately, the model suggests that given a system with the characteristics described above, improved clinical outcomes can be expected for children/youth and their families.

The study reported in this dissertation modeled change in symptomatology over a 24-month period for 514 children and adolescents who participated in the first phase of the national evaluation of the Comprehensive Community Mental Health Services for Children and their Families Program. Two primary research questions were addressed. The first question addressed within-groups growth: Does child symptomatology change over time in children with serious emotional disturbance who receive services through a CMHS-funded systems of care? The second question addressed growth between groups: Are changes in child symptomatology over time systematically related to selected characteristics of child background?

These questions were addressed through the testing of the following hypotheses

- H₁** There would be significant improvement in CBCL total problem scores from intake to final assessment point (24 months).
- H₂** The rate of change among individuals would vary significantly from intake to final assessment point (24 months).
- H₃** There would be a statistically significant difference between initial status (intercept) of children based upon distinguishing baseline characteristics.

H4 There would be a statistically significant difference between growth rates (slope) of children based upon distinguishing baseline characteristics.

In order to test each hypothesis hierarchical linear modeling (HLM) was used to model change in the intercepts and slopes of the 514 youth included in the sample. HLM is a multi-step analytic procedure that examines relationships between independent and dependent variables across multiple levels. It was selected as the key method of analysis for this study due its precision in parameter estimation, ability to model within and between group differences, and its capacity for dealing with incomplete or missing data.

CHAPTER 2

REVIEW OF THE LITERATURE

Serious Emotional Disturbance in Children and Adolescents

Serious emotional disturbance refers to diagnosable disorders in children and adolescents that severely disrupt daily functioning in the home, school and or community. This group of disorders includes but is not limited to depression, anxiety, eating disorders, conduct-behavioral disorders and attention-deficit/hyperactivity disorder (Center for Mental Health Services, 1997). Commonly found characteristics and behaviors of children with serious emotional disturbance include short attention span, impulsiveness, acting out inappropriately, fighting, failure to initiate interaction with others, retreat from exchanges of social interaction, excessive fear or worry, poor coping skills, inappropriate crying, temper tantrums and poor academic performance (National Information Center for Children and Youth with Disabilities, 2000). Children with serious emotional disturbance may also exhibit distorted thinking, excessive anxiety, bizarre motor acts, and abnormal mood swings and are sometimes identified as children who have a severe psychosis or schizophrenia. Although children who do not have a serious emotional disturbance may exhibit these characteristics and symptoms, the distinguishing factor is that children with serious emotional disturbance continue to exhibit those behaviors and symptoms over an extended period of time.

A great deal of discussion has centered on how the term “serious emotional disturbance” should be defined. In fact, a review of the literature reveals that the terms

“serious emotional disturbance”, “serious emotional disorder”, and “severe emotional disturbance,” are often used interchangeably by researchers, policy makers, and service providers. A recent publication of the National Information Center for Children and Youth uses the term serious emotional disturbance and refers to the definition as stated in the Individuals with Disabilities Education Act (Code of Federal Regulations, Title 34, Section 300.7(b)(9)):

A condition exhibiting one or more of the following characteristics over a long period of time and to a marked degree that adversely affects educational performance

- An inability to learn that cannot be explained by intellectual, sensory, or health factors;
- An inability to build or maintain satisfactory interpersonal relationships with peers and teachers;
- Inappropriate types of behavior or feelings under normal circumstances;
- A general pervasive mood of unhappiness or depression; or
- A tendency to develop physical symptoms or fears associated with personal or school problems.

Public Law 102-321 passed in 1992 established a block grant for community mental health services and the Center for Mental Health Services (CMHS). In addition, PL 102-321 called for the term “children with serious emotional disturbance” to be more precisely defined. In response, in 1993 a panel of experts proposed the following definition:

Children with serious emotional disturbance are persons from birth to age 18 who currently, or at any time during the past year, have had a diagnosable mental, behavioral, or emotional disorder of sufficient duration to meet diagnostic criteria specified within DSM-III-R, that resulted in functional impairment which substantially interferes with or limits the child's role or functioning in family, school, or community activities (Macro International Inc., 1996). Children meeting such conditions were targeted by the Comprehensive Community Mental Health Services for Children and Their Families Program.

Etiology and Prevalence of Child/Adolescent Mental Health Disorders

This dissertation study examined factors associated with change in child and adolescent symptomatology. Among the specific factors analyzed were clinical diagnosis upon entry into the system of care. More specifically, this study examined the relationship between clinical diagnosis and changes in emotional and behavioral problems of children and adolescents enrolled in a system of care. The most common diagnoses among children with serious emotional disturbance are attention-deficit/hyperactivity disorder (ADHD), conduct related disorders, mood disorders such as depression and dysthymia, and anxiety related disorders such as separation anxiety and generalized anxiety (U.S. Department of Health and Human Services, 1999).

Attention-Deficit/Hyperactivity Disorder

ADHD is the most commonly diagnosed among all childhood behavioral disorders. Prevalence estimates among school-age children for ADHD range from 3 to 5 percent. The two primary features characterizing ADHD are persistent patterns of inattention or hyperactivity-impulsivity. Children diagnosed with this disorder are

frequently unable to pay close attention to details or maintain attention in tasks or play activities are often distracted easily and have difficulty remembering information pertaining to daily activities. In addition, they may appear as if not listening when spoken to directly, and often have a difficult time following through on instructions resulting in incomplete schoolwork, chores, and/or work related tasks (American Psychiatric Association. DSM IV, 1994).

Although many of these symptoms may be found in other children not diagnosed as having ADHD, the frequency and severity of ADHD symptoms are considerably higher than those found in other children and youth at comparable levels of development. In most cases, by the time a child has reached age seven, ADHD associated symptoms have already occurred. Impairment in multiple settings such as the home or school is often exhibited by children with ADHD as a result of the disorders interference with developmentally appropriate social, academic or occupational functioning.

Changes in diagnostic protocol and criteria has allowed for a distinction to be made between impulsivity and hyperactivity. Children diagnosed with the hyperactivity sub-categorization of ADHD often exhibit hyper or fidgety behavior such as squirming and difficulty remaining in their desk or seat, excessive running, climbing and talking. Symptoms of impulsivity include blurting out answers before questions have been completed; impatience/difficulty waiting turn; and frequent interruptions or intrusions on others (Andreasen & Black, 1995). Pediatricians report that approximately 4% of the children they treat are diagnosed as having ADHD. However, it has also been noted that in practice children are often misdiagnosed as a result of partially meeting the diagnostic criteria (Wolraich, Lindgren, Stromquist, Milich, Davis & Watson, 1990). In terms of

gender, ADHD is far more frequently found among males than females. Reported male to female ratios for ADHD range from 4:1 for the general population to 9:1 within a clinical setting (DSM IV, 1994).

Although the cause of ADHD has not been determined, the disorder has been linked to a broad range of factors including brain damage, genetics, perinatal complications, and neurotransmitter deficits. Recently, ADHD treatment research has primarily focused upon neurotransmitter deficits. The neurotransmitter of interest has been dopamine. Dopamine significantly contributes to the body's ability to initiate purposive movement, regulate insomnia and appetite and also plays a crucial role in the enhancement of alertness and motivation (U.S. Department of Health and Human Services, 1999). In short, the "dopamine hypothesis" suggests that ADHD is the result of an inadequate availability of the dopamine neurotransmitter within an individual's central nervous system.

Conduct Related Disorders

Another disorder common among children with serious emotional disturbance is conduct disorder. Conduct disorder is primarily characterized by "a repetitive and persistent pattern of behavior in which the basic rights of others or major age-appropriate societal norms or rules are violated" (Andreasen & Black, 1995, p. 574). These behaviors are categorized into four groups: aggressive conduct, non-aggressive conduct, deceitfulness or theft, and serious violations of rules. Aggressive conduct refers to actions that result in the physical harm of others (people or animals). Children diagnosed with conduct disorder-aggressive type often may have a history of bullying, threatening or intimidating others, initiating fights, using a weapon that can cause serious physical

harm, and cruelty to people and or animals. In addition, youth with this conduct disorder subtype are more apt to have a history of theft by confrontation (i.e. mugging, armed robbery), and/or forced sexual activity (DSM IV, 1994).

Non-aggressive conduct refers to actions resulting in property loss and/or damage. Although just as severe, youth diagnosed as having a non-aggressive conduct disorder often engage in activities that are less direct yet equally dangerous. Specific behaviors indicative of non-aggressive conduct include fire setting with the intention of causing serious damage and/or a history of deliberately destroying the property of others (DSM IV, 1994).

Specific behaviors falling under the category of deceitfulness and theft include a history of breaking into someone else's home, building or car, frequently lying as a means of avoiding obligations or to obtain goods, and a history of stealing items of significant value without confronting a victim (e.g. shoplifting, forgery). Behaviors associated with the serious violation of rules category include a history of running away from home for extended periods of time, breaking established curfews and frequent truancy.

One of the more frequently diagnosed conditions for children and youth, the prevalence of conduct disorder has increased significantly over the last several decades. Among males under the age of 18, estimates range from 6% to 16% (Andreasen & Black, 1995). Prevalence estimates for females within this same age group, range from 2% to 9%. In addition to gender differences in conduct disorder prevalence rates, the way in which the disturbance is manifested in males and females also differs considerably. In females for instance, behaviors such as lying, truancy, running away, substance abuse,

and prostitution are common. In contrast, males frequently exhibit more aggressive behaviors such as fighting, stealing, vandalism, and school discipline problems.

As with ADHD, the specific causes of conduct disorder have not yet been determined. The condition has been associated with several biological as well as psychosocial specific factors. Social risk factors such as early maternal rejection, separation from parents, early institutionalization, neglect, and abuse have all been associated with conduct disorder. In addition, conduct disorder has been linked to family history of psychiatric illness, parental marital discord, large family size, crowding, and poverty (Loeber & Stouthamer-Loeber, as cited in U.S. Department of Health and Human Services 1999).

Several physical and behavioral risk factors have also been associated with conduct disorder. Factors such as neurological damage caused by birth complications or low birth-weight, ADHD, fearlessness and stimulation seeking behavior, learning impairments, autonomic under-arousal, and insensitivity to physical pain and punishment have all been linked to conduct disorder. Although the specific causes of conduct disorder remain unknown, the existing data clearly indicate that those children who are most susceptible to conduct disorder are those individuals with social deprivation as well as neurological/physical problems (Raine, Reynolds, Venables, Mednick & Farrington, 1996).

Depression/Dysthymia

Depressive disorders such as major depressive disorder, dysthymia and bipolar disorder are also common among children dealing with serious emotional disturbance. In

fact, of all mood disorders, these three disorders are the most commonly diagnosed among children and adolescents (U.S. Department of Health and Human Services, 1999).

The primary feature of major depressive disorder in children and adolescents is the occurrence of depressive episodes, which are typically seven to nine months in length. During depressive episodes, these children are sad, may complain of feelings of hopelessness, and may lose interest in activities that they typically would find enjoyable. They may become overly critical of themselves and in turn may feel that others are criticizing them as well. Children with depressive disorder often feel unloved and pessimistic, or even hopeless about the future describing life as not being worth living. They are often irritable, and their irritability may in turn lead to aggressive behavior. Indecisiveness, lack of motivation and neglect of their appearance and hygiene may also occur in addition to significant changes in appetite and sleep patterns (U.S. Department of Health and Human Services, 1999).

Although similar to major depressive disorder, children suffering from dysthymia or dysthymic disorder exhibit symptoms that are less frequent and severe. However, in terms of duration, dysthymia is an extremely persistent condition. Children suffering from dysthymia often experience symptoms for a number of years. The average duration of a dysthymic period in children and adolescents is approximately 4 years (U.S. Department of Health and Human Services, 1999). In fact, many children suffering from dysthymia have become so accustomed to their depressed mood that they are often unaware of its existence and subsequently do not complain of feeling depressed. Although the symptoms of dysthymia may not be as severe as major depression, early detection of the disorder is critical. Studies have shown that 70 percent of children and

adolescents with dysthymia eventually experience an episode of major depression at some point in their lives (U. S. Department of Health and Human Services, 1999).

Also included within the category of mood disorders is bi-polar disorder. This disorder is characterized by alternating episodes of depression and mania. The illness typically begins during adolescence with the initial manifestation being a depressive episode. “Manic features may not occur for months or even years thereafter, or may occur either during the first depressive illness or later, after a symptom-free period” (Strober, Schmidt-Lackner, Freeman, Bower, Lampert, & DeAntonio, 1995). In contrast to the characteristics of depression, adolescents experiencing a manic episode encounter feelings of grandiosity and confidence, very energetic despite the fact they often have difficulty sleeping and become extremely talkative, often speaking loud and at a rapid pace. Also characteristic of a manic episode are racing thoughts and a disorganized or chaotic approach to task completion (such as schoolwork). During these episodes, grandiose delusions about their capabilities and importance may lead to overconfidence and uninhibited behavior. These children often start projects that are ultimately not completed and may engage in reckless or risky behavior. In addition, children experiencing a manic episode may have a preoccupation with sex and may exhibit promiscuous behavior.

Depressive disorder, dysthymia and bi-polar disorder are the most common mood disorders among children and adolescents. An estimated 10% to 15% of children and adolescents suffer from some symptoms of depression (Smucker, Craighead, Craighead, & Green, 1986). Among all children between the ages of 9 and 17 years, the prevalence of major depressive disorder has been estimated at 5% (Shaffer, Fisher, Dulcan, Davies,

Piacentini, Schwab-Stone, Lahery, Bourdon, Jensen, Bird, Canino, & Regier, 1996a).

The prevalence of dysthymic disorder among adolescents has been reported as approximately 3%. Prior to reaching puberty, differences in dysthymia prevalence between girls and boys are not apparent. However, among females and males 15 years of age or older, the illness is twice as common among females than males. Lifetime prevalence of bipolar 1 disorder in community samples varies from 0.4% to 1.6%. Although the exact causes of depressive mood disorders have not been determined, depression has been associated with hereditary, biological, and cognitive factors, in addition to the previously mentioned gender differences.

Anxiety Related Disorders

Anxiety disorders such as separation anxiety disorder, generalized anxiety disorder, social phobia, and obsessive-compulsive disorder are higher in prevalence than all other childhood and adolescent mental disorders. Approximately 4% of children and young adolescents suffer from separation anxiety disorder. This anxiety disorder is primarily characterized by excessive distress stemming from the child's separation or fear of being separated from their home, a parent or some other individual with whom they have become attached. Although many children may experience some degree of anxiety, in children diagnosed with an anxiety disorder the condition is developmentally inappropriate and excessive. Children diagnosed with separation anxiety disorder are often fearful or reluctant to be alone or away from their parents, experience difficulty sleeping when separated from their parents and may complain of repeated nightmares headaches, stomach aches and nausea as a result of being separated (or possibly separated) from a caregiver (Andreasen & Black, 1995). As with most childhood

disorders, a specific cause has not been determined. However, researchers have linked the condition with genetic and environmental as well as physical risk factors such as family history of mental illness, close family structure and trauma (U.S. Department of Health and Human Services, 1999).

Generalized anxiety disorder is also referred to as an ‘overanxious disorder of childhood’ and is characterized by excessive worry about future events and occurrences (DSM IV, 1994). Children with this condition will often worry excessively about things such as academic performance, punctuality, or situations entirely out of their control such as natural disasters. This immoderate level of worry persists even when the child is not being judged and may have a history of performing well in specific areas. Children with this disorder are often perfectionists, doubtful of their own capabilities and over conforming. As a result, these children often tend to seek approval and constant reassurance about their performance and anxieties (DSM IV, 1994). In terms of prevalence, the one-year prevalence rate for adults and children diagnosed with generalized anxiety disorder is approximately 3 percent. The lifetime prevalence rate for this same population is approximately 5% (DSM IV, 1994).

An overview of common childhood and adolescent disorders reveals that many of the disorders found to be prevalent among children and adolescents are also common among adults. In fact, many adult disorders are manifestations of conditions that may have initiated in infancy, childhood or adolescence. Historically, the mental health system has focused primarily upon the treatment of adult disorders, thereby allowing many of the disorders discussed above to persist throughout most of a person’s life without any efforts towards assessment, treatment, or prevention. As a result, these gaps

in the approach towards providing mental health care have significantly many youth who have endured these disorders through adulthood. Early intervention has the potential to lead towards better management of the often debilitating effects of disorders such as depression as well as preventing the unruly and often violent manifestations of conditions such as conduct disorder. Research efforts such as the present study that attempt to better understand how children respond to particular interventions may also greatly impact our ability to treat, prevent and reduce instances of serious emotional disturbance.

The disorders described above are not only debilitating for the children and adolescents diagnosed with these conditions. They also significantly affect the families and caregivers of these children. In addition to dealing with the typical challenges associated with rearing a child, caregivers of children with serious emotional disturbance address on a daily basis the often overwhelming tasks associated with caring for a child with emotional and behavioral problems. These parents are routinely confronted with taxing concerns such as dealing with uncontrolled outburst or violent behavior, ensuring that their child is safe and not at risk of harming themselves or others as a result of their condition, and navigating an often confounding service system in order to obtain adequate care. For example, by definition, children with serious emotional disturbance require services from multiple child-serving agencies. In order to effectively coordinate needed services, caregivers often find themselves confronting a complex service system, functioning as a resource manager as well as advocating for themselves and their child.

The demands of caring for a child with serious emotional disturbance can significantly exacerbate the most common of tasks. Hiring a babysitter, for example, is complicated by the need to find an individual who is not only willing but also capable of

caring for a child with emotional and/or behavioral problems. Parents may find their jobs in jeopardy as a result of excessive leave for meetings with service providers. Siblings of children with serious emotional disturbance may feel neglected as a result of the added attention required of living with a child with a serious emotional disturbance. For single-parent families, these issues are doubly taxing and all the more difficult.

Traditional Service System Philosophy

Within the traditional mental health service system, children with mental problems have not received the level and amount of care they need in order to effectively deal with their conditions. Traditionally, services for children with mental health problems evolved from the community based guidance movement adopted in the 1920's and 1930's. This movement was rooted within juvenile court-related social work and the early efforts of the parent education movement (Hara and Ooms, 1995). As time progressed, children's mental health services were entirely incorporated within the adult mental health system, leaving little room for distinction between the two groups.

Overall, mental health service systems have traditionally adhered to the medical model in which treatment is determined by the diagnosis assigned to an individual. Based upon this diagnosis, a treatment plan is developed with the intention of stabilizing the specified illness. This model has been criticized for its emphasis upon pathology and failure to identify and build upon the strengths and competencies of the individual. Nonetheless, the medical model has been and continues to be the preminent approach to providing mental health services. This is largely due to the fact that most healthcare financing/reimbursement programs and organizations use the model as a basis for determining eligibility for services.

In *Unclaimed Children*, Knitzer (1982) describes how treatment approaches for children with mental health problems have traditionally been rooted in one of two schools of thought: the psychodynamic approach and the behavioral approach. Psychodynamics operates from the premise that mental health problems are manifestations of internal psychological conflicts. From this perspective, mental health problems are treated by attempting to change the way individuals may feel or think about themselves resulting in changes in the problematic or undesired behavior. Behaviorism focuses more closely on the relationship between behaviors and external stimuli. Behavioral treatment approaches often involve altering patterns of rewards and punishment as they relate to specific behaviors. Through this manipulation of rewards and punishment, undesired behaviors can be controlled and reduced.

Treatment within a traditional mental health setting has primarily been individual therapy, group and family therapy, crisis intervention, psychopharmacological therapy, or a combination of any of these approaches (Hara & Ooms, 1995). Settings in which these therapeutic approaches are implemented range from inpatient hospitals and residential treatment facilities to day treatment programs and outpatient settings such as community mental health centers, private clinics and offices (Hara & Ooms, 1995). Within the traditional service paradigm, these services are primarily conducted by individuals from the public sector in addition to privately practicing professionals and private non-profit or for-profit organizations and agencies.

Unfortunately for many, these providers, service settings and treatment approaches only exist in theory due to limited resources, availability and service capacity. Particular groups of children and adolescents have been identified as not

receiving the services or levels of care they needed (Knitzer, 1982). Among these identified groups were adolescents with serious or multiple problems in addition to those in hospitals or at risk of inpatient hospitalization, children with mental and emotional problems in out-of-home care under custody of child welfare or juvenile justice agencies, children from low-income families, and children of parents who have histories of mental illness, alcohol and/or substance abuse. In addition to the needs of children not being met, the needs of the parents and caregivers of these children are often neglected as well within the traditional service system. Parents caring for a child with mental and emotional problems often find themselves caring for their children alone and with little or no professional support or assistance.

Systems of Care

History

As stated, *Unclaimed Children* revealed an epidemic among the nations' children suffering from serious emotional disturbance and served as the key catalyst for children's mental health care reform and development. The findings of the 3 year study brought to light the unnerving extent to which children and adolescents with mental health problems were being inappropriately served and underserved. In response to *Unclaimed Children*, a meeting to explore the needs of children and adolescents with serious emotional disturbance and their families was jointly sponsored the National Institute of Mental Health (NIMH) and the State Mental Health Representatives for Children and Youth division of the National Association of State Mental Health Program Directors. During this meeting, Knitzer's findings provided direction in the development of recommendations for service system and service delivery reform.

Two years following the publication of *Unclaimed Children*, Congress funded an initiative to systematically respond to the complex clinical issues raised by the treatment of troubled children with multiple needs. This Congressional request led NIMH to develop the Child and Adolescent Service System Program (CASSP). This initiative prompted states to plan across the core child serving agencies (i.e. child welfare, mental health, education, health, and juvenile justice) to develop collaborative systems of care that would more effectively meet the multiple needs of children and youth with serious emotional disturbance. As a result of the CASSP planning grants, child serving agencies began to work collaboratively to improve service delivery, eventually raising public awareness of this vulnerable population and its needs.

Building upon the efforts set forth by the CASSP grants, the Robert Wood Johnson Foundation committed \$20.4 million in 1988 to implementation grants under its Mental Health Services Program for Youth (MHSPY). These grants were awarded to a total of eight state and community partnerships. Each grantee was to use the award to demonstrate the overall effectiveness of innovative, cost-effective integrated systems of care. Prior to the current CMHS initiative, MHSPY was the largest funded effort to serve children with serious emotional disturbance and their families and was also the first national children's mental health program with the explicit goals of creating new models of service delivery and reforming state and local public policy.

The principles of the Robert Wood Johnson Foundation's MHSPY served as the foundation for the Urban Child Mental Health Initiative launched by the Annie E. Casey foundation in 1990. Similar to MHSPY, the goal of this initiative was to "improve outcomes for troubled children, adolescents, and their families through demonstrating

new ways of delivering culturally appropriate, family focused mental health services in high-poverty, inner-city neighborhoods and to work with states to improve policies and practices supporting these services” (King & Meyers, 1996, p. 252). Planning grants of \$150,000 each were awarded initially to six states. Four of these six were later awarded another \$3 million in implementation grants based upon their initial plans. In contrast to traditional interventions that focused primarily upon prevention and treatment of mental illness, the mental health Initiative for Urban Children focused on “the promotion and protection of the emotional well being and behavioral health of children and their families” (King & Meyers, 1996, p. 253).

In 1992, the Comprehensive Community Mental Health Services for Children and Their Families Program was initiated by the Substance Abuse and Mental Health Services Administration (SAMHSA), Center for Mental Health Services, Child and Family Branch. This new federal program provided funds to promote the development of comprehensive and integrated service delivery systems for children with serious emotional disturbance through a system of care approach. The primary goal of the CMHS program was similar to that of the preceding CASSP and MHSPY programs: to support the development of family centered, culturally competent, multi-agency service delivery systems designed to meet the intensive needs of children and adolescents with serious emotional, mental and behavioral disorders and their families.

Since its inception in 1993, the Comprehensive Community Mental Health Services for Children and their Families Program has funded 67 grant communities in 49 states. In the initial phase of the program, 22 sites were awarded CMHS grants. Phase II of the program began in 1997 and consisted of awards to an additional 23 sites. The most

recent round of awards (Phase III) was issued in 1999 and included another 22 sites. To date, nearly five hundred million dollars have been invested in the Comprehensive Community Mental Health Services for Children and Their Families Program, making it the largest federally funded mental health initiative in the history children's mental health (Holden, 2001).

System of Care Program Theory Model

A system of care is defined as “a comprehensive spectrum of mental health and other necessary services which are organized into a coordinated network to meet the multiple and changing needs of children and adolescents with serious emotional disturbance and their families” (Stroul & Friedman, 1986). Stroul and Friedman developed three core values as part of the underlying framework for the system of care philosophy. These core values are

1. *The system of care should be child centered and family focused, with the needs of the child and family dictating the types and mix of services provided.*
2. *The system of care should be community based, with the locus of services as well as management and decision making responsibility resting at the community level.*
3. *The system of care should be culturally competent with agencies, programs, and services that are responsive to the cultural, racial, and ethnic differences of the populations they serve.*

The Comprehensive Community Mental Health Services for Children and Their Families Program's mission is to encourage “the development of intensive community-based services for children with serious emotional disturbance and their families based on

a multi-agency, multi-disciplinary approach involving both the public and private sectors” (Center for Mental Health Services, 1996).

The “system of care program theory model” (Stroul & Friedman, 1986), delineates the relationship between resources, activities and outcomes and how each of these components is related and contributes to the “widespread adoption of (the system of care) philosophy and approach.” According to the system of care logic model, children with serious emotional disturbance are best served through a service delivery system that not only offers a wide array of individualized services that have been developed and administered according to the unique needs of each client, but also ensures that these services have sufficient capacity to meet the needs of the children and families for whom they are intended.

The model suggests that the service system should be community-based with an emphasis on family involvement in both service planning and provision. In addition, the system should be capable of meeting the multicultural needs of its target population and should strive to serve children in the least restrictive yet clinically appropriate service setting. By definition, children with serious emotional disturbance are actively involved with multiple child-serving agencies. Therefore the model also emphasizes the importance of interagency collaboration and service. The system of care logic model graphically outlines the relationship between each of the components discussed above (see Figure 1).

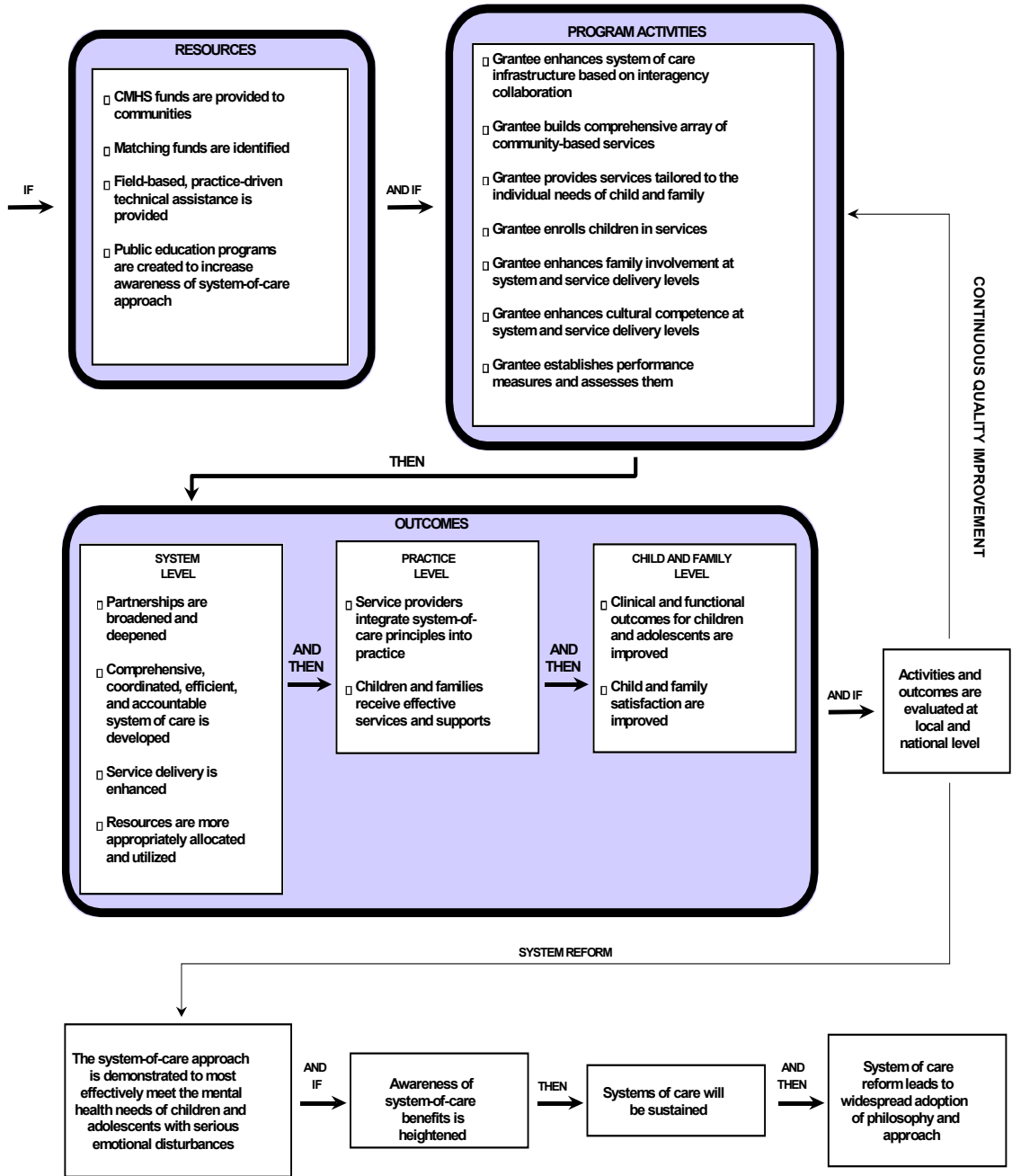


Figure 1. System of Care Program Theory Model. From Evaluation planning guide: Phase III of the national evaluation of the comprehensive community mental health services for children and their families program. (p.11), Macro International, 1999, Atlanta, GA: Macro International.

The first square of the logic model lists the resources required for successful implementation of the program. Resources include technical assistance and public education programs, in addition to funding from both federal CMHS dollars as well as matched funding from other sources. Each awarded grant community receives funding on an annual basis throughout the five-year duration of the grant. As each system of care develops, mechanisms for ensuring sustainability are expected to be implemented so that as federal funding decreases over the five-year period, alternate funding sources are identified and obtained. In addition to funding, field based, practice-driven technical assistance, consultation, evaluation and leadership are also provided by the CMHS. Finally, mechanisms must be in place to increase awareness about the system of care and inform the public (more specifically the target population), about the program, available services and its approach to serving children with serious emotional disturbance and their families.

The second square of the model provides a broad list of program level activities to be conducted given the presence of the preceding required resources. These activities include service system enhancement as a result of the emphasis upon interagency collaboration; development of a comprehensive array of community based, culturally competent and family focused services; the provision of services specifically tailored to meet the individual needs of children and families; the enrollment of children into the service system; enhancement of family involvement at the system and service delivery levels; enhancement of cultural competence at both the system and service delivery level; and the establishment of an quality assurance/quality improvement protocol.

If the listed resources are made available and the necessary actions are taken at the program level, the model then delineates the expected outcomes at the system and practice levels in addition to expected outcomes at the child and family level. The third square of the model specifically outlines the three levels of expected outcomes achieved as a result of the required resources and program activities. System level outcomes include the development of new relationships among partnering child and family serving agencies in addition to the strengthening of pre-existing agency relationships; the development of a service system that is comprehensive, coordinated, efficient and accountable; enhancement of the pre-existing service system, and improvements in the allocation and utilization of resources. Stemming from the system level changes, specific outcomes are expected at the practice level. Once the changes have been made at the system level, service providers are then able to integrate the system-of-care principles into practice, leading to the delivery of effective services and supports to children with serious emotional disturbance and their families.

The third and final level of outcomes refers to outcomes expected at the child and family level. As a result of each preceding stage in the model, children and adolescents with serious emotional disturbance who receive services within a system-of-care should experience improved clinical and functional outcomes. In addition, significant improvement is expected in terms of child and family satisfaction as well. Ongoing evaluation of the system and assessment of these expected outcomes was mandated at both the local and national level. If the system-of-care approach were then demonstrated to be the most effective approach for meeting the needs of children and adolescents with serious emotional disturbance and awareness of system of care benefits were

subsequently increased based upon these findings, then increased support for sustaining the system of care could be garnered. All of these factors ultimately contribute to the final indicator of system reform: widespread adoption of the system of care approach and philosophy. In addition to the three core values discussed earlier, Stroul and Friedman (1986) developed a set of ten guiding principles that are believed to be essential elements of any system of care. These ten principles not only provide guidance and direction in the development of a system of care, but also can serve as a standard by which adherence to the system of care philosophy can be assessed. The following section defines and discusses each of the ten system of care principles proposed by Stroul and Friedman. The guiding system of care principles are

1. Children with emotional disturbance should have access to a comprehensive array of services that address the child's emotional, social, and educational needs.

From a systems perspective, mental health services can be effective only within the context of a larger child-caring network (Stroul & Friedman, 1986). While it is true that service systems for children with serious emotional disturbance are primarily provided by mental health professionals, mental health services alone are not sufficient to meet the multiple needs of children with serious emotional disturbance. Mental health services can only truly be effective when viewed and applied within the context of a more comprehensive network of services. Thus, the array of services available to children with serious emotional disturbance must be comprehensive in order to adequately meet the multiple needs of these children. Services cannot be limited to those provided within a mental health setting, but should also include other services that meet the child's health, educational, recreational, family support, and vocational needs.

Stroul and Friedman (1986) identified eight core service components of a comprehensive system of care for children with serious emotional disturbance. The first component, mental health services, includes nonresidential services such as prevention, assessment, outpatient treatment and emergency services. The second service component, social services, includes protective services, financial assistance, foster care and adoption. Educational services, the third component, includes services such as assessment and planning, special schools, homebound instruction and alternative programs. Health education and prevention, screening and assessment, primary, acute and long-term care are all services included in the fourth component, health services.

Substance abuse services comprises the fifth service component and includes both residential and non-residential services. Specific residential services within this component include, detoxification, community residential treatment and recovery services and inpatient hospitalization. Nonresidential services include prevention, early intervention, assessment, outpatient services, day treatment, ambulatory detoxification and relapse prevention. The sixth core service component is vocational services. Services within this component are education vocational assessment and skills training, employment placement and retention services in addition to supported employment services. The seventh service component, recreational services, consists of after school programs, summer camps and special recreational projects. The eighth and final service component is operational services which includes case management, juvenile justice services, family support and self help groups, advocacy, transportation, legal services and volunteer programs.

This list of core services is comprehensive yet not exhaustive. These eight service components are considered to be the essential elements of any developing or established system of care. Additional services may very well be integrated with those listed above. The critical issue is that the service array of a system of care is able to meet the multidimensional needs of children with serious emotional disturbance who most often will require the services of multiple child serving agencies, organizations and providers.

2. Children with emotional disturbance should receive individualized services in accordance with the unique needs and potentials of each child and should be guided by an individualized service plan.

Individualized services, also commonly referred to as “wraparound” services, are individually tailored services designed to meet the specific needs of the child and family. As discussed earlier, the definition of serious emotional disturbance encompasses a wide array of diagnoses. Children with serious emotional disturbance vary across clinical factors such as diagnosis, level of functioning, symptomatology and degree of impairment. They also vary across common demographic factors such as sex, age, and race. Understanding the depth and variance associated with serious emotional disturbance, it is imperative that services provided to these children are capable of meeting the unique needs of each child. Children should not be required or expected to conform to the service system. Services should instead be designed and configured to fit the unique needs of each child.

Key to the provision of individualized services is assessment and service planning. A comprehensive assessment provides the vital information that subsequently

determines which specific services will be needed and in what fashion those services should be delivered. Demographic and clinical information as well as an assessment of the child's strengths and level of functioning should always be included in the assessment. In order to develop the most appropriate and effective service plan, the assessment should be conducted from an ecological perspective, taking into consideration the child within the context of their social environment. Building upon the assessment, an individualized service plan (ISP) is developed that identifies problems, establishes goals, specifies appropriate interventions and addresses the child's needs across all of the previously discussed core service system components. Development of the ISP should be a collaborative effort, actively involving family, service providers and any significant others who are actively involved.

3. Children with emotional disturbance should receive services within the least restrictive, most normative environment that is clinically appropriate.

As stated by Stroul and Friedman (1986), "preferred interventions are those that provide the needed services and, at the same time, are minimally intrusive in the normal day to day routine of the child and family." Often, children with serious emotional disturbance are unnecessarily served in restrictive service settings such as inpatient psychiatric facilities and residential treatment facilities. This often occurs due to the lack of less restrictive community based services within the service systems providing care.

The system of care philosophy advocates the provision of care to children with serious emotional disturbance in a manner that allows them to remain in their own homes and communities. This is accomplished through the establishment and maintenance of a service array that emphasizes the vital role of the family and is simultaneously rooted

within the community. Traditionally, many service systems did not include a full array of community-based services and resources for the treatment of children with serious emotional disturbance. In addition, state and federal financial resources for children with mental health problems have historically been allocated to institutional/residential facilities as opposed to providers based within the community. This has contributed significantly to children being served in service settings that are unnecessarily restrictive and thus clinically inappropriate. Data from several studies have indicated that most children with serious emotional disturbance can successfully be treated in less restrictive environments provided that a comprehensive service array is indeed available (Behar, 1985; Friedman & Street, 1985; Stroul, 1988, as cited in Stroul and Friedman, 1994).

4. The families and surrogate families of children with emotional disturbance should be full participants in all aspects of the planning and delivery of services.

The intent of this principle is to incorporate the ideas, opinions and perspective of caregivers into the service system at both the infrastructure and service delivery level. By doing so, the system of care facilitates, emphasizes and ensures a family focused orientation (Stroul & Friedman, 1986). A family focused system of care should involve caregivers at each level of the service system from assessment, planning and service provision to participation at the system or infrastructure level, contributing to such areas as program governance, strategic planning, budgeting and policy making.

In addition to including caregivers in the infrastructure and service delivery aspects of the service system, the system of care should also provide supports and services that “enhance their coping skills and their ability to care for their children effectively” (Stroul & Friedman, 1986). Services such as parent advocacy, education,

mentoring, counseling, and respite are all examples of needed services and supports to be provided to caregivers within a system of care. In addition to the services provided to caregivers, the needs of the family as a whole should also be assessed including the siblings of children with serious emotional disturbance. Based upon this assessment, services should then be accordingly planned and provided to meet the needs of these children as well.

5. Children with emotional disturbance should receive services that are integrated, with existing linkages between child-serving agencies and programs and mechanisms for planning, developing, and coordinating services.

This principle addresses the issues of service coordination, service system responsiveness and continuity of care. In a comprehensive service system designed to meet the needs of a diverse target population in which each individual has multiple needs, “integrated, multi-agency networks” are a necessity (Stroul and Friedman, 1986). Such provider networks are attained through the sharing and coordination of functions among the core child serving agencies and providers. Program development, administration, funding, service delivery, coordinating and evaluation are examples of the types of functions to be shared and coordinated across agencies (Stroul and Friedman, 1986).

Furthermore, in order to ensure responsiveness, the service system should allow for a certain degree of flexibility in areas such as funding and decision-making. Flexibility within the system’s structure allows the system to rapidly respond to the ever changing needs of the target population served as opposed to the continued provision of services in a narrowly focused, unchanging manner. Unfortunately, the latter is too

common within traditional service systems and ultimately leads to children and families having to conform to the values of the system in order to receive services.

6. Children with emotional disturbance should be provided with case management or similar mechanisms to ensure that multiple services are delivered in a coordinated and therapeutic manner and that they can move through the system of services in accordance with the changing needs.

Case management is an integral component of the system of care approach. Doel (as cited in Freisen & Poertner, 1995) defined case management as “a set of functions designed to mobilize resources to meet client needs.” Essential functions of case management include coordinating the comprehensive interagency assessment for the child’s needs; planning for services to address the needs of the child and family; arranging for needed services; linking various parts of the child’s system, including family, agencies, school, and significant others; monitoring the adequacy and appropriateness of services; ensuring continuity of service provision; advocating for the child and family and establishing linkages with the adult service system to facilitate transition (Stroul and Friedman, 1986).

The role of the case manager/care coordinator is to actualize the service plan by coordinating the delivery of the identified needed services from the varying child/family serving agencies and organizations. The case manager is essentially the hub, linking and coordinating the various services and components of each child’s particular system. This role is critical considering the multiple needs of children with serious emotional disturbance. In order to meet these multiple needs, integrated services from various child/family-serving agencies are required.

7. Early identification and intervention of children with emotional disturbance should be promoted by the system of care in order to enhance the likelihood of positive outcomes.

Confronting serious emotional disorder through efforts to reduce prevalence and severity level should be a primary goal of any system of care (Stroul and Friedman, 1986). Research has found that early identification of problems and early intervention has a significant impact upon improved outcomes for children with serious emotional disorder. An emphasis upon the early identification of serious emotional disturbance and the implementation of interventions designed to offset the impact of serious emotional disturbance allows the system of care to curb prevalence through both intervention and prevention approaches. When this emphasis is maintained, children who are identified early as being “high-risk” can receive preventative treatment, thus reducing their chances of developing increasingly severe levels of emotional and behavioral problems.

8. Children with emotional disturbance should be ensured smooth transitions to the adult service system as they reach maturity.

As children and youth with serious emotional disturbance become young adults, efforts should be made to ensure that their mental health needs are met throughout and following this transitional period. Due to the nature of serious emotional disturbance and the long-term course of the illness, children and youth receiving care often require multiple services upon their transition to adulthood. Realizing this, it is imperative that these young adults receive the support and services needed to ensure that this transition occurs as smoothly as possible. In order to achieve this, coordination, collaboration and preparation are required at both the client level as well as the system level. The

coordination of continuing services and newly required services should be conducted in addition to the preparation of adult serving agencies and organizations for serving former system of care children and youth.

9. The rights of children with emotional disturbance should be protected, and effective advocacy efforts for children and youth with emotional disturbance should be promoted.

This system of care principle addresses both the issues of client rights protection and client advocacy. A system of care should have in place specific mechanisms intended for the protection of client rights. Protection and advocacy systems, case review committees, grievance procedures, client rights statements, and legal statutes are all examples of such mechanisms. This principle also emphasizes the necessity of advocacy and support resources for children and youth with serious emotional disturbance.

Vehicles for support and advocacy for children and their families should be made readily available within a system of care. Stroul and Friedman (1986), described two levels of advocacy in their explanation of this principle. These two classifications are “case” advocacy and “class” advocacy.

Case advocacy refers to advocacy efforts on the individual level. This is defined as “efforts on behalf of an individual child to ensure that the child and his or her family receives appropriate services, benefits, or protections.” Class advocacy refers to efforts or actions directed at bringing about changes at the system level that benefit children and youth. Knitzer (as cited in Stroul and Friedman, 1986) defined this as “efforts to seek improvements in services, benefits, or rights on behalf of all children and youth with emotional disturbance.” In order to address this issue, child and family advocacy organizations such as the Federation of Families have been closely and actively involved

in the Comprehensive Community Mental Health Services for Children and Their Families Program since its inception.

10. Children with emotional disturbance should receive services without regard to race, religion, national origin, sex, physical disability, or other characteristics, and services should be sensitive and responsive to cultural differences and special needs.

The final system of care principle addresses the incorporation of assurances of nondiscrimination. As the principle clearly states, services should be made available to all children and youth with serious emotional disturbance regardless of factors such as race, sex special needs and cultural differences. Not only does this principle imply that systems provide services in a nondiscriminatory manner, but that they should be accessible to children/youth and their families with special needs such as physical disabilities and special language needs. Key to the operationalization of this principle is flexibility within the system of care to appropriately address and meet the needs of the diverse population of children and youth it serves. Flexibility in which services are made available, who provides those services and how services are provided helps to avoid the establishment of service systems that are excessively rigid and narrowly focused and disregard the needs of those individuals outside the systems limiting parameters.

The system of care logic model essentially focuses on how the system of care philosophy will be promoted, implemented, accepted and sustained. However, what is lacking from the literature is an in-depth explanation of how the system of care philosophy actually brings about improved emotional and behavioral outcomes for children and adolescents receiving services within a system of care. The system of care philosophy has been criticized within the literature for this lack of a justifying foundation

(Bickman, Guthrie, Foster, Lambert, Summerfelt, Breda, & Heflinger, 1995). The present system of care literature primarily discusses the principles and values associated with the service system philosophy, yet fails to explain the relationship between the system of care approach and child/youth functional and clinical change.

Similarly, the lack of sound empirical evidence supporting the system of care model has also been noted as a shortcoming of the approach. Several quasi-experimental studies have implemented comparison group designs to examine the effectiveness of systems of care. However, to date these studies have not been able to consistently demonstrate that children enrolled in a system of care experience significantly better outcomes than children receiving services within a traditional service system. These studies have found that compared to children in traditional service systems, children in systems of care tend to receive more services within their community, receive services in less restrictive environments, exhibit lower levels of functioning problems at home, school and in the community and when placed within restrictive service settings tend to have shorter lengths of stay. In addition parents of these children tend to have higher levels of satisfaction with services compared to parents of children within a more traditional service system (Hara & Ooms, 1995).

Fort Bragg Evaluation Project

Prior to the Comprehensive Community Services for Children and Their Families Program, child clinical outcomes were examined in a continuum of care demonstration program implemented in Fort Bragg, North Carolina. Funded by the U.S. Department of Defense, this program expanded the array of mental health services and supports available for the more than 42,000 children and adolescents of military families residing

within the Fort Bragg catchment area (Bickman, Lambert, Andrade, & Penaloza, 2000). In addition, the department of defense also provided funding for a comprehensive evaluation of the Fort Bragg Demonstration Project (FBDP). The North Carolina Department of Mental Health, Developmental Disabilities and Substance Abuse Services awarded a subcontract for the evaluation of the project to the Center for Mental Health Policy of the Vanderbilt Institute for Public Policy Studies at Vanderbilt University.

A quasi-experimental, longitudinal study, the Fort Bragg Evaluation Project (FBEP) consisted of four sub-studies and was designed to test the hypothesis that children receiving services within a continuum of care would demonstrate better mental health outcomes compared to children receiving services in a more traditional mental health system. The four sub-studies in the FBEP included the implementation study, the quality study, the mental health outcome study and the cost and utilization study. Over the course of a year, mental health data were collected on a total of 984 children and their families. The sample consisted of two groups, with 574 individuals from the demonstration site and the remaining 410 from comparison sites. Data for the outcome study were collected at intake and with follow up measures being collected every six months. Similar to the present study, the FBEP not only examined mental health outcomes for the sample as a whole but also looked at specific subgroups that were based upon individual level characteristics. Twelve key outcome measures were assessed during the study including the child behavior checklist (Achenbach, 1991). Over the 12 month period, each variable was assessed a total of 3 times.

Although outcomes were found to be positive for children at both the demonstration and comparison sites, the study failed to detect consistently superior

clinical outcomes for those children receiving services at the demonstration site. Significant findings were found in several areas, with some indicating superior outcomes for children in the demonstration project and other indicating significantly better outcomes for children from the comparison sites.

Similar to the system of care model discussed earlier, the continuum of care model implemented in the FBEP was a key catalyst in policy revisions within the area of children's mental health. As a result, the findings of the FBEP spurred a great deal of contention from those who supported the collaborative approach. Proponents of the system of care approach argued that the FBEP was unable to reliably capture differences in the outcomes of the comparison and demonstration sites due to the short length of time between the initial and final assessment. These critics argued that a 12 month period of time is not sufficient when trying to observe changes in clinical outcomes. However, the Vanderbilt Center for Mental Health Policy recently published several studies using the original FBEP data in which they continued to track clinical outcomes over a 3 year and 5 year period of time. The results of these two studies are consistent with those of the initial study. Significantly better outcomes were found for some variables favoring the demonstration site, while others indicated more improvement at the comparison sites. Such inconsistencies were also found during the examination of individual level characteristics and their impacts upon change in clinical outcomes (Hamner, Lambert & Bickman, 1997; and Bickman, Lambert, Andrade, & Penaloza, 2000).

Factors that Influence Child and Adolescent Mental Health Outcomes

A review of the research literature on child and adolescent mental health outcomes reveals that consensus within the field is lacking regarding specific factors

thought to be associated with mental health outcomes. Very few studies have specifically examined this issue as it pertains to children and adolescents with serious emotional disturbance. In fact, the few published studies in this area are primarily products of the Fort Bragg Evaluation Project discussed earlier.

For the most part, studies in this area have essentially focused on etiology rather than outcome. While it is undoubtedly critical that we continue to examine and identify factors related to the causes of child and adolescent mental disorders, it is equally if not more important that we attempt to identify those factors that may influence whether a child or adolescent's condition improves, deteriorates or remains the same following participation in/or exposure to a particular intervention or treatment approach. The present study examined whether or not behavioral problems improve, deteriorate, or remain constant during and following receipt of services from a CMHS funded system-of-care.

A combination of factors working together are believed to be needed in order to achieve positive outcomes. Burns (1996) identifies those factors as principles, incentives, service system adequacy, treatment quality, characteristics of the child and family, stakeholder preferences and research. She suggests that principles and values associated with an intervention or program strongly influence the direction of outcomes. Although limited empirical data exists which supports this hypothesis, she contends that this assumption is plausible considering the high possibility that the implementation of an alternate set of principles will influence outcomes in an alternate direction.

Secondly, Burns states that incentives must be in place to promote the actual implementation of the intervention's guiding principles or values. Incentives in this

context refers to mechanisms that are in place to promote the implementation of the above mentioned principles. For example, Burns points out that traditional services are designed such that they seriously limit a service system's ability to operationalize the system-of-care principles. In order to provide individualized services, flexibility in service provision is needed. In order to promote an emphasis upon least restrictive and community based care, resources must be redirected to more community based services and away from the traditional institutional settings such as hospitals and residential treatment facilities (Burns, 1996).

Adequacy of the service system refers to the service system's capacity to meet the needs of the children and families they serve. Unmet need, was one of the key issues identified by Knitzer (1982) in *Unclaimed Children*. Clearly, if children are experiencing a significant amount of difficulty accessing services, they surely cannot be expected to benefit from those services. Reported rates for unmet need among children and adolescents with emotional and behavioral problems ranged between 67% and 76% (U.S. Congress, as cited in Burns, 1996).

Another factor thought to drive outcomes is quality of treatment. This is defined as "the extent to which treatment provided, represents state-of-the-art interventions" (Burns, 1996). Information providing direction in terms of the appropriate treatment for specific mental, emotional and behavioral disorders has been extremely limited. In order to achieve positive outcomes, the most appropriate treatment interventions should be implemented in a manner that best addresses the condition being treated.

The present study examined the relationship between child outcomes and individual level baseline characteristics of the child. Although research in this area is

limited, numerous characteristics have been associated with various child and adolescent outcomes (Burns, 1996). Characteristics such as risk factors such as severity and onset of the illness, comorbidity; strength of the family and tolerance of stress; social support; case management skills; and treatment compliance have all been thought to influence children's mental health outcomes. However, it must again be noted that many of these characteristics are more closely associated with etiology than with outcomes.

In a study conducted by the Vanderbilt Center for Mental Health Policy, several child and family characteristics were examined to determine their predictive value in estimating outcomes among the 984 children who participated in the Fort Bragg Evaluation Project (Lambert, Nixon, Simpkins, & Bickman, 1996). Among the outcomes examined in this study was symptomatology as assessed by the CBCL. In this study, six characteristics were examined including age, gender, race, family socioeconomic status, substance use problems and parental confidence that treatment will be beneficial. The study looked for significant differences in severity at intake across each of the six predictor variables prior to measuring any significant differences in outcomes. In terms of age, the sample was divided into two groups teens (13-16 year olds) and non-teens. The study's findings suggested that older children (those between ages 13 and 16), had higher levels of pathology at intake and improved "slightly" more than their younger counterparts.

When looking at differences in gender, males and females were found to have had equal severity at intake as well as at the final assessment of outcome. Upon viewing differences according to race, the sample was grouped as either white or minority. Slightly higher levels of pathology were found for white children at intake, yet outcomes

were similar for both groups. The authors also found no significant difference between the socioeconomic status of the families in the sample. In general, children with histories of substance abuse exhibited similar outcomes to those without.

Seven of the eight outcome measures (including the CBCL) failed to reveal any significant differences between the two groups. However, when looking at substance abuse problems, a statistically significant difference was found on an experimental measure of serious problems in functioning (VFI) suggesting that children with substance abuse problems improved somewhat more than children without. Similar findings were observed for parental confidence in treatment. Parental confidence was unrelated to treatment for seven of the eight outcomes. Again, only the experimental measure of serious problems in functioning (VFI) revealed a significant difference. This measure indicated that parents of children with fewer child functioning problems at intake had higher levels of confidence yet their children exhibited less improvement.

Research Questions/Hypotheses Tested

In an effort to build upon the present knowledge of treatment outcomes, the present study addressed six specific research questions. The first question asks what is the average amount of change in emotional and behavioral problems (CBCL score) for the children included in the sample? Secondly, does initial CBCL status vary significantly from individual to individual? Third, what is the average rate of change in symptomatology for the children included in the sample? Fourth, does the rate of change vary significantly among each child included in the sample? Fifth, Is there a relationship between individual level characteristics and initial CBCL score? Sixth, Is there a relationship between individual level characteristics and amount of change?

By modeling caregiver reports of emotional and behavioral problems, the following hypotheses were tested

- H1** There would be significant improvement in CBCL total problem scores from intake to final assessment point (24 months).
- H2** The rate of change among individuals would vary significantly from intake to final assessment point (24 months).
- H3** There would be a statistically significant difference between initial status (intercept) of children based upon distinguishing baseline characteristics.
- H4** There would be a statistically significant difference between growth rates (slope) of children based upon distinguishing baseline characteristics.

CHAPTER 3

METHODS

The research questions for the present study were addressed through analysis of secondary data drawn from Phase I of the National Evaluation of the Comprehensive Community Mental Health Services for Children and their Families Program. This initiative was mandated by Public Health Service Act (PL 102-321) and has been sponsored by the Child and Family Branch of the Federal Substance Abuse and Mental Health Services Administration's Center for Mental Health Services. In addition to authorizing this program, PL 102-321 required evaluation activities to be incorporated into the implementation of the program. As a result, a team of research and evaluation experts from both the public and private sector in addition to family advocacy representatives was assembled to address this component of the initiative. This national evaluation team includes staff from ORC Macro, the Louis De La Parte Florida Mental Health Institute of the University of South Florida, and the Federation of Families for Children's Mental Health.

The evaluation design for the CMHS initiative incorporated both qualitative including quantitative research methods. The evaluation consists of five major components: a system level assessment, a services and costs study, a cross-sectional descriptive study, a child and family outcome study and a practice level assessment. The data for this study were drawn from the sample of children and youth participating in the

child and family outcomes component of the evaluation. The purpose of the National Evaluation as outlined in the 1999 Evaluation Planning Guide is to

- describe the children and families receiving services from a CMHS-funded system of care;
- show whether there are observable differences in child and family outcomes that can be plausibly linked to a faithful implementation of the system of care approach
- describe how children and families experience the service system and how they use services and supports.
- estimate the cost of serving children in systems of care
- evaluate the effectiveness of evidence-based interventions delivered in systems of care
- illustrate the development of systems of care as they move toward offering integrated and comprehensive services
- assess the effectiveness of the system of care approach as compared to usual service delivery approaches.

The child and family outcomes component of the evaluation focuses specifically on how child clinical and functional status changes over time. Factors examined include, diagnosis, symptomatology, social functioning, substance abuse, school attendance and performance, delinquency and juvenile justice involvement, and stability of living arrangements. In addition, changes in child status and family life are also assessed in terms of family functioning, material resources and caregiver strain (Macro International, 1999).

Research Design

The present study made use of a pre-experimental, single group longitudinal design in which the outcome variable examined was child/youth symptomatology. This was operationalized as the child/adolescent's total problem raw score on the Child Behavior Checklist (CBCL). Although participants in the national evaluation are assessed every six months throughout the five-year duration of the grant, the present study examined four waves of data that were collected at intake, 6 months, 12 months, and 24 months. Over 40,000 children and youth are included in the Phase 1 database from which the sub-sample for the present study was drawn. From this population, a sample of 514 children was selected through the process of list-wise deletion resulting in the omission of any cases having insufficient data for analysis. Included in the final sample were all cases with at least two values for the outcome variable (CBCL total problem raw score) across all time points and those children and youth for whom complete data were available for all independent/predictor variables at each assessment point.

A graphic representation of the research design is as follows

O₁ X O₂ O₃ O₄

In this design, **O₁** represents the initial assessment-point (intake) when the first wave of data was collected. According to the data collection schedule for the National Evaluation, this baseline information is collected within the first thirty days following enrollment in the system-of-care. Exposure to or participation in the system-of-care is represented by the symbol **X**. It should be noted that the intervention (enrollment in the system-of-care) is ongoing and continues throughout the entire twenty-four month

period. Wave two is represented in the model as O_2 . Data here were collected six months following entry into the service system. Waves three O_3 and four O_4 represent the twelve-month and twenty-four month assessment periods. The eighteen-month assessment period was intentionally omitted from the design due to insufficient data.

Data Collection and Sample

As stated, data were collected from each participant within 30 days of entering the service system and then at follow-up every six months throughout the five year duration of the grant. The data collection process for the 22 Phase I grantees began in 1993 and was completed in 2000.

In order to participate in the study, youth had to meet the following eligibility criteria

- Be eligible for and have entered the grant-funded system of care
- Receiving or are about to receive services
- Be between 5 and 17.5 years old
- Were selected through a sampling method (if a sampling scheme is employed by the site)
- Had a caregiver who could provide the requested information and complete an interview
- Had a caregiver who could legally grant consent or a legal custodian who would grant consent for the child and the child's primary caregiver to participate in the outcomes study

A diverse population of children is represented in the sample for this study. The total number of children/youth in the data set is 514. The mean age for the sample was 13.4 ($SD = 2.57$) years. The sample was predominantly male (68.7 percent, $N = 353$).

In terms of ethnicity, the largest ethnic group represented was white, non Hispanic (63.2 percent, N = 325), followed by Hispanic (14.2 percent, N = 73), African Americans (12.1 percent, N = 62), Native American/Alaskan Native (3.7 percent, N = 19), Native Hawaiian (2.3 percent, N = 12), and Asian/Pacific Islander (1.4 percent, N = 7). Nearly half of the children/youth were in the legal custody of their mothers (47.5 percent, N = 244), with slightly more than a quarter of the children/youth (27.0 percent, N = 139) in both parent's custody, 5.8 percent (N = 30) in the custody of the father, and 3.9 percent (N = 20) within the custody of legal guardians. In terms of family income, over half of the sample (53.3 percent, N = 274) were from families with incomes less than \$15,000 per year.

Reflective of the broad range of clinical diagnoses associated with serious emotional disturbance, the sample included over 12 various primary diagnoses. The most commonly reported diagnosis was conduct related disorders (39.3 percent, N = 202), followed by depression/dysthymia (23.2 percent, N = 119), attention deficit hyperactivity disorder (21.6 percent, N = 111), and anxiety related disorders (6.8 percent, N = 35). In terms of comorbidity, 47.1 percent (N = 242) of the sample had co-existing conditions.

When looking at the presenting problems of subjects in the sample, over 30 various problems were reported. The most commonly reported presenting problems were physical aggression (17.5 percent, N = 90), noncompliance (13.8 percent, N = 71), hyperactive impulsive problems (8.8 percent, N = 45), and substance abuse (5.6 percent, N = 29).

A total of ten various referral sources were reported. The most common referral source was mental health agencies (21.6 percent, N = 111), followed by schools (16.2

percent, N = 83), corrections (15.8 percent, N = 81), social service agencies (15.8 percent, N = 81), parents (8.2 percent, N = 42), courts (5.6 percent, N = 29) self (4.3 percent, N = 22), private therapists (1.9 percent, N = 10), physicians (1.4 percent, N = 7), and other (9.3 percent, N = 10). The average total number of risk factors (child and family) for the sample was 4.6 (SD = 2.60). The level of functioning difficulties among the children and youth in the sample was assessed by the Child and Adolescent Functional Assessment Scale (CAFAS). Children in the sample had an average CAFAS score of 113.29 (SD = 43.2). Possible scores on the CAFAS range from 0 to 240. Scores ranging from 100 to 130 indicate marked impairment in functioning. The average number of contacts with the legal system for the sample was 3.9 (SD = 5.42).

Measure of Dependent Variable

The dependent variable in this study is symptomatology or emotional and behavioral problems. Symptomatology is operationalized as the child or adolescent's total problem raw score on the Child Behavior Checklist (CBCL). The CBCL is a standardized measure developed by Thomas Achenbach (1991) to assess clinical symptomatology and behavioral competence for children 4 through 18 years of age. A caregiver report of emotional and behavioral problems, the CBCL consists of 113 behavior problem items in addition to 17 social competence items. The measure assesses child symptomatology on a continuum, producing two broad band syndrome scores, eight narrow band syndrome scores, and measures of three behavioral competencies, in addition to a total problem score and a total competence score. The broad band syndrome/subscales are internalizing and externalizing and were developed through factor analysis of the eight narrow band subscales. The eight narrow band

syndromes/subscales were developed through the use of cluster analysis and include withdrawn, somatic complaints, anxious/depressed, social problems, thought problems, attention problems, delinquent behavior, and aggressive behavior (Gallucci, Middleton & Kline, 1999).

Items on the CBCL are rated on a three-point scale on which the caregiver indicates how true (not true, somewhat or sometimes true, very true or often true) each item/statement is for the child within the past six months. The score for the Internalizing scale is calculated through summing the problem items on the Withdrawn, Somatic Complaints, and Anxious/Depressed scales. The Externalizing scale is determined by summing the problem items from the Delinquent and Aggressive Behavior scales. The sum of all problem items with the exception of two referring to asthma and allergies are summed in order to arrive at a total problem score. Higher scores indicate more severe levels of symptomatology. As stated the CBCL also measures behavioral competence. The three behavioral competencies, Activities, Social and School are summed to arrive at a total competence score. The total problem raw score was used in the present study as a measure of child/youth symptomatology.

The CBCL has been used in numerous research studies and has been found to be both reliable and valid (Lowe, 1998). High inter-rater reliability has been reported for the instrument. Inter-Rater reliability for the measure was tested by comparing the results of 723 CBCL's completed by three interviewers. The sample consisted of three demographically homogeneous groups of children (241 each). A resulting overall intra-class correlation coefficient (ICC) of .927 was obtained for the 20 competence items and an ICC of .959 was obtained for the 118 behavior items (Achenbach, 1991). In terms of

test-retest reliability, a mean correlation of .87 was obtained for the competence scales over a seven day period. The mean test-retest correlation for the problem scales was .89 over a seven day period. Over a period of one year, the mean correlations were .62 for the competence scales and .75 for the problem scales. The present study examined the Total Problem score, utilizing four data collection points over a 24-month period of time. Test-retest reliability correlations after a two year period were .56 for the competence scales and .71 for the problem scales (Achenbach, 1991).

The validity of the CBCL has also been demonstrated (Achenbach, 1991). Content validity of the CBCL was demonstrated by comparing the competence and problem scores of demographically matched referred and non-referred children. Nearly all of the items of the CBCL were able to discriminate significantly between the two groups. Referred children received higher problem scale scores, while non-referred children received higher competence scale scores. Construct validity of the CBCL was demonstrated through the measure's relatively high correlations with the Conners Parent Questionnaire ($r = .82$) and the Quay-Peterson Revised Behavior Problem Checklist ($r = .81$). In support of the measure's criterion validity, the CBCL's ability to discriminate between referred and non-referred children was examined. After controlling for demographic differences, 116 of the 118 problem items and all of the competence items were found to significantly discriminate ($p < .001$) between the two groups (Achenbach, 1991).

Data Analysis Method

This present study modeled change in symptomatology over a twenty-four month period of time for the 514 children and adolescents included in the sample. In order to do

this, growth curve analysis was used to determine the individual pattern of each participant in the study.

Traditionally, change within a behavioral science context has primarily been viewed as an incremental process. In this context, change is assessed or measured in terms of the difference between the value of the variable of interest at point A and point B. In this incremental view, the amount of change is equal to the difference between an individual's score on a particular measure at time-point A (intake) and time point B (discharge or termination of treatment). This difference score method can be expressed in equation format as

$$D_i = X_{2i} - X_{1i}$$

Although the difference score method is commonly found as a means for measuring change throughout the behavioral outcome study literature, the approach has also received a great deal of criticism due to its limitations in accurately assessing change. Although the observed difference score method has been described as being an easily computed "unbiased estimator of true change," it fails to capture more precise information concerning direction, rate and patterns of change (Willett, Ayoub & Robinson, 1991).

Bryk and Raudenbush (1987) are among several authors who have published studies identifying several of the limitations and inadequacies associated with traditional methods of measuring change. They noted deficiencies in pre/post methods regarding conceptualization, measurement, and design. In terms of conceptualization, they examined the heuristic significance of modeling the specific phenomena to be studied. They contend that most research studies do not address how individual growth is or will

be modeled. In terms of measurement, the authors call for psychometric procedures that enable the researcher to assess how accurately their instrument measures not only change in terms of change of status but in terms of rate of change as well. Finally, they also discuss the predominance of difference score methods of assessing change within the literature and how it has led to a limited view of measuring change based upon individual status data from only two time points. They argue that the use of multiple time-points increases the reliability and accuracy of any estimates concerning growth or change.

Most criticisms of difference score methods have focused on two factors: unreliability and correlation with initial status. A number of studies have suggested low reliability for difference scores (Speer & Greenbaum, 1995). In some instances, the reliability for difference scores have been found to be lower than that of the actual pre and post test measures used to assess the dependent variable (Willet, Ayoub, & Robinson, 1991). In contrast, other studies have argued that these criticisms are unwarranted suggesting that difference score methods of assessing change can in fact be reliable under certain circumstances. Rogosa and Saner (1995) for instance, noted that “when there are individual differences in change, the difference score has decent reliability.” They found that many of these previous studies that led to the criticism of reliability of difference scores incorrectly assumed equal variance for pre and post-test assessments. In addition, the lack of individual variability in difference scores was also noted as a reason for why the method may often appear to be unreliable (Rogosa, & Saner, 1995).

Another criticism of the difference score method refers to the “Law of Initial Value” discussed by Lambert, Nixon, Simpkins, & Bickman, (1996). This concept

essentially refers to the inverse relationship between the resulting difference score and the subject(s) initial status. Because of the method's dependence upon initial status, individuals with certain initial values are more likely to demonstrate a greater amount of change. For example, a child who has an initial CBCL score of 79 at intake has more room for improvement than the child with a CBCL score of 71 at intake. Although this concern is valid, others have pointed out that the actual time at which initial status is measured must be taken into consideration prior to dismissing the appropriateness of the difference score method. The relationship between an individual's status at intake and their amount of change over time (difference score) is partially dependent upon the ratio of pretest to post-test variances (Gardner & Neufeld, 1987). In order for the relationship between the amount of change and initial status to be positive, the variability among individual subjects must either remain the same or decrease across time. Furthermore, as test-retest correlation scores increase, the correlation between initial status and change in turn becomes increasingly negative.

In summary, the conflicting perspectives concerning the reliability of difference scores remain debatable. Conclusive findings supporting either perspective have yet to be presented in the literature. It can be stated with a relative degree of certainty that in situations where only two waves of data are available, the difference score may be a useful, unbiased estimator of true change. However, when multiple waves of data are available, the literature clearly suggests the use of methods that utilize all available data, thus increasing reliability and accuracy.

Despite the assertions that the difference score is an unbiased, valid and reliable method of assessing change, the limitations associated with the examination of only two

waves of data remain apparent. “Taking a snapshot of status before and after cannot reveal the intricacies of the ongoing process of growth” (Willett, Ayoub, & Robinson, 1991). Two waves of data provides a minimal amount of information about change and how it occurs. “The individual’s status may be changing smoothly in some complex and substantively interesting way, but pre/post measurement is simply too coarse to permit mapping out the details of the time path” (Willett, Ayoub, & Robinson, 1991).

The present study implemented an alternative approach to assessing change. In order to avoid many of the previously discussed limitations of the difference score method, the present study went beyond two-wave data analysis and instead treated change as a continuous process of development observed over a specified period of time. The method for doing this was Growth Curve Analysis (GCA). GCA is based on the assumption that change is an ongoing process, where an individual’s score is more accurately reflected by a time dependent curve which is characterized by a specific set of parameters (Francis, Fletcher, Stuebing, Davidson & Thompson, 1991). From this perspective, an individuals ‘true’ change that occurs between any two time periods is a result of that person’s individual underlying growth trajectory. GCA allows for the analysis of this underlying growth trajectory providing information on how people change over time. Several authors have discussed the “advantages” of individual growth curve analysis as a method of assessing change (Speer & Greenbaum, 1995, Francis, Fletcher, Stuebing, Davidson, & Thompson, 1991, Willett & Ayoub, 1991). The advantages of growth curve analysis techniques such as hierarchical linear modeling include greater precision in estimating individual change parameters, use of all available data, flexible data requirements, and the incorporation of the EM (expectation-

maximization) algorithm for obtaining (maximum-likelihood) estimates from unbalanced or incomplete data.

Hierarchical linear modeling (HLM) is a growth curve analysis method that refers to the often hierarchical or nested structure of data. Much of the data analyzed in the behavioral/social sciences exist in a ‘nested’ structure. For example, growth curve analysis has primarily been used to analyze educational data. If the academic achievement of students is being examined, students are viewed as being nested within schools or classrooms while the schools are considered nested within a higher categorical level such as parochial or private auspices. In terms of HLM, these repeated measures are nested within each individual. In the present study, each observation or measure is nested within each individual child included in the sample.

HLM has been noted as being a more accurate method of analysis than the difference score in the assessment of change (Willett & Ayoub, 1991). This is primarily due to the method’s ability to model growth over multiple time-points, providing valuable information on temporal changes in behavioral outcomes. In contrast to pre/post-test score methods of analysis in which change is viewed in increments, growth curve modeling allows change to be conceptualized as a continuous process and thus allows for the statistical analysis of multiple waves of data (minimum of 3 observations required). When change is viewed in this manner, an individual’s score represents an ongoing process underlying continuous change in the expression of a characteristic of interest, which in the case of the present study is emotional and behavioral problems (CBCL total problem raw score). From this perspective, the variable of interest is most appropriately described by a “time-dependent curve” which is continuous and is

characterized by a specified set of parameters. In GCA, this specified set of parameters is then used to assess change. If for example, a child's CBCL score increases or decreases linearly over time, then the rate of change in CBCL score is represented by the slope of the line that illustrates the relationship between CBCL and time. The linear equation for this model is presented below

$$Y_{it} = B_{0i} + B_{1i} \text{ time}_{it} + R_{it}$$

The outcome variable in this linear equation is Y_{it} which represents the total problem CBCL raw score for youth (subscript I) at a given point in time from 1 to T_i where T_i represents the total number of time-points for that particular child. The initial CBCL total problem raw score is represented by the parameter B_{0i} . This is the intercept for the line and represents the child's CBCL (Y) at time point 0 (intake). The slope of the line (B_{1i}) is equal to the average rate of change in CBCL total problem raw score (Y) for child (I). In addition to time, the model includes a random error coefficient (R_{it}). A regression coefficient varying across individuals, this term represents random error in the outcome variable (Y) for child I at time t. The random error coefficient indicates the extent to which the Y_{it} data do not all fall on the curve given by the equation for each child.

Growth curve analysis shares many of the same characteristics available with more conventional trend analysis methods. What distinguishes GCA is its ability to utilize growth parameters specific to each individual to model growth. This allows for

the examination of within group variability to determine if specific correlates of change can be identified, based upon variability in growth parameters across subjects.

Although similar to conventional trend analysis methods such as ANOVA and MANOVA, the growth curve model is unique and was selected for the present study due to its allowance for subject specific growth parameters. Traditional trend analysis methods typically make use of an ordinary least squares (OLS) approach to parameter estimation. However, HLM uses an “optimal” method to arrive at a more precise estimation: the empirical Bayes estimate (Bryk & Raudenbush, 1992). The empirical Bayes estimate is based on the data from each individual child as well as an estimate based on data from other similar individuals (Greenbaum, Dedrick, & Ferron, 1999). By making use of all information present in the data, the EB method improves individual level coefficient estimates for each of the subsequent waves of data collection (level 2 units). As a result, estimates are more precise and have significantly smaller standard error compared to estimates obtained through OLS estimation (see Figure 2). Correlates of change are then more precisely identified based upon within-group variability or the extent to which growth parameters vary across subjects (Francis, Fletcher, Steubing, Davidson, & Thompson, 1991).

In contrast, conventional trend analysis views within group individual variability as error, requiring the fitting of a separate OLS regression model to each group’s data. For example, within the present data, the number of observations for each level-2 unit decreases over time (see Figure 3). OLS estimates of this data would be imprecise because as discussed above the estimates would appear significantly more variable than

the true parameters are, resulting in increased standard error. Figure three also demonstrates the necessity of the EM Algorithm in accounting for missing values.

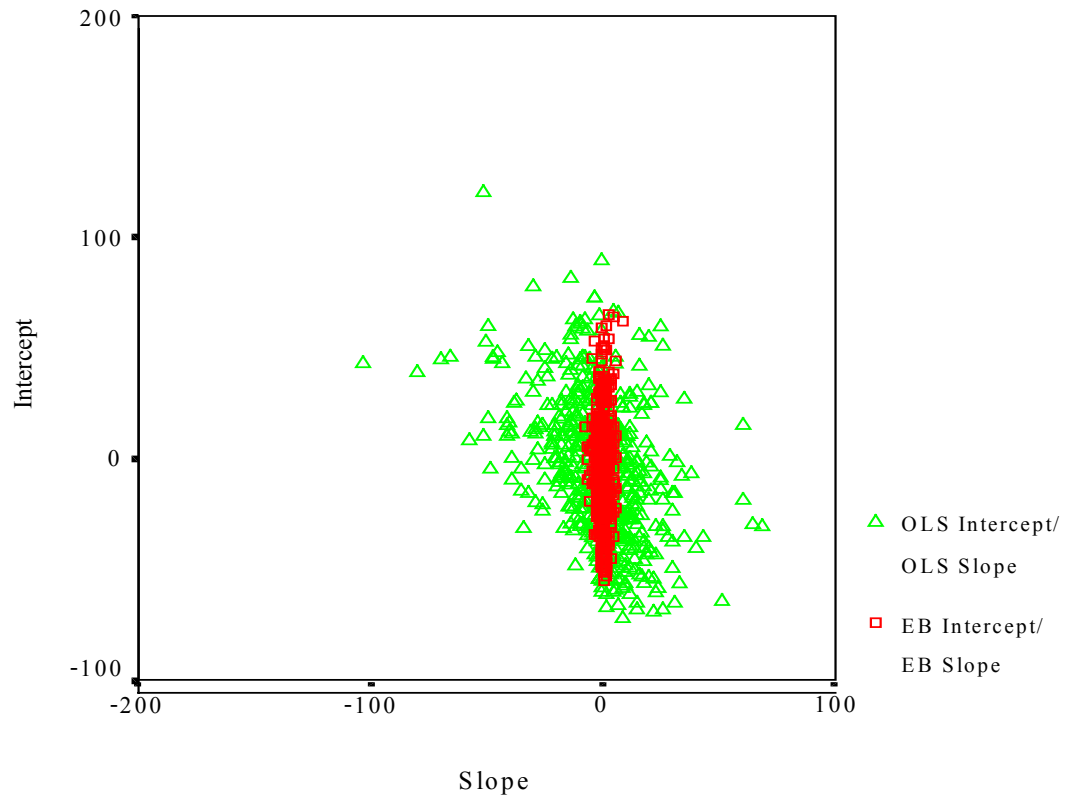


Figure 2. Overlay of Ordinary Least Squares and Empirical Bayes Intercept and Slope Residuals. Intercept values are plotted on Y-axis and Slope values are plotted on X-axis. Less variance is observed among the EB parameter estimates when compared to variability in OLS parameter estimates resulting in smaller residual values. Number of Children = 514.

In addition to addressing questions concerning within groups variability, a second level model can be created that provides a collective description of growth based upon groups of individuals. In this model, the growth parameters from the first model become outcome/dependent variables at the second level allowing correlates of change to be examined by incorporating subject characteristics as predictor variables.

A two-level growth curve model of growth was used to examine change in the present study. At the first level of the model, individual growth curves were generated for each child in the sample to model change in symptomatology over time. At the second level of the model, the intercepts and slopes from the level-one model were then treated as outcome variables in order to portray growth across groups collectively.

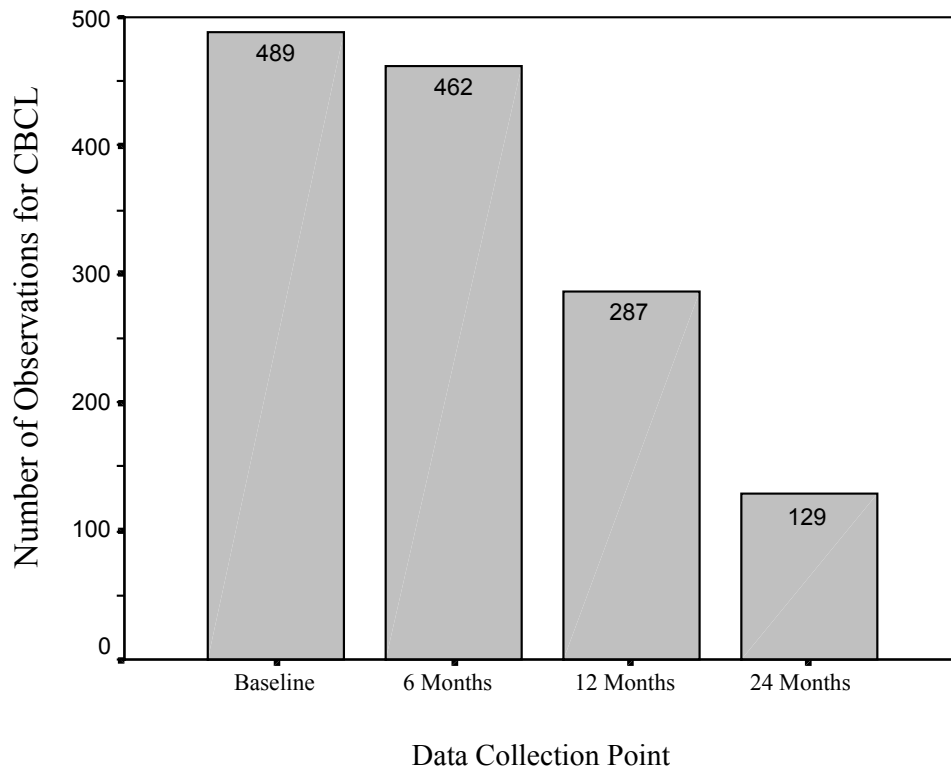


Figure 3. Number of Observations for Each Level-2 Unit (data collection point). A total of 514 observations were made at baseline (within 30 days of entry into system of care). Number of observations decreases at each subsequent data collection point.

The model building process involves the determination of an unconditional random coefficients model to assess the amount of variability in intercepts and slopes among individuals at level 2, prior to developing the predictive model. If significant variability is found to exist between the intercepts and slopes, predictor variables can

then be added to determine if differences in initial values and rates of change are attributable to specific individual level factors. A representation of the two-level model used is provided below

Level 1 $Y_{it} = B_{0i} + B_{1i} \text{ time}_{it} + R_{it}$

Level 2 $B_{0i} = B_{00} + B_{01} * (\text{Predictor A}) + B_{02} * (\text{Predictor B}) + \dots + R_0$

$B_{1i} = B_{10} + B_{11} * (\text{Predictor A}) + B_{12} * (\text{Predictor B}) + \dots + R_1$

In this study, level 1 modeled initial symptomatology as indicated by the Child Behavior Checklist total problem raw score (B_0) and change over time (B_1). Level 2 modeled the intercepts and slopes from Level 1 and incorporated the coefficients for the specified predictor variables in addition to the associated random error (R).

Based upon a review of the literature pertaining to factors associated with child and adolescent outcomes, a total of 16 demographic and clinical potential predictor variables were examined. These variables included age, gender, race, total number of child and family risk factors, custody status at intake, family annual income level, comorbidity, level of functional impairment (as assessed by initial CAFAS total score), primary diagnosis (ADHD, conduct disorder, anxiety, or hyperactive-impulsive disorder), and whether or not the individual reported a history of suicidal ideations. In addition, 3 interaction variables were examined race (white/non-white), and family income, number of risk factors and family income, and number of risk factors and gender. HLM requires all data to be either continuous or dichotomous, so pre-coding was conducted to create

dichotomous variables for each categorical variable as follows: gender (female = 0, male = 1); race (non-white = 0, white = 1); custody status (child in custody of someone other than mother = 0, child in custody of mother = 1); income level (annual family income less than \$15,000 = 0, greater than \$15,000 = 1); comorbidity (children without comorbidity = 0, children with comorbidity = 1); ADHD (primary diagnosis other than ADHD = 0, primary diagnosis of ADHD = 1); conduct disorder (primary diagnosis of conduct disorder = 1; primary diagnosis not conduct disorder = 0); Anxiety (primary diagnosis not anxiety = 0, primary diagnosis of anxiety = 1); and suicidal ideations (those children presenting for services without suicidal ideations = 0, those children with a primary presenting problem of suicidal ideations = 1).

Prior to building HLM data file, each predictor variable was grand mean centered. Similar to analysis of covariance, grand mean centering allows interpretation of the intercept and slope as the group means. Univariate analysis indicated normal distributions for each of the variables examined with the exception of hyperactive impulsivity as a presenting problem. The skewness and kurtosis values for this particular variable were 2.927 and 6.592 respectively, indicating that a significant number of the children in the sample (92.2%) did not present with hyperactive-impulsivity as their primary problem. As a result, this variable was dropped from subsequent analyses to reduce the negative effects of substantially unbalanced data upon the results. In addition, data cleaning was conducted to ensure that only valid values were maintained in the final data set (For example, the maximum possible score a child can receive on the CAFAS is 240, therefore any values in the data set greater than 240 were obviously the result of error during the data collection/entry process and were accordingly omitted).

CHAPTER 4

RESULTS

The first step in the model building process is to test the unconditional model as set forth on page 63 (sans predictor variables). The fitting of a model with no level-2 predictors provides the necessary empirical evidence for determining a proper specification of the individual growth equation and baseline statistics for evaluating subsequent level-2 models (Bryk & Raudenbush, 1992). Table 1 summarizes the results from the unconditional model.

Table 1

Final Estimation of Fixed Effects From Unconditional Model

(with robust standard errors)

Fixed Effect	Coefficient	Standard Error	T-Ratio	Approximate <u>df</u>	P-Value
Intercept	66.468	1.385	48.980	513	< 0.001
Slope	-5.537	0.516	-0.733	513	< 0.001

The table shows that the unconditional model yielded significant fixed effects for both the intercept and slope. Coefficients for the intercept and slope were 66.468 (SE = 1.385, df = 513) and -5.537 (SE = 0.516, df = 513) respectively. This suggests that on average, children in the sample had a CBCL total problem score of 66 at intake and an

average growth rate of -6.995 over the 24-month period. Recalling that the CBCL is a caregiver report of emotional and behavioral problems, the negative coefficient for the slope indicates that on average children in the sample were indeed improving over the two-year period they were enrolled in the system of care. The average rate of improvement was -5.537 every six months. The t-ratios for both the mean intercept and mean slope were large suggesting that both parameters significantly influenced the dependent variable and were necessary for describing the mean growth trajectory. Equally important during this initial stage of model building is the determination of significant variance among the models' intercept and slope parameters.

To test the null hypothesis that there is no true variation in individual growth parameters, a chi-square test was applied. Table 2 presents the results from this test of homogeneity. The χ^2 test statistic for the intercept term 1677.385 ($df = 513$, $p < .001$) suggests that the null hypothesis can be rejected ($H_0: B_0 \neq 0$), meaning that children in the sample do vary significantly in terms of initial CBCL score. The χ^2 test statistic for the slope was 581.031 ($df = 513$, $p < .05$), indicating that the null hypothesis that there are no individual differences among CBCL growth rates (i.e. $H_0: B_1 = 0$) could also be rejected. In order to further illustrate the variance within each parameter, the standard deviations for both parameters were examined. The estimated standard deviation for the slope variance component of 5.35 indicates that an individual whose growth rate is one standard deviation above the average can be expected to change at the slower rate of $-5.54 + 3.43 = -2.11$ raw score points every six months.

In summary, the findings from the unconditional model suggested that the average initial CBCL total problem raw score and growth rate were both necessary in

explaining differences in the intercept and slope of the children in the sample and that there was indeed significant variance in initial CBCL score and growth rate over the 24-month period they were enrolled within the system of care.

Table 2

Final Estimation of Variance Components from Unconditional Model

Random Effect	Standard Deviation	Variance Component	Degrees of Freedom	Chi-square	P-value
Intercept	26.150	683.808	513	1677.385	< 0.001
Slope	3.433	11.782	513	581.032	0.020
R (level-1)	18.559	344.424			

Although the random effects for the intercept and slope were both found to be statistically significant, the second largest variance component from the model was for the level-1 residual variance (344.424, SD = 18.559), indicating that a fair amount of variation in the outcome variable remains unexplained by the present model. The intention of the subsequent steps in modeling growth was to account for as much of the remaining variance in the intercepts and slopes as possible through the incorporation of specific predictor variables into a final fitted model.

A one way ANOVA was also conducted to determine the amount of variance attributable to between subject differences (see Table 3). The variance components from

this analysis were then used to calculate the intra-class correlation coefficient (IC) which in this case represents the proportion of variance explained by modeling individual differences in total problem CBCL score.

The formula for this procedure is provided below:

$$IC = \text{Variance CBCL scores} / \text{Variance CBCL scores} + R (\text{level 1}) \text{ from ANOVA}$$

$$IC = 634.540 / 634.540 + 420.959 = .60$$

Based on this calculation, approximately 60 percent of the variance in total problem CBCL score was between subjects.

Table 3

Results From One-Way ANOVA Model

Random Effect	Standard Deviation	Variance Component	Degrees of freedom	Chi-square	P-value
Intercept	25.190	634.540	513	2573.419	< 0.001
R (level-1)	20.517	420.959			

Prior to proceeding to the development of the conditional model, the process of determining which specific individual level variables should be included as potential predictor variables was undertaken. Initially, a total of 16 variables (including 3 interactions) representing individual level characteristics known at intake were considered in this study. Over parameterization can have adverse effects upon the

estimates produced within any subsequent models, increasing the potential of Type I or Type II error.

The HLM 5 software package allows for the creation of a residual file from which data describing the remaining variance unaccounted for by the unconditional model can be used to make guided decisions concerning predictor variable selection. Through this process, variables not significantly related to the outcome variables can be eliminated, thus reducing the number of variables to a more workable subset. The first step in reducing this set of variables down to the most auspicious set of predictor variables included the examination of correlations between each of the variables and the empirical Bayes intercept residuals and empirical Bayes slope residuals from the unconditional model. This allowed for the examination of the strength of the relationship between each of the predictor variables and the residual variance from both the intercept and slope. Table 4 summarizes the correlations for each of the potential predictor variables.

Significant correlations with the EB intercept residuals were found for eight of the original 16 potential predictor variables and ranged from small (.112) to moderate (.280). These included age ($r = -.198, p < .001$), race ($r = .148, p = .001$), total number of risk factors ($r = .158, p < .001$), custody of mother ($r = .118, p < .05$), comorbidity ($r = .140, p < .001$), level of functioning difficulty at intake ($r = .280, p < .001$), ADHD ($r = .144, p = .001$), and conduct disorder ($r = -.172, p < .001$). In contrast, only three variables were found to have a significant correlation with the EB slope residuals. Those variables included level of functioning difficulty at intake ($r = -.131, p < .05$), ADHD ($r = .142, p = .001$), and the interaction term race and level of income ($r = .112, p < .05$). Based on this data, the set of predictor variables was reduced to the 13 variables that correlated

significantly with the EB intercept and the eight variables that correlated significantly with the EB slopes. In addition to examining the relationship between each variable and the EB intercept and EB slope, HLM 5 also provides an exploratory analysis procedure in which estimated level-2 coefficients and their standard errors are obtained by regressing the Empirical Bayes residuals (intercept and slope) on the level-2 predictors selected for possible inclusion in subsequent HLM runs (Raudenbush, Bryk, Cheong & Congdon, 2000). Table 5 presents the findings from the exploratory analysis. Similar to the preceding analysis, the strength of the relationship of each variable with the slope and intercept were examined. Here, however, the relationships were represented by their respective t-values. The estimated beta coefficients and standard errors are also produced.

The t-values for the potential predictor variables ranged from 0.030 to 6.591. Variables with t-values less than 2.0 were excluded from consideration in the level-2 model (Bryk & Raudenbush, 2000). At this point, a backward elimination process was used to examine the remaining set of predictor variables. A saturated model was created with non-significant variables being removed one at a time until a final model consisting of only those variables found to contribute significantly to explaining the variance associated with the intercept and slope remained.

Table 4

Correlations of Potential Level-2 Predictor Variables and Empirical Bayes Intercept and Slope Residuals

Potential Predictors	EB Intercept Residual	Sig.	Effect Size	EB Slope Residual	Sig.	Effect Size
Age	-.198	.000***	.04	-.045	.312	-
Gender	.016	.716	-	-.019	.673	-
Race	.148	.001**	.02	-.055	.213	-
Risk Factors	.158	.000***	.02	-.054	.222	-
Custody	.118	.008**	.01	.073	.099	-
Income Level	.035	.483	-	.087	.048	-
Comorbidity	.140	.001***	.01	-.001	.976	-
<u>CAFAS</u>	.280	.000***	.08	-.131	.003***	.02
ADHD	.144	.001***	.02	.142	.001***	.02
Conduct	-.172	.000***	.03	-.045	.308	-
Anxiety	-.054	.187	-	.067	.131	-
Suicidal Ideations	.048	.273	-	-.079	.075	-
Race X Income	-.048	.277	-	.112	.011**	.01
Risk X Income	.029	.519	-	.038	.393	-
Risk X Gender	.045	.306	-	-.063	.152	-

Note. significance: * $p < .05$, ** $p < .01$, *** $p < .001$

Table 5

Estimated Level-2 Coefficients and Standard Errors for Intercept

Potential Level-2 Predictor	Coefficient	Standard Error	t-value
Age	-1.818	0.398	-4.568
Gender	0.820	2.248	0.365
Race	7.258	2.139	3.476
Risk Factors	1.454	0.404	3.602
Custody	5.556	2.074	2.679
Income Level	1.646	2.089	0.788
Comorbidity	6.608	2.069	3.194
<u>CAFAS</u>	0.153	0.023	6.591
ADHD	8.286	2.508	3.304
Conduct	-8.556	2.074	-2.679
Anxiety	-5.552	4.203	-1.321
Suicidal Ideations	6.396	5.825	1.098
Race X Income	4.880	4.488	1.087
Risk X Income	0.525	0.813	0.645
Risk X Gender	0.889	0.868	1.025

Estimated Level-2 Coefficients and Standard Errors for Slope

Potential Level-2 Predictor	Coefficient	Standard Error	t-value
Age	-0.018	0.017	-1.012
Gender	-0.041	0.096	-0.422
Race	-0.115	0.092	-1.247
Risk Factors	-0.021	0.017	-1.221
Custody	0.147	0.089	1.652
Income Level	0.177	0.089	1.985
Comorbidity	-0.003	0.089	-0.030
<u>CAFAS</u>	-0.003	0.001	-2.994
ADHD	0.349	0.107	3.252
Conduct	-0.093	0.091	-1.021
Anxiety	0.268	0.177	1.513
Suicidal Ideations	-0.444	0.249	-1.782
Race X Income	0.488	0.191	2.554
Risk X Income	0.030	0.035	0.855
Risk X Gender	-0.053	0.037	-1.436

A summary of the final estimation of fixed effects for both the intercept and slope is presented in Table 6.

Table 6

Final Estimation of Fixed Effects From Fitted Model (with robust standard errors)

Fixed Effect	Coefficient	Standard Error	T-Ratio	Approximate d. f.	P-Value
Intercept	66.533	1.233	53.949	508	0.000
Age	-2.140	0.502	-4.259	508	0.000
Risk	1.096	0.469	2.339	508	0.019
Custody	5.310	2.322	2.286	508	0.022
<u>CAFAS</u>	0.220	0.029	7.529	508	0.000
Conduct Disorder	-7.309	2.411	-3.032	508	0.003
Slope	-5.561	0.520	-10.688	510	0.000
<u>CAFAS</u>	-0.046	0.014	-3.380	510	0.001
ADHD	2.389	0.960	2.487	510	0.013
Race X Income	4.065	2.075	1.959	510	0.050

The final specified model is provided below in equation format

Level-1 Model

$$Y = B_0 + B_1*(TIME) + R$$

Level-2 Model

$$B_0 = G_{00} + G_{01}*(AGE) + G_{02}*(Number\ of\ Risk\ Factors) + G_{03}*(\underline{CAFAS}) + G_{04}*(Conduct\ Disorder) + G_{05}*(Custody\ Status) + U_0$$

$$B_1 = G_{10} + G_{11}*(\underline{CAFAS}) + G_{12}*(ADHD) + G_{13}*(Race/Income) + U_1$$

Variables remaining in the final fitted model for the intercept were age, risk factors, CAFAS, conduct disorder, and custody status. The coefficient for age was – 2.140, indicating that older children typically entered the system of care with a lower degree of emotional and behavioral problems than younger children. The negative coefficient for age suggests that the total problem CBCL score decreased by 2.140 points as the age of children at intake increased by 1 year. The 0.220 coefficient for CAFAS indicates that children with higher levels of functioning difficulties at intake tend to enter the system of care with a higher degree of emotional and behavioral problems. In terms of risk factors, as the total number of child and family risk factors increased the total problem CBCL score at intake increased by 1.096 points. Children with conduct disorders on average had significantly higher CBCL scores at intake (-7.309) than those children without conduct disorders. In terms of custody, children reported as being in the custody of their mothers at intake into the system of care, on average entered the system of care with a greater degree of emotional and behavioral problems (5.310) than those children not in the custody of their mother at intake.

When looking at the final estimation of fixed effects for the slope, three of the predictor variables remained in the final model, including one interaction term. CAFAS total score, ADHD, and the interaction of race and family income level were found to be significantly predictive of growth rate. The -0.046 coefficient for CAFAS indicates that children with higher levels of functioning difficulty at intake tended to improve more rapidly in terms of emotional and behavioral problems than those children who entered the system of care with lower CAFAS total scores. In terms of ADHD, on average those children with a primary diagnosis of ADHD ($B_1 = -3.688$) improved at a slower rate (2.389) than those without ($B_1 = -6.087$) over the 24-month period. When looking at the interaction between race and family income level, non-white children from families with incomes less than \$15,000 improved at the fastest rate ($B_1 = -6.761$), followed by white children from families with incomes greater than \$15,000 ($B_1 = -6.358$), white children from families with incomes less than \$15,000 ($B_1 = -4.863$), and non-white children from families with incomes greater than \$15,000 ($B_1 = -4.191$).

The final estimations of the variance components are presented in Table 7. The standard deviation coefficients of the intercept and slope and the corresponding chi-square values indicate that there was a significant amount of variability remaining in terms of average initial total problem CBCL score and a moderately significant amount of variance remained in terms of rate of change.

Table 7

Final Estimation of Variance Components From Fitted Model

Random Effect	Standard Deviation	Variance Component	Degrees of freedom	Chi-square	P-value
Intercept	22.911	524.924	508	1384.939	0.000
Slope	2.546	6.483	510	553.308	0.090
R (level-1)	18.525	343.171			

The proportion of variance explained by the model was determined through implementation of the following formulae:

$$\text{PVE } B_{00} = \frac{\mathbf{R_0 \text{ unconditional model} - R_0 \text{ final model}}}{\mathbf{R_0 \text{ unconditional model}}}$$

$$\text{PVE } B_{01} = \frac{\mathbf{R_1 \text{ unconditional model} - R_1 \text{ final model}}}{\mathbf{R_1 \text{ unconditional model}}}$$

In the above formulae, the proportion of variance explained by the model in terms of the intercept and slope is equal to the difference between the total parameter variance as estimated by the unconditional model and the residual parameter variance from the final fitted model while accounting for the total parameter variance. Table 8 summarizes the results from these calculations. The final fitted model for the intercept including age, risk factors, custody, CAFAS total score, and conduct disorder as predictors accounts for

approximately 30% of the parameter variance in the initial status. The final fitted model for the slope with CAFAS, ADHD and the race x income level interaction as significant predictors account for approximately 44.9% of the parameter variance in growth rate.

Table 8

Variance Explained in Initial Status (intercept) and Growth Rate (slope) by Final Fitted Model

Model	Intercept	Slope
Unconditional	683.808	11.782
Conditional	524.924	6.483
Proportion of variance explained	30%	44.9%

In summary, the results of the two level linear model indicate that children in the present sample improved over the 24 month period and varied significantly in terms of intercept and slope. On average the children in the sample experienced a 22-point reduction in total problem CBCL score from baseline to final assessment point (24 months following enrollment into the system of care). In addition, several individual level characteristics assessed at intake were found to be predictive of initial CBCL total problem score and rate of change.

CHAPTER 5

DISCUSSION

This study modeled changes in caregiver reports of the emotional and behavioral problems of 514 children and adolescents participating in a federally funded, collaborative children's mental health initiative. Data were collected over a 24-month period in which children were assessed every six months. The purpose of the study was threefold: 1) to determine if individuals participating in the system of care improved over time; 2) to determine if specific factors significantly influenced or were predictive of their level of emotional and behavioral problems upon entry; and 3) to determine if specific factors significantly influenced their rate of growth in terms of emotional and behavioral problems over the 24 month period. More specifically, the present study addressed the following six research questions

1. What is the average amount of change in emotional and behavioral problems (CBCL score) for the children included in the sample?
2. Does initial CBCL status vary significantly from individual to individual?
3. What is the average rate of change in symptomatology for the children included in the sample?
4. Does the rate of change vary significantly among children included in the sample?

5. Is there a relationship between individual level characteristics and initial CBCL score?
6. Is there a relationship between individual level characteristics and amount of change?

Each of these questions were addressed through testing of the following hypotheses

H₁ There would be significant improvement in CBCL total problem scores from intake to final assessment point (24 months).

H₂ The rate of change among individuals would vary significantly from intake to final assessment point (24 months).

H₃ There would be a statistically significant difference between initial status (intercept) of children based upon distinguishing baseline characteristics.

H₄ There would be a statistically significant difference between growth rates (slope) of children based upon distinguishing baseline characteristics.

A key assumption of the Comprehensive Community Services for Children and their Families Program is that participation in the system of care will produce and promote improvements in clinical outcomes including emotional and behavioral problems. This assumption is summarized in hypothesis number one, where a significant improvement in emotional and behavioral problems was predicted for children enrolled in the system of care over the 24-month period assessed. Results of the unconditional model results support this hypothesis. The final estimation of the fixed effects for the slope indicated an average rate of growth for children in the sample as -5.561 . The downward direction of the slope (as indicated by the negative slope coefficient) indicates that on average children improved at a rate of 5.561 points every six months. Assuming

a linear model, the average amount of change over a 24-month period would then be equal to the slope parameter (-5.561) multiplied times the number of time intervals (4) within the specified assessment period. Children enrolled in the system of care had an average have a decrease of -22.44 points over the 24-month period they were assessed. To determine the percentage of children in the sample that improved significantly over the 24-month period, individual change rates were calculated. To calculate change rates, a Z ratio was formed by each child's empirical Bayes estimated slope coefficient divided by the empirical Bayes estimated posterior standard error of the slope. This formula is provided below

$$\mathbf{B}^* / \mathbf{V}^{*1/2}$$

In the above formula \mathbf{B}^* represents the empirical Bayes estimate of the linear slope and $\mathbf{V}^{*1/2}$ is the standard deviation of the empirical Bayes estimate. Results indicated that none of the children in the sample deteriorated significantly in terms of emotional and behavioral problems and nearly 15% ($\underline{N} = 514$) of the sample experienced a statistically significant reduction in symptoms.

The second hypothesis predicted significant variability in total problem CBCL scores at intake. This hypothesis was supported by the results of the chi-square tests summarizing the estimated variance components for the unconditional/random coefficients model. In terms of initial CBCL score, the chi-square test was statistically significant, indicating significant variability in the level of caregiver reported emotional and behavioral problems at intake ($\underline{X}_2 = 524.924$, $p < .001$). More importantly, this finding provided the information needed to support subsequent analysis of individual level factors influencing symptomatology at intake.

Similar to hypothesis number two, hypothesis three predicted significant variability over the 24-month period in rate of change. Support for this hypothesis was also found in the final estimation of variance components for the unconditional model. The chi-square test for the slope was also significant ($\chi^2 = 6.483, p < .05$), indicating that there was significant variability in the rate of change for the sample over the two-year assessment period.

Hypothesis four predicted a statistically significant difference in initial CBCL scores based on specific individual level characteristics known at intake. Five of the initial sixteen potential predictor variables were found to be significantly predictive of initial CBCL total problem score. The final five predictor-variables remaining in the model were age, total number of risk factors, CAFAS, conduct disorder, and custody status.

The final estimates from the fitted/conditional model revealed that on average, older children entered the system of care with lower CBCL scores than younger children. For every unit change in age, there was an average initial total problem raw score difference of 2.140. The relationship between age and initial CBCL score was negative indicating that as the age of children in the sample increased there was a corresponding decrease in initial CBCL score of 2.140 points (see Figure 4). This is consistent with findings from previous studies where a positive relationship between child and family risk factors and emotional and behavioral problems was found among similar populations (Manteuffel, Stephens, & Santiago, 2002; Stanger, Achenbach, & McConaughy, 1993, Chapman, & Scott, 1999; Cheong, & Raudenbush, 2000). As part of the Fort Bragg Evaluation

Project, Lambert et al. (1996) concluded that pathology for their sample peaked between the ages of thirteen and sixteen.

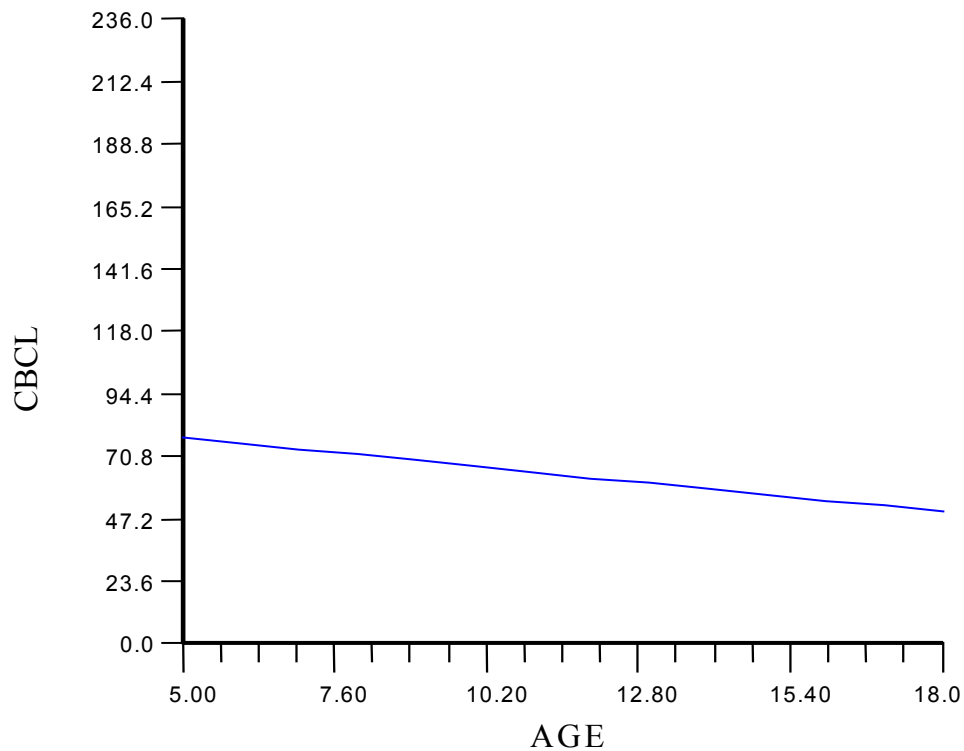


Figure 4. Relationship Between Total problem CBCL Raw Score at Intake and Age.

Children in sample ranged in age from 5 to 18 years. Total number of children = 514.

In a study examining the clinical characteristics and outcomes of 2,850 children also enrolled in Phase I of the CMHS national evaluation, a negative relationship was also found between age and initial CBCL score (Manteuffel, B, Stephens, R., & Santiago, R., 2002). In this study, children ages 16 and older exhibited fewer emotional and behavioral problems at intake than those 12 to 15 years old and those 5 to 11 years old.

A positive relationship was found between CBCL scores at intake and the total number of risk factors for each child (see Figure 5). As the number of risk factors reported increased, there was a relative increase in initial CBCL score of 1.096 points. This finding illustrates the similarities between the present sample and those examined in

other studies of children with severe emotional disturbances. A positive relationship between child and family risk factors and emotional and behavioral problems has also been found in previous studies of similar populations (Manteuffel, B., et al. 2002; Stanger, C., Achenbach, T., & McConaughy, 1993, Chapman, D., & Scott, K., 1999; Cheong, Y., & Raudenbush, S., 2000).

In terms of custody, those children who were reported as being within the custody of their mother were found to have higher CBCL scores at intake than those children reported as being within the custody of someone other than their mother (see Figure 6). An average difference of 5.310 points in initial CBCL score was found between each group. This finding is consistent with the results of previous studies examining differences in perceptions of behavior problems based upon parent (Webster-Stratton, C. 1988; Christensen, A., Margolin, G., & Sullaway, M. 1992; Christensen, A., Phillips, S., Glasgow, R., & Johnson, S. 1983). It must be noted however that, this finding should not be interpreted as maternal custody having a negative effect upon child and adolescent emotional and behavioral problems, yet should be viewed as being reflective of the association between maternal perception and identification of problem behavior. Examination of inter-parental agreement in identifying and reporting child behavior problems indicate that mothers are more likely to report higher levels of emotional and behavioral problems in their children when compared to fathers.

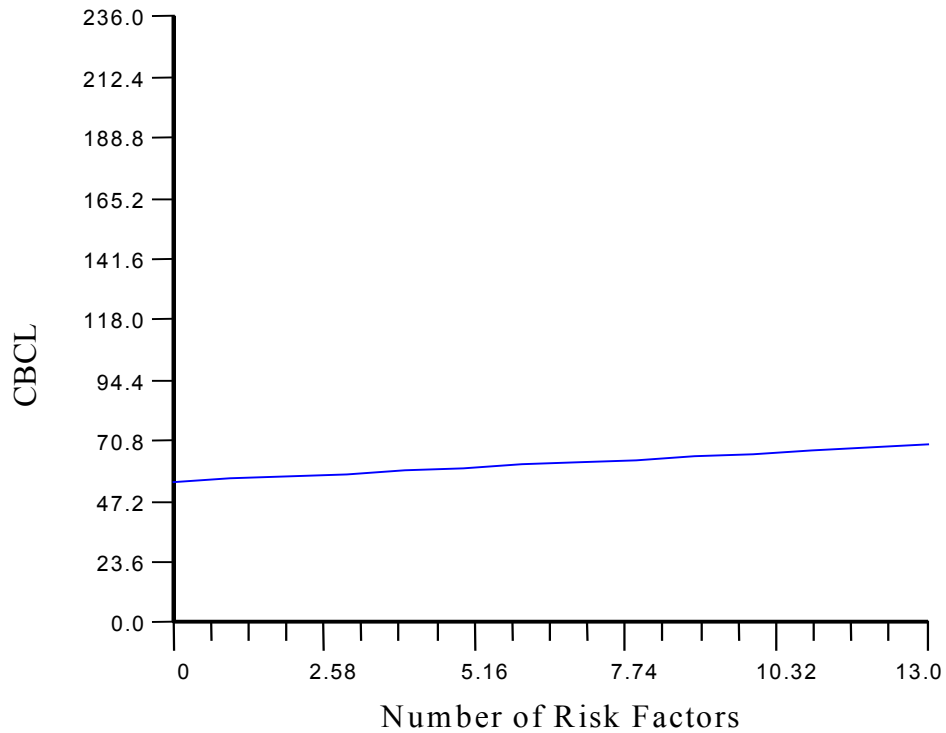


Figure 5. Relationship Between Total problem CBCL Raw Score at Intake and Total Number of Risk Factors (child and family) Reported. Number of children = 514.

In a study of 137 families with children between the ages of 3 and 13, Christensen found that, fathers consistently reported fewer problem behaviors than mothers on the CBCL (Christensen, A., et al., 1992). Similarly, in a study examining mothers' and fathers' perception of child deviance (as determined by the CBCL), mothers' perceptions of deviant behaviors were significantly influenced by personal adjustment problems such as depression, anxiety, and marital dissatisfaction. In contrast, fathers' perceptions of deviant problems were unaffected by personal adjustment.

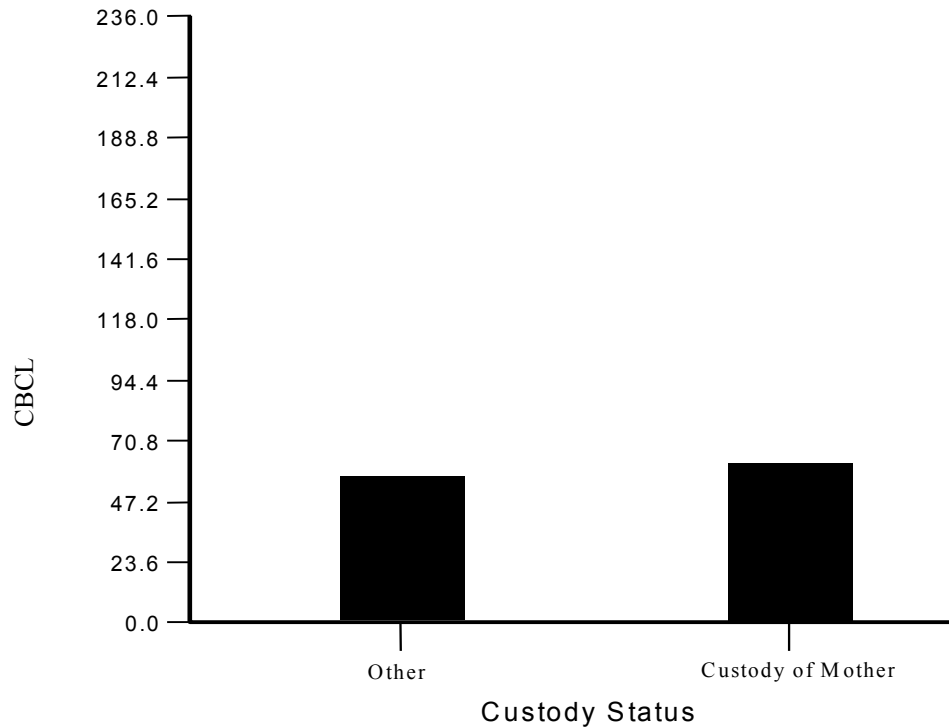


Figure 6. Relationship Between Total problem CBCL Raw Score at Intake and Custody Status. Children in custody of mother coded as 1, children not in custody of mother coded as 0. Number of children = 514.

A positive relationship was found between CAFAS total scale score and CBCL total problem score (see Figure 7). Children entering the system of care with higher levels of functioning difficulties typically had a higher degree of emotional and behavioral problems as well. For every unit change in CAFAS score at intake, the average corresponding difference in total problem CBCL score was 0.220. Considering that many of the symptoms associated with serious emotional disturbance are manifested through emotional and behavioral problems and functional impairment in everyday environments, children with high levels of functioning difficulty would be expected to enter the system of care with similarly high levels of emotional and behavioral problems.

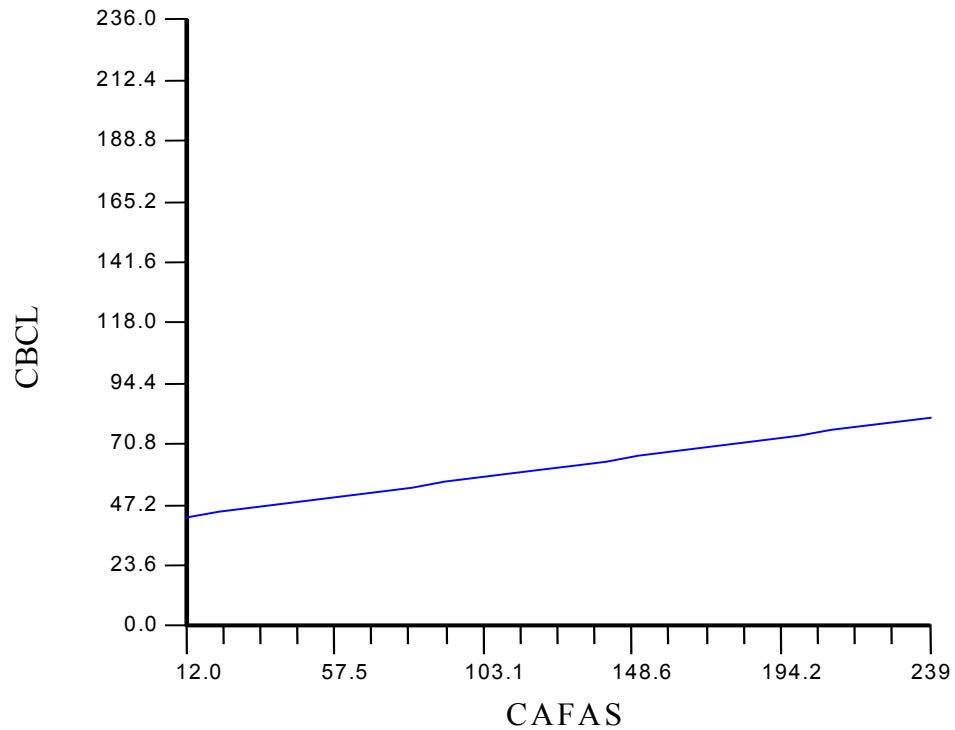


Figure 7. Relationship Between Total problem CBCL Raw Score at Intake and level of Functioning Impairment (CAFAS). CAFAS scores for sample ranged from 12 to 239. Number of children = 514.

Children entering the system of care with a primary diagnosis of conduct disorder on average had initial CBCL scores that were 7.309 points lower than those children entering the service system without conduct disorder as a primary diagnosis (see Figure 8). Although on the surface this particular finding may seem contradictory to the assumption that more severe children have higher levels of emotional and behavioral problems, what must be considered is that the children participating in the present study represent a full range of severity in terms of symptomatology. Children presenting with a primary DSM III diagnosis of conduct disorder may have higher levels of severity in terms of exhibiting more of the symptoms associated with conduct disorder, yet when viewing severity globally (i.e. symptoms beyond the range of those associated with

conduct disorder), they clearly entered the system of care with higher levels of emotional and behavioral problems.

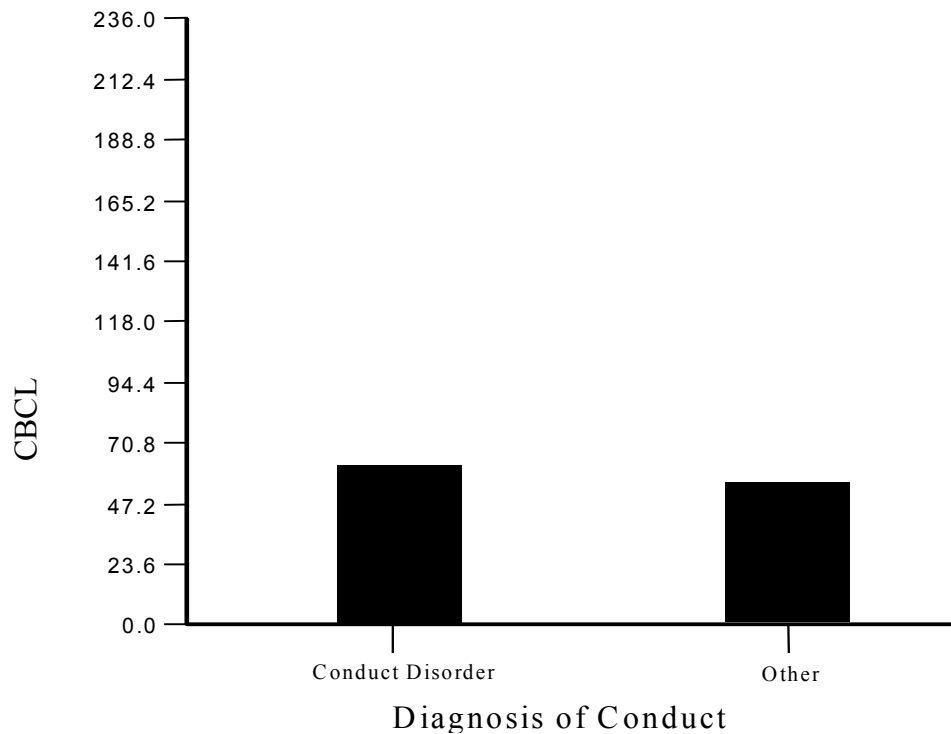


Figure 8. Relationship Between Total problem CBCL Raw Score at Intake and Primary Diagnosis of Conduct Disorder. Children with a diagnosis of conduct disorder coded 1; children with a diagnosis other than conduct disorder coded 0. Number of Children = 514.

The fifth hypothesis predicted significant variability in growth rate (slopes) based upon individual level characteristics known at intake. This hypothesis was also supported by the findings. Rejection of the null hypothesis here warranted subsequent analyses seeking to explain or account for the variance in growth rates. Three of the initial 16 potential predictor variables considered were found to be predictive of slope. The three variables remaining in the final fitted model included level of functioning

(CAFAS), ADHD as primary diagnosis, and the interaction of race and family level of income.

The final estimation of fixed effects for the slope indicated that those children in the sample with higher levels of functioning difficulties improved at a faster rate than those children with lower levels of functioning difficulties (see Figure 9). This finding is consistent with the assumption that within a slopes-as-outcome model, more severe cases tend to show the most improvement over time. This finding is also consistent with previous research examining the relationship between level of functioning and child and adolescent mental health outcomes (Lambert, Nixon, Simpkins, & Bickman, 1996). For the present sample, as CAFAS scores increased by 1 point at intake, there was an average difference in slopes of 0.061 points, where those children with higher levels of functioning exhibited the most improvement over the two-year assessment period. To illustrate this relationship, Figure 9 shows change in CBCL total problem score over the 24-months for children with CAFAS scores one standard deviation above and below the sample mean.

Children with a primary diagnosis of ADHD improved at a rate that was on average 2.493 points slower per assessment point than those children with a primary diagnosis other than ADHD (see Figure 10). This suggests that although children with ADHD improve over time their change may not be consistent over the entire 24-month assessment period. The effect of ADHD on outcome is such that children experience periods of low acuity as well as periods of high acuity over the two-year period, resulting in acceleration and deceleration in change over time. In contrast, those children entering

the system of care without a diagnosis of ADHD experience and maintain a more consistently steady reduction in symptomatology thus resulting in a greater slope.

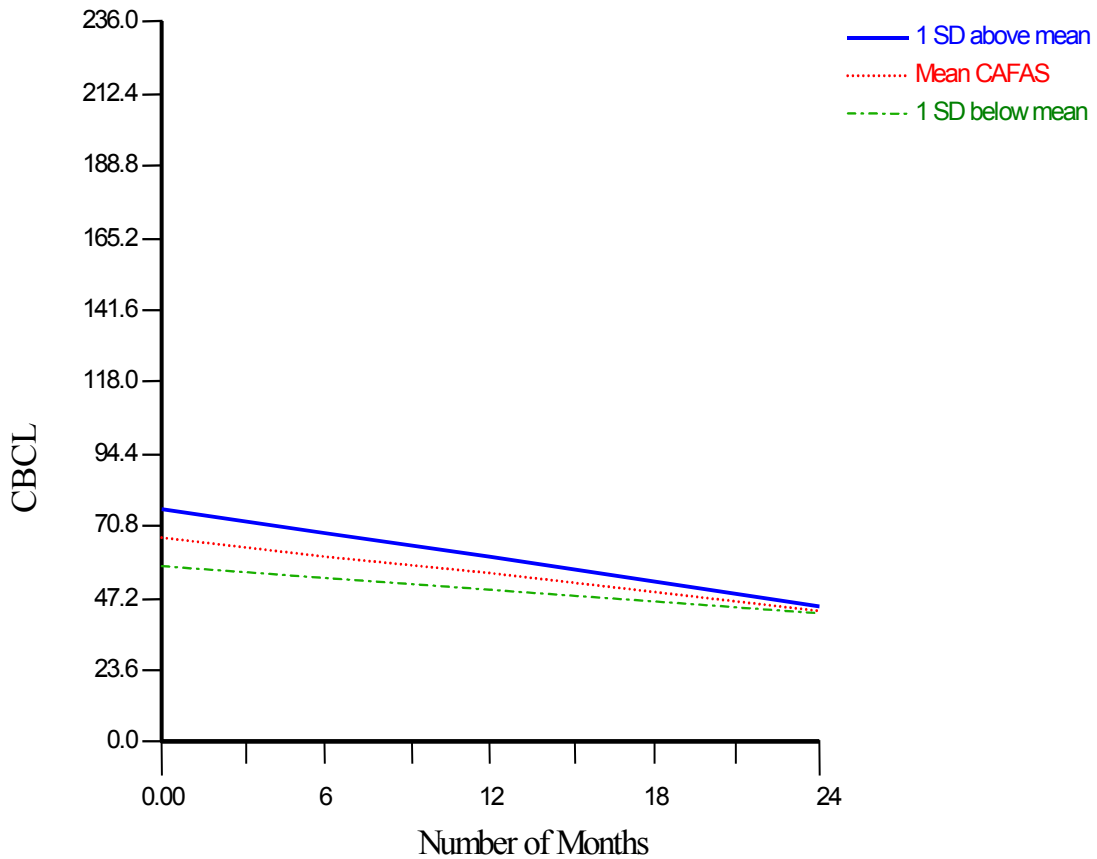


Figure 9. Sample Growth Trajectories for CBCL Total Problem Raw Score by Level of Functioning Impairment (CAFAS). Children with higher CAFAS scores improve at a faster rate over the 24-month period. For example, the slope for those children with scores equal to the mean CAFAS score at intake ($M = 113.60$, $SD = 43.183$) was -10.805 . Children with a CAFAS score one standard deviation above the mean improved at the fastest rate ($B_1 = -12.791$), while those with a CAFAS score one standard deviation below the mean improved the least ($B_1 = -8.819$). Number of Children = 514.

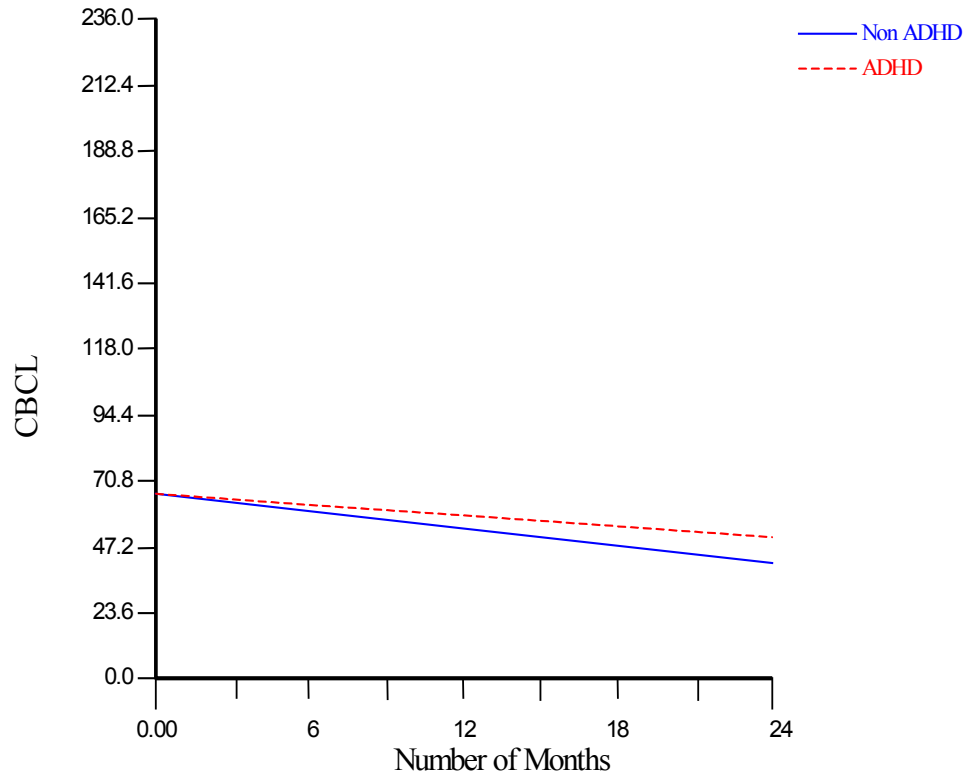


Figure 10. Growth Trajectories for CBCL Total Problem Raw Score by Primary Diagnosis of Attention Deficit/Hyperactivity Disorder. Children with a primary diagnosis of ADHD at intake improved at a slower rate ($B_1 = -3.688$) than those children presenting with a primary diagnosis other than ADHD ($B_1 = -6.077$). Children with ADHD coded as 1, children with primary diagnosis other than ADHD coded as 0. Number of Children = 514.

In addition, the effects of global severity should also be considered. Additional covariates beyond the scope of the symptoms associated with ADHD may have a significant impact upon how those children with ADHD in the present sample changed over the two-year assessment period in terms of emotional and behavioral problems.

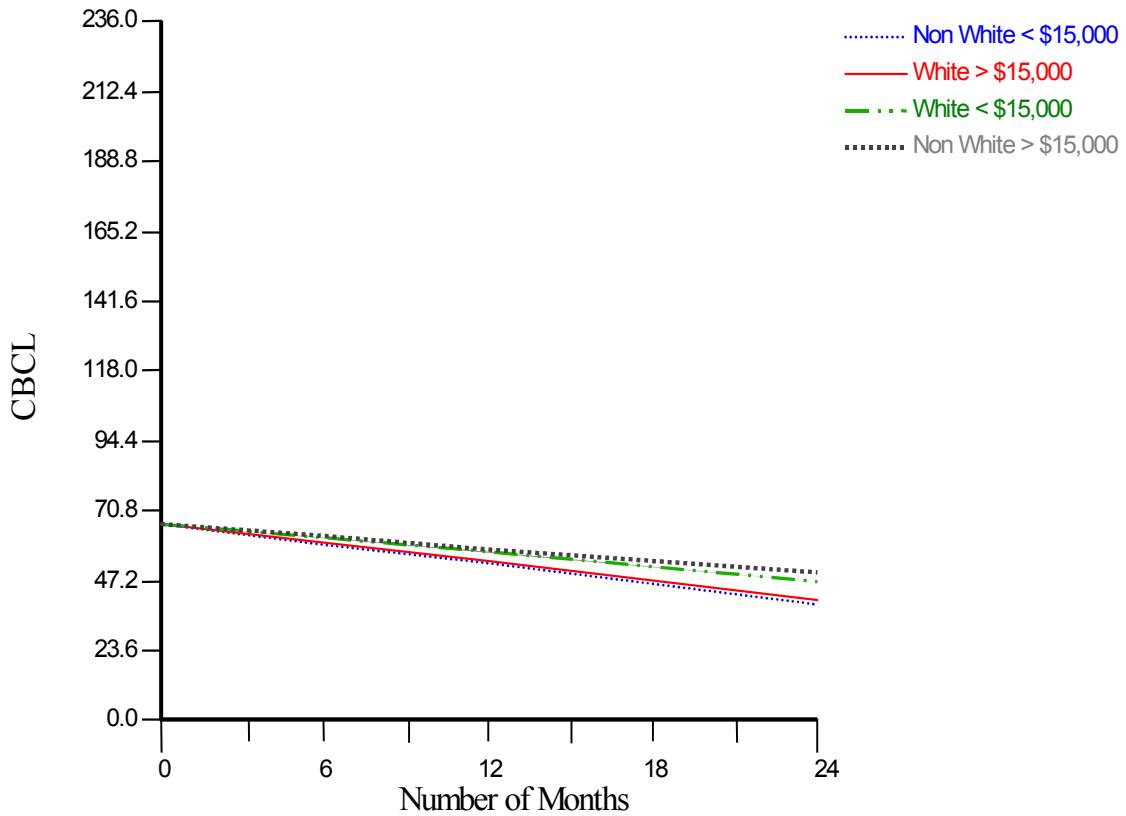


Figure 11. Growth Trajectories for CBCL Total Problem Raw Score by Race by Family Income Level Over Time. Number of Children = 514.

Figure 11 depicts the interaction between race and income. Non-white children from families with incomes less than \$15,000 improved at the fastest rate ($B_1 = -6.761$), followed by white children from families with incomes greater than \$15,000 ($B_1 = -6.358$), white children from families with incomes less than \$15,000 ($B_1 = -4.863$), and lastly, non-white children from families with incomes greater than \$15,000 ($B_1 = -4.191$).

The effect for the interaction between race and income upon CBCL score may be reflective of how services are delivered. More specifically, the groups showing the most improvement (non-white families with incomes less than \$15,000 and white families with incomes greater than \$15,000) are most similar to the specific target populations served

in grant communities. Traditionally, therapeutic services for children and adolescents with emotional and behavioral problems were most often accessed by children from families belonging to the majority ethnic/racial group having the resources (i.e. insurance coverage or ability to pay themselves) that allowed them to access services. Initially, in response to the general need for services to treat children and adolescents with mental health problems, service systems were developed based primarily upon the need of the larger (majority) population. However, specific efforts have been made to address the unmet needs of specific racial and ethnic populations within the larger group of children and families requiring mental health services. Quite often the children belonging to these minority groups are from families with limited financial resources.

Non-white children from families with incomes less than \$15,000 and white children from families with incomes greater than \$15,000 represent a smaller percentage of the children and families served in the comprehensive community mental health services for children and their families program and thus most often are not the focus of specific service initiatives. However, several grant communities have developed systems specifically targeting under-served populations including children and families within the white, less than \$15,000 category mentioned above. In order to better serve these groups, grant communities have implemented specific initiatives such as cultural sensitivity training, training on the provision of individualized and family-focused services, targeted outreach efforts and recruitment and hiring of service providers from within the community.

Implications

Implications of the present study are apparent when considered in the context of the current state of children's mental health and the need for continued systems reform. The Center for Mental Health Services' (CMHS) Comprehensive Community Mental Health Services for Children and Their Families Program was implemented as part of the federal government's ongoing efforts to address the needs of the sizeable yet underserved population of children with serious emotional disturbance and their families. Initiated in response to research indicating that over two-thirds of the nation's children with mental health problems do not receive the services they need, the program is based upon a theory of change that underscores the development of service systems and the delivery of services that are individualized, comprehensive, family-focused, community-based, and culturally competent (Stroul & Friedman, 1994).

Studies of systems of care have demonstrated that system reform has resulted in positive system level outcomes including, "more youths being served, services being received in a more timely and appropriate manner, increased coordination and integration among child serving agencies, decreased likelihood of dropping out of services prematurely, increased family satisfaction with services, and lower system-level costs of services (Farmer, 2001)." In addition, similar to the findings of the present study, researchers examining clinical outcomes such as emotional and behavioral problems and level of functioning have found that children enrolled in systems of care indeed improve over time (Lambert, Nixon, Simpkins, & Bickman, 1996; Manteuffel, Stephens, & Santiago, 2002; Farmer, 2000).

Despite the numerous advancements made in system development and the treatment of children with serious emotional disturbance, a large percentage of children and families in need of services are still not served adequately by the current mental health system (Goldberg, 2001). In fact, the need for continued systems reform and the appropriate research necessary to support such reform is even more evident. In January of 2001, a children's mental health alert was issued by U.S. Surgeon General David Satcher. This is the first time in U.S. history that such an action has been taken by the Surgeon General's office (Hoagwood, 2001). Stemming from the Surgeon General's conference on children's mental health held in September of 2000, a national action agenda was developed. Parallel to the guiding principles outlined by Stroul and Friedman (1994), the guiding principles developed during that conference emphasized individualized care, family-focused and child-centered service planning, infrastructure development, and the overall promotion of children's mental health. The following key goals were also emphasized

1. Promote public awareness of children's mental health issues and reduce stigma associated with mental illness
2. Continue to develop, disseminate, and implement scientifically proven mental health prevention and treatment services.
3. Improve assessment and recognition of mental health needs in children.
4. Eliminate racial/ethnic and socioeconomic disparities in access to mental health care.
5. Improve financial infrastructure for mental health services including support for scientifically proven interventions across professional services.

6. Increase access to and coordination of quality mental healthcare services.
7. Train frontline providers to recognize mental health issues; educate mental health providers in scientifically proven prevention/treatment services.
8. Monitor access to/coordination of quality mental healthcare services.

The present outcome study is reflective of the current emphasis on research in children's mental health, contributes to what is known about factors that influence differences in emotional and behavioral problems, and directly addresses many of the goals outlined above in the Surgeon General's National Action Agenda for Children's Mental Health. The specification of characteristics associated with level of severity at intake and change in severity over time is invaluable to the identification of early indicators of serious emotional disturbance. These findings can play a key role in informing state and local policy makers and administrators responsible for determining program focus and identifying specific target populations in need of services.

Evaluation has played an important role in the Comprehensive Community Mental Health Services for Children and Their Families Program since its inception. In fact, the Public Health Service Act of 1992, which authorized the program, mandates the incorporation of quality monitoring and evaluation at both the local and national level. At the federal, state and local levels, outcomes research has played a pivotal role in the accountability and sustainability of the program. At the federal level, empirically based evidence is needed to garner continued support of the CMHS initiative. Similarly at the state level, research findings are used to garner support and inform decision making and policy reform. Local systems are expected to develop methods for sustaining their system of care beyond the duration of the CMHS grant. In the years following the initial

receipt of a CMHS award, grant communities are expected to secure annually increasing matched funding as federal support decreases over the five-year course of the grant.

Findings from the present study indicate that children receiving services with a system of care do improve over time. This information should be of great value to local program administrators seeking matched dollars. It can also be used in a broader sense by policy makers and children's mental health advocates to garner continued support for system reform and development.

Another issue for which these findings are relevant is the allocation of resources or rationing of services. As federal support decreases over time, grant communities may need to consider options for maximizing resources and sustaining system development beyond matched funding. One such method proposed has been the assignment of services and determination of treatment dosage based upon information identifying and describing who can be expected to benefit from specific services or treatment approaches (Lambert, Nixon, Simpkins, & Bickman, 1996). Proponents of this approach contend that in today's managed care environment of fixed resources, services can no longer be provided in a blanket fashion to all consumers. Findings from research such as the present study can provide administrators with the data necessary to make empirically informed decisions in this area.

Social workers play key roles in the provision of services to children with serious emotional disturbance and their families at each of the levels discussed above. Thus, the findings from this study have significant implications for social workers involved at the systems level as well as those functioning at the direct service delivery level. More specifically, this study contributes considerably to our understanding of how specific

factors influence change in symptomatology over time. Understanding the relationship between individual characteristics and change is critical in a service system that highly emphasizes individualized treatment. Being able to identify which variables influence growth better equips mental health service providers with the information and skills necessary to develop and implement treatment interventions in a manner that is most effective for the children and adolescents they serve. This information is equally important at the systems level. Instead of providing services in a all-inclusive, generalized manner, policy makers and service system administrators can create and revise system policy so that it promotes the delivery of individualized services at the service provision level.

Finally, growth curve analysis is a non-conventional approach to assessing change. Social work students, instructors and professionals should be open to multiple means of assessing change and should view GCA as an innovative tool that strengthens our ability to assess, measure and understand the social and behavioral phenomena we routinely face. Hopefully this study will encourage the use of innovative statistical and analytical methods among social work students, practitioners and researchers, thereby increasing our aptitude for conducting and understanding research as well as enhancing our ability to apply our findings to practice.

Limitations

An important caveat in the use of hierarchical linear modeling is the requirement of large sample sizes. Further compounding this issue is the lack of “well established rules of thumb for assessing sample size adequacy” (Speer & Greenbaum, 1995). Small samples are strongly discouraged as the methods for estimation in HLM assume large

sample properties. The application of the method to small sample sizes may very well result in type I error due to overly liberal estimates and overstated rates of change.

In light of this requirement and the heretofore lack of a demonstrated method for determining appropriate sample size, the present study used all available data to avoid the problems associated with inadequate sample size. The sample size of the present study was considerably larger than those examined in similarly designed growth model studies currently available in the literature. For example, in a longitudinal study that examined systematic differences in growth of families at risk of maladaptive parenting, child abuse, or neglect, Willet, et al. (1991) conducted a growth curve analysis with a sample of 172 families. In Speer and Greenbaum's 1995 study examining growth in client well being, HLM was used to model growth in a sample of only 73 outpatient adult clients.

Raudenbush, Barnett, & Brennan, (1995) modeled psychological change with data from a sample of 285 dual-earner married couples using a multivariate hierarchical model approach. Bickman et al. (2000) implemented a random regression longitudinal model in their follow-up study that re-examined and compared long-term outcomes for 984 children (system of care: $N = 574$, comparison group: $N = 410$), included in the initial Fort Bragg evaluation. The present study examined a single group of 514 children and adolescents participating in a system of care and thus by comparison should have avoided any methodological threats associated with insufficient sample sizes.

Another limitation of the present study is the lack of a control or comparison group. This limitation poses several threats in terms of internal validity of research design. These threats include history, maturation, experimental mortality and diffusion or inconsistency of treatment. History refers to the potential effects extraneous variables

and/or events that coincide with the manipulation of the independent variable may have upon the independent variable (Rubin & Babbie, 1993). Without a control or comparison group, the ability to definitively rule out or control for specific extraneous variables is limited. As a result, although the conclusion can be made that on average children within the system of care improve over time, explicit conclusions cannot be made concerning the existence of a causal relationship between system of care enrollment and reduction of emotional and behavioral problems. The unavailability of comparative data from a control or comparison group, made it impossible for the present study to incorporate a control group into the research design.

Maturation refers to the continuous growth and change participants undergo regardless of their participation in a research study. Such changes can negatively influence the results of a study. Due to the nature of serious emotional disturbance, children receiving services undergo periods where symptoms are more or less severe at varying points in time. In addition, many of the symptoms may be more prevalent among younger children and may diminish in severity as children increase in age. Considering this, it is possible that maturation or a natural growth process in which children improve may have influenced a reduction in emotional and behavioral problems. However, this threat was addressed and limited by the HLM analysis method. The results from earlier exploratory analyses in which alternative growth patterns were tested suggested that a linear model best described the growth process for this sample. Results from the present study are based upon individual growth estimates used to estimate the average direction and rate of growth for the entire sample. Although individuals may indeed improve and/or worsen over the 24-month period, none of the children in the sample deteriorated

significantly and the average slope estimate for the sample clearly indicated that the growth trajectory for the sample across all assessment points was one in which children improved in a linear fashion.

Another issue to consider is the potential negative effect of experimental mortality. Common when discussing potentially biasing factors in applied longitudinal research, experimental mortality or attrition refers to the lost of follow-up observations due to participant “drop-out.” If a particular factor or characteristic significantly influences attrition, resulting findings can be biased thereby limiting the extent to which any conclusions can be drawn based upon findings. Studies have shown that in general as many as 40% of community mental health center outpatients and 20% of clients treated in private psychiatric settings drop out of treatment after only one or two visits (Pekarik, 1993). This problem also significantly contributes to “missingness” (missing follow-up values) or incomplete data.

Although attrition was certainly a factor in the present study, the potential of this threat was taken into consideration in the analysis of the data. Because of HLM’s flexible data requirements and use of the EM algorithm to account for missing values, the threat of attrition or experimental mortality was significantly reduced. As described earlier, the EM algorithm is the iterative process used in HLM to produce maximum likelihood estimates of variance-covariance components for unbalanced data (Greenbaum, Dedrick, & Ferron, 1999).

Lastly, diffusion of system implementation is also a potential threat to the internal validity of this study. Diffusion of treatments or services occurs when clients or providers of services are somehow influenced unexpectedly in a way that diminishes how

the independent variable was intended to be implemented (Rubin & Babbie, 1993). The Comprehensive Community Mental Health Services for Children and their Families Program is based upon the system of care philosophy and promotes the operationalization and implementation of the system of care guiding values and principles in each grant community. Although the system of care philosophy provides a guide for system development, grant communities maintain the flexibility to develop their system of care in a manner that best suits their particular target population. This flexibility is beneficial from a system development standpoint, yet from an evaluation perspective it presents the challenge of assuring system fidelity across all grant communities included in the study, taking into consideration the effects of the varying approaches to system development. In short, to make conclusive determinations regarding the effectiveness of a system of care, the researcher must also determine that the service system being measured is indeed a “system of care.”

Recommendations for Further Study

Future research efforts would greatly benefit from the incorporation of control or comparison groups into their design. Although this may very well be an ideal situation in terms of research design, it is often not feasible within an active community mental health system. Unfortunately, within these environments, the researcher’s control over extraneous variables is often quite limited. Nonetheless, we should continue to seek opportunities to test the system of care approach within a true experimental design and thereby control for many of the discussed threats to internal and external validity. In addition to the descriptive and longitudinal outcome studies from which the present sample was drawn, another component of the national evaluation includes a comparison

study that specifically examines the differences between clinical outcomes of children enrolled in federally funded systems of care and children enrolled in traditional mental health service systems. Future efforts should certainly be made to apply the analysis method used in the present study to examine differences between these two groups in terms of initial status and change over time.

The final fitted model arrived at in the present study accounted for approximately 30 percent of the variance associated with the intercept and approximately 44.9 percent of the variance associated with the slope. Building upon these findings, future analyses should seek to account for larger percentages of variance in emotional and behavioral problems initial status and change over time. For example, subsequent studies could incorporate and examine additional interactions among the individual level variables in addition to looking more specifically at some of the categorical variables examined in this study such as race, and annual family income level. Additionally, future attempts to explain differences in initial status and change over time should incorporate additional variables not examined in the present study such as family resources and caregiver strain. Given an adequate sample size, HLM would be an excellent method of analysis for examining the impact of individual, practice and system level variables upon child and adolescent mental health outcomes. For example, the practice level assessment component of the national evaluation may provide invaluable information towards future efforts to further explain how system level changes influence service delivery and ultimately influence individual level child and adolescent clinical outcomes. Furthermore, in a three-level hierarchical linear model, predictors of change could be

examined at the child/client level, practitioner level as well as the grant-community or systems level.

Conclusion

Consistent with the findings of earlier studies of serious emotional disturbance, the present study has shown that children receiving services in a system of care do improve over time. In addition, the results clearly indicate that certain individual level characteristics contribute to difference in initial status, as well as differences in patterns and rates of change. These findings further define the characteristics of children with serious emotional disturbance and provide valuable information regarding how the symptoms exhibited by these children change over time.

The use of HLM to arrive at these finding demonstrates the utility of growth curve analysis in the study of change and predictors of change. Despite the limitations often associated with studies using longitudinal data drawn from community mental health samples, HLM allowed for more precise estimates of change than those typically attained through more traditional statistical methods. The present study demonstrated how an alternative method of modeling and assessing change produces information valuable to clinicians, program administrators and policy makers addressing the needs of children with serious emotional disturbance. Furthermore, the findings from the present study support the ongoing reform efforts in the arena of children's mental health services and have important implications for the sustainability of system of care values, principles and goals.

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