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## Contextual Predictors of Mental Health Service Use Among Children Open to Child Welfare

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### Abstract

**Background**—Children involved with child welfare systems are at high risk for emotional and behavioral problems. Many children with identified mental health problems do not receive care, especially ethnic/minority children.

**Objective**—To examine how patterns of specialty mental health service use among children involved with child welfare vary as a function of the degree of coordination between local child welfare and mental health agencies.

**Design**—Specialty mental health service use for 1 year after contact with child welfare was examined in a nationally representative cohort of children aged 2 to 14 years. Predictors of service use were modeled at the child/family and agency/county levels. Child- and agency-level data were collected between October 15, 1999, and April 30, 2001.

**Setting**—Ninety-seven US counties.

**Participants**—A total of 2823 child welfare cases (multiple informants) from the National Survey of Child and Adolescent Well-being and agency-level key informants from the participating counties.

**Main Outcome Measures**—Specialty mental health service use during the year after contact with the child welfare system.

**Results**—Only 28.3% of children received specialty mental health services during the year, although 42.4% had clinical-level Child Behavior Checklist scores. Out-of-home placement, age, and race/ethnicity were strong predictors of service use rates, even after controlling for Child Behavior Checklist scores. Increased coordination between local child welfare and mental health agencies was associated with stronger relationships between Child Behavior Checklist scores and

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service use and decreased differences in rates of service use between white and African American children.

**Conclusions**—Younger children and those remaining in their homes could benefit from increased specialty mental health services. They have disproportionately low rates of service use, despite high levels of need. Increases in interagency coordination may lead to more efficient allocation of service resources to children with the greatest need and to decreased racial/ethnic disparities.

Availability of and access to mental health services for children in child welfare/child protective services (“child welfare”) should be a high priority. Several studies have documented high rates of emotional and behavioral problems among children removed from their homes<sup>1–3</sup> or who remain with their families with active child welfare cases.<sup>1,4,5</sup> Delivery of appropriate and timely mental health services may be an important element in reducing long-term negative consequences for children served by child welfare agencies and in decreasing placement instability among children removed from their homes.

Little is known at a national level, however, about rates and patterns of specialty mental health service use among children served by child welfare agencies. Several regional studies have shown relatively high rates of specialty mental health service use among children in foster care<sup>6</sup> compared with relevant groups of impoverished children.<sup>7,8</sup> Less is known about rates of mental health service use among children served by child welfare agencies who remain in their homes of origin.

Recent analyses from the National Survey of Child and Adolescent Well-being (NSCAW) confirm and extend these findings.<sup>1</sup> Analyses of NSCAW data reveal (1) substantial specialty mental health service use in children placed out of the home in the first few months after contact with the child welfare system (kinship care, 26.1%; foster care, 28.4%; and group care, 59.9%); (2) much higher rates of specialty mental health service use by children placed in out-of-home care compared with those who remain in their homes, even after controlling for clinical need; and (3) limited use of specialty mental health services despite clear evidence of need in many children. Numerous studies have demonstrated that clinical and nonclinical factors predict children’s specialty mental health service use, suggesting that level of emotional and behavioral problems, maltreatment type, age, and race/ethnicity may all be powerful predictors of mental health service use.<sup>6</sup>

The literature to date, however, has focused primarily on child-level factors associated with children’s specialty mental health service use and has not examined contextual factors that may explain variations in service use. Our study extends previous work by examining the unique contribution of several county-level contextual variables to rates and patterns of specialty mental health service use, beyond important child- and family-level predictors. Specifically, 2 county-level factors—the degree of integration between child welfare and mental health service systems and the available supply of mental health providers—have been discussed as policy contexts that may affect rates and patterns of service use. To date, there have been few opportunities to examine the interplay of these key contextual variables with known drivers of service use.

We first ask, What is the relationship between child service use patterns and the strength of interagency linkages between local child welfare and mental health agencies? Strong interagency linkages have been proposed as a critical mechanism for enhancing the effectiveness, efficiency, and continuity of services for high-risk target populations.<sup>9</sup> Linkages are developed through mechanisms such as greater communication between agencies, heightened awareness of concerns that extend across organizational boundaries, simplified and streamlined referrals between agencies, and co-location of providers to increase sharing of information on specific cases.<sup>10,11</sup> Interagency linkage has a long history in broader system

integration efforts, dating back to the 1960s' War on Poverty<sup>9,11</sup> and extending through children's system-of-care efforts.<sup>12,13</sup>

Explicit tests of the effects of system integration efforts are recent and focus on improving individual client-level outcomes, with no study to date finding client-level benefit from service integration manipulations.<sup>10,14,17</sup> From a theoretical standpoint, equally important and less studied are potential increases in the efficiency of service delivery owing to system integration efforts.<sup>18</sup> We predict that children with a clinically significant need for specialty mental health services in counties with strong interagency linkages are more likely to receive specialty mental health services than children in counties with weak interagency linkages. Such linkages may result in overall increases in rates of service use, but they may also result in a stronger association between need and service use. In addition, we hypothesize that stronger interagency linkages will result in greater emphasis on clinical factors and in weaker associations between specialty mental health service use and nonclinical factors, especially race/ethnicity.

Our second research question asks, What role does the differential supply of mental health providers across counties, specified as a per capita rate, play in explaining service use? Differences in provider supply may be due to economic conditions in an area<sup>19,20</sup>; environmental characteristics of a region, such as the presence of educational institutions<sup>19</sup>; or other factors. Regardless of the specific determinants, many argue that a lower relative supply of specialty mental health providers in a county will cause a reduction in the percentage of children receiving specialty mental health services or increases in the strength of the relationship between need and use if lower relative supply leads to more restrictive criteria for children accessing services. Federal- and state-level programs exist to try to address mental and physical health provider shortages.

We begin by examining specialty mental health service use during 1 year among children whose families are referred to child welfare and have a child welfare case opened, first modeled as a function of known child- and family-level predictors of service use. We then address whether the 2 contextual variables, linkages and relative specialty mental health provider supply, relate to patterns of specialty mental health service use among children in child welfare, with a particular focus on whether these variables moderate key relationships between need and service use.

## METHODS

### OVERVIEW

The NSCAW aims to learn about the experiences of children who are subjects of child abuse and child neglect investigations (or assessments) conducted by child welfare agencies, and it is the first nationally representative study of its kind. The NSCAW used a stratified 2-stage cluster-sampling strategy to select a nationally representative sample of children. Detailed discussions of the NSCAW methods have been published elsewhere.<sup>21</sup>

The linked Caring for Children in Child Welfare study collected additional information about characteristics of the counties and agencies in which children were sampled.<sup>22</sup> In each NSCAW county, interviews were conducted with key informants from a variety of state and local agencies, with supplemental information obtained from agency Web sites and internal publications and from the Area Resource File, maintained by Quality Resource Systems Inc, Fairfax, Va, for the National Center for Health Workforce Analysis, Rockville, Md. Detailed discussions of the Caring for Children in Child Welfare methods have been published elsewhere.<sup>22</sup>

## SAMPLE

Children in the NSCAW were sampled from 92 selected primary sampling units (PSUs) consisting of 97 counties. The PSUs were typically defined as geographic areas that encompass the population served by a single child welfare agency (usually 1 county; hereafter, PSUs will frequently be referred to as counties). The PSUs were selected with probability proportional to the size of the county child welfare population. From an original sample of 100 PSUs, 8 were removed because of regulations that made study recruitment unworkable. This had a small effect on the definition of the sample, but the sample continues to represent the national target population.<sup>23</sup>

In participating counties, children were selected from among the population of children from birth to age 14 years for whom an investigation of abuse or neglect had been opened by the child welfare system during a 15-month period beginning October 1, 1999. The final child welfare sample included 5504 children, resulting in an overall weighted response rate of 64%. Extensive analyses concluded that nonresponse bias was minimal and unlikely to be consequential for most analyses.<sup>21</sup> This article focuses specifically on children who were removed from their homes or were living in a family in which a case was opened for child welfare services after substantiation of abuse or neglect (N=2823). Child welfare services could range from minimal (eg, information and referral) to intense (eg, removal of the child from the home).

Approval for this study was provided by the US Office of Management; by the budget and institutional review boards of Research Triangle Institute (Research Triangle Park, NC), University of California at Berkeley, and Children's Hospital, San Diego (San Diego, Calif); and by numerous state and county institutional review boards representing PSUs involved in the study. Informed consent was obtained from all participants.

## PROCEDURES

**Child-Level Data**—This study uses data from initial interviews with child welfare workers and initial and 12-month follow-up interviews with current caregivers. For children remaining in their homes (n=1961), the current caregiver was most often the child's biological parent. Among children removed from their homes (n=862), current caregiver interviews were completed with relative or nonrelative foster caregivers or group care staff. Initial current caregiver interviews were completed a mean (SD) of 5.6 (2.7) months after the onset of the child welfare investigation, and follow-up interviews were completed after a mean (SD) of 13.5 (1.6) months. Initial interviews with child welfare workers were completed a mean (SD) of 5.2 (2.7) months after the onset of the child welfare investigation.

**County-Level Data**—Trained research assistants collected interview data from agency informants between September 21, 2000, and July 25, 2001. When the primary identified agency respondent did not feel qualified to answer some or all questions, he or she was encouraged to identify alternate informants who could provide the relevant information.

## MEASURES

**Sociodemographics and Placement**—Children's age, sex, and race/ethnicity were collected as part of the initial case identification procedure and were confirmed by caregiver and child welfare worker interviews. The child's placement at the time of the initial caregiver interview was classified into 1 of 4 categories: (1) home of origin, (2) kinship foster care, (3) nonrelative foster care, and (4) group care. Excluded from analyses were 32 children in unknown settings.

**Maltreatment History**—Child welfare workers identified the types of suspected maltreatment using a modified Maltreatment Classification Scale.<sup>24</sup> Six non-mutually exclusive dichotomous variables that describe maltreatment types were created: (1) physical abuse, (2) sexual abuse, (3) emotional abuse, (4) supervisory neglect, (5) physical neglect, and (6) abandonment.

**Family Risk Factors and Insurance Status**—For each case in the NSCAW, caseworkers reported the presence or absence of risk factors that resulted in the family having contact with child welfare. Risks fell into the following 7 categories: (1) alcohol or drug abuse by the primary caregiver or recent arrest history; (2) poor parenting skills; (3) physical, mental, or cognitive limitations of the primary caregiver; (4) low social or economic support; (5) history of domestic violence; (6) history of substantiated child abuse; and (7) poor cooperation with the child welfare investigation. Cases were categorized regarding the number of risks reported by caseworkers. Based on caregiver reports at the initial interview, children's insurance was classified as (1) Medicaid, (2) private or CHAMPUS (Civilian Health and Medical Program of the Uniformed Services), or (3) no insurance.

**Need for Mental Health Services**—The Child Behavior Checklist (CBCL), a widely used and psychometrically established measure,<sup>25</sup> was used to estimate emotional and behavioral problems for youth and the need for mental health treatment. Two caregiver report forms of the CBCL were used, one for children in the study aged 2 to 3 years and another for children aged 4 to 14 years. Children at or above the clinical cutoff point ( $t=64$ ) on any of the internalizing, externalizing, or total scale scores were categorized as having clinically significant levels of need. Our research team used this method to identify need<sup>1</sup> rather than just the total CBCL score because it identifies a slightly larger group of children as having need while still representing a very conservative clinical threshold with respect to evaluation of met and unmet needs.

**Use of Mental Health Services**—Current caregivers responded to questions about children's mental health service use in an adapted version of the Child and Adolescent Services Assessment.<sup>26</sup> The present study included information on the use of outpatient specialty mental health services from investigation onset through approximately 1 year, including (1) clinic-based specialty mental health services (eg, community mental health clinics), (2) therapeutic nursery, (3) day treatment, and (4) private professionals, such as psychiatrists, psychologists, social workers, and psychiatric nurses.

**Linkages**—The strength of ties existing between child welfare and mental health agencies at the local level (linkages) was assessed through 2 different interview modules, one focusing on mental health services available to children in the child welfare system and one focusing on characteristics of the local mental health agency in the county. Linkages were defined by a count of 26 concrete indicators of linkage between the 2 local agencies (eg, co-location of child welfare and mental health services, existence of a formal child welfare committee that reviews mental health service use on a case-by-case basis, shared office space, joint service provision at the caseworker level, and joint training). The full set of indicators was drawn from the ACCESS (Access to Community Care and Effective Services and Supports) program's study of service integration efforts to improve care for homeless mentally ill adults,<sup>10</sup> and a complete list can be obtained from one of us (M.S.H.).

**Mental Health Specialist Supply**—Regional variation in specialty mental health provider supply was measured using Area Resource File variables. Approximations of federal methods for defining provider supply when identifying mental health shortage areas were applied to each NSCAW county.<sup>27</sup> Using data from 1990 (the most recent data available for all necessary



human resource variables), the numbers of psychiatrists (adult and child), psychologists, and social workers in each county were summed, and a rate per 10 000 population was derived. For reference, the average child in the target population lived in a county with a total of 30 such providers per 10000 individuals in the population (range, 9–69 providers).

**County Population and Poverty Level**—Variables that describe the child population size and the level of poverty in the county were included as control variables in multivariate models.

## STATISTICAL ANALYSES

All analyses used sampling weights that account for the sampling plan. Descriptive, bivariate, and multivariate analyses were conducted using statistical analysis software (SUDAAN version 8.0; Research Triangle Institute to account for the sampling design. Modeling of specialty mental health service use followed 3 steps. First, predictor variables were examined for collinearity with one another or inadequate cell sizes. Second, child- and family-level variables were entered into an initial model of service use. Finally, each of the primary contextual variables of interest was added to the model to evaluate its unique contribution.

Multivariate models were also developed using appropriately weighted random-effects logistic regression (GLIMMIX macro; SAS Institute, Cary, NC) with a random intercept. Similar results were observed between the 2 approaches; therefore, results based on models in SUDAAN are reported herein.

## RESULTS

### BIVARIATE PREDICTORS OF SPECIALTY MENTAL HEALTH SERVICE USE

Across 1 year after the initial child welfare investigation, an estimated 28.3% of children in the population studied received outpatient specialty mental health services. Many of the predicted relationships between child- and family-level factors and specialty mental health service use were confirmed by using bivariate analyses (Table 1). Children with higher rates of use were those who were placed outside of their homes and those with clinical-level CBCL scores. Other significant predictors of service use at the bivariate level included age, several different abuse types, family risk factors, and insurance status.

### MULTIVARIATE PREDICTORS OF SPECIALTY MENTAL HEALTH SERVICE USE

The 3 multivariate models in Table 2 correspond to the 3 analytic steps: (1) entry of child- and family-level predictors, (2) addition of several county-level control variables, and (3) addition of the 2 primary variables of interest (mental health provider supply and strength of interagency linkages). In Table 2, step 1 summarizes the relationships between specialty mental health service use and each of the child- and family-level predictors. Dominant predictors in the multivariate model were children's CBCL scores and placement status. Children above the clinical cutoff point on the CBCL were 4.0 times as likely to receive specialty mental health services as those below the cutoff point. Adjusting for other variables, we found that children placed outside the home were much more likely to receive services than those remaining in their homes of origin, with those in nonrelative foster care (odds ratio [OR], 3.92) and group care (OR, 5.51) being the most likely to receive services.

Other variables also accounted for service use patterns. Despite controlling for level of clinical need, younger children were much less likely to receive specialty mental health services than older children. Race/ethnicity also accounted for differentials in service use; specifically, African American children were 0.61 times as likely and Hispanic children were 0.51 times as likely to use services as white children. In the multivariate model, insurance status and family risk factors no longer had significant associations with specialty mental health service use.

## CONTEXTUAL PREDICTORS

After entering child-level predictors of service use, which served the function of risk adjustment across counties, we entered the contextual variables individually. In Table 2, step 2 summarizes the second multivariate model with the addition of 2 county-level control variables. The addition of county poverty level to the model did not contribute significantly to the prediction of children's service use (OR, 1.25), and neither did the size of the county child population (OR, 1.03 for small compared with large counties; OR, 1.41 for medium compared with large counties). The 2 independent variables of interest, agency linkages and provider supply, were then sequentially added to the model, along with their interactions with CBCL score and race/ethnicity. Substantial relationships were present on addition of the linkage variable and its interactions (Table 2, step 3, and the Figure). For children with CBCL scores below the clinical cutoff point, increased interagency linkages were related to a decreased likelihood of service use (OR, 0.93 per linkage item). This relationship was moderated by a strong and significant interaction of interagency linkage with CBCL score. In counties with strong interagency linkages compared with those with weaker linkages, the differential in service use rates was greater between children above and below the CBCL clinical cutoff point. For example, in counties with linkage levels 1 SD above the mean level of interagency linkage, children above the clinical CBCL cutoff point were estimated to receive specialty mental health services at 6.40 times the rate of children below the cutoff point:

$$\begin{aligned} & \text{Exp}[(\beta_{\text{CBCL}}) \times 1 + (\beta_{\text{CBCL} \times \text{Linkage}}) \times \text{LinkageScore}] \\ & = \text{Exp}[0.38(1) + 0.09(16.40)] = 6.40. \end{aligned}$$

The same OR was estimated to be 2.64 in counties 1 SD below the mean:

$$\text{Exp}[0.38(1) + 0.09(6.56)] = 2.64.$$

The mean level of interagency linkage applicable to children in this study was 11.48 (weighted), with an SD of 4.92 (unweighted). This mean is based on attaching a linkage score to each child; a mean based only on 1 observation per county would not account for the number of children served in each county.

Linkages also moderated the relationship between race/ethnicity and service use (see Table 2 for interaction ORs), with the effect primarily focused on service use patterns by African American children ( $\chi^2=8.17; P=.04$ ). In counties with stronger linkages (vs those with weaker linkages), differentials in service use between African American children and white children diminished. In counties 1 SD above the mean on the interagency linkage variable, African American children were estimated to be 0.89 times as likely to receive services as white children:

$$\begin{aligned} & \text{Exp}[(\beta_{\text{African American}}) \times 1 + (\beta_{\text{African American} \times \text{Linkage}}) \times \\ & \text{LinkageScore}] = \text{Exp}[-1.91(1) + 0.11(16.40)] = 0.89. \end{aligned}$$

The same OR was estimated to be 0.30 in counties 1 SD below the mean:

$$\text{Exp}[-1.91(1) + 0.11(6.56)] = 0.30.$$

The interactions of interagency linkage with CBCL score and race/ethnicity are also shown in the Figure, with linkage segmented into low, medium, and high tertiles. As linkage levels increase, the likelihood of specialty mental health service use increases for children above the clinical cutoff point and decreases for those below the cutoff point (Figure, A). As linkage

levels increase, differences in rates of service use between white and African American children diminish (Figure, B).

Specialty mental health provider supply did not contribute to prediction of service use (OR, 1.01 per additional professional). The same result was found when supply was trichotomized to examine for nonlinear patterns. The interaction of provider supply and CBCL score did not contribute significantly to the model ( $\chi^2_1 = 1.64; P = .20$ ), and neither did its interaction with race/ethnicity ( $\chi^2_3 = 1.03; P = .79$ ).

## COMMENT

This article examined the relationship between 2 contextual variables and specialty mental health service use, controlling for other predictors of service use, in a nationally representative sample of children referred to the child welfare system who were subsequently removed from their homes or who remained with their families but had a child welfare case opened.

At a broad level, our analyses confirm findings that rates of mental health need are exceptionally high in this population.<sup>3,28</sup> At the time of the first interview wave, 42.4% of children had clinical-level CBCL scores. Within approximately 1 year of the child welfare investigation, 28.3% of children had received specialty mental health services. Despite large increases in specialty mental health service use during this time, these analyses demonstrate that many children with strong clinical indications of need for service continue not to receive such services, consistent with our earlier work examining service use among children shortly after contact with the child welfare system.<sup>1</sup>

The present study extends that earlier work by focusing on how contextual predictors moderate service use patterns among children open to child welfare during a full year after contact with child welfare. Results from this study revealed that child- and contextual-level variables serve as powerful predictors of rates and patterns of specialty mental health services. At the child level, out-of-home placement status and older age predicted increased service use, even after controlling for level of need in multivariate models. At a minimum, these findings raise questions about the degree to which counties and child welfare agencies are missing opportunities to address mental health concerns that are already substantial among younger children and children remaining in their homes of origin. In addition, race/ethnicity and CBCL scores contribute to patterns of specialty mental health service use.

Child-level variables must be examined jointly with county-level contextual variables. The 2 most significant results of this analysis concern the interactions of CBCL score and race/ethnicity with the strength of interagency linkages between the local child welfare and mental health service systems. First, our data suggest that child welfare systems are responsive to the level of emotional and behavioral problems that children experience but that local interagency linkages increase the focus of specialty mental health service delivery to children with clinical levels of need. Whether targeting specialty mental health services to children with the most substantial levels of clinical need represents the most efficient and effective allocation of mental health resources is unclear. Some might argue that given the overall high levels of need and the comparatively low rates of specialty mental health service use, it is critical to increase rates of specialty mental health service use by all children. Others might argue that specialty mental health services should focus primarily on children with the most significant levels of need, paired with appropriate prevention approaches for children and families with lower risks. Regardless, the results of this study suggest that interagency coordination may have important effects on the patterns of children receiving services.



The strength of interagency ties also seems to affect racial/ethnic disparities in service use. Without taking county contextual variables into account, we found that African American and Hispanic children are markedly less likely to receive specialty mental health services than white children, replicating findings from other local studies<sup>29–31</sup> of children in the child welfare system. Increased interagency linkages, however, seem to decrease disparities for African American children but not for children from other minority groups. A variety of potential mechanisms have been proposed to explain lower use rates by racial/ethnic groups, such as language barriers, knowledge of services, concerns about stigma, and differences in beliefs about the nature of mental health problems. Although this study does not directly identify specific mechanisms that contribute to lower use rates, efforts by child welfare and mental health agencies to coordinate around the mental health needs of children maybe able to prevent disparities in mental health care use among African American children, who are heavily overrepresented in the child welfare system.

These results are in accord with other studies that show the importance of specific linkage mechanisms (eg, providers' knowledge of and connection with mental health service resources) to increased identification of children's need for services.<sup>18</sup> However, system integration efforts emphasize a broader array of mechanisms designed to streamline the identification and referral process. Items in the linkage construct exemplify these mechanisms. It is important to note that the linkage construct items are not highly correlated. This poses no theoretical problem because the linkage indicators are best conceptualized as cause indicators.<sup>32</sup> However, if interagency linkage is causally related to patterns of service use, a pragmatic implication is that communities may need to focus on multiple aspects of coordination to make significant changes in the way services are targeted to children in the child welfare system.

The other contextual variable studied herein, total supply of mental health providers in a county, does not seem to have a strong relationship with specialty mental health service use among children in the child welfare system. Using an approximation of federal methods for defining mental health care supply, only a relatively weak and non-significant trend was found for increased use of services in areas with greater relative provider supply.

## STRENGTHS AND LIMITATIONS

This study has 2 major strengths: it includes a nationally representative sample of children involved with child welfare systems from 92 PSUs and thus allows for the unique opportunity to study how contextual characteristics of counties and service systems relate to service delivery rates and patterns.

These strengths suggest some inherent limitations. First, there have been few opportunities to formally develop and test measures of some constructs of interest, such as interagency linkage and provider supply. However, the measure of interagency linkage used is the most concrete operationalization we are aware of. Likewise, the provider supply variable is an approximation of a federal approach to assessing mental health resource adequacy, although it does not take into account other master's-level providers who make up large segments of the mental health care system. Second, although associations between linkages and service use were identified in this study, it was not possible to evaluate the causality of the observed relationships. Despite these limitations, this study is the first to explore contextual predictors of specialty mental health service use among children in the child welfare system, and it reveals potentially important associations.

## IMPLICATIONS

These results confirm previous findings regarding child- and family-level variables that affect specialty mental health service use in children served by child welfare agencies. In addition to

these findings, 2 new primary messages emerged from this study. First, counties and child welfare systems may largely be missing several important opportunities to improve the well-being of children and reduce the likelihood of families' reinvolvement with child welfare. Specifically, counties and child welfare agencies may want to evaluate opportunities for addressing the high rates of clinically significant emotional and behavioral problems among young children and children who remain in their homes of origin that currently are not adequately addressed.

Second, the degree of linkage between the local child welfare and mental health service systems may have important effects on the pattern of children receiving specialty mental health services. Increasing coordination between the 2 agencies at the local level may facilitate targeting of scarce service resources to those children with the greatest levels of need. Furthermore, it may help mitigate the effects of other forces that frequently lead to disparities in service use by African Americans. The specific mechanisms by which these effects occur are not known and may be multiple. Future research is warranted to understand whether increased collaboration between agencies can improve the targeting of resources and minimize inappropriate disparities.

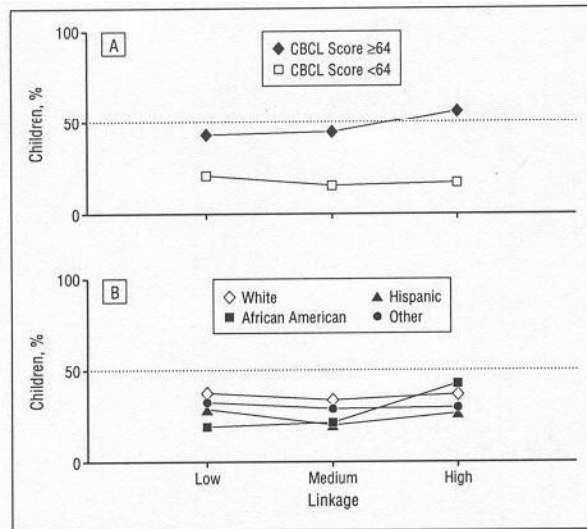
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**Figure.** Percentage of children (n=2099) receiving specialty mental health services in counties with different levels of interagency linkages by Child Behavior Checklist (CBCL) score (A) and race/ethnicity (B). For CBCL score, the cutoff was defined as at or above the clinical cutoff point on internalizing, externalizing, or total scale scores. Linkage is categorized into tertiles of the overall distribution.

**Table 1**  
 Characteristics and Specialty Mental Health Service Use of 2823 Participants During 1 Year

	Unweighted, No.	Weighted, %	Use of Specialty Mental Health Services		P Value*
			%		
Age group, y					
2–5	831	30.5	13.1	]	<.001
6–10	1105	38.3	31.4		
11–14	887	31.3	39.1		
Sex				]	
F	1470	49.4	29.2	]	.55
M	1353	50.6	27.3		
Race/ethnicity					
African American	899	32.9	24.1	]	.07
Hispanic	487	13.1	22.0		
Other	226	7.2	27.7		
White	1208	46.8	33.0		
Abuse type					
Physical					
Yes	848	33.7	34.9	]	.04
No	1752	66.3	24.7		
Emotional					
Yes	350	12.8	44.4	]	.01
No	2250	87.2	25.8		
Sexual					
Yes	517	13.1	42.5	]	<.001
No	2083	86.9	26.0		
Physical neglect					
Yes	684	27.4	25.2	]	.20
No	1916	72.6	29.3		
Emotional neglect					
Yes	1093	44.8	24.4	]	.06
No	1507	55.2	31.2		
Abandonment					
Yes	143	3.7	45.3	]	.06
No	2457	96.3	27.5		
CBCL score					
≥64	1243	42.4	45.4	]	<.001
<64	1578	57.6	15.7		
Family risk factors, No.					
1–2	876	42.5	24.4	]	<.01
3–4	909	39.5	35.3		
≥5	506	18.0	36.7		
Insurance status					
Medicaid	2000	67.4	32.2	]	.03
Private	529	21.2	21.7		
CHAMPUS	22	0.9	10.8		
No insurance	254	10.5	19.7		
Placement					
In home, child welfare case opened	1961	70.8	19.7	]	<.001
Kinship foster care	349	13.6	34.0		
Nonrelative foster care	413	11.9	57.0		
Group home	100	3.7	80.0		
<b>Overall</b>	<b>2823<sup>†</sup></b>	<b>100</b>	<b>28.3</b>		

Abbreviations: CBCL, Child Behavior Checklist; CHAMPUS, Civilian Health and Medical Program of the Uniformed Services.

\* P values are based on  $\chi^2$  tests; degrees of freedom is the number of categories in the variable minus 1.

<sup>†</sup> Numbers in column sum to 2823 for variables for which no data are missing (age group, sex, and race/ethnicity). For other variables, all cases with data available were included in the analyses.

**Table 2**  
Multivariate Logistic Regression Models of Specialty Mental Health Service Use During 1 Year\*

	Step 1: Child and Family Predictors (n = 2275) <sup>†</sup>		Step 2: County-Level Control Variables Added (n = 2182) <sup>‡</sup>		Step 3: Provider Supply and Linkage Variables Added (n = 2099) <sup>‡</sup>	
	$\beta$	OR (CI)	$\beta$	OR (CI)	$\beta$	OR (CI)
Intercept	-1.93	0.15 (0.05-0.42)	-2.05	0.13 (0.05-0.35)	-1.68	0.19 (0.05-0.70)
Age group, y						
2-5	-1.21	0.30 (0.18-0.49) <sup>‡</sup>	-1.21	0.30 (0.18-0.49) <sup>‡</sup>	-1.33	0.26 (0.16-0.44) <sup>‡</sup>
6-10	-0.40	0.57§ (0.47-0.96)	-0.40	0.67§ (0.47-0.97)	-0.47	0.63§ (0.43-0.91)
11-14	1.00		1.00		1.00	
Sex						
Male (reference = female)	0.01	1.01 (0.72-1.43)	-0.02	0.98 (0.69-1.41)	-0.03	0.97 (0.68-1.38)
Race/ethnicity						
African American	-0.50	0.61§ (0.39-0.94)	-0.49	0.61§ (0.38-0.97)	-1.91	0.15§ (0.03-0.63)
Hispanic	-0.68	0.51§ (0.28-0.93)	-0.62	0.54§ (0.30-0.96)	-0.84	0.43 (0.07-2.52)
Other	-0.43	0.65 (0.36-1.17)	-0.36	0.70 (0.38-1.29)	-0.74	0.48 (0.13-1.75)
White	1.00		1.00		1.00	
Abuse type						
Physical	0.50	1.64§ (1.13-2.39)	0.49	1.64 (1.14-2.38) <sup>‡</sup>	0.50	1.66 (1.14-2.40) <sup>‡</sup>
Emotional	0.61	1.84 (1.17-2.91) <sup>‡</sup>	0.62	1.86 (1.18-2.91) <sup>‡</sup>	0.47	1.60§ (1.08-2.37)
Sexual	0.51	1.66§ (1.03-2.63)	0.44	1.55 (0.94-2.57)	0.33	1.38§ (0.82-2.34)
Physical neglect	0.07	1.08 (0.71-1.64)	0.01	1.01 (0.65-1.56)	0.00	1.00 (0.65-1.52)
Emotional neglect	-0.33	0.72 (0.48-1.09)	-0.32	0.72 (0.48-1.09)	-0.24	0.79 (0.52-1.18)
Abandonment	0.63	1.87 (0.90-3.87)	0.61	1.84 (0.89-3.84)	0.58	1.78 (0.85-3.73)
Placement						
Group foster care	1.71	5.51§ (1.27-24.03)	1.73	5.61§ (1.23-25.70)	1.69	5.44§ (1.31-22.62)
Nonrelative foster care	1.37	3.92 (2.19-7.01) <sup>‡</sup>	1.40	4.06 (2.24-7.36) <sup>‡</sup>	1.43	4.19 (2.38-7.40) <sup>‡</sup>
Kinship foster care	0.66	1.93§ (1.06-3.50)	0.60	1.82§ (1.01-3.30)	0.87	2.38 (1.38-4.12) <sup>‡</sup>
In home, child welfare case opened	1.00		1.00		1.00	
CBCL score <sup>¶</sup>						
≥64 (reference = <64)	1.39	4.00 (2.36-5.61) <sup>‡</sup>	1.34	3.83 (2.73-5.37) <sup>‡</sup>	0.33	1.46 (0.66-3.25)
Family risk factors						
1-2	-0.24	0.78 (0.45-1.38)	-0.24	0.79 (0.45-1.37)	-0.20	0.82 (0.47-1.42)
3-4	0.10	1.11 (0.70-1.77)	0.08	1.08 (0.69-1.71)	0.10	1.11 (0.70-1.75)
≥5	1.00		1.00		1.00	
Insurance status						
Medicaid	0.68	1.97 (0.63-5.67)	0.64	1.89 (0.86-5.42)	0.64	1.90 (0.67-5.38)
Private or CHAMPUS	0.43	1.54 (0.51-4.62)	0.40	1.49 (0.50-4.42)	0.50	1.84 (0.54-4.94)
No insurance	1.00		1.00		1.00	
County child population <sup>¶</sup>						
0-25000 (small)						
25001-100 000 (medium)			0.03	1.03 (0.65-1.65)	0.29	1.33 (0.78-2.28)
≥100001 (large)			0.34	1.41 (0.77-2.58)	0.24	1.27 (0.66-2.46)
County poverty level (reference = low poverty) <sup>¶</sup>			1.00		1.00	
Medium			0.23	1.25 (0.79-1.98)	0.08	1.09 (0.69-1.72)
High						
Mental health provider supply per 10000 child population					0.01	1.01 (0.99-1.03)
Linkages (No. of indicators)					-0.07	0.93§ (0.87-1.00)
Linkages × CBCL score					0.09	1.09§ (1.02-1.17)
Linkages × race/ethnicity						
Linkages × African American					0.11	1.12§ (1.01-1.25)
Linkages × Hispanic					0.02	1.02 (0.90-1.15)
Linkages × other					0.03	1.03 (0.92-1.15)



Step 1: Child and Family Predictors (n = 2275) <sup>†</sup>	Step 2: County-Level Control Variables Added (n = 2182) <sup>†</sup>	Step 3: Provider Supply and Linkage Variables Added (n = 2099) <sup>†</sup>
$\beta$	$\beta$	$\beta$
OR (CI)	OR (CI)	OR (CI)

Abbreviations: CBCL, Child Behavior Checklist; CHAMPUS, Civilian Health and Medical Program of the Uniformed Services; CI, confidence interval; OR, odds ratio.

\* All analyses are weighted and account for sample design. Analysis follows 3 steps: step 1 includes only child- and family-level predictors to adjust for differences in those variables across communities, step 2 adds several county-level control variables to model 1, and step 3 adds key variables of mental health provider supply and interagency linkage to model 2.

<sup>†</sup>The sample size for each model was determined by the presence of data available for all variables.

<sup>‡</sup> $P < .01$ , based on  $t$  tests;  $df = 1$ .

<sup>§</sup> $P < .05$ .

<sup>||</sup>The cutoff level is defined as being at or above the clinical cutoff point on internalizing, externalizing, or total scale scores on the CBCL.

<sup>¶</sup>The total number of children in the county population aged 0 to 14 years.

<sup>#</sup>Poverty level within a county, categorized as (1) nonpoor, 5% or less of county families with children living below the 50% poverty level, or (2) poor, more than 5% of county families with children living below the 50% poverty level.