Psychiatric Disorders among American Indian and White Youth in Appalachia: The Great Smoky Mountains Study

ABSTRACT

Objectives. This study examined prevalence of psychiatric disorders, social and family risk factors for disorders, and met and unmet needs for mental health care among Appalachian youth.

Methods. All 9-, 11-, and 13-year-old American Indian children in an 11-county area of the southern Appalachians were recruited, together with a representative sample of the surrounding population of White children.

Results. Three-month prevalences of psychiatric disorders were similar (American Indian, 16.7%; White, 19.2%). Substance use was more common in American Indian children (9.0% vs 3.8% in White children), as was comorbidity of substance use and psychiatric disorder (2.5% vs 0.9%). American Indian poverty, family adversity (e.g., parental unemployment, welfare dependency), and family deviance (parental violence, substance abuse, and crime) rates were higher, but the rate of family mental illness, excluding substance abuse, was lower. Child psychiatric disorder and mental health service use were associated with family mental illness in both ethnic groups but were associated with poverty and family deviance only in White children. Despite lower financial barriers, American Indian children used fewer mental health services.

Conclusions. This study suggests that poverty and crime play different roles in different communities in the etiology of child psychiatric disorder. (*Am J Public Health.* 1997;87:827–832)

E. Jane Costello, PhD, Elizabeth M. Z. Farmer, PhD, Adrian Angold, MRCPsych, Barbara J. Burns, PhD, and Alaattin Erkanli, PhD

Introduction

The goals of this paper are to describe rates and risk factors for child psychiatric disorders in an American Indian population and a White sample from the same geographical area, to examine the use of mental health services in the two communities, and to discuss possible explanations for the similarities and differences observed.

There is little reliable information about the development of psychiatric disorders in American Indian youth. This ignorance extends to the prevalence of psychopathology, its developmental course, and its causes and correlates. In their review for the Office of Technology Assessment in 1990, Manson and Bergeisen concluded that although no epidemiologic data are available comparable to those of national studies of the general population,[1] there is evidence that "Indian adolescents have more serious mental health problems than the United States all races population with respect to developmental disabilities . . . ; depression; suicide; anxiety; alcohol and substance abuse; self-esteem and alienation; running away; and school dropout."[2] American Indian youth have been described as particularly vulnerable to polydrug use[3] and as prone to begin abusing various substances earlier in life.[4] However, several authors have pointed to marked differences among tribes in rates of mental health and substance-related problems.[5,6] The present study provides information for only one tribe but uses standardized methods applicable to other racial and ethnic groups. The study is taking place in the context of a representative-sample survey of an 11-county area in the southeastern United States in which an American Indian reservation is located. Comparable data are thus available on a sample of White children who are of the same age as the American Indian children, live in the same geographical area, and use many of the same community services.

Methods

The study involves an accelerated cohort design[7]; children 9, 11, and 13 years of age were recruited and are interviewed annually. Overlapping cohorts permit us to test for cohort effects.

The Qualla Boundary, the federal reservation of the Eastern Band of Cherokee Indians, extends into two counties in North Carolina and covers some 55 000 acres (22 000 hectares). The Cherokee are one of the largest American tribes. Most live in the Midwest, but about 8500 remain in North Carolina. Most American Indians in the southern Appalachians are members of the Cherokee tribe. The Cherokee share with the rest of the population of the region the problem of making a living in an area rich in timber and natural beauty but little else. Employment is hard to find and frequently seasonal. The birth rate is high, and the average age is about 10 years younger than that of the US population. Incomes are low (50.4% of households with an annual income below $15 000), and unemployment is high (14.4% vs 9% among all American Indians in 1990).[7] On the other hand, educational levels are higher than

The authors are with the Developmental Epidemiology Program, Department of Psychiatry and Behavioral Sciences Duke University Medical Center, Durham, NC.

Requests for reprints should be sent to E. Jane Costello, PhD, Developmental Epidemiology Program, Box 3454, Duke University Medical Center, Durham, NC 27710.

This paper was accepted July 19, 1996.

TABLE 1—Risk of and Protective Factors for Psychiatric Disorders in American Indian and White Families in Western North Carolina, 1992/93

	American Indian, %	White, %
Poverty (household income below the federal poverty line)	62.5**	25.5
Family deviance		
Parental history of drug/alcohol problems	42.2**	21.3
Parental history of arrest	60.6**	30.9
Parental violence to spouse or children	20.4**	12.6
Family deviance present[a]	42.5**	18.4
Parental mental illness		
Parental history of psychiatric treatment	20.9	29.6*
Current maternal depression	7.2	7.2
Parental mental illness present[a]	16.9	23.0*
Family adversity		
Household partly or wholly dependent on welfare	36.3**	17.2
One or both parental figures unemployed	23.8**	11.6
Four or more children in household	23.4**	10.1
One or both parental figures did not graduate from high school	60.6**	33.5
Family adversity present[a]	44.4**	18.2

Note. Significance levels refer to differences between groups.
[a]See text for explanation.
*$P < .01$; **$P < .0001$.

TABLE 2—Demographic Characteristics of American Indian and White Children: The Great Smoky Mountains Study

	American Indian (n = 323), %	White (n = 933), %
Age, y		
9	33.5	36.1
11	36.3	34.5
13	30.1	29.4
Sex		
Female	46.8	49.9
Male	53.2	50.1
Residence		
Urban	8.0	30.8
Rural	92.0	69.2

those found in other American Indian groups; for example, 1990 census data indicate that only 4.3% of the North Carolina Cherokee left school before ninth grade, as compared with 14% of American Indians as a whole.[8]

Definition of American Indian Ethnicity

Children were defined as American Indian for the purposes of this study if they met the criterion of being an enrolled member of a recognized tribe or band or the first- or second-generation descendent of an enrolled member. Almost all of the children attending school on the reservation meet this criterion; the Qualla Boundary schools identified from their records the handful of children (mainly Mexican immigrants) who attend reservation schools but do not meet the criterion, and these students were not recruited for the study. The same criterion was used in identifying American Indian children attending public schools in the surrounding counties. It is one that the schools themselves use to apply for Title V funds under the Indian Education Act and for Impact Aid funds under Public Law 874. Names, addresses, and ethnic identification were provided by the schools on the reservation (with the permission of the Tribal Council and the director of education) and by the schools in the surrounding community (with the permission of the school boards). Four hundred thirty-one children 9, 11, and 13 years of age during the period of sample recruitment (November 1992 through October 1993) were identified in this way (380 living on the boundary and the rest in the surrounding counties). All but 25 were Cherokee. The majority attend schools on the reservation; at the time of the first assessment, however, 19.2% were in public schools in the surrounding community.

Comparison with the White Sample

The American Indian study is taking place in the context of a community investigation of psychopathology and service use in 11 contiguous counties in the southern Appalachians. Wave 1 data are available on a sample of more than 1000 children of the same age as the American Indian children (9, 11, and 13 years at intake), selected to be representative of the general population of the area. Most are White; a small subgroup (82 children; 8.1% of the total) is African American. Because the African American sample is so small, it is not included in these analyses (a note on the findings from this group is available from the authors). Full details on the sampling procedures and results of the baseline assessment for the main sample can be found in other publications.[9–11] Interview measures and procedures were identical for all subjects.

Interviewing Measures

The following areas are included in the analyses reported here: (1) diagnosable psychiatric disorders, symptoms, and functional impairment; (2) mental health service use; (3) family mental illness; (4) family deviant behavior; and (5) poverty and family adversity. The measures used for each area are reviewed briefly here; further details, including psychometric properties, may be obtained from the first author and from other study publications.[12–15]

Diagnoses, symptoms, and functional impairment. The Child and Adolescent Psychiatric Assessment[12,13] is an interview that elicits information about symptoms that contribute to a wide range of diagnoses according to the taxonomies of the *International Classification of Diseases* (10th edition) and the *Diagnos-*

TABLE 3—Three-Month Prevalence Rates of Psychiatric Disorders, by Sex and Ethnic Group

	American Indian						White					
	Girls (n = 151)		Boys (n = 172)		Both (n = 323)		Girls (n = 411)		Boys (n = 522)		Both (n = 933)	
Diagnosis	%	SE	%	SE	%	SE	%	SE	%	SE	%	SE
Separation anxiety	6.0	1.9	3.5	1.4	4.6	1.2	3.9	1.2	2.8	1.0	3.3	0.8
Any anxiety disorder	6.0	1.9	4.7	1.6	5.3	1.3	6.7	1.6	4.6	1.2	5.6	1.0
Any depressive disorder	0.7	0.7	0.0	. . .	0.3	0.3	1.4	0.7	1.6	0.7	1.5	0.5
Conduct or oppositional disorder	4.6	1.7	8.1	2.1	6.5	1.4	2.8	0.8	7.8	1.4	5.3	0.8
Attention deficit hyperactivity disorder	0.7	0.7	1.7	1.0	1.2	0.6	1.0	0.2	2.9	0.8	1.9	0.4
Substance abuse or dependence[a]	2.0	1.1	0.6	0.6	1.2	0.6	0.1	0.1	0.1	0.1	0.1	0.1
Any tic disorder[b]	1.3	0.9	2.3	1.1	1.9	0.8	2.5	1.1	5.8	1.6	4.2	1.0
Enuresis or encopresis	4.0	1.6	4.1	1.5	4.0	1.1	2.0	0.7	7.6	1.7	4.8	0.9
Core disorders[c]	11.9	2.6	14.5	2.7	13.3	1.9	10.6	1.9	13.7	1.9	12.2	1.3
More than one disorder	4.0	1.6	2.3	1.1	3.1	1.0	1.8	0.4	4.8	1.2	3.1	0.6
Any disorder	15.9	2.5	17.4	2.9	16.7	2.1	14.3	2.2	24.0	2.7	19.2	1.7

Note. OR = odds ratio; CI = confidence interval.
[a]More common in American Indian than in White sample (OR = 11.9, 95% CI = 2.1, 65.5).
[b]Less common in American Indian than in White sample (OR = 0.4, 95% CI = 0.18, 0.98).
[c]Excludes enuresis, motor tics, and vocal tics when not accompanied by other disorders.

tic and Statistical Manual of Mental Disorders (revised 3rd edition [DSM-III-R] and 4th edition [DSM-IV]). It also contains ratings of interviewers' observations of the child's behavior and affect during the interview. The Child and Adolescent Psychiatric Assessment is "interviewer based" rather than "respondent based."[13] That is, the onus is on the interviewer to use the questions and probes provided in the interview schedule to ensure that subjects (1) understand the question being asked, (2) provide clear information on behaviors or feelings relevant to the symptom, and (3) have the symptom at a clinical level of severity. For the analyses presented here, a symptom was counted as present if the parent or the child, or both, reported it.[12] The Child and Adolescent Psychiatric Assessment is thus more adaptable to the ways in which different ethnic groups think about mental illness than is a respondent-based interview asking the identical questions of every child, regardless of age, developmental level, or culture. The instrument has good retest reliability in use with White and African American children,[13] but its retest reliability in American Indian populations has not been established. James E. Sanders, MSW, director of Bureau of Indian Affairs Social Services on the Qualla Boundary, served as consultant to the study on the appropriateness and cultural competence of the interview.

Service use and access and barriers to care. The Child and Adolescent Services Assessment,[16] an interview conducted separately with parents and children, is designed to elicit information about recent (past 3 months) and lifetime use of a wide range of services for mental health problems.[14,15]

Family risk factors. A portion of the Child and Adolescent Psychiatric Assessment consists of a series of assessments of family characteristics that previous studies have linked with child psychopathology. The measures (see Table 1) were analyzed in four factor-analytically derived categories: family mental illness, family deviance, poverty, and family adversity. In terms of family mental illness, the interviewed parent completed a self-report depression questionnaire, the Mood and Feelings Questionnaire.[17,18] She or he also provided a brief history of psychiatric treatment and hospitalization for the child's biological and, if appropriate, nonbiological parents. Family mental illness was counted as present if there were two or more reports of treatment for a mental illness in parental figures or if the interviewed parent had five or more symptoms on the Mood and Feelings Questionnaire (a rough approximation to DSM-III-R major depressive episode).

The same informant also provided information about parental drug and alcohol problems and treatment, criminal convictions, and violent behavior. Family deviance was counted as present if two or more such problems were reported.

The parent was asked about annual household income; sources of income, including welfare payments; number of parents and children in the household; level of education and occupation of all of the child's parental figures; recent unemployment; and Medicaid eligibility. Poverty was considered to be present if the family income was below the federal poverty line. Family adversity was counted as present if the family had two or more of the adversity indexes.

Correlations between scales were below .30 except for poverty and family adversity, which were highly correlated (*rs* = .53 for White children and .48 for American Indian children). However, these two risk factors were kept separate because of our interest in whether poverty showed a pattern of relationships with child psychopathology different from that of the problems that often, but not inevitably, accompany it.

Interviews and Interviewer Training

Interviewers are residents of the area in which the study is taking place; two are American Indians, of whom one is Cherokee. All have at least bachelor's-level degrees. They receive 1 month of training, and quality control is maintained by

TABLE 4—Percentage of Children with Risk Factor Who Had Psychiatric Disorders, by Race

Risk Factor	American Indian	White	Odds Ratio	95% Confidence Interval
Family mental illness	29.63[a]**	20.76[a]**	1.10[b]	0.82, 3.13
Family deviance	15.44[a]	21.37[a]**	0.93[b]	0.64, 1.37
Family adversity	16.67[a]	18.19[a]*	0.90[b]	0.46, 1.74
Poverty	15.26[a]	21.47[a]**	0.66[b]	0.40, 1.08

[a]Significance of chi-square test of difference in proportion of children with and without exposure to each risk factor who had a psychiatric disorder, separately by race.
[b]Comparison of rates of disorder in exposed White and American Indian children (0 = White, 1 = American Indian).
*$P < .05$; **$P < .001$.

TABLE 5—Multivariable Logistic Regression Models of Child Psychiatric Disorders, by Race

	American Indian		White	
Risk Factor	Odds Ratio	95% Confidence Interval	Odds Ratio	95% Confidence Interval
Family mental illness	3.4	1.6, 7.1*	2.1	1.3, 3.2*
Family deviance	0.9	0.5, 1.9	1.4	0.9, 2.4
Family adversity	1.2	0.6, 2.6	0.8	0.4, 1.4
Poverty	1.1	0.5, 2.5	2.6	1.6, 4.2**
	$-2 \log L = 11.1$, $df = 4$, $P < .05$		$-2 \log L = 38.5$, $df = 4$, $P < .0001$	

*$P < .01$; **$P < .001$.

postinterview reviews of each schedule by experienced interviewer supervisors.

First Wave

Children and parents were interviewed within 1 month of the birthday on which the child became 9, 11, or 13. Families recruited for the interview stage of the study were visited by two interviewers, either at home or in a location convenient for them. Before the interviews began, the parent and the child signed informed-consent forms. They were then interviewed in separate rooms. Parents and children were paid $10 each after the interview had been completed.

Results

Of the 431 Cherokee children whose names were provided, 375 were recruited into the study, and 59 refused (86.3% compliance). Blizzards in the winter of 1992 made travel to interviews on the reservation impossible on two occasions during the interviewing period; as a result, 52 scheduled interviews could not be completed (12%). Interviews were thus completed on 323 children (75%) during this interviewing cycle. Table 2 shows the distribution by age, sex, and residence. Information on families who refused or could not be interviewed (available from the telephone screening questionnaire, which included a psychiatric symptom checklist) showed no significant differences from the other families in age, sex, Age × Sex distribution, family income, reported need for mental health care, recent use of mental health services, or score on the symptom checklist.

Child Psychiatric Disorders

Table 3 shows the 3-month prevalence of the major types of DSM-III-R psychiatric disorders in the American Indian and White children. The American Indian children had a slightly lower overall prevalence of psychiatric disorders than the White sample (16.7% vs 19.2%; odds ratio [OR] = 0.9, 95% confidence interval [CI] = 0.6, 1.2; $P = .382$), accounted for largely by the difference in rates of tic disorders in 9-year-old boys (0.0% vs 10.6%; OR = 0.8, 95% CI = 0.8, 0.9; $P = .010$).

On the other hand, although substance abuse or dependence was rare in both groups, as expected in this age range, it was significantly more common in American Indian children (1.2%) than in White children (0.1%) (OR = 11.7, 95% CI = 2.1, 65.2, $P = .005$). Use of tobacco, alcohol, or illegal drugs during the previous 3 months was reported by 9.0% of American Indian children and 3.8% of White children (OR = 2.6, 95% CI = 1.6, 4.3; $P < .001$). Alcohol was the most commonly reported substance used. Analysis by age group showed almost no reported use at 9 and 11 years of age; at 13 years of age, however, 6.2% of the American Indian children reported using alcohol recently, as compared with 3.0% of the White sample (OR = 2.1, 95% CI = 0.7, 6.1; $P = .167$). Comorbidity of substance use and psychiatric disorder was also more common among American Indian youth (2.5% vs 0.9% for White youth; OR = 2.9, 95% CI = 1.1, 7.4; $P = .026$).

Risk of Psychiatric Disorder

Tables 4 and 5, respectively, show the results of weighted bivariate comparisons and multivariable logistic regression analyses of risk factors for psychiatric disorders in the two ethnic groups. In the bivariate analyses, family mental illness was strongly associated with childhood disorder in both ethnic groups. Poverty and family deviance and, to a lesser extent, family adversity were associated with child psychiatric disorder in the White sample but not in the American Indian group. In the multivariable models, family mental illness doubled the risk of child mental illness in both groups. Poverty was associated with a doubling of risk for White youth but did not increase risk for American Indians.

To assess the robustness of the associations, we used a bootstrapping approach, splitting the samples into two randomly selected halves and repeating the analysis. Over 100 replications, the models remained essentially unchanged for each ethnic group.

Use of Mental Health Services

It seemed possible that the Cherokee children were protected from the direct impact of poverty on pathology because, under the Indian Health Service, they had access to mental health care with no cost

barriers. Figure 1 shows the rates at which children used one or more of five service sectors for the child's mental health care during the 3 months preceding the interview. Rates of service use overall were slightly, but not significantly, lower for American Indian than for White children. The rate of professional mental health care was low relative to the rate of disorder. Only one American Indian child in seven with a current disorder had used professional mental health services in the previous 3 months (as compared with one in eight in the White sample). In general, therefore, the data did not support the idea that use of mental health services was sufficiently high to moderate the effect of poverty.

We compared rates of specialty mental health care for children with psychiatric disorders as a function of insurance status, treating the American Indian families as having publicly funded insurance, since they were all eligible either for Medicaid or for care under the Indian Health Service. The comparison was made for rural children only; there were very few urban American Indian families, and rates of mental health care were higher for urban youth.[9] Rates of service use were lower for American Indian than for White youth with public insurance. Even among children with a current psychiatric disorder, only about one American Indian child in seven had seen a mental health care professional in the past 3 months, in comparison with one in four White youth with a disorder and public insurance. Logistic regression analyses controlling for poverty, family mental illness, family deviance, and family adversity confirmed these results.

Geography and Culture

Most of the Cherokee children lived and went to school on the reservation, but 62 (19% of the interviewed sample) lived (n = 28) or went to school (n = 59) in the surrounding 11-county area. They remained eligible for health benefits as members of the tribe. We examined whether this group differed from those who lived and went to school on the reservation in prevalence of child psychiatric disorder, exposure to family risk, effect of risk on psychopathology, or use of services. The off-reservation group showed no differences from the others on any of these analyses. Nor was the possibility that urban-dwelling children were at higher family risk than rural children supported in either ethnic group after control for family risk.

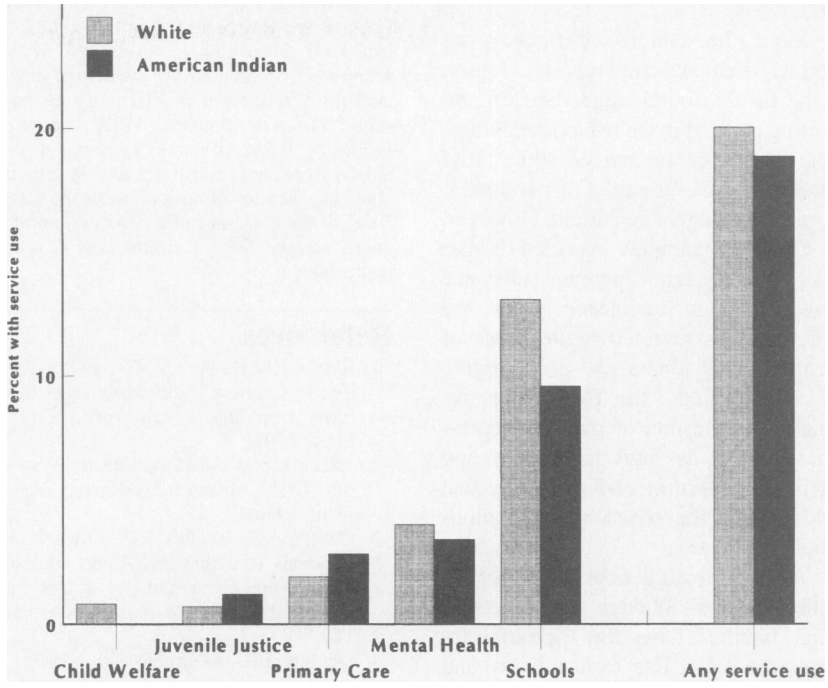

FIGURE 1—Use of five service sectors for mental health care in the previous 3 months among American Indian and White youth.

Discussion

The data from the first wave of the Great Smoky Mountains Study show that, up to the age of 13 years, the mental health problems of American Indian children had much in common with those of other children in this part of southern Appalachia. Furthermore, the 3-month prevalence rates of DSM-III-R psychiatric disorders found in both samples were very much what would have been expected given rates found in other epidemiological studies in the United States and elsewhere.[19] The only diagnosis that occurred more frequently in the Cherokee children than in the White children was substance abuse. This is consistent with the observation of Oetting et al.[3] that American Indian children are prone to begin abusing substances earlier in life than White youth.

There is concern that the high level of poverty in North Carolina's Cherokee community might place these American Indian children at additional risk of childhood disorders. Emotional and behavioral problems have been shown to occur more frequently in children from poor, urban families,[20,21] but little is known about rates of mental illness in poor, rural youth.[22–26] Urban poverty often coincides with low educational levels, unemployment, welfare dependency, and a high risk of criminal activity and substance abuse, the syndrome described by Wilson[27] as characteristic of the urban "underclass." This study addressed the question of whether these phenomena co-occur in the same way in poor rural communities, as well as their impact on children's mental health. The data presented here (Table 1) show that, in both White and American Indian communities, poverty is highly correlated with parental unemployment, lack of education, and income from welfare (family adversity) and, to a lesser but still considerable extent, with parental crime, violence, and substance abuse (family deviance). However, the association of poverty, family adversity, and deviance with child psychiatric disorder was significant for the White community but not for the American Indians. Thus, the underclass phenomenon described by Wilson was not inevitably a risk factor for children; its effect, at least for the 9- to 13-year-olds studied here, could apparently be mitigated by other aspects of family or community life. In later years of this longitudinal study, we will be able to see whether the protective characteristics of American Indian life continue to operate as the children move through adolescence and to explore in more detail exactly what factors are exerting this

protective effect in the presence of high levels of risk.

Since the data for this study are based on parent and child reports, a reason for the results found might be different reporting patterns in the two communities. In the absence of any agreed-upon "gold standard" for the presence of psychiatric disorder, one cannot be certain. However, the Cherokee families reported higher rates of poverty, crime, parental substance abuse, and family violence, while the White families reported higher rates of parental mental illness and poor parent–child relationships; the two groups reported the same rate of parental depression. Thus, it is hard to discern any systematic pattern of underreporting that could explain the observed associations among risk factors.

Another possible explanation for the findings is that although the American Indian families have low personal incomes, the direct line from poverty and child psychopathology has been broken by the safety net of social services provided by the federal government and the tribe: subsidized housing, free medical care, free prenatal care, access to social workers and mental health professionals, and so forth. However, only a small proportion of children with psychiatric disorders received mental health care. Specialized child mental health services were scarce on the reservation, as they are in most American Indian communities,[28,29] and these services (whether on or off the reservation) were used only reluctantly by families (E. M. Z. Farmer, D. K. Stangl, B. J. Burns, E. J. Costello, and A. Angold, unpublished data, 1997).

These analyses are based on a single wave of data collection, and the direction of causality is unclear. They do, however, suggest that, in the effort to develop prevention programs for childhood disorders,[30] it may be important to explore different strategies for different communities, depending on the type of social pressures to which they are most vulnerable. Removing the pressures of poverty and its correlates would be the first priority in some communities; in others, poverty and family vulnerability must be addressed simultaneously. □

Acknowledgments

This project was supported by grant MH48085 from the National Institute of Mental Health. Additional support was provided through faculty scholar awards from the William T. Grant Foundation to Dr Costello and Dr Angold and a center grant from the Leon Lowenstein Foundation to Dr Angold.

The fieldwork for this study was supervised by Teresa Sweeney, BA. Ralph Folsom, PhD, of the Research Triangle Institute, consulted on the sampling design. We wish to acknowledge with gratitude the help of superintendents of schools in the 11-county area of the study; James E. Sanders, MSW, director of Bureau of Indian Affairs Social Services on the Qualla Boundary; and Joyce Dugan, principal chief and director of education for the Eastern Band of the Cherokee. The cooperation of the entire western North Carolina area is warmly appreciated.

References

1. Robins LN, Regier DA. *Psychiatric Disorders in America: The Epidemiologic Catchment Area Study.* New York, NY: Free Press; 1991.
2. *Indian Adolescent Mental Health.* Washington, DC: Office of Technology Assessment; 1990.
3. Oetting ER, Swaim RC, Edwards RW, Beauvais F. Indian and Anglo adolescent alcohol use and emotional distress: path models. *Am J Alcohol Abuse.* 1989;15:153–172.
4. Oetting ER, Goldstein GS. Drug use among Native American adolescents. In: Beschner G, Friedman A, eds. *Youth Drug Abuse.* Lexington, Mass: Lexington Books; 1979.
5. Jensen GF, Strauss JH, Harris VW. Crime, delinquency, and the American Indian. *Hum Organ.* 1977;36:252–257.
6. Beiser M, Manson SM. Prevention of emotional and behavioral disorders in North American Native children. *J Prev Psychiatry.* 1987;3:225–240.
7. Schaie KW. A general model for the study of developmental problems. *Psychol Bull.* 1965;64:92–107.
8. *1990 Census of Population and Housing Summary.* Washington, DC: US Bureau of the Census; 1990.
9. Burns BJ, Costello EJ, Angold A, et al. Children's mental health service use across service sectors. *Health Aff.* 1995;14:147–159.
10. Costello EJ, Angold A, Burns BJ, et al. The Great Smoky Mountains Study of Youth: goals, design, methods, and the prevalence of DSM-III-R disorders. *Arch Gen Psychiatry.* 1996;53:1129–1136.
11. Costello EJ, Angold A, Burns BJ, Erkanli A, Stangl D, Tweed D. The Great Smoky Mountains Study of Youth: functional impairment and severe emotional disturbance. *Arch Gen Psychiatry.* 1996;53:1137–1143.
12. Angold A, Prendergast M, Cox A, Harrington R, Simonoff E, Rutter M. The Child and Adolescent Psychiatric Assessment (CAPA). *Psychol Med.* 1995;25:739–753.
13. Angold A, Costello EJ. A test-retest reliability study of child-reported psychiatric symptoms and diagnoses using the Child and Adolescent Psychiatric Assessment (CAPA-C). *Psychol Med.* 1995;25:755–762.
14. Farmer EMZ, Angold A, Burns BJ, Costello EJ. Reliability of self-reported service use: test-retest consistency of children's responses to the Child and Adolescent Services Assessment (CASA). *J Child Fam Stud.* 1994;3:307–325.
15. Ascher BH, Farmer EMZ, Burns BJ, Angold A. The Child and Adolescent Services Assessment (CASA): description and psychometrics. *J Emotional Behav Disord.* 1996;4:12–20.
16. Burns BJ, Angold A, Magruder-Habib K, Costello EJ, Patrick MKS. *The Child and Adolescent Services Assessment (CASA): Version 3.0.* Durham, NC: Duke University Medical Center; 1992.
17. Angold A, Costello EJ, Messer SC, Pickles A, Winder F, Silver D. The development of a short questionnaire for use in epidemiological studies of depression in children and adolescents. *Int J Methods Psychiatr Res.* 1995;5:237–249.
18. Messer SC, Angold A, Costello EJ, Loeber R, Van Kammen W, Stouthamer-Loeber M. Development of a short questionnaire for use in epidemiological studies of depression in children and adolescents: factor composition and structure across development. *Int J Methods Psychiatr Res.* 1995;5:251–262.
19. Costello EJ. Developments in child psychiatric epidemiology. *J Am Acad Child Adolesc Psychiatry.* 1989;28:836–841.
20. Offord DR, Boyle MH, Szatmari P, et al. Ontario Child Health Study, II: six-month prevalence of disorder and rates of service utilization. *Arch Gen Psychiatry.* 1987;44:832–836.
21. Rutter M, Cox A, Tupling C, Berger M, Yule W. Attainment and adjustment in two geographical areas, I: the prevalence of psychiatric disorder. *Br J Psychiatry.* 1975;126:493–509.
22. Donnermeyer JF, Park DS. Alcohol use among rural adolescents: predictive and situational factors. *Int J Addict.* 1995;30:459–479.
23. Hagen BH. Rural adolescents and mental health: growing up in the rural community. *Hum Services Rural Environment.* 1987;11:23–28.
24. Kelleher KJ, Rickert VI, Hardin BH, Pope SK, Farmer FL. Rurality and gender: effects on early adolescent alcohol use. *Am J Dis Child.* 1992;146:317–322.
25. Metzner HL, Harburg E, Lamphiear DE. Residential mobility and urban-rural residence within life stages related to health risk and chronic disease in Tecumseh, Michigan. *J Chronic Disease.* 1982;35:359–374.
26. Napier TL, Carter TJ, Pratt MC. Correlates of alcohol and marijuana use among rural high school students. *Rural Sociol.* 1981;46:319–332.
27. Wilson WJ. *The Truly Disadvantaged: The Inner City, the Underclass, and Public Policy.* Chicago, Ill: University of Chicago Press; 1987.
28. Nelson SH, McCoy GF, Stetter M, Vanderwagen WC. An overview of mental health services for American Indians and Alaska Natives in the 1990s. *Hosp Community Psychiatry.* 1992;43:257–261.
29. *A National Plan for Native American Mental Health Services.* Washington, DC: US Dept of Health and Human Services; 1989.
30. Mrazek PJ, Haggerty RJ. *Reducing Risks for Mental Disorders: Frontiers for Prevention Research.* Washington, DC: National Academy Press; 1994.