

Predictors of Reduction in Symptoms of Depression for Children and Adolescents in Foster Care

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Abstract Children and adolescents in the foster care system have less favorable mental health outcomes than those in the general population. Within this system, depression is one of the most commonly diagnosed disorders, with prevalence rates up to three times that of same-aged peers, and is associated with long-term negative outcomes such as greater substance use, suicidality, and psychiatric hospitalization. The elevated rate of depression in children and adolescents in foster care and increased risk of adverse outcomes over time highlight the importance of identifying factors that promote reduction of symptoms of depression in this population. Using Optimal Data Analysis, this study examines the moderating effect of ecological systems variables, as measured by the Child and Adolescent Needs and Strengths-Mental Health, on decreases in depressive symptomatology in a sample of 228 foster care youth between the ages of 4 and 20. Results revealed positive change in adjustment to trauma (i.e., symptoms of Post-Traumatic Stress Disorder) as the optimal predictor of reduction of symptoms of depression. Positive change in family functioning, total youth strengths, positive change in sexualized behavior, and positive change in school functioning emerged as additional predictors of reduction of depression. These results indicate that clinically significant decreases over time in symptoms of depression are associated with concurrent improvement in variables across the social ecologies of children and adolescents, including the individual youth, family, and school systems. Implications for service providers working with this population are discussed.

Keywords Foster care · Depression · Community-based care · Youth · Optimal Data Analysis

Introduction

Historically, children and adolescents served in the foster care system experience less favorable mental health outcomes compared to those in the general population (Anctil et al. 2007; Burns et al. 2004; Garland et al. 2001; Zima et al. 2000) and are up to eight times more likely to have a diagnosis of mental illness (Burns et al. 2004; Landsverk and Garland 1999). These figures are not surprising considering the traumatic experiences that lead youth to enter the child welfare system, such as abuse, neglect, and social instability. Unfortunately, once in the foster care system, many children continue to be exposed to traumatic stressors. Research suggests that multiple foster home placements, disruption of mental health and educational services, and the potential for abuse and neglect in the foster care system contribute to the increased vulnerability of this population to mental illness (Benedict et al. 1996; McMillen et al. 2005; Newton et al. 2000; Roberts 1993; Oswald et al. 2010; Skarbo et al. 2004).

Lifetime prevalence rates of mental illness in the foster care population suggest up to 80 % of youth have clinically significant psychological issues (Garland et al. 1996; Landsverk and Garland 1999; Pilowsky 1995), compared to 20 % of youth in community samples experiencing any disorder resulting in functional impairment (Costello et al. 1996; Shaffer et al. 1996). Depression is one of the most common disorders found in the foster care population across development (dos Reis et al. 2001; White et al. 2007). In a study comparing youth in foster care to those supported by Supplemental Security Income, dos Reis and

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colleagues (2001) found the prevalence of depression in the foster care group to be twice that found in the group receiving federal financial assistance (i.e., 15 % compared to 7 %). Another study of older youth in foster care found a 27 % lifetime prevalence rate for depression, three times greater than same-aged working class youth in the community (McMillen et al. 2005).

Researchers suggest that the increased prevalence rates of depression found in the foster care sample may be due to both genetic and environmental risk factors. Youth may inherit a potential genetic predisposition from biological parents (Munson and McMillen 2010). The loss of biological parents, extended family, and familiar community as a result of out-of-home placement may also contribute to the elevated rate of depression in the foster care population (Pecora et al. 2009). Additionally, challenges faced by children and adolescents while in the foster care system, such as placement changes, the stigma of being in foster care, and conflict in relationships with foster parents and siblings, may also influence the prevalence of depression in this group (Pecora et al. 2009).

Furthermore, environmental factors are responsible for foster care membership. Although youth enter foster care for a variety of reasons, a history of persistent maltreatment is currently the most common background for youth in a foster care placement (Oswald et al. 2010; Pecora et al. 2006). There is a strong history of research documenting the relationship between depression and child maltreatment (Bagley and Mallick 2000; Carlson et al. 2001; Johnson et al. 2002; McMillen et al. 2005; Nelson et al. 2002; Reinherz et al. 2003). Additionally, higher incidence of maltreatment both before entering and while in care is associated with greater depressive symptomatology (Salarzar et al. 2011).

Youth with depression in the foster care system are at risk of long-term negative outcomes. In general, depression in adolescence is associated with substance use, academic underachievement, employment difficulties, risky sexual behavior, and teenage pregnancy (Munson and McMillen 2010). Additionally, there is evidence of a positive relationship between depression and elevated substance use (Stevens et al. 2011) and hospitalization for suicide attempts and psychiatric symptoms (Vinnerljung et al. 2006).

Evidence that rates of depression are elevated in foster care samples and that these youth are at increased risk for negative long-term outcomes highlights the importance of establishing community-based service options for this group of youth. In 2002, the Illinois Department of Children and Family Services (DCFS) responded to the call to serve youth in the community by developing a statewide community-based program designed to provide multi-modal services to youth in the foster care system. Illinois' program is based on the System of Care (SOC) model,

which establishes the community as the centerpiece of the service system and promotes community-based placements as the treatment setting of choice (Stroul and Friedman 1986, 1996). SOC principles are delivered using the Wraparound approach, which uses existing community services and natural supports to provide family-centered and child-focused interventions that capitalize on youth strengths to create an individualized, community-based treatment program that is culturally competent and inter-agency coordinated (Burchard et al. 2002; Burchard et al. 1993; VanDenBerg and Grealish 1998).

Research has found positive mental health outcomes for Illinois' program, called "community SOC." One study reported modest positive change in outcome trajectories on a composite measure of clinical severity (Sieracki et al. 2008), and another stated that the SOC program successfully reduces placement disruption in foster care youth (McClelland and Schneider 2009). However, the limitation of the extant literature is that outcomes were studied using main effects predictors and failed to examine whether outcome effects were moderated by other ecological systems variables (e.g., family functioning). Further, prior research has focused on composite measures of emotional and behavioral problems and has not examined youth outcomes by presenting problem to explore potentially unique predictors of outcomes for subgroups of youth. The current study addresses these gaps in the literature by examining the potential moderating effects of a range of ecological systems variables on decreases in depressive symptomatology in a sample of children and adolescents in foster care.

The statistical analysis methods employed by Optimal Data Analysis (ODA; Soltysik and Yarnold 1993; Yarnold and Soltysik 2005) are best suited for creating a model predicting clinically significant decreases in symptoms of depression and identifying specific subgroups of children and adolescents with depression in the current study. ODA is an exploratory, non-parametric data analysis method that maximizes the classification accuracy of the model created from the sample data. This approach is best suited to test multivariate interactions in this study, as ODA allows for the fit of an unlimited number of variables to be tested and selects those that provide the optimal predictive model. Traditional analyses, such as ANOVA and regression, require the establishment of a pre-described model and the selection of specific predictors to fit the model. ODA accommodates the inclusion of an unlimited number of predictor variables without interaction specifications and does so without increasing the chance of Type I error (Yarnold and Soltysik 2005). Without restrictions on the number of predictors included, ODA allows for a multitude of ecological system variables to be examined for involvement in mental health outcomes. Additionally, ODA identifies moderators and creates subgroups within the model,

revealing variables that have a predictive effect for different subgroups of children and adolescents. The methodology of ODA creates a model that specifies the strongest predictors of decrease in symptoms of depression for each subgroup of the overall sample (Yarnold and Soltysik 2005).

In this study we used a longitudinal approach to investigate the clinical characteristics and environmental and service delivery variables associated with clinically significant reduction in symptoms of depression in a sample of children and adolescents in foster care receiving community-based services. We aimed to detect the differences between the ecological systems factors found to predict outcome in children and adolescents who experienced clinically significant reduction in depression and those that did not in an effort to identify targets for intervention for children and adolescents with depression in the foster care system.

Based on the existing literature with this clinical population (e.g., Birmaher et al. 2002; Hammen and Rudolph 2003), a range of variables across the social ecological systems of children and adolescents in foster care are suggested to predict outcome. However, it is important to note that overwhelming majority of variables studied in the child and adolescent depression literature have been main effects variables. There is very little guidance offered in the literature as to what will emerge from an exploratory statistical analysis designed specifically to identify highly distinct moderations. Therefore, the following hypotheses apply to univariate ODA analyses, and not the final multivariate model. With this in mind, based on a review of the available literature and how the findings are best mapped onto Child and Adolescent Needs and Strengths-Mental Health (CANS-MH; Lyons 1999) variables, the measurement tool used in this study, the following factors are proposed to predict reduction of depression for children and adolescents in foster care: male sex, low temporal consistency of problems, high interpersonal strengths, high well-being, and/or positive family functioning.

Method

Participants

The subsample used for this study consisted of 228 children and adolescents in foster care referred to community-based SOC treatment who were rated by their caseworker team as exhibiting significant depressive symptoms (i.e., a 2 or 3 on the CANS-MH depression item); this group was taken from a larger sample of 503 children and adolescents in foster care. The data collection period was between September 1999 and December 2005. The sample ranged from four to 20 years of age, with a mean age of

11.79 years old ($SD = 3.99$), and 56.6 % of the sample was female. Services were retrieved from 21 distinct agencies with episodes of care averaging 304.44 days ($SD = 110.58$). The race/ethnicity of the sample was as follows: 71 % African American, 21 % European American, 4 % Latino/a, and 3 % Asian American.

Materials

Child and adolescent outcomes were evaluated using the 44-item version of the CANS-MH (Lyons 1999). This assessment tool was developed to guide service delivery for children and adolescents with emotional and behavioral healthcare needs. The CANS-MH instrument assesses the needs and strengths of a child or adolescent across multiple domains and is used as an assessment, decision-support, and outcome measure instrument (State of Illinois Department of Child and Family Services 2009). It has been shown to be a reliable and valid assessment tool at the item-level (Anderson et al. 2002; Lyons 1999; Lyons 2004) and its items are sensitive to change after three months (Lyons et al. 2004). The CANS-MH was designed to give a profile of the needs and strengths of the child/adolescent and family (Lyons 1999).

The CANS-MH consists of 44 items across six factors: symptoms, risk behaviors, functioning, care intensity and organization, caregiver needs and strengths, and youth strengths. Severity ratings are reported along a four-point Likert scale from 0 to 3. Across all needs items, a score of 0 indicates no evidence or reason to believe that the rated item requires action; a 1 indicates a need for “watchful waiting,” monitoring or possibly preventative action; a 2 indicates a need for action and the implementation of strategies to address the problem or need; and a 3 indicates a need for immediate or intensive action and identifies an immediate safety concern or a priority for investigation. A score of a 2 or 3 on a clinical needs item is consistent with a DSM diagnosis (Lyons et al. 2004). For strength items, a 0 indicates a centerpiece strength, a 1 represents a strength that can be used in treatment planning, a 2 indicates an identified strength in need of bolstering, and a 3 represents the absence of that particular strength. As an outcome measurement instrument, as used in this study, CANS-MH items initially rated a 2 or 3 are monitored over time to determine the percent of children and adolescents who move to a rating of 0 or 1, indicating a resolved need or built strength (Lyons 1999).

According to the DCFS protocol, the CANS-MH is completed by a DCFS community-based SOC worker and the child or adolescent’s Child and Family Team when the client is accepted into the program (State of Illinois Department of Child and Family Services 2009). The CANS-MH is also given at regular intervals throughout

each client's placement—every six months of receiving SOC services, after the Individual Plan of Care (IPC) for the client has been updated or renewed, and at discharge from the program. It is expected that all Illinois DCFS staff be competent in administering the CANS-MH. A CANS-MH training course is offered by Northwestern University. Each SOC service provider is expected to send at least one staff member to receive training to become a CANS-MH Certified Trainer. In order to become a Certified Trainer, trainees must achieve a competency of 80 % correct on two test vignettes, which corresponds to a Kappa value of over 0.75. The remaining staff is then trained by the Certified Trainer in administration of the CANS-MH, and must achieve a reliability of 80 % correct on the two test vignettes. Chart reviews are regularly conducted throughout the year to ensure that reliability remains high.

The 228 children and adolescents who were selected for this study out of the larger sample of 503 youth in foster care receiving SOC services obtained a rating of a 2 or 3 on the CANS-MH depression item, consistent with a DSM diagnosis (Lyons et al. 2004) and indicating clinically significant symptom severity and need for action by the treatment team in this domain. The depression variable was selected because of its prevalence in the foster care population, supported by the fact that it was the diagnosis-anchored presentation problem with the highest mean at Time 1 in the overall sample.

Statistical procedure

In order to create a prediction model for clinical reduction in symptoms of depression for children and adolescents in foster care, ODA was used (Soltysik and Yarnold 1993; Yarnold and Soltysik 2005). ODA is an exploratory data analysis method that works to maximize the accuracy of the model created from the sample data. For the present study, the selection of the best predictors of reduction of depression for children and adolescents in foster care was conducted with the aid of ODA software for Windows. All individual CANS-MH variables were entered into the analyses. Additionally, difference scores were computed by subtracting Time 1 CANS-MH scores from the CANS-MH scores from the final time point available and entered into the analyses to account for change in each individual variable over time in foster care. Children and adolescents in foster care exhibiting clinically significant symptoms of depression (i.e., a score of a 2 or 3 on the CANS-MH depression item) at admission to community-based SOC treatment were used as the sample for the analysis. The ODA analysis will reveal those factors that significantly predict decreases in depressive symptomatology (i.e., a score of 0 or 1 on the CANS-MH depression item at discharge; no longer qualify for a DSM diagnosis of

depression) and those that predict no improvement or an increase in symptoms (i.e., a score of a 2 or 3 on the CANS-MH depression item at discharge; continue to qualify for a DSM diagnosis of depression).

Optimal Data Analysis techniques allow for the identification of both main effects and interactions. Main effects are tested using univariate ODA (UniODA; Yarnold and Soltysik 2005). First, UniODA is performed for each variable of the CANS-MH as well as composite problem presentation, risk behaviors, functioning, care intensity and organization, caregiver needs and strengths, and youth strengths, revealing the variables that significantly predict reduction of symptoms of depression in foster care youth. Use of the leave-one-out (LOO) approach insures the stability and generalizability of the predictive model. After identifying those variables with a significant main effect, a Classification Tree Analysis (CTA) is performed to provide information about other variables that interact with the variables with significant main effects in predicting decreases in depression. Only those variables that are LOO stable are allowed to enter into the CTA.

The optimal predictors, those variables with the greatest effect strength, were selected for the CTA. ODA analyses provide a decision rule that divides the sample into subgroups. Once the sample has been partitioned, ODA is again performed with all of the original variables, but this time only for those members of the particular subgroup. For example, if sex is determined to be the optimal predictor of reduction in symptoms of depression for children and adolescents in foster care, the second ODA selects one group, males or females, and determines the greatest main effect for that subgroup, further dividing the original sample. This process continues, forming “branches” of the CTA, until the sample can no longer be subdivided (Yarnold and Soltysik 2005). ODA is then conducted on each branch of the ODA tree until it cannot be partitioned further. Significance is determined using the Dunn and Sidak adjusted per-comparison p values (Yarnold and Soltysik 2004) for an experiment-wise alpha of 0.05. This procedure determines the adjusted Type I error rate according to the number of contrasts conducted in the multivariate classification trees.

Results

Descriptive statistics

Descriptive statistics were computed for the sample of children and adolescents with clinically significant symptoms of depression (see Table 1). Overall, 228 children and adolescents were included in the analyses. The descriptive statistics for the CANS-MH composite scales (problem

Table 1 Descriptives and UniODA results for children and adolescents with symptoms of depression

Study variables	%	Time 1 M (SD)	Difference score M (SD)	ODA Time 1 predictors (p value)	ODA difference score predictors (p value)
Age		11.79 (3.99)	–	<0.001***	–
Sex (Female)	56.6			1.000 ^α	
Treatment days		304.44 (110.58)		0.131	
Problem presentation domain		8.57 (2.97)	–	1.00 ^α	–
Psychosis		0.29 (0.57)	0.06 (0.45)	0.090	0.933 ^α
Attention problems		1.19 (0.94)	0.15 (0.73)	0.047*	<0.001 ^α
Depression		2.09 (0.28)	0.51 (0.66)	0.264	<0.001***
Oppositional behavior		1.43 (0.83)	0.23 (0.88)	0.068	<0.001***
Antisocial behavior		0.72 (0.77)	0.15 (0.67)	0.184	0.018*
Substance abuse		0.31 (0.66)	0.00 (0.50)	0.008**	0.026*
Adjustment to trauma		1.74 (0.76)	0.35 (0.76)	0.190	<0.001***
Attachment		1.13 (0.76)	0.24 (0.72)	0.070	0.001**
Situational consistency		1.39 (0.82)	0.22 (0.81)	0.151	0.009**
Temporal consistency		1.69 (0.97)	0.21 (0.84)	0.014*	0.013*
Risk behaviors domain		3.55 (2.40)	–	0.472 ^α	–
Danger to self		0.54 (0.68)	0.05 (0.64)	0.019*	0.001**
Danger to others		0.98 (0.86)	–	0.002**	–
Elopement		0.48 (0.80)	0.03 (0.73)	0.002**	<0.001***
Sexually abusive behavior		0.29 (0.61)	0.04 (0.56)	0.290	0.105
Social behavior		0.96 (0.86)	0.19 (0.77)	0.171	<0.001***
Crime/delinquency		0.39 (0.68)	0.01 (0.62)	0.038*	0.035*
Functioning domain		3.96 (1.86)	–	0.013*	–
Intellectual functioning		0.43 (0.63)	–0.03 (0.51)	0.221	0.072
Physical functioning		0.39 (0.71)	0.05 (0.59)	<0.001 ^α	0.204
Family functioning		1.68 (0.93)	0.22 (0.85)	0.131	<0.001***
School functioning		1.45 (0.97)	0.26 (0.97)	0.016*	<0.001***
Sexual development		0.49 (0.74)	0.05 (0.68)	0.334	0.056
Care intensity and organization domain		3.86 (2.07)	–	0.007**	–
Monitoring		0.84 (0.88)	0.12 (0.78)	0.013*	<0.001***
Treatment		1.25 (0.89)	0.16 (0.90)	0.191	<0.001***
Transportation		0.59 (0.64)	0.06 (0.64)	0.060	0.001**
Service permanence		1.26 (1.06)	0.18 (1.06)	0.317	0.045*
Caregiver needs and strengths domain		3.39 (3.16)	–	0.091 ^α	–
Behavioral health		0.30 (0.56)	–0.05 (0.56)	0.246	0.651 ^α
Supervision		0.37 (0.63)	–0.07 (0.70)	0.108	0.001**
Involvement with care		0.55 (0.69)	–0.04 (0.75)	0.052	0.007**
Knowledge		0.77 (0.74)	0.06 (0.75)	0.094	0.006**
Organization		0.31 (0.58)	–0.09 (0.65)	0.003**	0.057
Resources		0.67 (0.75)	0.08 (0.75)	0.053	0.182
Residential stability		0.12 (0.39)	–0.05 (0.46)	0.119	0.060
Safety		0.29 (0.55)	–0.01 (0.56)	0.131	1.000 ^α
Youth strengths domain		12.66 (4.57)	–	0.016*	–
Family strengths		1.33 (0.90)	0.06 (0.78)	0.085	0.001**
Interpersonal strengths		1.31 (0.79)	0.18 (0.82)	0.182	<0.001***
Relationship permanence		1.54 (0.86)	0.26 (0.77)	0.079	0.001**
Educational strengths		1.19 (0.87)	0.17 (0.84)	0.007**	0.001**
Vocational strengths		1.58 (0.97)	0.27 (0.75)	0.087	0.146

Table 1 continued

Study variables	%	Time 1 M (SD)	Difference score M (SD)	ODA Time 1 predictors (<i>p</i> value)	ODA difference score predictors (<i>p</i> value)
Well-being		1.71 (0.66)	0.30 (0.77)	0.324	<0.001***
Spiritual strengths		1.01 (0.92)	0.09 (0.73)	0.015*	0.925 ^α
Talents		1.27 (0.86)	0.19 (0.75)	0.028*	0.004**
Inclusion		1.27 (0.83)	0.20 (0.76)	0.116	<0.001***

The leave-one-out (LOO) approach insures the stability of the predictive model. CANS variables at Time 1 and difference scores between Time 2 and Time 1 entered into the ODA model as predictors of change in the CANS depression variable. Dashes indicate that the data was not computed. Severity ratings of CANS-MH items are reported along a four-point Likert scale from 0 to 3. Across all needs items, a score of 0 indicates no evidence or reason to believe that the rated item requires action; a 1 indicates a need for “watchful waiting,” monitoring or possibly preventative action; a 2 indicates a need for action and the implementation of strategies to address the problem or need; and a 3 indicates a need for immediate or intensive action and identifies an immediate safety concern or a priority for investigation. For strength items, a 0 indicates a centerpiece strength, a 1 represents a strength that can be used in treatment planning, a 2 indicates an identified strength in need of bolstering, and a 3 represents the absence of that particular strength

^α Variable was not LOO stable and, therefore, was not eligible to be entered into the overall classification tree model

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

presentation, risk behavior, functioning, care intensity and organization, caregiver needs and strengths, youth strengths) suggest that this sample’s needs and strengths are consistent with other samples of children and adolescents in foster care served in community settings (Lyons 2004). However, the individual CANS items comprising the various composite scales varied in their rated severity (see Table 1). For example, examining items from the problem presentation scale, depression ($M = 2.09$, $SD = 0.28$) and adjustment to trauma ($M = 1.74$, $SD = 0.76$) were the highest rated items, with average scores in the moderate range of impairment across youth (i.e., a 2 rating on the CANS-MH item). These results are intuitive given that this sample was chosen due to their score on the depression item of the CANS-MH and that the sample is composed of children and adolescents in the foster care system, where symptoms of post-traumatic stress as a result of a history of abuse and neglect are prevalent.

Regarding functioning challenges, impairment in family functioning ($M = 1.68$, $SD = 0.93$) had the highest mean in the sample, reaching the moderate range of impairment. This is consistent with a sample of children and adolescents who were referred to services due to being at-risk for stepping up to higher levels of care. In terms of youth strengths, means were highest across the sample for deficits in well-being ($M = 1.71$, $SD = 0.66$), vocational strengths ($M = 1.58$, $SD = 0.97$), and relationship permanence ($M = 1.54$, $SD = 0.86$). All of these items fell in the moderate range of impairment. A lack of sense of well-being may be a psychological consequence of the trauma of being in the foster care system. Impairments in relationship permanence are an intuitive result of being in the foster care system due to the fact that children are not only removed from their biological parents, but also often

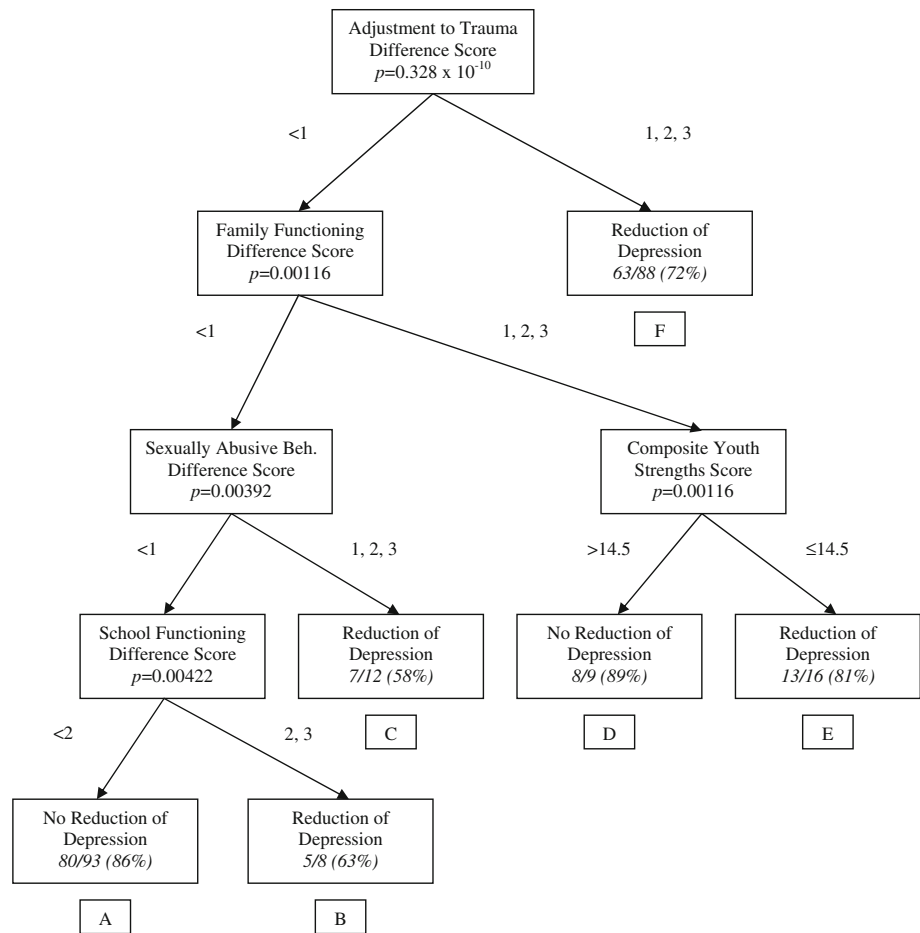
experience multiple placements while within the system. In terms of vocational strengths, this sample had an average age of about 12 years old, so it is unlikely that this group developed vocational skills at this point. None of the items in the risk behaviors, care intensity and organization, and caregiver strengths domains reached the moderate range of impairment.

ODA results

Univariate ODA analyses were used to determine the optimal predictors of reduction of depression. The identified optimal predictors established subgroups of children and adolescents predicted to experience reduction and those not predicted to experience symptom reduction. Multivariate classification trees were created, first for the reduction group and then for the no-reduction group, by using UniODA analyses for subsequent predictor variables, controlling for the optimal predictor, until variables no longer significantly predicted decrease. Many variables emerged as having high classification accuracy, both in the initial UniODA and in subsequent analyses; however, a strategy was developed where all possible classification trees were created and that with the best overall classification accuracy was retained.

Figure 1 depicts the final ODA classification tree model for children and adolescents with clinically significant depression at Time 1. Each rectangle signifies a decision point, and arrows represent pathways of prediction. *P* values for each decision point are listed within the rectangles to show significance. The fractions and percentages included within the rectangles represent the number of correctly predicted individuals and the total number included in that category at that particular endpoint. The

Fig. 1 Predictors of outcome in a sample of children and adolescents with clinically significant symptoms of depression: Optimal Data Analysis (ODA) results



numbers listed next to the prediction pathway arrows specify the cutoff values for designation into classification categories. Dunn and Sidak adjusted per-comparison p values (Yarnold and Soltysik 2004) were used to decrease Type I error. Only those decision points that met the Dunn and Sidak criteria were included.

According to results of the initial UniODA analysis, Time 1 clinical and strengths variables across a number of social ecological domains including the problem presentation domain (e.g., attention problems), risk behaviors domain (e.g., elopement, danger to self), functioning domain (e.g., school functioning), care intensity and organization domain (e.g., monitoring and organization), and youth strengths domain (e.g., educational strengths, talents) were significant predictors of reduction of symptoms of depression (see Table 1). Age at Time 1 also emerged as a significant predictor, as well as several difference score variables from the problem presentation domain (e.g., oppositional behavior, adjustment to trauma), functioning domain (e.g., family functioning, school functioning), and youth strengths domain (e.g., interpersonal strengths, well-being). Difference scores tended to be stronger predictors of reduction of depression

than Time 1 scores. UniODA results found change in adjustment to trauma from Time 1 to termination (or the last data point available) to be the strongest predictor of reduction of symptoms of depression on the CANS-MH. Children and adolescents who showed no change or negative change in their adjustment to trauma (difference less than one) score were more likely to not demonstrate reduction of symptoms of depression, while those who reported positive change in their adjustment to trauma score (difference of one, two, or three) were significantly more likely to experience reduction of symptoms of depression.

Classification tree analysis

Adjustment to trauma difference score was entered as the first variable in the multivariate analysis because it came out as the optimal predictor in the overall UniODA analysis (see Fig. 1). Subsamples of children and adolescents were formed; those with a positive change in adjustment to trauma (difference of one, two, or three) formed the predicted reduction group (labeled group F on the right side of the tree), and those with an adjustment to trauma difference

less than one comprised the subgroup predicted to remain clinically depressed. Additional UniODA analyses were conducted for both subgroups to identify variables that further divided the groups. For the predicted reduction group, an additional variable that significantly predicted reduction did not emerge; therefore, further analyses were not conducted. Positive change in adjustment to trauma score predicted reduction with 72 % accuracy.

For the subgroup predicted to remain clinically depressed (the left side of the tree), change in family functioning came out as the next best predictor of reduction of depression and, therefore, was entered next into the multivariate analysis. Subgroups were established, children and adolescents with a positive change in family functioning (difference of one, two, or three) comprising the predicted reduction group and those with a difference of less than one in the group predicted not to remit. Subsequent UniODA analyses revealed additional significant predictors for both groups. For the predicted reduction subgroup, composite strengths score came out as the next best predictor of reduction of depression and was entered into the multivariate analysis. Two subgroups were formed; children and adolescents whose composite strengths score was greater than 14.5 (predicted to remain clinically depressed) and those with composite strengths scores less than or equal to 14.5 (predicted to experience symptom reduction). It is important to note that for strengths variables, a higher score is indicative of a greater deficit in strengths. No additional variables emerged for either group in subsequent UniODA analyses. Clinically significant reduction in symptoms of depression was accurately predicted in 81 % of the cases for those children and adolescents with a composite strengths score less than 14.5 (labeled group E) and remaining clinically depressed was accurately predicted for 89 % of those in the subgroup comprised of children and adolescents with composite strengths scores above 14.5 (labeled group D).

For those children and adolescents with a family functioning difference score of less than one, an additional UniODA analysis revealed change in sexually abusive behavior to be the next best predictor of reduction of depression in this group. Children and adolescents with positive change in sexually abusive behavior (difference of one, two, or three) formed the subgroup predicted to experience symptom reduction, and those with a difference score less than one were predicted to remain clinically depressed. UniODA analysis on the predicted reduction group did not reveal any additional variables that significantly predicted reduction of depression. Clinically significant reduction was accurately predicted for 58 % of the children and adolescents in this subgroup (labeled group C). Change in school functioning came out of an additional UniODA analysis as significantly predicting reduction of depression for the group with no change or negative change in sexually abusive

behavior. Again, subgroups were created with the addition of this variable to the multivariate analysis. Children and adolescents with a school functioning difference score of two or three comprised the predicted reduction subgroup and those with a difference score of less than two formed the group predicted to not experience symptom reduction. Additional UniODA analyses performed for both subgroups did not reveal additional variables that significantly predicted symptom reduction or failure to experience symptom reduction. Clinically significant reduction of symptoms of depression on the CANS was predicted with 63 % accuracy for those with a school functioning difference score of two or three (labeled group B), and remaining clinically depressed was predicted accurately for 86 % of those with a family functioning difference score of less than two (labeled group A).

Classification performance statistics were calculated for the overall CTA model for depression, as well as for the separate reduction and no reduction groups (see Table 2). The full classification tree was predicted with 77.2 % accuracy. The mean sensitivity for the overall model of depression was 81.5 %, with a sensitivity of 88.6 % for the reduction group and 74.3 % for the no-reduction group. The mean overall specificity was 77.8 % for the full CTA model, with a specificity of 84.6 % in the reduction group and 71.0 % in the group that remained clinically depressed. The overall classification tree predicted reduction 54.4 % above chance, which is considered a “strong” effect strength according to parameters set forth by Yarnold and Soltysik (2005). Additionally, bivariate correlations between depression and the variables that emerged as significant predictors of clinically significant reduction of symptoms of depression—adjustment to trauma, composite youth strengths, family functioning, school functioning, and sexually abusive behavior—were low (i.e., 0.23 and below), suggesting low construct overlap.

Discussion

Clinically significant reduction of depression was achieved in 46 % of the sample of children and adolescents in foster care who exhibited depression at Time 1. Children and adolescents in this group initially rated a 2 or 3 and moved to a rating of 0 or 1, indicating a resolved need, and would no longer qualify for a DSM diagnosis of depression (Lyons 1999; Lyons et al. 2004). This rate is within the range of remission rates (from 37 to 65 %) reported for randomized clinical trials of antidepressants and cognitive behavioral therapy in the literature for children and adolescents with moderate to severe depression (see Kennard et al. 2006). Change in adjustment to trauma emerged as the optimal predictor of reduction of depression in the UniODA

Table 2 Classification performance summary for the classification tree model of reduction vs. no reduction of depression (N = 228)

Performance index	Performance parameter	Effect strength (%)
Overall classification accuracy	176/228 (77.2 %)	54.4
Sensitivity (reduction)	124/140 (88.6 %)	77.2
Sensitivity (no reduction)	104/140 (74.3 %)	48.6
Mean sensitivity across classes	81.5 %	63.0
Specificity (reduction)	88/104 (84.6 %)	69.2
Specificity (no reduction)	88/124 (71.0 %)	42.0
Mean specificity across classes	77.8 %	56.6
Mean performance across classes	79.7 %	59.4

Overall cross-classification table

	Predicted status	
	No reduction	Reduction
Actual status		
No reduction	88	36
Reduction	16	88

Overall classification accuracy is the percentage of the total sample that is correctly classified by the overall tree model. Sensitivity is a predictive indicator of the percentage of the predicted classifications into a given category that were correct. Specificity is a descriptive index of the percentage of the actual members of a given category (i.e., those who experienced a reduction in their depression) that the classification tree correctly categorized. Effect strength is a standardized index of the performance of the model, defined as the percentage above chance that the model correctly predicts, on a 0-100 scale, where 0 is the performance expected by chance and 100 is perfect classification accuracy. The statistic is computed using the following formula: $[(1 - \{(100 - \text{model performance statistic}) / (100 / C)\}) \times 100 \%$, where C is the number of response categories for the class variable (Yarnold et al. 1997, p 1,454). Effect strengths of 25 % or less are considered weak, values between 25 and 50 % are considered moderate, and those above 50 % are considered strong (Yarnold and Soltysik 2005)

analysis. Within the overall model, variables across the social ecologies of children and adolescents, including factors within the individual child/adolescent, family, and school, emerged as significant predictors of reduction in symptoms of depression. These findings are supported by longitudinal studies identifying family system variables of support and conflict (Bond et al. 2001; Lewinsohn et al. 1998), the school system variable of academic achievement (Lewinsohn et al. 1998), and the individual child/adolescent experience of adverse life events (Cicchetti and Toth 1998) as precursors of depression.

Four typologies of depression emerged from the multivariate classification trees. For a subgroup of children and adolescents, reduction of depression was associated with change in adjustment to trauma (see endpoint F, Fig. 1). Research supports the relationship between trauma and depression, linking exposure to trauma with higher rates of

depression in adolescence (Lewis et al. 2010). As previously stated, the experience of trauma is ubiquitous in the foster care system, from entry into care to child and adolescent experiences while in care (Benedict et al. 1996; Newton et al. 2000; Roberts 1993; Skarbo et al. 2004). The association between trauma and depression and the prevalence of trauma in the foster care population supports the finding that adjustment to trauma is the best predictor of reduction of depression in this population. Additionally, research has found that the experience of being victimized makes an independent contribution to depressive symptomatology, above and beyond that accounted for by comorbid Post-Traumatic Stress Disorder (PTSD), suggesting that the association is due to more than diagnostic overlap (Boney-McCoy and Finkelhor 1996). According to the learned helplessness theory of depression (Abramson et al. 1978), the onset and maintenance of symptoms of depression are the result of an interaction between an external locus of control and a negative event, such as trauma. Those with an external locus of control believe that they lack control over the outcome of events in their lives, resulting in a negative attributional style and leaving them more vulnerable to experience depression. The finding that, for a subgroup of children and adolescents, reduction of depression is associated with concurrent improvement in symptoms of PTSD supports this diathesis-stress model of depression as well as the use of a cognitive approach, such as Trauma-Focused Cognitive Behavioral Therapy (TF-CBT; Cohen et al. 2006), with this subgroup of children and adolescents in order to address dysfunctional beliefs and attributions.

Change in family functioning score emerged as the next best predictor of reduction of symptoms of depression for those children and adolescents who exhibited no change or negative change in their adjustment to trauma score (see endpoint E, Fig. 1). However, the subsample of children and adolescents in this branch of the classification tree could be further classified with the composite youth strengths score at Time 1. Therefore, for this subsample, both an improvement in family functioning over the course of treatment in combination with strengths at the beginning of care were necessary to be associated with reduction in depressive symptoms. These findings suggest a family environment subtype of depression. The associated Time 1 strengths component may support the behavioral model of unipolar depression (Lewinsohn et al. 1979). The model proposes that depression results from a stressor, which for this subtype may be the result of stress associated with family dysfunction, that leads to the disruption of normal behavior patterns, resulting in a reduction of positive reinforcement. This negative reinforcement pattern leads to self-criticism and behavioral withdrawal that are socially reinforced by the child or adolescent's family through negative feedback and enabling (Antonuccio 1998). It may

be that the children and adolescents in this subsample who experienced reduction of depression did so because the treatment was able to improve family functioning and engage the child/adolescent's strengths to disrupt the pattern of withdrawal. Taken together, these findings may support the use of a family systems approach in treating children and adolescents with this subtype of depression, with the a goal of helping the family work through dysfunctional patterns of relating so that family members can orient more attention to the child or adolescent's strengths in order to break negative behavioral patterns.

For children and adolescents who reported no change or negative change in adjustment to trauma score and no change or negative change in family functioning, change in sexually abusive behavior emerged as a secondary variable associated with reduction of depression (see endpoint C, Fig. 1). Depression may be related to experience of trauma that resulted in the sexualized behavior problems of this subgroup. Sexualized behavior is considered to be a primary indicator of a history of sexual abuse; however, sexual behavior problems have been found in children and adolescents with physical abuse histories as well as those without histories of abuse (Kendall-Tackett et al. 1993). The sexually abusive behavior of youth without abuse histories is suggested to be a part of more global disruptive behavior patterns [Association for the Treatment of Sexual Abusers (ATSA) 2006]. For children and adolescents with abuse histories, this subgroup may not have experienced many of the classic symptoms of PTSD and, instead, act out their abuse as an attempt to process their experience (Coleman 2009). The Traumagenic Dynamics Model of child sexual abuse (Finkelhor and Browne 1985) proposes that rather than manifest traditional symptoms of PTSD, some children experience change in their cognitive and/or emotional attributional style as a result of sexual abuse (Finkelhor 1987). According to the model, these changes may result in four dynamics: traumatic sexualization, betrayal, stigmatization, and powerlessness. This subgroup may be responding to an experience of sexual abuse through traumatic sexualization, with symptoms of depression the result of the dynamics of betrayal, stigmatization, and powerlessness. Reduction of depression is associated with concurrent improvement in sexual behavior problems in this subgroup. Treatment efficacy trials have shown that outcomes vary depending on whether or not sexualized behavior is the result of trauma or generalized disruptive behavior, emphasizing the need for the assessment of trauma history. Children and adolescents whose sexualized behavior is primarily the result of a history of traumatic stress are best served by TF-CBT infused with sexual behavior problem components to bring about the needed changes in home environment, supervision, and self-control skills (ATSA 2006). Alternatively, sexual

behavior problems may be a part of a more pervasive disruptive behavior pattern. The experience of depression in this subgroup may related to shame-proneness, which has been found to be associated with an increased expression of both anger and aggression (Bennett et al. 2005) and sadness and internalizing problems (Stuewig and McCloskey 2005) in children and adolescents. For this group a behavioral treatment approach should be used with added components specific to sexual behavior problems (ATSA 2006). Regardless of the impetus of such behavior, these results suggest that sexualized behavior be considered and addressed in the treatment of children and adolescents with this subtype of depression.

Finally, a school environment typology of depression was identified from the multivariate analyses (see endpoint B, Fig. 1). Change in school functioning emerged as the final significant predictor of reduction for those children and adolescents who experienced no change or negative change in adjustment to trauma score, had no change or negative change in family functioning score, and experienced no change or negative change in sexually abusive behavior. The depression experienced by this subgroup may be the result of negative self-evaluation due to impaired academic functioning. Alternatively, symptoms of depression may be driving their impaired academic functioning. Depression is associated with a loss of motivation and disruptions in thinking and concentration, which may impair school performance, and diagnostic criteria require symptoms to interfere with functioning across domains, including academic (American Psychiatric Association 2000). Reduction of depression for this subgroup is linked to simultaneous improvement in school functioning. Regardless of the causality, treatment of depression for this subgroup of children and adolescents should focus on bolstering school functioning and self-concept regarding academic performance.

Though the present study extends the current literature by examining predictors of outcomes specific to a particular symptom domain (i.e., depression) and identifies interaction effects among various ecological systems variables, it has several limitations. Most important among these is the use of the CANS-MH to measure predictor and outcome variables. Though the CANS-MH has demonstrated both reliability and validity in the assessment of children and adolescents in foster care, it is a single-informant measure, completed by caseworkers. Despite the fact that the CANS-MH is intended to be a post-triangulation measure (see Obeid and Lyons 2011)—the informant is supposed to combine available information from multiple sources in completing the tool—it is completed by only one person and requires the informant to interpret the perspectives of others when reviewing other source information. Although provider agency did not emerge as a

predictor of remission status, the CANS-MH is subject to clinical judgment and thus to variation in assessment across raters. Thus, the use of the CANS-MH may not adequately capture the full picture of the clinical status and functioning of children and adolescents in a variety of domains and settings. Future research should include both parent and teacher reports to assess behavior across contexts, particularly since changes in family and school functioning emerged as significant predictors of outcomes for particular subgroups of children and adolescents with depression. Moreover, subsequent research should include child and adolescent self-reports. Because depression is marked by internalizing symptoms, children and adolescents may be more accurate reporters of symptoms of depression than caseworkers or other adults who have limited knowledge of their subjective experiences. An additional limitation of the CANS-MH stems from its reliance on a single item to assess each construct (e.g., depression, family functioning). Although there is evidence of unique variability in the individual items within the subscales of the CANS-MH (Miller et al. 2007), and some researchers advocate for the individual item approach as a way to describe clinical characteristics and monitor outcomes in detail (Lyons 2009), use of multi-item measures of each area assessed would increase reliability and validity of the results found in the present study. For instance, the use of a multi-item depression scale would allow for more nuanced assessment of child and adolescent clinical status and changes in specific symptoms. Also, the elevated prevalence rate of depression found in this sample may be the result of use of a single item to assess for symptoms of depression.

An additional limitation concerns the lack of knowledge regarding potential experiences of trauma among the children and adolescents in this sample. It is unclear whether or not individuals in the sample experienced trauma and, if so, what types of traumas occurred. A study by Lewis and colleagues (2010) of teens with a history of trauma and clinically significant symptoms of depression found that youths' responses to various treatment types (e.g., combined treatment, anti-depressants, cognitive-behavioral therapy) differed based on the type of trauma they experienced. These findings point to the importance of knowledge of the nature of trauma in aiding treatment planning. In the future, researchers should explore differences in outcome pathways for children and adolescents with different trauma histories, as interactions among outcome predictors may vary based on trauma type.

Furthermore, causality cannot be inferred using ODA. The results indicate that co-occurring changes in key variables predict symptom change. For example, it appears that for a subgroup of children and adolescents, reduction of depression is associated with concurrent improvement in adjustment to trauma. It is unclear, however, whether

adjustment to trauma precedes decreases in depressive symptoms or whether reduction of depression facilitates improved adjustment. Similarly, for some children and adolescents, changes in school or family functioning appear to be related to reduction of depression. However, the results cannot determine if change in school or family functioning causes changes in depression or if it is change in depressive symptoms that is responsible for altered functioning at school or within the family system. Knowledge of causality would make a major contribution to treatment planning and would indicate the most appropriate targets for intervention (e.g., individual youth, family system, or school environment). Future studies should use a longitudinal approach with several assessment points to monitor changes in the variables identified as predictors and clarify the timing of these changes relative to the occurrence of depression reduction. Additionally, ODA is limited to identifying moderating variables and does not provide any information regarding the processes or mechanisms through which positive outcomes occur. Future studies should explore the effects of potential process variables, such as attributional style, on clinical outcomes using a mediational model. Information on mediating variables would identify the key ingredients driving change and would inform the development of individualized treatment plans for children and adolescents. Lastly, this study sought to find targets for intervention and, therefore, focused on predictors of remission; however, there is a subgroup of children and adolescents who experience a worsening of symptoms of depression over the course of their time in foster care. Children and adolescents who did not qualify for a DSM diagnosis of depression at Time 1 are completely absent from this study. Future research should focus on this distinct group and identify predictive risk factors associated with increasing symptoms of depression in this population.

The present study extends the current foster care mental health outcomes literature base by going beyond a composite measure of clinical severity and by investigating predictors of reduction in a specific clinical presentation prevalent in this population, namely, depression. Additionally, this study moves beyond identifying main effects predictors of outcomes and explores moderators in reduction of depressive symptomatology for youth in foster care receiving community-based services. The multivariate classification trees created using ODA identified subgroups of children and adolescents for whom reductions in depression are associated with co-occurring changes in other variables. These results point to the heterogeneity of depression in this population of children and adolescents with complex needs and stressors and highlight the importance of conducting a thorough assessment of children and adolescents experiencing depression in foster care

as it cannot be assumed that their symptoms have similar causes or that a single approach to treatment will work for everyone. As previously discussed, these subgroups are conceptualized as different “typologies” of children and adolescents with depression, which have immediate clinical implications. Even when an individual’s membership in one of these four subgroups cannot be conclusively determined, the identified typologies can point clinicians to areas for further assessment in order to determine the most appropriate intervention targets and treatment approaches. For example, the typologies suggest that family functioning, PTSD symptoms, school functioning, and sexualized behavior are key areas that should be considered when assessing a child or adolescent with depression and developing a treatment plan.

In the future, a nomenclature around these typologies should be developed, and service providers should be trained on the classification system to allow for consistency in referring to and identifying these subgroups. Future research should explore group differences in the clinical and demographic characteristics of these different typologies at intake in order to promote early classification of children and adolescents and selection of appropriate treatments based on clinical presentation typology. Finally, the results of this study may inform the future direction of intervention research. For example, subjects with comorbid conditions historically have been ruled out of treatment studies; however, the results of this study suggest that comorbidity may be part of a typology that cannot be overlooked, as it plays an integral part in how the condition improves (e.g. trauma-typology of depression). Future intervention research should use the typologies presented here to develop inclusion criteria that allow for comorbidity and evaluate treatment effects for subgroups of children and adolescents, providing a more nuanced look at the effectiveness of interventions.

References

- Abramson, L. Y., Seligman, M. E., & Teasdale, J. D. (1978). Learned helplessness in humans: Critique and reformulation. *Journal of Abnormal Psychology, 87*, 49–74.
- American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders* (Vol. 4). DC: Washington.
- Ancil, T. M., McCubbin, L. D., O’Brien, K., & Pecora, P. (2007). An evaluation of recovery factors for foster care alumni with physical or psychiatric impairments: Predictors of psychological outcomes. *Children and Youth Services Review, 29*, 1021–1034.
- Anderson, R. L., Lyons, J. S., Giles, D. M., Price, J. A., & Estes, G. (2002). Examining the reliability of the child and adolescent needs and strengths-mental health (CANS-MH) scale from two perspectives: A comparison of clinical and research ratings. *Journal of Child and Family Studies, 12*, 279–289.
- Antonuccio, D. O. (1998). The coping with depression course: A behavioral treatment for depression. *The Clinical Psychologist, 51*, 3–5.
- Association for the Treatment of Sexual Abusers. (2006). Report of the task force on children with sexual behavior problems. Retrieved from <http://www.atsa.com/pubRpt.html>.
- Bagley, C., & Mallick, K. (2000). Prediction of sexual, emotional, and physical maltreatment and mental health outcomes in a longitudinal cohort of 290 adolescent women. *Child Maltreatment, 5*, 218–226.
- Benedict, M. I., Zuravin, S., Somerfield, M., & Brandt, D. (1996). The reported health and functioning of children maltreated while in family foster care. *Child Abuse and Neglect, 20*, 561–571.
- Bennett, D. S., Wolan Sullivan, M., & Lewis, M. (2005). Young children’s adjustment as a function of maltreatment, shame, and anger. *Child Maltreatment, 10*, 311–323.
- Birmaher, B., Arbelaez, C., & Brent, D. (2002). Course and outcome of child and adolescent major depressive disorder. *Child and Adolescent Psychiatric Clinics of North America, 11*, 619–637.
- Bond, L., Carlin, J. B., Thomas, L., Rubin, K., & Patton, G. (2001). Does bullying cause emotional problems? A prospective study of young teenagers. *British Medical Journal, 323*, 480–484.
- Boney-McCoy, S., & Finkelhor, D. (1996). Is youth victimization related to trauma symptoms and depression after controlling for prior symptoms and family relationships? A longitudinal, prospective study. *Journal of Consulting and Clinical Psychology, 64*, 1406–1416.
- Burchard, J. D., Burchard, S. N., Sewell, R., & Van DenBerg, J. (1993). *One kid at a time: Evaluative case studies and descriptions of the Alaska Youth Initiative Demonstration Project*. Juneau, AK: State of Alaska, Division of Mental Health and Mental Retardation.
- Burchard, J. D., Bruns, E. J., & Burchard, S. N. (2002). The wraparound approach. In B. J. Burns & K. Hoagwood (Eds.), *Community treatment for youth* (pp. 69–90). New York: Oxford University Press.
- Burns, B. J., Phillips, S., Wagner, H., Barth, R., Kolko, D., Campbell, Y., et al. (2004). Mental health need and access to mental health services by youths involved with child welfare: A national survey. *Journal of the American Academy of Child and Adolescent Psychiatry, 43*, 960–970.
- Carlson, E. B., Dalenberg, C., Armstrong, J., Daniels, J. W., Loewenstein, R., & Roth, D. (2001). Multivariate prediction of posttraumatic symptoms in psychiatric inpatients. *Journal of Traumatic Stress, 14*, 549–567.
- Cicchetti, D., & Toth, S. L. (1998). The development of depression in children and adolescents. *American Psychologist, 53*, 221–241.
- Cohen, J. A., Mannarino, A. P., & Deblinger, E. (2006). *Treating trauma and traumatic grief in children and adolescents*. New York: The Guilford Press.
- Coleman, H. (2009). Sexual development and behavior in children: Information for parents and caregivers. Retrieved from <http://www.nctsn.org/products/sexual-development-and-behavior-children-information-parents-and-caregivers-2009>.
- Costello, E. J., Angold, A., Burns, B. J., Stangl, D. K., Tweed, D. L., Erkanli, A., et al. (1996). The Great Smokey Mountains Study of Youth: Goals, design, methods, and the prevalence of DSM-III-R disorders. *Archives of General Psychiatry, 53*, 1129–1136.
- dos Reis, S., Magno Zito, J., Safer, D. J., & Soeken, K. L. (2001). Mental health services for youths in foster care and disabled youths. *American Journal of Public Health, 91*, 1094–1099.
- Finkelhor, D. (1987). The trauma of sexual abuse: Two models. *Journal of Interpersonal Violence, 2*, 348–366.
- Finkelhor, D., & Browne, A. (1985). The traumatic impact of child sexual abuse: A conceptualization. *American Journal of Orthopsychiatry, 55*, 530–541.
- Garland, A. F., Landsverk, J. L., Hough, R. L., & Ellis-MacLeod, E. (1996). Type of maltreatment as a predictor of mental health service use for children in foster care. *Child Abuse and Neglect, 20*, 675–688.

- Garland, A. F., Hough, R. L., McCabe, K. M., Yeh, M., Wood, P. A., & Aarons, G. A. (2001). Prevalence of psychiatric disorders in youths across five sectors of care. *Journal of the American Academy of Child and Adolescent Psychiatry*, *40*, 409–418.
- Hammen, C., & Rudolph, K. D. (2003). Childhood mood disorders. In E. J. Mash & R. A. Barkley (Eds.), *Child psychopathology* (2nd ed., pp. 233–278). New York: The Guilford Press.
- Johnson, R. M., Kotch, J. B., Catellier, D. J., Winsor, J. R., Dufort, V., Hunter, W., et al. (2002). Adverse behavioral and emotional outcomes from child abuse and witnessed violence. *Child Maltreatment*, *7*, 179–186.
- Kendall-Tackett, K. A., Williams, L. M., & Finkelhor, D. (1993). Impact of sexual abuse on children: A review and synthesis of recent empirical studies. *Psychological Bulletin*, *113*, 164–180.
- Kennard, B., Silva, S., Vitiello, B., Curry, J., Kratochvil, C., Simons, A., March, J. (2006). Remission and residual symptoms after short-term treatment in the Treatment of Adolescents with Depression Study (TADS). *Journal of the American Academy of Child and Adolescent Psychiatry*, *45*, 1404–1411.
- Landsverk, J., & Garland, A. F. (1999). Foster care and pathways to mental health services. In P. A. Curis, G. Dale, & J. C. Kendall (Eds.), *The foster care crisis: Translating research into policy and practice* (pp. 193–210). Lincoln, NE: University of Nebraska Press.
- Lewinsohn, P. M., Youngren, M. A., & Grosscup, S. J. (1979). Reinforcement and depression. In R. A. Dupre (Ed.), *The psychobiology of depressive disorders: Implications for the effects of stress* (pp. 291–316). New York: Academic Press.
- Lewinsohn, P. M., Rohde, P., & Seeley, J. R. (1998). Major depressive disorder in older adolescents: Prevalence, risk factors and clinical implications. *Clinical Psychology Review*, *18*, 765–794.
- Lewis, C. C., Simons, A. D., Nguyen, L. J., Murakami, J. L., Reid, M. W., Silva, S. G., et al. (2010). Impact of childhood trauma on treatment outcome in the Treatment for Adolescents with Depression Study (TADS). *Journal of the American Academy of Child and Adolescent Psychiatry*, *49*, 132–140.
- Lyons, J. S. (1999). *The child and adolescent needs and strengths for children with mental health challenges*. Winnetka, IL: Buddin Praed Foundation.
- Lyons, J. S. (2004). *Redressing the emperor: Improving our children's public mental health system*. Westport, CT: Praeger Publishing.
- Lyons, J. S. (2009). *Communimetrics: A communication theory of measurement in human service settings*. New York: Springer.
- Lyons, J. S., Weiner, D. A., & Lyons, M. B. (2004). Measurement as communication in outcomes management: The child and adolescent needs and strengths (CANS). In M. E. Maruish (Ed.), *The use of psychological testing for treatment planning and outcomes assessment* (3rd ed., Vol. 2, pp. 461–476). New York, NY: Routledge.
- McClelland, G. M., & Schneider, A. (2009). *Annual report of performance of SOC program (Report to IDCFS)*. IL: Chicago.
- McMillen, J. C., Zima, B. T., Scott, L. D., Auslander, W. F., Munson, M. R., Ollie, M. T., et al. (2005). Prevalence of psychiatric disorders among older youths in the foster care system. *Journal of the American Academy of Child and Adolescent Psychiatry*, *44*, 88–95.
- Miller, S. A., Leon, S. C., & Lyons, J. S. (2007). *The Child and Adolescent Needs and Strengths Scale: Factor analytic investigations*. Chicago, IL: Poster presented at the meeting of the Midwestern Psychological Association.
- Munson, M. R., & McMillen, C. (2010). Trajectories of depression symptoms among older youths exiting foster care. *Social Work Research*, *34*, 235–249.
- Nelson, E. C., Heath, A. C., Madden, P. A. F., Cooper, M. L., Pinwiddie, S. H., Bucholz, K. K., et al. (2002). Association between self-reported childhood sexual abuse and adverse psychosocial outcomes. *Archives of General Psychiatry*, *59*, 139–145.
- Newton, R. R., Litrownik, A. J., & Landsverk, J. A. (2000). Children and youth in foster care: disentangling the relationship between problem behaviors and number of placements. *Child Abuse and Neglect*, *24*, 1363–1374.
- Obeid, N., & Lyons, J. S. (2011). Pre-measurement triangulation. Considerations for program evaluation in human services. *Canadian Journal of Program Evaluation*, *25*, 59–82.
- Oswald, S. H., Heil, K., & Goldbeck, L. (2010). History of maltreatment and mental health problems in foster children: A review of the literature. *Journal of Pediatric Psychology*, *35*, 462–472.
- Pecora, P. J., Kessler, R. C., O'Brien, K., Roller White, C., Williams, J., Hiripi, E., et al. (2006). Educational and employment outcomes of adults formerly placed in foster care: Results from the Northwest Foster Care Alumni Study. *Children and Youth Services Review*, *28*, 1459–1481.
- Pecora, P. J., Roller White, C., Jackson, L. J., & Wiggins, T. (2009). Mental health of current and former recipients of foster care: A review of recent studies in the USA. *Child & Family Social Work*, *14*, 132–146.
- Pilowsky, D. (1995). Psychopathology among children placed in family foster care. *Psychiatric Services*, *46*, 906–910.
- Reinherz, H. Z., Paradis, A. D., Giaconia, R. M., Stashwick, C. K., & Fitzmaurice, G. (2003). Childhood and adolescent predictors of major depression in the transition to adulthood. *American Journal of Psychiatry*, *160*, 2141–2147.
- Roberts, J. (1993). Abused children and foster care: The need for specialist resources. *Child Abuse Review*, *2*, 3–14.
- Salazar, A. M., Keller, T. E., & Courtney, M. E. (2011). Understanding social support's role in the relationship between maltreatment and depression in youth with foster care experience. *Child Maltreatment*, *16*, 102–113.
- Shaffer, D., Fisher, P., Dulcan, M. K., Davies, M., Piacentini, J., Schwab-Stoner, M. E., et al. (1996). The NIMH Diagnostic Interview Schedule for Children Version 2.3 (DISC-2.3): Description, acceptability, prevalence rates, and performance in the MECA study. *Journal of the American Academy of Child and Adolescent Psychiatry*, *35*, 865–877.
- Sieracki, J. H., Leon, S. C., Miller, S. A., & Lyons, J. S. (2008). Individual and provider effects on mental health outcomes in child welfare: A three level growth curve approach. *Children and Youth Services Review*, *30*, 800–808.
- Skarbo, T., Rosenvinge, J. H., & Holte, A. (2004). Adolescent life events and adult mental health 5–9 years after referral for acute psychiatric outpatient treatment. *Clinical Psychology and Psychotherapy*, *11*, 401–413.
- Soltysik, R. C., & Yarnold, P. R. (1993). *ODA 1.0 optimal data analysis for DOS*. Chicago, IL: Optimal Data Analysis, Inc.
- State of Illinois Department of Child and Family Services (2009). Procedures 301: Placement and visitation services. Retrieved from http://www.state.il.us/dcf/docs/ocfp/procedure/Procedures_301.pdf.
- Stevens, S. B., Brice, C. S., Ale, C. M., & Morris, T. L. (2011). Examining depression, anxiety, and foster care placement as predictors of substance use and sexual activity in adolescents. *Journal of Social Service Research*, *37*, 539–554.
- Stroul, B., & Friedman, R. (1986). *A system of care for children and youth with severe emotional disturbances (Rev. Ed)*. Washington, DC: Georgetown University Child Development Center, National Technical Assistance Center for Children's Mental Health.
- Stroul, B., & Friedman, R. (1996). The system of care concept and philosophy. In B. A. Stroul, R. M. Friedman, & B. A. Stroul

- (Eds.). *Systems of care for children's mental health series: Children's mental health: Creating systems of care in a changing society* (pp. 1–22). Baltimore, MD: Paul H. Brooks Publishing Co.
- Stuewig, J., & McCloskey, L. A. (2005). The relation of child maltreatment to shame and guilt among adolescents: Psychological routes to depression and delinquency. *Child Maltreatment, 10*, 324–336.
- VanDenBerg, J. E., & Grealish, M. E. (1998). *The wraparound process training manual*. Pittsburgh, PA: The Community Partnership Group.
- Vinnerljung, B., Hijern, A., & Lindblad, F. (2006). Suicide attempts and severe psychiatric morbidity among former child welfare clients—A national cohort study. *Journal of Child Psychology and Psychiatry, 47*, 723–733.
- White, C. R., Havalchak, A., Jackson, L. J., O'Brien, K., Pecora, P. J. (2007) Mental health, ethnicity, sexuality, and spirituality among youth in foster care: Findings from the Casey Field Office Mental Health Study. Casey Family Programs, Seattle, WA. Retrieved from http://www.casey.org/Resources/Publications/pdf/MentalHealthEthnicitySexuality_FR.pdf.
- Yarnold, P. R., & Soltysik, R. C. (2004). *Optimal data analysis: A guidebook with software for Windows*. Washington, DC: American Psychological Association Books.
- Yarnold, P. R., & Soltysik, R. C. (2005). *Optimal data analysis with software for DOS and Windows*. Washington, DC: American Psychological Association Books.
- Yarnold, P. R., Soltysik, R. C., & Bennett, C. L. (1997). Predicting in-hospital mortality of patients with AIDS-related Pneumocystis carinii pneumonia: An example of hierarchically optimal classification tree analysis. *Statistics in Medicine, 16*, 1451–1463.
- Zima, B. T., Bussing, R., Yang, X., & Berlin, T. R. (2000). Help-seeking steps and service use for children in foster care. *Journal of Behavioral Health Services and Research, 2*(3), 271–285.