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# Psychopathology In Adolescents With A History Of Foster Care

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Psychopathology in Adolescents with a  
History of Foster Care

A Thesis Submitted to the  
Yale University School of Medicine  
in Partial Fulfillment of the Requirements for the  
Degrees of Doctor of Medicine and Master of Health Science

by

Scott Ronald Hunter

2011

## Abstract

PSYCHOPATHOLOGY IN ADOLESCENTS WITH A HISTORY OF FOSTER CARE. Scott R. Hunter (Sponsored by Elena L. Grigorenko). Child Study Center, Yale University, School of Medicine, New Haven, CT.

Despite the enormous cost of the foster care system, high rates of psychopathology and homelessness among young-adult foster care alumni provide a stark reminder of the challenges faced by this vulnerable population. This study characterizes the effect of a history of foster care on psychopathology in a group of 39 adolescents that had exited foster care and were reunified with their biological mothers. A history of foster care was defined as out-of-home placement by child welfare for at least one month; median foster stay was 1.5 years and median age at placement was 8.5 years. A control group of 78 adolescents was matched with the foster group using exact and logistic-regression nearest-neighbor methods. Matched variables included well-established, major childhood risk factors for the development of psychopathology: maternal substance abuse, maternal psychopathology, and childhood maltreatment (i.e. physical and sexual abuse, neglect and domestic violence). With the two groups matched in this way, recent research suggests that the two groups had comparable histories of adverse childhood events, and thus the major inter-group difference is a temporary separation from the biological mother, enforced by child welfare services (i.e. foster care). Participants, and their mothers as second reporters, completed self-report, parent-report and structured interview assessments, providing data on major psychiatric diagnoses and symptom scales. The prevalence of externalizing diagnoses in the foster group was 41.0% (24.9% - 57.2%) compared with 19.2% (10.3% - 28.2%) in the control group ( $r = .25$ ). Substance dependence prevalence was 25.6% (11.3% - 40.0%) compared with 5.1% (0.1% - 10.1%) in the control group ( $r = .30$ ). The foster group also had more depression symptoms as measured by three assessments ( $p < .05$ ,  $r = .21$  to  $.25$ ); the foster group also had more overall externalizing symptoms ( $p = .015$ ,  $r = .22$ ), including conduct problems ( $p = .007$ ,  $r = .25$ ) and hyperactivity ( $p = .023$ ,  $r = .21$ ). For every comparison made, the foster group demonstrated more psychopathology than controls. Thus despite the protective goal of foster care, it may have detrimental effects on the child's subsequent development. Further studies with larger sample sizes are needed to confirm these findings that have the potential to substantially alter child welfare policy by reducing the number of foster care placements in favor of other child and family support services.

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## Table of Contents

<b>Introduction</b> .....	<b>1</b>
<b>Foster Care in the United States</b> .....	<b>4</b>
<b>Outcomes Associated with Foster Care Placement</b> .....	<b>5</b>
Childhood maltreatment.....	6
Developmental outcomes of foster care children.....	7
Psychopathology.....	9
<b>The fate of foster care alumni</b> .....	<b>12</b>
Risks of reunification.....	13
<b>Improving foster care research</b> .....	<b>15</b>
Responding to research recommendations.....	16
<b>Statement of Purpose</b> .....	<b>20</b>
Hypothesis.....	20
<b>Methods</b> .....	<b>22</b>
<b>Overview of Project History and Student Involvement</b> .....	<b>22</b>
Work Performed by Student.....	24
Work Performed by Others.....	25
<b>Methods of Research</b> .....	<b>26</b>
Participants.....	26
Measures.....	32
Outcome measures.....	33
Data Analysis.....	35
<b>Results</b> .....	<b>36</b>
Frequency of psychiatric disorders.....	36
Psychiatric symptom scales.....	37
<b>Discussion</b> .....	<b>39</b>
<b>References</b> .....	<b>44</b>

## **Introduction**

U.S. Child Protective Services receives approximately two million reports of child maltreatment each year (1). From these, just under one half million are substantiated when children are found inhabiting environments often characterized by neglect, abuse, poverty, violence, and parental mental illness, all of which are recognized risk factors for the development of emotional and behavioral problems in the child's lifetime (2-6). Moreover, the greater number of categories of adverse childhood events experienced, such as abuse and family dysfunction, the more likely the child will suffer from some of the most common illnesses as an adult, including ischemic heart disease, cancer, chronic lung disease, skeletal fractures and liver disease (7, 8). In an attempt to protect children from such outcomes, Child Protective Services separates children from their primary caregivers when they believe it is in the best interest of the child, amounting to approximately 250,000 children placed into foster care every year (9).

The foster care system, however, may present its own risks. While children are generally safe from further maltreatment while in foster care—U.S. states report a maltreatment rate of less than half of one percent, though many dispute this statistic (1)—securing placement of a child into the least restrictive environment can be challenging. There is a general shortage of foster families (10), and as a result, some children who would be better served in foster families are instead placed in more restrictive environments such as group homes or institutional settings, where children tend to have more behavior problems (6). Even if children are placed in a supportive foster home environment, their history of abuse and neglect frequently makes them susceptible to the pre-placement risk

factor of poor attachment formation (11). Many scholars recognize a difficulty in attachment formation as the basis for adverse outcomes (12, 13), including poor adjustment in their foster care placement (14) and subsequent poor developmental outcomes. Foster care status, even after these children have exited foster care, has been associated with a number of negative outcomes, including psychological and behavioral problems (up to 80 percent), medical problems (up to 60%), dropping out of high school (40 percent), unemployment (up to 50 percent), teen pregnancy (OR = 2.5), homelessness (25 percent), and criminal behavior (25 percent) (15, 16).

The foster care population represents a group of children and teens that have poor adjustment and very high needs for health, mental health and social services. While the experience of foster care itself is far less likely to be the cause of any negative outcomes than the repeated abuse and neglect that preceded foster care, it is nonetheless important to question the effect that foster care placement has on maltreated children. The high frequency of poor outcomes in multiple domains (i.e. medical, psychological, social) means that even modest improvement in foster care-associated interventions could provide lasting benefits to many children. The high prevalence of poor outcomes demands attention, but at the same time, foster care represents a moment of opportunity for intervention by child welfare services and health care providers, which may currently be underutilized. Once children are in the State's care, the initial barriers to access have already been hurdled. Indeed, much attention has been given in recent years to methodological improvements that will more effectively measure the impact of the foster

care experience so that further steps may be taken to improve foster care as an intervention for at risk children (17-19).

By 2003 the U.S. Justice Department had developed guidelines on the treatment of physically and sexually abused youths that detail evidenced-based psychosocial interventions (20). Following this, similar guidelines for interventions in neglected youth as well as other evidenced-based interventions for improving outcomes in foster children have been popularized (21-23). Within the current system, however, access to mental health services appears to be problematic. In a recent large, national study, 50 percent of children in family foster care screened positive for mental health problems, but only 30 percent sought out services at a child mental health clinic (6). Accordingly, leaders and academics in child advocacy are recognizing the necessary role of the child welfare system as a “de facto public behavioral health care system” (24). They advocate that the behavioral health needs of foster youth extend beyond the few with the most severe problems, and that the system even has a responsibility to intervene and prioritize the prevention of severe psychiatric disorders and dysfunction in such a highly vulnerable population. A frequent suggestion is to provide thorough assessments of development and mental health in all foster children (16, 24, 25). A recent government report on foster care health needs and service delivery reports that states are responding: a number of them already recommend, if not require, mental health screens for all children entering foster care. The concurrent barriers, however, are explicit: the report also identified a lack of mental health services for children in general as a common challenge facing states (19).

### **Foster Care in the United States**

A child is said to be in foster care when he is removed from parents or guardians and is placed under the responsibility of the state (19). The number of children in foster care in 2009 was 423,773, representing approximately one half of one percent of the country's population under age 21. This figure has been nearly constant for a decade and unless otherwise indicated, 2009 data from the Adoption and Foster Care Analysis and Reporting System are provided here (1, 26). Child maltreatment is by far the most frequent reason for the decision to place a child in foster care. According to one large U.S. study (27), the primary reason for foster care placement (in percent) was neglect in 30, physical abuse in 25, no available caretaker in 24, abandonment in 9, failed placement in 7, and sexual abuse in 5. Other reports of rates of the type of maltreatment vary. A recent review of family foster care identified 12 studies describing rates and types of maltreatment: "the highest rates were found for neglect (18-78%), physical abuse (6-48%) and sexual abuse (4-35%)." The authors of the review, however, assert that rather than any single type of maltreatment, it is the varied and often multiple forms of persistent maltreatment that is the most common background of children placed in foster care (16).

The goal of placement—so long as children are not in foster care for their own misbehavior or for special needs related to a disability—is to place a child in the least restrictive environment (28). Placement types in order, beginning with the least restrictive environments, were: 28% in pre-adoptive homes or in kinship foster families,

48% in non-kinship foster families, 6% in group homes, and 10% in institutional placements. The remaining 8% were either in trial home visits, had run away, or were in supervised independent living. The median age of children that entered foster care was 7.1 years, and the median length of time that exiting children had spent in foster care was 13.7 months. Thus the majority of children in foster care are school age or younger and are away from home for a relatively short time, developmentally speaking, but there is a sizable minority of children in long-term foster care. Approximately one-third has been in foster care for three years or longer, and one in ten has been in foster care for five years or more. The overall age distribution is actually somewhat bi-modal: sixteen and seventeen are the most common ages of foster children, followed by one and two year-olds.

### **Outcomes Associated with Foster Care Placement**

As mentioned previously, it can be difficult to describe the effect of foster care. Attempts to measure emotional, social and behavior problems before, during, and after foster placement are influenced by a multitude of factors, not the least of which is a significant history of maltreatment in the child. Much of the literature accordingly does not seek to describe the particular effects of foster care, but rather recognizes the population as one with a severe and multidimensional risk profile that is often associated with undesirable developmental and psychopathological and health outcomes.

### *Childhood maltreatment*

It bears repeating that childhood maltreatment is a common pre-placement experience that poses significant risk for poor developmental outcomes in multiple domains (16, 17, 29). In recent years, improving methodologies have led to more detailed understanding of the types of maltreatment children experience and the associated developmental and psychological outcomes. In one study of three to six year-olds (30), class analysis of maltreatment types revealed distinct maltreatment profiles that had different relationships to the outcome measures of cognitive functioning, internalizing symptoms and externalizing symptoms. Lower cognitive functioning was related to profiles with neglect or physical abuse (or both), externalizing was highest in the sexual abuse/physical abuse/emotional maltreatment/neglect profile, and internalizing was highest in the profiles with physical or sexual abuse, or both. Pearson's  $r$  for such comparisons in this study ranged from  $r = .20$  to  $r = .25$ . Detailed analyses such as these have direct clinical implications: a strong association of physical neglect with physical abuse, for example, improves our clinical acumen to identify neglect when presented with the more obvious physical evidence of abuse. Studies that further our knowledge of the particular effects of maltreatment are of vital importance to the foster care population given their exceptionally high rates of maltreatment, and the need for child welfare and the health care system to respond appropriately.

Other studies are building on the related evidence of the significant associations between retrospectively reported adverse childhood events (ACEs) and adult illness (31, 32).

Subsequent studies even documented dose-response relationships between ACEs and

adult outcomes (33-35). One such study recently examined the relationship between retrospectively reported ACEs and first onset of DSM-IV disorders using complex multivariate models (36). The strongest correlates of disorder onset were parental mental illness, parental substance abuse disorder, parental criminality, family violence, physical abuse, sexual abuse and neglect. Little specificity was found for particular ACEs with the onset of particular disorders. The authors report that their simulations suggest that ACEs are associated with 44.6% of all childhood-onset disorders and 25.9% to 32.0% of later-onset disorders. The authors also confirmed the findings of other studies (37), which report that ACEs are very often clustered, and that “even the [ACEs] most likely to be independent co-occur with at least one other ACE in most cases” (36). Studies such as the two previously described suggest that any evidence of a single ACE is likely also evidence of another co-occurring event. Furthermore, the differential effect of experiencing one type of ACE versus another may not be clinically relevant as ACEs almost always co-occur and while Pears et al. demonstrated statistically significant developmental effects for differing types of maltreatment, the effect size was small to moderate.

#### *Developmental outcomes of foster care children*

Other lines of research have focused on foster care children, as opposed to maltreatment in general, and a number of these studies identify a high prevalence of developmental delay in early childhood. Negative developmental consequences associated with a foster care population have even been noted in neonates. Compared to the general population, infants born into foster care have low birth weight, low head circumference, younger

gestational age, more birth abnormalities, higher reports of maternal smoking, and no prenatal care (16, 38, 39). Such outcomes have been demonstrated to persist as foster children develop. A comparison of foster children (age 3-6 years) and a non-maltreated community sample (40) found that a significantly higher percentage of foster children were at or below the 5th percentile for age-normed height (8%vs. 0%) and head circumference (10% vs. 2%). There was no significant difference in weight-for-height. Foster children scored significantly lower in sensori-motor function, visuo-spatial processing, memory, cognitive function, and language.

Differences between foster care children and community comparisons are similarly evident in school age and adolescent children. The National Survey of Child and Adolescent Well-being (NSCAW) examined 5,501 US children aged 15 years or younger who had contact with the child welfare system over a 15-month period. Among those with a history of foster care placement, 61% had had special health care needs and 50 percent had had special needs (41). Foster children were 2.1 times more likely to have ever had special health care needs and 2.3 times more likely to have ever had special needs compared to children who had never been placed out of the home.

Given the high rates of substance dependence in birth mothers of foster children, some have hypothesized an association between cognitive outcomes and prenatal illicit drug use (42). An analysis of full scale IQ of children at time of first placement into foster care (mean age 5.8 years) demonstrated no difference between children with prenatal drug exposure and those with no maternal drug abuse history. Children coming from

homes where drug abuse was present (but had no record or report of prenatal exposure), however, did have significantly lower IQ scores. While the study was under-powered (prenatal exposure group was small), it may suggest that the more salient effects of maternal or other care-giver substance abuse may be the drugs' secondary effects on interpersonal relationships rather than the biological effects on the developing fetus.

### *Psychopathology*

Similar to other developmental outcomes, the prevalence of psychiatric disorders in foster children exceeds that of otherwise comparable populations. The remarkably high rates of disorders and problem behaviors have been known for decades since the earliest large scale studies of mental health issues of children in foster care reported frequent diagnoses of anxiety and/or depression (43, 44). Soon after the first large longitudinal investigation found behavior problems (45) in 46% of children discharged from foster care after 1 year and in 54% of those in foster care 5 years or longer (46, 47).

A recent national study of the mental health needs in children referred to child welfare included 3,803 children of which 373 were living in foster care (6). The investigators used the Child Behavior Checklist (CBCL), a frequently used, standardized measure of clinical need to measure behavior problems (48). They reported that 55.6% of children in foster care scored in the clinical range for “internalizing symptoms”, “externalizing symptoms,” or “total behavior problems,” which are the three composite subscales that the CBCL behavior assessment measures. The “clinical range” for these subscales is defined as a standardized score of 1.4 standard deviations above the mean of sample

population norms. Notably, the proportion meeting the “clinical” benchmark varied widely by foster care placement: 39.3% in kinship foster families, 63.1% in non-kinship foster families, and 88.6% in group home or institutional settings. Burns et al. suggest that such variations in mental health need according to placement type may underlie the variation in results among several other studies that also used the CBCL, which ranged from 36-61% of foster children reaching the clinical range (49-52).

Wide variations are reported in the literature with respect to psychopathology in the foster care population. Table 1 summarizes the findings of some of the largest published studies on prevalence of psychopathology of children in foster care. While the study reported here involves children who have exited the foster care system and returned to live with their biological mothers, a growing number of studies are demonstrating the persistent differences in increased prevalence of psychopathology throughout early adulthood. One such study compared 479 foster care alumni with a normative sample of 1601 individuals with respect to DSM-IV-TR diagnoses (53). The past-year prevalence of any CIDI diagnosis was 54.4 for the foster care alumni and 22.1 for the normative sample ( $p < .05$ ,  $R = .99$ ), which is a very large difference. Past-year prevalence estimates for the foster care samples described in Table 1 are similar to the prevalence estimates found in foster care alumni. However, it is important to note that the largest samples were derived from Medicaid billing data, and thus may be lower limit estimates for individual diagnoses but possible upper-limit estimates when considering any diagnosis.

**Table 1. Prevalence of psychopathology in the foster care population: summary of previous studies<sup>A</sup>**

Study author(s), year of publication	N	Age of particip ants	Current psychiatric diagnosis	Lifetime psychiatric diagnosis	More than one lifetime diagnosis	ADHD	CD	ODD	Anxiety disorder	Att/ adj	Mood disorder	Drug abuse	Drug depend	PTSD
Burge, 2007 (54)	429	0-18	32%	-	-	21%	1.6%	3.5%	4.4%	3.3%	2.1%	-	-	-
Steele & Buchi, 2008 (55)	6,177	0-18	44%	-	-	10%	-	18%	12%	17%	15%	-	-	-
McMillen et al.2005 (56)	373	17	37%	61%	32%	38%	-	-	-	-	-	-	-	14%
Zima et al., 2000 (57)	255	6-12	-	80%	-	-	-	-	20%	13%	32%	-	-	-
dosReis et al., 2001 (58)	15,507	0-18	57%	-	-	-	-	-	-	-	-	5%	-	-
Harman et al., 2000 (59)	39,500	0-18	-	-	-	15%	4.5%	9.4%	2.5%	-	5.9%	-	-	-
Pilowsky & Wu, 2006 (60)	19,430	12-17	-	-	-	-	-	-	-	-	-	7.1%	9.8%	-
Dubner & Motta, 1999 (61)	150	8-19	-	-	-	-	-	-	-	-	-	-	-	62%

<sup>A</sup> ADHD: attention deficit hyperactivity disorder; CD: conduct disorder; ODD: oppositional defiant disorder; Att/adj: attachment and/or adjustment disorder; Drug abuse: drug abuse not including alcohol; Drug dependence: drug dependence not including alcohol; PTSD: post-traumatic stress disorder

### **The fate of foster care alumni**

Upon exit from foster care just over half of the children are reunited with their original parent or guardian (9); the high frequency of reunification clearly follow from child welfare agencies setting “case goals” of reunification with a comparable frequency.

Interestingly, the basis for this goal of reunification follows from little evidence of what disposition is best for the child, as there is very little evidence on reunification outcomes (62). Reunification is instead a priority that is observed to follow from the Law:

The bedrock assumption underlying child welfare policy is that children are better off if raised by their natural parents. This preference for the role of natural parents is codified in law and provides the rationale for retaining reunification as a core outcome for children placed in foster care. Parents have the fundamental right to direct the care, custody, and control of their children, and it is presumed that, until or unless proven otherwise, they will act in a child’s best interest (63).

The fundamental rights of parenthood aside, the results from a growing number of studies in the past two decades highlight the risks of reunification. Studies of child welfare data from the 1990s have reported that 19-24% of children reunified with their parents return to foster care within two years (64-66). Risks are particularly high when there is history of maltreatment, which includes most foster children: maltreatment rates by a foster child’s birth family have been reported as high as 93.3% in one study that included 659 individuals that were in foster care as adolescents (67). A recent study in the United Kingdom found that foster children who were returned to their homes were more likely to be abused than those who did not return home; a total of 42% that returned home had at least some evidence of re-abuse (68).

### *Risks of reunification*

The risks of bad outcomes following reunification are evident in younger children. A U.S. study of 445 reunified children with a mean age of just over four years found that 20 percent experienced further neglect and nine percent were re-abused (69). In a case-control study of 120 re-abused or re-neglected children compared with 92 for whom there was no suspicion of abuse, risk for re-abuse was greater for those under 12 than for older children and was greatest for infants under one year of age. Children with multiple placement moves during foster care were a staggering eleven times more likely to be re-abused than children with more stable placements (70). Fuller also observed that children returned to care-givers with mental health problems were nine times more likely to be re-abused. Studies conducted by British pediatricians have noted similar outcomes: among one, two and three year-olds, the rates of maltreatment after reunification ranged from 20 to 30 percent, and reunited infants had slower “catch-up” growth in both height and weight than infants that remained in foster care (62). Following his review of this and other evidence, Biehal concludes that the problems with reunification most likely stem from incomplete assessments from child welfare services as well as a general lack of support for the child and family after reunification.

Problems with reunification have been illustrated by studies in older children as well. In a prospective cohort study, Taussig, Clyman and Landsverk (71) assessed 149 children who entered foster care between the ages of 7 and 12, and then assessed them again 6 years later, by which time 63 had been reunified and 86 were still in foster care placement. The authors observed that reunified youth showed more self-destructive

behavior ( $p = .04$ ,  $r = .18$ ), substance abuse ( $p = .02$ ,  $r = .20$ ), and total risk behavior problem scores ( $p = .03$ ,  $r = .19$ ). Reunified youth were also more likely to have received a ticket or have been arrested ( $p = .02$ ,  $r = .19$ ), to have dropped out of school ( $p = .05$ ,  $r = .16$ ), and to have received lower grades ( $p = .03$ ,  $r = .17$ ). Reunified youth also had more internalizing behaviors ( $p = .04$ ,  $r = .17$ ) and total behavior problems ( $p = .04$ ,  $r = .17$ ). The authors conclude that youth who reunify with their biological families after placement in foster care have more behavior problems than youth who do not reunify. While the effect sizes are somewhat small in this study, the clear trend is nonetheless striking, especially since those who reunify are returning to relatively higher functioning families compared to those that do not reunify. The authors offer a number of possible explanations for their findings, including a persistence of inadequate parenting, the reoccurrence of abuse or maltreatment as has been documented in studies described above. They also offer that the negative outcomes could result from the stress of renegotiating relationships after time away from the biological family.

The evidence raising concerns about returning foster children to their biological families, however, must be considered in the broader context of outcomes of children placed in foster care. A number of recent studies have observed that children placed in foster care have many bad outcomes compared to the general population, including rates of arrest, incarceration, lower high school graduation rates, high unemployment, a greater likelihood of suffering from depression more frequently, and more representation among the homeless (72). Confirming that these differences cannot be explained by socio-demographic differences alone, other studies still have noted many of the same poor

outcomes when the comparison is made with children with similar household incomes or other characteristics but have no history of foster care placement (53, 73). While it can be difficult to compare similar populations when it comes to the highly relevant variables like history of maltreatment, such controlled comparisons nonetheless raise the question about whether or not there may be something detrimental about foster care itself. While there is clear sense in removing children from proven adverse or dangerous environments, that forced family separation nonetheless represents another traumatic event both the child and the caregiver, even if that relationship is a dysfunctional one.

### **Improving foster care research**

Despite such reports of negative outcomes, other studies have identified some positive longer-term outcomes among alumni of foster care services, including improvements in physical health, emotional adjustment, school performance and behavioral functioning (62, 72, 74). Needless to say, there is a lack of consensus on the effects and outcomes of foster care placement, but given the magnitude of the problem and the importance of understanding outcomes for the benefit of current and future children in the system, there are regular calls in the literature to improve research in the area. In a recent systematic review of developmental and mental disorders in foster care youth, Oswald et al. (16) emphasized that the “accumulation of multiple risk factors does not allow an attribution of symptoms to single factors.” In describing their review methods, the authors lament great variations in methodologies and in measures across studies. They highlight the need for methodological enhancements in the field that may better support causal inference; they suggest that differences in studies could be reduced through consistent,

detailed descriptions of the independent variables, such as age at first placement, number of placements, reasons for placement, exposure to traumatic situations and parenting risk factors, such as maternal substance use and family history of psychiatric disorders (16).

The challenges to achieving such goals in this area of research are multitude. Due to a necessary heavy reliance on self-report data, results are not easily verifiable and subject to recall bias. The complexity the child welfare services administration in conjunction with the comparably low socioeconomic status of most families in the foster care system underlies many difficulties in obtaining adequate sample sizes for prospective studies. Furthermore, ethical challenges abound: as an example, prospective randomization to foster care versus keeping a child in a confirmed abusive environment would unlikely pass ethical standards given our current knowledge.

#### *Responding to research recommendations*

Experts recommend undertaking longitudinal research that will follow foster children into adulthood in order to gain insight into long-term developmental outcomes and the consequences of current and past practices of child welfare services. Currently, very few follow-up studies of young adults who have been in foster care have interviewed persons who were 22 years of age and older (75). While our study focuses on older-child and adolescent outcomes (ages 8-17), longitudinal data from late adolescence and early adulthood (ages 13-22) is also available for analyses in the immediate future; and by 2013 data will be available when all children have reached adulthood (ages 18-27). The

retention rate for T2 was 92% and the overall retention for T3 is expected to remain high at 85% of the original T1 sample.

The impetus to improve knowledge in this area and devise new interventions is strengthened by evidence of effectiveness of a handful of programs seeking to improve outcomes of foster care children. As one example, Fisher, Stoolmiller, Gunnar, and Burraston (2007) compared salivary cortisol levels (as a marker for stress) in 3 to 6 year-old foster children, randomized to either multimodal treatment foster care (MTFC;  $n = 57$ ) or regular foster care ( $n = 60$ ), along with a community comparison group ( $n = 460$ ). Monthly early-morning and evening cortisol levels were assessed over 12 months. No significant differences were found at baseline between foster and community children, but over time, foster children in MTFC exhibited an AM-PM cortisol level change that became comparable to the community children, whereas children in regular foster care exhibited increasingly flattened morning-to-evening cortisol activity over 12 months (16).

While some effective interventions exist, the majority of foster care children navigate the system with unmet needs. Given the number of children entering foster care system each year, and using the figures from Burns et al. regarding mental health service need (6), 235,000 new foster children require mental health services each year. But again, extrapolating from Burns' reported service use rates, however, only 74,000 received any service, leaving over 160,000 foster children annually with unmet mental health needs.

Challenges to State agencies, however, are also considerable: for one, foster families can be difficult to find. Connecticut's child welfare agency, for example, reports that for decades it has struggled to find enough foster homes to meet the state's needs, resulting in more restrictive placements in group homes or institutional settings, and many of these are out of state (10). The cost of such arrangements further restricts the mobility of the child welfare agency, and additional evidence is needed to determine if those resources could not be better spent either growing specialized foster care programs, or even providing more in-home services as opposed to foster care. Given the circumstances of state budgets currently, finding the most effective and efficient means of service delivery is vital to the State as well as children receiving services.

According to specific research recommendations for improving our understanding of foster care outcomes, this study aims to:

- Make use of multiple informants (a combination of mother and child self-reports and structured interviews are discussed in this study; study personnel is currently seeking permission to corroborate reports of foster care placement with the Department of Children and Families.
- Contribute to the limited data on the incidence of PTSD in children with a history of foster care. The rates of PTSD in alumni have been reported at very high levels, and patterns of onset for youth in foster care or those that have recently left care are not known.

- Include a comparison group that is similar to the foster care group on key variables beyond socio-demographics, including major family risk factors and a history of maltreatment.
- Describe rates of disorders among youth that have recently exited from foster care. Rates of pathology in youth have been much lower than young adult foster care alumni, but it is unclear if this is related to a delayed onset of mental illness related to emerging adulthood, or insufficient screening and diagnosis in youth (72).

## Statement of Purpose

The purpose of this study is to explore the principal effects of a history of foster care on adolescent psychopathological internalizing and externalizing symptoms in 39 foster care children and 78 controls, specifically:

- Compare the twelve-month prevalence of internalizing disorders: Depression, dysthymia, social phobia, separation anxiety, panic disorder, generalized anxiety disorder, and post-traumatic stress disorder.
- Compare rates of endorsement of internalizing symptom items using parent- and self-reports.
- Compare the twelve-month prevalence of externalizing disorders: ADHD, oppositional defiant disorder, and conduct disorder
- Compare rates of endorsement of externalizing symptom items using parent- and self-reports.
- Compare the lifetime and twelve-month prevalence of substance use disorders.

### *Hypothesis*

Adolescents with a history of foster care will exhibit more internalizing and externalizing symptoms and meet more psychiatric diagnoses compared with matched community controls. When assessed again in young adulthood (not reported here), the differences in internalizing entities are expected to persist, whereas the observed effect in externalizing will reverse itself in the community sample, which will have higher rates of antisocial personality disorder. Because the groups will be matched for maternal mental illness, maternal substance abuse, and maltreatment history, differences are expected to be

greater in adolescence, when behavioral symptomatology may be resulting from re-adjustment to the biological family after the child's (recent, in some cases) foster placements.

## Methods

### Overview of Project History and Student Involvement

This work is ancillary to a three-wave longitudinal study (funded by the National Institutes of Health, R01-DA10726) investigating the effects of maternal drug abuse and maternal psychopathology on children's adjustment (76, 77). The first wave of data collection (T1) began in 1996 and recruited 361 mother-child dyads over the next six years. The subsequent follow-up, or second wave of data collection (T2), was completed in the fall of 2007. This report makes use of the data from primarily T1, but also includes a brief analysis of T2 data. The third wave of data collection (T3), or second follow-up, is currently in progress with an estimated completion in early 2013.

When this author joined the project in June of 2010, others had already identified a high frequency of mother-child dyads reporting a history of involvement with the Department of Children and Families (DCF, Connecticut's child welfare agency), which for many had resulted in placement of the children in foster care. The project's principal investigator, Elena L. Grigorenko, developed this observation into a project plan that aimed to describe the DNA methylation patterns in a group of adult children who had experienced foster care, as compared to a matched sample without such a history.

Another member of the lab subsequently examined participant demographic data and identified a convenience sample of twenty dyads with a history of foster care. The number was limited by a requirement for ethnic homogeneity, which was necessary for

the planned genetic analyses. The majority of dyads with a history of foster care were those with African-American mothers, and thus he chose the ethnicity of the group to maximize sample size. The twenty dyads were manually matched, pair-wise with twenty other African-American dyads that reported no history of foster care. The main grouping factor, a history of foster care placement, was determined using both T1 and T2 data, but relied more heavily on T1 data. Additional variables considered in the matching included:

- Mother's response to screening questions about psychiatric history and drug abuse
- Child's sex and age
- Mother's age
- Mother's education
- How often the child has seen the biological father in the past year

In order to verify and gain additional information on foster care placement, in early 2010, before this author joined the project, the research team developed, piloted, and implemented a survey to gain more detail of the dyad's involvement with DCF. This survey was added to the already-in-progress T3 assessment battery for only the forty dyads (twenty in exposure group and twenty controls) selected for the ancillary study.

When this author began working on this project in June of 2010, we decided to expand the analysis of the foster care group to include analysis of the psychometric data as well as DNA methylation data. Initial analysis and discussion of only the psychometric

portion of the ancillary project appears in this report. The DNA methylation portion of the study is ongoing, and while preliminary data is expected in the spring of 2011, complete data is not expected to be available until late summer or early fall of 2011. For the psychometric portion reported here, I performed all background research, the retrospective project design and data analysis. A detailed listing of work performed by me and work performed by others appears below.

### *Work Performed by Student*

- *T3 data collection:* worked as interim second research assistant for two months while the position was being filled. Responsibilities included contacting and scheduling participants, conducting structured interviews, supervising self-report assessments, and data entry. The student also made some visits to participants' homes to complete the additional foster care history survey.
- *Data cleaning:* significant time spent (with others, Baptiste Barbot and Theresa Barbuscio) cleaning data from T1 and T2 that had not been previously used in publications. "Cleaning" refers to checking for consistencies in coding, merging data that was entered in multiple places, confirming identified discrepancies by reviewing original paper records.
- *Sampling for ancillary study of psychometric measures in foster care group:* since the selection of the foster care group for psychometric outcomes did not include ethnic homogeneity, I re-performed the selection of dyads with a history of foster care, as well as the matching procedure for this portion of the project. Details of

sampling and matching methodologies appear below. Baptiste Barbot performed the sampling of the forty dyads in the methylation portion.

- *Retroactive study design and analysis of psychometric outcomes in foster care group:* I selected the relevant assessment data and performed all summary and statistical analyses that appear in this report.
- *Extension of foster care survey and seeking data directly from DCF:* I suggested expanding the use of the foster care survey to all persons at T3, not just the forty dyads chosen for the methylation study. In addition to this expanded use of the survey, I (with the help of others) am currently exploring the feasibility of obtaining confirmation of foster care placement directly from DCF.
- *Blood collection:* for the methylation portion of the study, blood was collected by one of two individuals, either the regular phlebotomist employed at the study location, the APT foundation at 1 Long Wharf Drive, or me, who was available at other times such as evenings and on weekends, which allowed the research team more flexibility in scheduling participants for blood draws. I also made a number of visits to participants' homes when it was otherwise difficult for them to transport themselves to the study location.

#### *Work Performed by Others*

- *Project design of parent study:* as described above, the work presented here is an ancillary study of existing longitudinal study, originally conceived by Suniya S. Luthar of Columbia University Teachers College, and now under the direction of principal investigator Elena L. Grigorenko of the Yale Child Study Center.

- *Data collection and entry:* two research assistants (RAs) have collected and entered all data since the project's inception. Turnover in these positions is relatively high (every two years), but continuity is provided by the project manager (Pamela J. Brown), who manages the RAs and is responsible for all ongoing study logistics. As stated above, I filled the role of a research assistant for two months in the summer of 2010.
- *Laboratory procedures:* cell isolation, DNA extraction, isolation of methylated DNA, and preparation of samples for sequencing was performed by Maria Eastman, Oksana Naumova, and Adam Raefski. I occasionally observed these protocols.

## **Methods of Research**

### *Participants*

The participants in this study were selected from the sample of 361 mother-child dyads described above. Children were 8-17 years of age and were required to be in the care of their biological mother at the time of enrollment. The sample includes approximately equal numbers of mothers with substance dependence, mothers with depressive or anxiety disorders, mothers with both substance dependence and depression or anxiety, and other mothers without these diagnoses, living in the same community under comparable socioeconomic conditions. From the total sample of 361 dyads, 39 reported a significant history of foster care, and 322 reported no significant foster care history and thus represented controls (see Table 2).

**Table 2.** Foster and control group demographic characteristics and major risk factors

	Foster Care	Control	Matched Control
Total sample	<i>n</i> = 39	<i>n</i> = 322	<i>n</i> = 78
Gender (% female)	69.2	51.9 <sup>A</sup>	67.9
Race (% White, non-Hispanic)	30.8	28.9	30.8
(%Black, non-Hispanic)	43.6	52.5	47.4
(% Other)	25.6	18.6	21.8
Child's age (mean yrs. and SD at enrollment)	13.6	12.4 <sup>A</sup>	13.4
Mother's age (mean yrs. and SD at child's birth)	25.8	24.8	24.8
Mother's education (yrs. complete at enrollment)	11.2	12.6 <sup>B</sup>	11.8
Maternal substance use (%)	20.5	19.3	20.5
Maternal depression/anxiety (%)	15.4	20.2	15.4
Maternal substance use + depression/anxiety (%)	53.8	22.7 <sup>C</sup>	53.8
No maternal diagnoses (%)	10.3	37.9 <sup>C</sup>	10.3
Child maltreatment (%)	20.5	12.1	20.5

<sup>A</sup> Compared with foster care, value differs significantly at  $p < .05$ .

<sup>B</sup> Compared with foster care, value differs significantly at  $p < .01$ .

<sup>C</sup> Compared with foster care, value differs significantly at  $p < .001$ .

*Foster Care Participants.* The 39 foster care children were identified by reviewing mother and child reports on two survey instruments, primarily from T1, but also from T2. During T1 enrollment, a question concerning placement by DCF into foster care was only added to the general demographics questionnaire after 133 dyads had already been interviewed. From the remaining 228 respondents, 26 reported DCF had previously been involved in placing the child in someone else's care. For the 133 respondents who were not asked this question, item-level data from the Survey of Exposure to Community Violence (78, 79) was reviewed for details on family separations. In the description of the reason for the child's separation from the mother, if respondents mentioned "DCF," "foster care," or "neglect," or if the child was placed in a residential facility operated by DCF, then that child was considered to have a history of foster care as well, and this was case in 14 additional children. Additionally, the T2 responses regarding foster care placement were counted as occurring before T1 if the amount of time reported in foster care was equal to the amount of time reported in the family separations items of the SECV from T1, and if the reason for the separation could reasonably have prompted DCF involvement (e.g. "staying away while mom was hospitalized at mental health center). A history of foster care placement at T1 was inferred in this way in 2 additional cases, resulting in a total of 42 cases with a history of foster care (but again living in the care of their biological mothers at T1, as this was a requirement for enrollment).

Consistent with others' work, four consecutive weeks, or one month, of foster care was chosen as the cut-off for a significant foster care stay (80). Three cases were placed in foster care for less than one month, and thus they were not counted as having a

significant history of foster care placement, resulting in the identification of 39 children with a significant history of foster care prior to their enrollment at T1. Overall, the age of first placement ranged from birth to 16 years (median = 8.5 years); the length of foster care placement ranged from 1 month to 9 years (median = 1.5 years). Data was not collected on multiple placements, so in some cases the length of placement may represent the sum of multiple placements. The temporal proximity of the foster care placement, or the number of years since the children had returned from placement to their mothers' care was calculated and the available data and ranged from 2 months to 10.3 years (median = 2.1 years).

*Control participants.* The responses from the remaining 322 dyads to the DCF placement question (when asked) and the SECV indicated no history of foster care placement. While some did report significant separations from the mother, these presumably occurred with the mother's or another family member's personal arrangements, or possibly by order of a probate judge because at both T1 and T2 these individuals maintained that DCF had not been involved in the placement of their child in another's care.

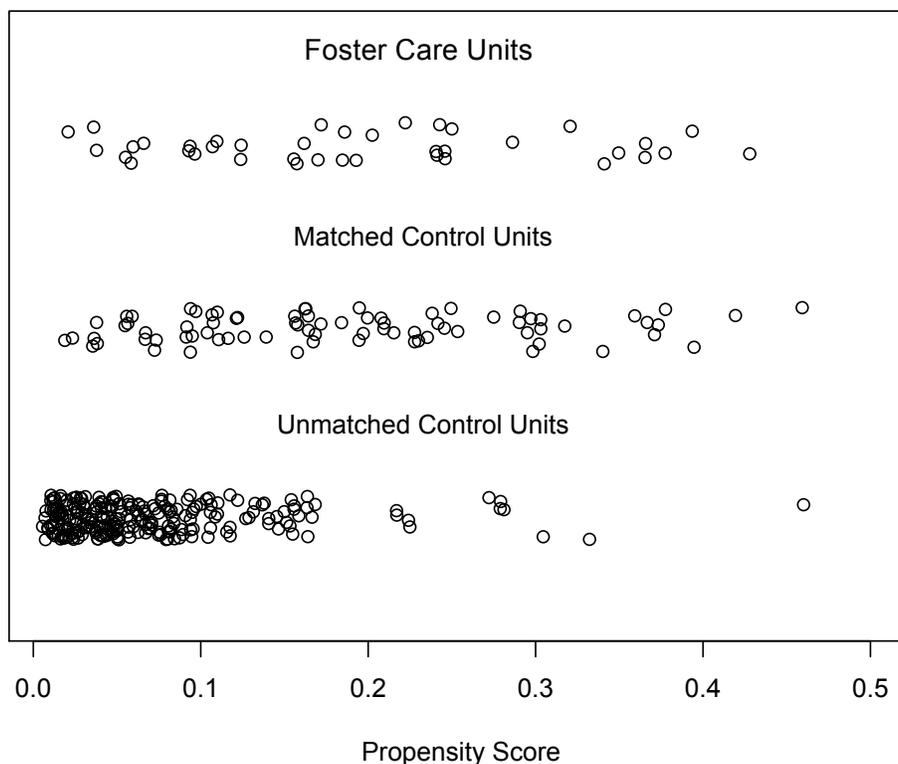
*Matched control participants.* Pair-wise analysis of the demographic characteristics and major risk factors of the entire control group revealed a number of significant differences from the foster care group (see Table 2). Significant differences were observed in gender ( $p = .04$ ,  $r = .11$ ), child's age ( $p = .019$ ,  $r = .12$ ), mother's education ( $p = .002$ ,  $r = .16$ ), frequency of mother's with substance use and depression/anxiety disorders ( $p < .001$ ,  $r =$

.22), and frequency of mother's with no substance use or depression/anxiety disorders ( $p = .001$ ,  $r = .18$ ). While the statistically significant differences between the groups are somewhat small, they are all variables that have well documented relationships to primary study outcomes of child psychopathology, in particular, a mother's history of substance use and depression/anxiety during the child's lifetime. Child maltreatment is another important confounder, with well-established links to a child's development of psychopathology. While the two groups do not differ significantly on this variable, the trending difference ( $p = 0.14$ ) could make it more difficult to detect more subtle differences between the groups.

In consideration of these differences, we decided to match individuals in the foster care group with the individuals most similar in major risk factors and demographics, so as to better identify the particular effect of the children's stay in foster care, as differentiated from commonly co-occurring risks such as maternal substance abuse, maternal depression or anxiety, and childhood maltreatment. To obtain the best-matched individuals, the R-based statistical package MatchIt was used (81). The model chosen was nearest neighbor, because the model has the unique option of exact matching on some variables, followed by nearest-neighbor matching with other variables, making use of a logistic regression model. Thus exact matching was performed for the major risk factors (i.e. the four possibilities for maternal diagnoses, and child maltreatment), followed by nearest-neighbor matching of the demographic variables (child gender, child race, child age, mother's education and mother's age). Results of the matching are

summarized in the table. Seventy-eight individuals were chosen, as this was the largest multiple of the foster group ( $n = 39$ ) that the software could adequately match.

**Figure 1**



***Matching results: distribution of propensity scores***<sup>A</sup>

<sup>A</sup> Figure generated by R software {{273 R Development Core Team 2011;}}

An illustration of the matching procedure is presented in Figure 1. Each circle represents an individual case that is plotted against its propensity score, a value that is an output from the logistic regression model produced by MatchIt and represents a case's statistical

distance of all of the matched variables combined. The cases are grouped by foster care units ( $n = 39$ ), matched control units ( $n = 78$ ), and unmatched control units ( $n = 244$ ).

This last group was then not considered in subsequent analyses.

### *Measures*

*Historical Measures.* Demographic characteristics of the dyad were recorded at T1 and included information on the dyad's family circumstances, medical history, substance abuse treatment history, and as described above, DCF-involved placement history. The SECV, also mentioned above, is a self-report measure with both parent and child versions. In addition to corroborating reports of DCF involvement, data gathered from the SECV was used to identify children with a history of major maltreatment. Any child or parent who reported major or repeated instances of verbal abuse, physical abuse, sexual abuse, neglect, or domestic violence (i.e. witnessing physical fights between family members in the home), was considered to have a positive history of maltreatment. A history of maltreatment was then used as a matching variable, as summarized in Table 2.

Assessment of the mothers' diagnostic history (e.g. substance dependence, anxiety or depression) included both self-report of treatment or a diagnosis received during the child's lifetime, as well as structured interview data from the latest version of the Diagnostic Interview Schedule (82). Particular sections of the DIS were selected and administered to gather information on anxiety disorders, depressive disorders, substance use disorders and antisocial personality disorder. The DIS used at T1 was based on the

Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (83). Mothers were identified as having a depressive disorder if they met DSM-IV criteria for major depressive episode or dysthymia during their child's lifetime. An anxiety disorder was identified if, during the child's lifetime, the mother met criteria for panic disorder, generalized anxiety disorder (GAD), social phobia, or post-traumatic stress disorder (PTSD). Mothers were also assessed for antisocial personality disorder (APD) and substance abuse or dependence (heroin or cocaine); similar to other clinical entities these diagnoses were identified if the mother met DSM-IV criteria during the child's lifetime.

The self-report data on treatment history and the structured interview data on diagnoses, only when occurring during the lifetime of the child, were used to group the mothers into four groups: (1) substance abuse, (2) depressed or anxious, (3) substance abuse and depressed or anxious, and (4) no diagnoses during the lifetime of the child. These groups were then used as an exact matching variable as described above.

#### *Outcome measures*

Outcome measures that directly reported on child psychopathology were selected from among the available data. The variety of measures used in the parent study affords the opportunity for multiple observations of psychopathology, including assessments with more specific binary outcomes based on DSM-IV criteria as well as symptom scales that are more sensitive for clinical features.

*Diagnostic Interview Schedule for Children (DISC-IV)*. The DISC-IV is a structured interview based on DSM-IV criteria (84). Both child report and parent report versions were used. Anxiety diagnoses included either mother or child endorsement of symptoms meeting criteria for social phobia, separation anxiety, panic disorder, generalized anxiety disorder, and PTSD. Depressive diagnoses included child or mother endorsement of symptoms meeting criteria for major depressive episode or dysthymia. Externalizing diagnoses included child or mother endorsement of symptoms meeting criteria for attention deficit hyperactivity disorder (ADHD), oppositional defiant disorder (ODD), and conduct disorder (CD). Children and mothers also both reported on the child's substance use, specifically including alcohol, marijuana, and other substances.

*Behavior Assessment System for Children – Self Report of Personality and – Parent Rating Scale (BASC-SRP and BASC-PRS)*. The BASC is a set of measures for the assessment and identification of school-age children with emotional disturbances and behavioral disorders (85). This study makes use of two of these measures, the BASC-SRP and BASC-PRS to obtain continuous symptom scores for depression and anxiety (on both the BASC-SRP and BASC-PRS), as well as general internalizing and general externalizing scales (BASC-PRS only). Internalization is a composite score derived from the sum of somatization, depression and anxiety on the BASC-PRS. Externalization is also a composite score, derived from the sum of three scales also on the BASC-PRS: hyperactivity, aggression, and conduct problems. The BASC measures are widely used and the version used at T1 was standardized and validated in children in grades 3 to 11, and has demonstrated validity in a variety of settings (86, 87).

*Child Depression Inventory (CDI)*. The CDI is a self-report questionnaire designed to measure childhood depression on a continuous scale (88). The measure differs from adult measures of depression in alterations of phraseology more suitable for children, and the measure has demonstrated good test-retest reliability and internal consistency (89). The mean score of a normative population (out of a maximum of 54) is approximately 9.00, standard deviation is about 7.00 and 19 is the cutoff for the upper 10 percent of the distribution. While slight gender differences in raw scores have been reported, raw scores were nonetheless used in this analysis as the comparison groups are matched very closely for child's gender.

#### *Data Analysis*

Matching of the foster care group with selected controls with similar risk factors for psychopathology was performed using R, a system for statistical computation and graphics, with the additional software package MatchIt (81). All other analyses were performed using PASW Statistics 18.0. Chi-square tests were used to compare the frequency of binary outcomes between groups such as the proportion meeting DSM-IV criteria for various pathological syndromes. Fisher's exact test was used when cell frequencies were less than 5. The two groups mean symptom scores were compared with t tests with  $\alpha = 0.5$ .

## Results

### *Frequency of psychiatric disorders*

To examine differences between psychopathology in the foster care and matched control groups, a series of chi-square tests were conducted (see Table 3). The proportions meeting DSM criteria as measured by the DISC-IV were significantly different ( $p < .05$ ) for externalizing diagnoses ( $p = .012$ ,  $r = .23$ ) and substance dependence ( $p = .002$ ,  $r = .30$ ), representing small-medium- and medium sized differences, respectively. No significant differences were observed for Internalizing disorders, anxiety disorders and depressive disorders. Frequencies of both depression and substance abuse were low overall.

**Table 3.** *Proportion meeting DSM Criteria at T1*

	Foster Care ( $n = 39$ )		Matched Control ( $n = 78$ )	
	Freq.	95% CI	Freq.	95% CI
Internalizing (%)	48.7	32.3-65.1	52.6	41.2-63.9
Anxiety (%)	46.2	29.8-62.5	51.3	39.9-62.6
Depression (%)	7.7	0-16.4	6.4	0.85-12.0
Externalizing (%)	41.0 <sup>A</sup>	24.9-57.2	19.2 <sup>A</sup>	10.3-28.2
Substance abuse (%)	5.1	0-12.4	7.7	1.7-13.7
Substance dependence (%)	25.6 <sup>B</sup>	11.3-40.0	5.1 <sup>B</sup>	0.12-10.13

<sup>A</sup> Proportions are significantly different ( $p < .05$ )

<sup>B</sup> Proportions are significantly different ( $p < .01$ )

**Table 4.** Means and standard deviations of BASC subscales and CDI

	Foster Care ( <i>n</i> = 39)		Matched Controls ( <i>n</i> = 78)	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
BASC-SRP Anxiety	4.86	3.77	3.52	3.63
BASC-SRP Depression	2.31 <sup>B</sup>	2.63	1.19 <sup>B</sup>	1.78
BASC-PRS Internalizing	23.46	11.38	19.09	13.52
BASC- PRS Anxiety	8.31	4.71	7.53	5.06
BASC-PRS Depression	8.28 <sup>A</sup>	4.89	5.64 <sup>A</sup>	4.93
BASC-PRS Somatization	6.87	4.94	5.92	5.51
BASC-PRS Externalizing	23.77 <sup>A</sup>	16.05	16.95	13.11
BASC-PRS Hyperactivity	7.61 <sup>A</sup>	5.92	5.43 <sup>A</sup>	4.20
BASC-PRS Aggression	7.46	5.91	6.04	5.19
BASC-PRS Conduct Problems	8.69 <sup>B</sup>	6.38	5.47 <sup>B</sup>	5.67
Child Depression Inventory	9.41 <sup>A</sup>	8.41	6.10 <sup>A</sup>	6.65

<sup>A</sup> Means in the same row are significantly different ( $p < .05$ )

<sup>B</sup> Means in the same row are significantly different ( $p < .01$ )

#### *Psychiatric symptom scales*

Differences in mean scores between groups for symptom scales such as the subscales of the BASC measures and the CDI were analyzed by independent-samples *t* tests (see Table 4). The foster care group's mean scores were higher on a number of subscales, including all three subscales measuring depression: BASC-SRP depression ( $p = .008$ ,  $r =$

.25), BASC-PRS depression ( $p = .007, r = .25$ ), and CDI total score ( $p = .022, r = .21$ ).

The BASC-PRS composite score for externalizing symptoms was also significantly greater in the foster care group ( $p = .015, r = .22$ ). Significant differences were also seen in two of the three subscales that make up the composite externalizing score: BASC-PRS Hyperactivity ( $p = .023, r = .21$ ) and BASC-PRS Conduct problems ( $p = .007, r = .25$ ).

## Discussion

This study examined the effect of foster care placement on adolescent psychopathology by making use of a convenience sample drawn from a high-risk population. Through highly conservative matching, this study effectively compared outcomes of adolescents who likely experienced adverse childhood events and were temporarily placed in foster care with the outcomes of adolescents who were likely exposed to the similar adverse childhood events, but were never removed from their mothers' care by a child welfare agency. After matching, the frequency of adverse childhood events in both groups was extremely high, with 20.5% reporting a history of major maltreatment (i.e. major neglect, physical or sexual abuse, or exposure to family violence) and no less than 90% of both the foster care and control samples reporting a significant history of maternal drug abuse or a significant history of anxiety and depression, or both. Any one of these characteristics is a major risk factor for adverse outcomes in childhood, adolescence and adulthood (33, 35). Furthermore, a positive history for any one of those risk factors likely means the child has experienced multiple, prolonged adverse events; thus both groups, the foster care group and the control, are considered extremely high risk groups, likely having endured multiple adverse childhood events throughout their lives (36, 37).

Compared with their matched peers, children with a history of foster care demonstrated significantly higher rates of substance dependence, conduct problems and depressive symptoms. They also demonstrate small but statistically significant differences in hyperactivity and number of externalizing diagnoses. Furthermore, on every measure for

which the groups differed statistically, children with a history of foster care had worse outcomes than those without a history of foster care. The purpose of the close matching for this study was to make every effort to make the foster care group and the control group the same with respect to adverse childhood events; the major exception, however, is the additional likely traumatic experience of being forcibly removed from one primary caretaker, in this case, a child's biological mother. The higher incidence of drug dependence, externalizing disorders, depressive symptoms and conduct problems demonstrated in this study is consistent with the literature indicating increased prevalence of all mental illness in foster care populations. Again, what is unique about this study is that the comparison group also has experience major adverse childhood events as well as being matched socio-demographically. It is somewhat surprising then that the control sample actually demonstrates more adaptive characteristics because presumably, they are the ones who continued to endure the adverse childhood events inherent to their environments while their matched foster care pairs were removed from these situations.

These results suggest that foster care may have some deleterious developmental consequences when children are returned to their biological mothers. These results are consistent with the results of Taussig et al. (71), described earlier, when they demonstrated that children who had returned to their biological families after a mean of two years in foster care and were then reunified with their mothers for a mean of four years, fared worse on a number of outcomes such as internalizing problems and school performance, compared with others who were still in foster care after six years. What the present study adds to Taussig et al.'s findings is the possibility that it was the original act

of removing the child from the home itself, and not the return, that represents the developmental adversity leading to the poor outcomes.

An alternative interpretation of these findings, however, is that children with more psychopathology are more likely to come to the attention of child welfare services and perhaps by nature of their greater underlying symptomatology, are furthermore more likely to be placed in foster care when child welfare workers observe the maladjustment. This alternative explanation of the results highlights the limitations of this study's cross sectional design. It is likewise conceivable that children who have a history of foster care are more likely to express symptoms given their foster care experience, an ostensibly safer environment where such expressions may have been more acceptable. As discussed earlier, such limitations should be addressed with longitudinal studies, as attempted in the study by Lawrence, Carlson and Egeland (80). For their comparison group, they selected children who were investigated for reports of maltreatment, but for whom the maltreatment was not considered severe enough to remove the children from the home. Dissimilar to our findings, the authors' were unable to differentiate the risks associated with foster care from those remaining with the family of origin and a maltreating caregiver. However, in their discussion they attribute their inability to distinguish a difference to type II error, as each group only included 46 participants, and the authors assert their concern for the potential ill effects of foster care, including separation from primary caregivers, and social, school and familial changes, which are risks for maladjustment in themselves. No difference may have been observed in their study

perhaps because they relied on teacher-report measures, and teachers' awareness of subtler symptomatology may be limited, particularly in adolescents.

Regarding the limitation of this study's small sample size: significant differences were noted, but the effect sizes of those differences were only small to moderate. This study also only provides a cross sectional picture. As hypothesized, it is possible that the foster care group will begin to demonstrate some qualities of resilience as they continue to develop. It is certainly plausible that the protective factor of removal from a deleterious environment during the formative years of their childhood, even if it was a traumatic removal, may have protective effects that will not be realized until adulthood. It is also possible that despite our sophisticated matching, the two groups differ in some way other than their experience in foster care. This is a very difficult thing to verify even in prospective studies as individuals are typically only assessed a few times before during and after placement, and so it is very difficult to observe consistent, representative patterns in times that are so trying for families.

The implication of this study's findings, if verified by future studies including prospective data, is not necessarily that fewer children should be returned to their biological homes after foster care. Instead, the important implication is that fewer children should be removed from their homes in the first place and that all effort should be made to keep families together (consistent with our civil notions of family rights and personal liberty as discussed earlier) (63). This is the same goal of child welfare services now; however, removing a child from the home in the first place potentially traumatizes

the mother and child in ways that appear to be very difficult to repair. Thus only the most careful attention should be paid to how placements are executed, and accordingly, child protective workers should be highly trained in the management and consequences of attachment-related trauma. Furthermore, foster parents, whether kinship or not, should be trained in parenting strategies for traumatized children, and highly selective and careful screenings of foster families are essential.

One challenge in confirming our findings is that a good experimental approach to testing this phenomenon would involve randomizing children to either stay in the home with additional services or be removed from the home and placed in foster care per current protocol. The danger, however small, in leaving children in potentially dangerous situations for the benefit of unknown long-term consequences is enough to give great pause, and despite the growing body of evidence, no public welfare agency is likely to bet their reputation on that risk. Fortunately, there is still much work to do with existing data, including more sophisticated usage of the advanced statistical models, now commonplace in the social sciences that have already been so instructive in the past few years on the influence of adverse childhood events on adult outcomes.

## References

In the Reference section, list references numbered in the order in which they appear in the text in the format shown below (note that the initials of the authors always follow the surnames, and that there should be no space between more than one initial). Include all authors' names up to 5 authors (use *et al.* after the 5<sup>th</sup> author) and complete article titles. Indicate articles that are in press following the journal name.

Abbreviate the names of journals according to *Pub Med* or *BIOSIS Database*. Spell out names of unlisted journals. Supply inclusive page numbers. Submitted manuscripts, manuscripts in preparation, unpublished observations, personal communications, and preliminary report citations must appear parenthetically in the text. They should not appear in the Reference section. See examples below:

Journal style guides and Endnote style files for the *Journal of Clinical Investigation* and *New England Journal of Medicine* – are also acceptable.

### *Journal Articles*

1. Yalow, R.S., and Berson, S.A. 1960. Immunoassay of endogenous plasma insulin in man. *J. Clin. Invest.* 39:1157-1175.

### *In Press*

2. Gardner, W., and Schultz, H.D. 1990. Prostaglandins regulate the synthesis and secretion of the atrial natriuretic peptide. *J. Clin. Invest.* In press.

### *Complete books*

3. Myant, N.B. 1981. *The Biology of Cholesterol and Related Steroids*. London: Heinemann Medical Books. 882 pp.

### *Articles in books*

4. Innerarity, T.L., Hui, D.Y., and Mahley, R.W. 1982. Hepatic apoprotein E (remnant) receptor. In *Lipoproteins and Coronary Atherosclerosis*. G. Nosedo, S. Fragiaco, R. Fumagalli, and R. Paoletti, editors. Amsterdam: Elsevier/North Holland. 173-181.

### *Abstracts*

5. Packman, C.H., Rosenfeld, S.I., and Leddy, J.P. 1981. Inhibition of the C8/C9 steps of complement lysis by a high density lipoprotein (HDL) of human serum. *Fed. Proc.* 40:967a. (Abstr.)

## References

1. U.S. Department of Health and Human Services. Child maltreatment 2009. Washington, D.C.: 2010.

2. Attala JM, Bauza K, Pratt H, Vieira D. Integrative review of effects on children of witnessing domestic violence. *Issues Compr Pediatr Nurs*. 1995 Jul-Sep;18(3):163-72.
3. Cicchetti D, Lynch M. Toward an ecological/transactional model of community violence and child maltreatment: Consequences for children's development. *Psychiatry*. 1993 Feb;56(1):96-118.
4. Brooks-Gunn J, Duncan GJ. The effects of poverty on children. *Future Child*. 1997 Summer-Fall;7(2):55-71.
5. Ireland T, Widom CS. Childhood victimization and risk for alcohol and drug arrests. *Int J Addict*. 1994 Jan;29(2):235-74.
6. Burns BJ, Phillips SD, Wagner HR, Barth RP, Kolko DJ, Campbell Y, et al. Mental health need and access to mental health services by youths involved with child welfare: A national survey. *J Am Acad Child Adolesc Psychiatry*. 2004 Aug;43(8):960-70.
7. McQuown SC, Wood MA. Epigenetic regulation in substance use disorders. *Curr Psychiatry Rep*. 2010 Apr;12(2):145-53.
8. Repetti RL, Taylor SE, Seeman TE. Risky families: Family social environments and the mental and physical health of offspring. *Psychol Bull*. 2002 Mar;128(2):330-66.
9. U.S. Department of Health and Human Services. The AFCARS report. July 2010.
10. State child protection: State child protection officials sending increasing number of kids to out of state facilities - [courant.com](http://www.courant.com/news/politics/hc-dcf-children-0116-20110115,0,6993802.story) [Internet].; cited 4/8/2011]. Available from: <http://www.courant.com/news/politics/hc-dcf-children-0116-20110115,0,6993802.story>.
11. Carlson EA. A prospective longitudinal study of attachment disorganization/disorientation. *Child Dev*. 1998 Aug;69(4):1107-28.
12. Dozier M, Stovall KC, Albus KE, Bates B. Attachment for infants in foster care: The role of caregiver state of mind. *Child Dev*. 2001 Sep-Oct;72(5):1467-77.
13. Bowlby J. Separation anxiety. *Int J Psychoanal*. 1960 Mar-Jun;41:89-113.
14. Cicchetti D, Cummings EM. Attachment in the preschool years : Theory, research, and intervention. In: Greenberg MT, Cicchetti D, Cummings EM, editors. *Attachment in the Preschool Years*. The John D. and Catherine T. MacArthur Foundation series on mental health and development ed. Chicago: University of Chicago Press; 1990. p. 339-74.
15. Casey Family Programs. Improving outcomes for older youth in foster care. Seattle, WA: Casey Family Programs; 2008.

16. Oswald SH, Heil K, Goldbeck L. History of maltreatment and mental health problems in foster children: A review of the literature. *Journal of Pediatric Psychology*. 2010 June 01;35(5):462-72.
17. Noll JG, Shenk CE. Introduction to the special issue: The physical health consequences of childhood maltreatment--implications for public health. *J Pediatr Psychol*. 2010 Jun;35(5):447-9.
18. Chamberlain P. An overview of the history and development of the multidimensional treatment foster care model and the supporting research. In: *Treating chronic juvenile offenders: Advances made through the Oregon multidimensional treatment foster care model*. Washington, DC, US: American Psychological Association. xvi; 2003. p. 47-67.
19. Brown K, Bascetta S. Foster care : State practices for assessing health needs, facilitating service delivery, and monitoring Children's care. Washington DC: United States Government Accountability Office; 2009. Report No.: GAO-09-26.
20. Saunders BE, Berliner L, Hanson RF(). Child physical and sexual abuse: Guidelines for treatment (final report: January 15, 2003). Charleston, SC: National Crime Victims Research and Treatment Center.: Crime Victims Research and Treatment Center; 2003.
21. Chamberlain P, Price J, Leve LD, Laurent H, Landsverk JA, Reid JB. Prevention of behavior problems for children in foster care: Outcomes and mediation effects. *Prev Sci*. 2008 Mar;9(1):17-27.
22. Shipman K, Taussig H. Mental health treatment of child abuse and neglect: The promise of evidence-based practice. *Pediatr Clin North Am*. 2009 Apr;56(2):417-28.
23. Fisher PA, Kim HK. Intervention effects on foster preschoolers' attachment-related behaviors from a randomized trial. *Prev Sci*. 2007 Jun;8(2):161-70.
24. Lyons JS, Rogers L. The U.S. child welfare system: A de facto public behavioral health care system. *J Am Acad Child Adolesc Psychiatry*. 2004 Aug;43(8):971-3.
25. Janssens A, Peremans L, Deboutte D. Conceptualizing collaboration between children's services and child and adolescent psychiatry: A bottom--up process based on a qualitative needs assessment among the professionals. *Clin Child Psychol Psychiatry*. 2010 Apr;15(2):251-66.
26. DP-1. general demographic characteristics [Internet].; 2010. Available from: <http://factfinder.census.gov/home/saff>.
27. Takayama JI, Wolfe E, Coulter KP. Relationship between reason for placement and medical findings among children in foster care. *Pediatrics*. 1998 Feb;101(2):201-7.
28. Levels of care - child welfare maine DHHS: OCFS [Internet].; cited 4/8/2011]. Available from: <http://www.maine.gov/dhhs/ocfs/cw/locabout.shtml>.

29. Cicchetti D, Toth SL. Developmental processes in maltreated children. *Nebr Symp Motiv.* 2000;46:85-160.
30. Pears KC, Kim HK, Fisher PA. Psychosocial and cognitive functioning of children with specific profiles of maltreatment. *Child Abuse Negl.* 2008 Oct;32(10):958-71.
31. Higgins D. Multiple forms of child abuse and neglect: Adult retrospective reports *Aggression and Violent Behavior.* 2001;6(6):547-578.
32. Mullen PE, Martin JL, Anderson JC, Romans SE, Herbison GP. The long-term impact of the physical, emotional, and sexual abuse of children: A community study *Child Abuse Negl.* 1996;20(1):7-21.
33. Dube SR, Anda RF, Felitti VJ, Chapman DP, Williamson DF, Giles WH. Childhood abuse, household dysfunction, and the risk of attempted suicide throughout the life span: Findings from the adverse childhood experiences study. *JAMA.* 2001 Dec 26;286(24):3089-96.
34. Dong M, Anda RF, Felitti VJ, Williamson DF, Dube SR, Brown DW, et al. Childhood residential mobility and multiple health risks during adolescence and adulthood: The hidden role of adverse childhood experiences. *Arch Pediatr Adolesc Med.* 2005 Dec;159(12):1104-10.
35. Edwards VJ, Holden GW, Felitti VJ, Anda RF. Relationship between multiple forms of childhood maltreatment and adult mental health in community respondents: Results from the adverse childhood experiences study. *Am J Psychiatry.* 2003 Aug;160(8):1453-60.
36. Green JG, McLaughlin KA, Berglund PA, Gruber MJ, Sampson NA, Zaslavsky AM, et al. Childhood adversities and adult psychiatric disorders in the national comorbidity survey replication I: Associations with first onset of DSM-IV disorders. *Arch Gen Psychiatry.* 2010 Feb;67(2):113-23.
37. Dong M, Anda RF, Felitti VJ, Dube SR, Williamson DF, Thompson TJ, et al. The interrelatedness of multiple forms of childhood abuse, neglect, and household dysfunction. *Child Abuse Negl.* 2004 Jul;28(7):771-84.
38. Kalland M, Sinkkonen J, Gissler M, Merilainen J, Siimes MA. Maternal smoking behavior, background and neonatal health in finnish children subsequently placed in foster care. *Child Abuse Negl.* 2006 Sep;30(9):1037-47.
39. Needell B, Barth RP. Infants entering foster care compared to other infants using birth status indicators. *Child Abuse Negl.* 1998 Dec;22(12):1179-87.
40. Pears K, Fisher PA. Developmental, cognitive, and neuropsychological functioning in preschool-aged foster children: Associations with prior maltreatment and placement history. *J Dev Behav Pediatr.* 2005 Apr;26(2):112-22.

41. Ringeisen H, Casanueva C, Urato M, Cross T. Special health care needs among children in the child welfare system. *Pediatrics*. 2008 Jul;122(1):e232-41.
42. McNichol T, Tash C. Parental substance abuse and the development of children in family foster care. *Child Welfare*. 2001 Mar-Apr;80(2):239-56.
43. Shah CP. Psychiatric consultations in a child welfare agency. some facts and figures. *Can Psychiatr Assoc J*. 1974 Aug;19(4):393-7.
44. Swire MR, Kavalier F. The health status of foster children. *Child Welfare*. 1977 Dec;56(10):635-53.
45. Achenbach TM. The child behavior profile: I. boys aged 6–11. *J Consult Clin Psychol*. 1978;46(3):478-88.
46. Fanshel D, Finch SJ, Grundy JF. Modes of exit from foster family care and adjustment at time of departure of children with unstable life histories. *Child Welfare*. 1989 Jul-Aug;68(4):391-402.
47. Fanshel D, Shinn EB. *Children in foster care : A longitudinal investigation*. New York: Columbia University Press; 1977.
48. Achenbach TM, Howell CT, Quay HC, Conners CK. National survey of problems and competencies among four- to sixteen-year-olds: Parents' reports for normative and clinical samples. *Monogr Soc Res Child Dev*. 1991;56(3):1-131.
49. Clausen JM, Landsverk J, Ganger W, Chadwick D, Litrownik A. Mental health problems of children in foster care. *Journal of Child & Family Studies*. 1998 09;7(3):283-96.
50. Holtan A, Ronning JA, Handegard BH, Sourander A. A comparison of mental health problems in kinship and nonkinship foster care. *Eur Child Adolesc Psychiatry*. 2005 Jul;14(4):200-7.
51. Sawyer MG, Carbone JA, Searle AK, Robinson P. The mental health and wellbeing of children and adolescents in home-based foster care. *Med J Aust*. 2007 Feb 19;186(4):181-4.
52. Tarren-Sweeney M, Hazell P. Mental health of children in foster and kinship care in new south wales, australia. *J Paediatr Child Health*. 2006 Mar;42(3):89-97.
53. Pecora PJ, White CR, Jackson LJ, Wiggins T. Mental health of current and former recipients of foster care: A review of recent studies in the USA *Child & Family Social Work*. 2009;14(2):132-146.
54. Burge P. Prevalence of mental disorders and associated service variables among ontario children who are permanent wards. *Can J Psychiatry*. 2007 May;52(5):305-14.

55. Steele JS, Buchi KF. Medical and mental health of children entering the Utah foster care system. *Pediatrics*. 2008 Sep;122(3):e703-9.
56. McMillen JC, Zima BT, Scott LD, Jr, Auslander WF, Munson MR, Ollie MT, et al. Prevalence of psychiatric disorders among older youths in the foster care system. *J Am Acad Child Adolesc Psychiatry*. 2005 Jan;44(1):88-95.
57. Zima BT, Bussing R, Yang X, Belin TR. Help-seeking steps and service use for children in foster care. *J Behav Health Serv Res*. 2000 Aug;27(3):271-85.
58. dosReis S, Zito JM, Safer DJ, Soeken KL. Mental health services for youths in foster care and disabled youths. *Am J Public Health*. 2001 Jul;91(7):1094-9.
59. Harman JS, Childs GE, Kelleher KJ. Mental health care utilization and expenditures by children in foster care. *Arch Pediatr Adolesc Med*. 2000 Nov;154(11):1114-7.
60. Pilowsky DJ, Wu LT. Psychiatric symptoms and substance use disorders in a nationally representative sample of American adolescents involved with foster care. *J Adolesc Health*. 2006 Apr;38(4):351-8.
61. Dubner AE, Motta RW. Sexually and physically abused foster care children and posttraumatic stress disorder. *J Consult Clin Psychol*. 1999 Jun;67(3):367-73.
62. Biehal N. Reuniting children with their families: Reconsidering the evidence on timing, contact and outcomes *British Journal of Social Work*. 2006;37(5):807-823.
63. Wulczyn F. Family reunification. *The Future of Children*. 2004 Winter;14(1, Children, Families, and Foster Care):pp. 94-113.
64. Courtney ME. Reentry to foster care of children returned to their families. *Soc Serv Rev*. 1995 Jun.;69(2):pp. 226-241.
65. Wells K, Guo S. Reunification and reentry of foster children. *Children and Youth Services Review*. 1999 4;21(4):273-94.
66. Wulczyn F. Caseload dynamics and foster care reentry. *Soc Serv Rev*. 1991 Mar.;65(1):pp. 133-156.
67. Pecora P, Kessler R, Obrien K, White C, Williams J et al. *Educational and employment outcomes of adults formerly placed in foster care: Results from the northwest foster care alumni study Children and Youth Services Review*. 2006;28(12):1459-1481.
68. Sinclair I, Baker C, Wilson KaG, Ian. *Foster children : Where they go and how they get on*. London. GBR: Jessica Kingsley Publishers; 2005.
69. Jones L. The social and family correlates of successful reunification of children in foster care. *Children and Youth Services Review*. 1998 5;20(4):305-23.

70. Fuller TL. Child safety at reunification: A case-control study of maltreatment recurrence following return home from substitute care. *Children and Youth Services Review*. 2005 12;27(12):1293-306.
71. Taussig HN, Clyman RB, Landsverk J. Children who return home from foster care: A 6-year prospective study of behavioral health outcomes in adolescence. *Pediatrics*. 2001 Jul;108(1):E10.
72. Pecora PJ. Why current and former recipients of foster care need high quality mental health services *Adm Policy Ment Health*. 2010 Mar 14.
73. Minty B. Annotation: Outcomes in long-term foster family care. *J Child Psychol Psychiatry*. 1999 Oct;40(7):991-9.
74. Berrick JD. When children cannot remain home: Foster family care and kinship care. *Future Child*. 1998 Spring;8(1):72-87.
75. Pecora PJ, Oxford University Press. *What works in foster care?* 2009:320.
76. Luthar SS, Sexton CC. Maternal drug abuse versus maternal depression: Vulnerability and resilience among school-age and adolescent offspring. *Dev Psychopathol*. 2007 Winter;19(1):205-25.
77. McMahon TJ, Luthar SS. Defining characteristics and potential consequences of caretaking burden among children living in urban poverty. *Am J Orthopsychiatry*. 2007 Apr;77(2):267-81.
78. Richters JE, Martinez P. The NIMH community violence project: I. children as victims of and witnesses to violence. *Psychiatry*. 1993 Feb;56(1):7-21.
79. Martinez P, Richters JE. The NIMH community violence project: II. children's distress symptoms associated with violence exposure. *Psychiatry*. 1993 Feb;56(1):22-35.
80. Lawrence CR, Carlson EA, Egeland B. The impact of foster care on development. *Dev Psychopathol*. 2006 Win;18(1):57-76.
81. Ho DE, Imai K, King G, Stuart EA. Matching as nonparametric preprocessing for reducing model dependence in parametric causal inference *Political Analysis*. 2006;15(3):199-236.
82. Robins LN, Helzer JE, Croughan J, Ratcliff KS. National institute of mental health diagnostic interview schedule. its history, characteristics, and validity. *Arch Gen Psychiatry*. 1981 Apr;38(4):381-9.
83. American Psychiatric Association, American Psychiatric Association. Task Force on DSM-IV. *Diagnostic and statistical manual of mental disorders : DSM-IV. 4th ed.* Washington, DC: American Psychiatric Association; 1994.

84. Shaffer D, Fisher P, Lucas CP, Dulcan MK, Schwab-Stone ME. NIMH diagnostic interview schedule for children version IV (NIMH DISC-IV): Description, differences from previous versions, and reliability of some common diagnoses. *Journal of the American Academy of Child & Adolescent Psychiatry*. 2000 1;39(1):28-38.
85. Reynolds CR, Kamphaus RW. *The clinician's guide to the behavior assessment system for children (BASC)*. The Guilford Press.
86. Doyle A, Ostrander R, Skare S, Crosby RD, August GJ. Convergent and criterion-related validity of the behavior assessment system for children-parent rating scale *J Clin Child Psychol*. 1997 Sep;26(3):276-84.
87. Flanagan R. A review of the behavior assessment system for children (BASC): Assessment consistent with the requirements of the individuals with disabilities education act (IDEA). *J School Psychol*. 1995 0;33(2):177-86.
88. Kovacs M. The children's depression, inventory (CDI). *Psychopharmacol Bull*. 1985;21(4):995-8.
89. Smucker MR, Craighead WE, Craighead LW, Green BJ. Normative and reliability data for the children's depression inventory. *J Abnorm Child Psychol*. 1986;14(1):25-39.