Hunger in Children in the United States: Potential Behavioral and Emotional Correlates

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ABSTRACT. *Objective.* **Results from a recent series of surveys from 9 states and the District of Columbia by the Community Childhood Hunger Identification Project (CCHIP) provide an estimate that 4 million American children experience prolonged periodic food insufficiency and hunger each year, 8% of the children under the age of 12 in this country. The same studies show that an additional 10 million children are at risk for hunger. The current study examined the relationship between hunger as defined by the CCHIP measure (food insufficiency attributable to constrained resources) and variables reflecting the psychosocial functioning of low-income, school-aged children.**

Methods. **The study group included 328 parents and children from a CCHIP study of families with at least 1 child under the age of 12 years living in the city of Pittsburgh and the surrounding Allegheny County. A two-stage area probability sampling design with standard cluster techniques was used. All parents whose child was between the ages of 6 and 12 years at the time of interview were asked to complete a Pediatric Symptom Checklist, a brief parent-report questionnaire that assesses children's emotional and behavioral symptoms. Hunger status was defined by parent responses to the standard 8 food-insufficiency questions from the CCHIP survey that are used to classify households and children as "hungry," "at-risk for hunger," or "not hungry."**

Results. **In an area probability sample of low-income families, those defined as hungry on the CCHIP measure were significantly more likely to have clinical levels of psychosocial dysfunction on the Pediatric Symptom Checklist than children defined as at-risk for hunger or not hungry. Analysis of individual items and factor scores on the Pediatric Symptom Checklist showed that virtually all behavioral, emotional, and academic problems were more prevalent in hungry children, but that aggression and anxiety had the strongest degree of association with experiences of hunger.**

Conclusion. **Children from families that report multiple experiences of food insufficiency and hunger are more likely to show behavioral, emotional, and academic problems on a standardized measure of psychosocial dysfunction than children from the same low-income communities whose families do not report experiences of hunger. Although causality cannot be determined from a cross-sectional design, the strength of these findings suggests the importance of greater awareness on the part of health care providers and public health officials of the role of food insufficiency and hunger in the lives of poor children.** *Pediatrics* 1998;101(1). URL: http://www.pediatrics.org/cgi/content/full/101/1/e3; *hunger, children, mental health, poverty.*

ABBREVIATIONS. CCHIP, Community Childhood Hunger Identification Project; PSC, Pediatric Symptom Checklist.

A decade-long political debate about the meaning and measurement of domestic hunger has taken on greater urgency in the context of recent federal legislation that has significantly diminished support for many low-income children and their families. The prevalence of chronic undernutrition (weight for height below the 5th percentile) is relatively low and has been estimated at <1.0% of all children and <10% even in the highest risk groups (eg, children in homeless shelters) in the United States.[1] In contrast, intermittent episodes of prolonged food insufficiency and hunger are more common, especially in low-income populations, and although severe undernutrition can be readily recognized by biochemical, anthropometric, and clinical indicators, the periodic and repeated episodes of hunger that some poor children and adults experience are not accurately assessed by these measures.[2]

The understanding of the epidemiology of hunger among children in the United States advanced significantly in the early 1980s, when the constructs of "food insecurity"[3] and "food insufficiency"[4] were advanced as a proxy for the more difficult to quantify construct of hunger. The most widely used measure of this sort was developed by the Community Childhood Hunger Identification Project (CCHIP) which conducted a series of 18 studies using large, rigorously selected, samples in communities across the United States. CCHIP categorizes families as "hungry," "at-risk for hunger," or "not hungry" on the basis of parent answers to 8 standardized questions about child and family experiences of food

insufficiency attributable to constrained resources.[4–6] One indicator of CCHIP's acceptability has been its wide use in the public policy arena and the adoption of its questions and/or methods by a number of large-scale governmental projects like the National Health and Nutrition Examination Survey and by the federal agencies like the United States Department of Agriculture and the United States Census Bureau.[7–9] Despite the official acceptance and use of this measure however, there have been no studies to date on the emotional or behavioral correlates of hunger as assessed by CCHIP.

Using this measure of food insufficiency as the principal indicator of hunger, a recent CCHIP summary report estimates that 8% of the children under the age of 12 in this country experience hunger and that an additional 21% are at risk for hunger.[5,6] According to CCHIP, hunger is most prevalent in children from the lowest income families. In such samples, as many as 21% percent of children are found to be hungry using the CCHIP measure and an additional 50% are classified as at-risk for hunger, suggesting that more than two thirds of all of the poor children in this country have had at least one experience of prolonged food insufficiency in the past year. If CCHIP's figure is accurate, hunger is an issue for most low-income children in this country and a serious problem for many of them.

Like hunger, psychosocial problems are common among low-income children in the United States.[10–15] With estimates ranging from 10 to 30%, the prevalence of psychosocial dysfunction in low-income children is generally considered to be higher than the prevalence of dysfunction in more advantaged populations (12 to 20%).[10–15] Although many investigators have documented the association between increased psychosocial dysfunction and low-income status in general, there have been no studies exploring the emotional and behavioral consequences of domestic hunger, which the CCHIP studies now suggest are also a common correlate of low-income status.

Although it is not clear how similar the effects of subcatastrophic hunger are to those of severe undernutrition, it does seem likely that there would be at least some similarities. Studies have shown that for infants and children in nonindustrialized countries, chronic undernutrition is associated with increased anxiety, attention deficits, increased prevalence of school absence and tardiness,[16,17] lower levels of social responsiveness, and decreased affect.[18–21] Aggression has also been linked to subclinical hunger in both human and animal studies, although the human evidence is largely anecdotal and/or poorly controlled.[22,23] The current study sought to build upon prior work by examining the relationship between persistent periods of food insufficiency and psychosocial problems.

METHODS

The study group included children from a CCHIP study of families with at least one child under the age of 12 years living in the city of Pittsburgh and surrounding Allegheny County. As in other CCHIP studies, a two-stage area probability sampling design with standard cluster techniques was used. Door-to-door enumeration of 25 000 households was conducted to build a sampling frame of 4638 households with at least 1 child under the age of 12 years and incomes at or below 185% of poverty ($25 812 for a family of four at the time the households were screened in 1993). A sample of 1018 households was randomly selected for interviews. One hour face-to-face interviews were conducted with 720 households (71% of the initial sample, 75% of the eligible households at the time of interviewing).

Interviews were conducted orally with one parent of each household by lay interviewers from the community trained for the CCHIP study. Eighty-four percent of the study group were mothers of the children. When a parent was not available, a guardian was interviewed. Just Harvest, a community-based antihunger organization hired lay interviewers from the local community to conduct the door-to-door interviews. Data collection was directed by the National CCHIP researchers.[24] Community interviewers and their supervisors were provided an initial 2-week intensive training in survey interviewing by the National CCHIP researchers. Each interviewer received extensive supervision throughout the interview process. On occasions when responses were ambiguous or unclear, interviewers followed-up to clarify ambiguities either by phone or by returning to the subjects' homes.

The full CCHIP interview contains 165 questions. An 8-item "hunger" scale that explores food shortages in the household is used to classify households and children as "hungry," "at-risk for hunger," or "not hungry" (Table 1). Four of the 8 questions on the hunger scale concern the children in the household, 2 questions concern hunger of adult members of the household, and 2 questions concern household food insufficiency. Children are classified as "hungry" if the parent responds positively to 5 or more of the 8 questions concerning hunger in the past year. With a score of 5, the parent must have responded positively to at least 1 question concerning the child's hunger. Children are classified as at-risk for hunger if the parent responds positively to 1 or as many as 4 of the 8 hunger questions. If the parent does not respond positively to any of the 8 hunger questions, the child is classified as not-hungry.

In the Pittsburgh and Allegheny County CCHIP survey, the interview included a Pediatric Symptom Checklist (PSC) for all parents whose randomly selected child was between the ages of 6 and 11 years at the time of interview. The PSC is a brief, parent-completed questionnaire that has been validated as a screening measure to identify children in this age range with psychosocial dysfunction.[25–27] The PSC consists of 35 items that are answered

TABLE 1. Eight Food Insecurity Questions Used to Measure Hunger in the Community Childhood Hunger Identification Project Survey

Thinking about the past 12 months:
1. Did your household ever run out of money to buy food to make a meal?
2. Did you or adult members of your household ever eat less than you felt you should because there was not enough money to buy food?
3. Did your child(ren) ever eat less than you felt they should because there was not enough money to buy food?
4. Did your child(ren) ever say they were hungry because there was not enough food in the house?
5. Did your child(ren) ever go to bed hungry because there was not enough money to buy food?
6. Did you ever cut the size of your child(ren)'s meals or did they skip meals because there was not enough money to buy food?
7. Did you or adult members of your household ever cut the size of your meals or skip meals because there was not enough money to buy food?
8. Did you ever rely on a limited number of foods to feed members of your household because you were running out of money to buy food for a meal?

"never," "sometimes," or "often" and which are scored 0, 1, or 2, respectively. A total score of 28 or higher is indicative of psychosocial dysfunction.

Of 720 households participating in the Pittsburgh CCHIP survey, 329 (46%) had a target child between the ages of 6 and 12 years and all of these households were administered the PSC. Because of incomplete data, one interview was eliminated, leaving a sample of 328. To be consistent with the administration of the rest of the standard CCHIP interview, PSC items were presented orally to the parent and responses were recorded by the interviewer. In addition to the standard PSC items, the form used in this study contained items asking the parent whether the child was receiving special education services, mental health services, had ever repeated a grade, or was living in a single-parent family.

Statistical Analysis

To test the hypothesis that hungry children have a higher rate of psychosocial dysfunction than not hungry children, Pearson χ^2 analysis of case rates and one-way analysis of variance of differences in mean PSC total symptom scores were used for the 3 CCHIP hunger groups. To explore the relationship between hunger status and more specific behavioral symptoms, the differences between the 3 hunger groups on individual PSC symptoms were examined. Finally, a factor analysis assessed differences between the hunger groups in terms of clusters of PSC symptoms.

The study was approved by the Committee on Human Studies at the Massachusetts General Hospital. Consent for participation in this study was obtained by community interviewers at the time of initial meeting at subjects' homes.

RESULTS

The 328 families in the current subsample did not differ significantly from the rest of the Pittsburgh CCHIP sample in terms of family income, race, gender, or hunger category. Fifty-three percent (175/328) of children in the current study were male, 63% (208/328) came from single-parent families, 12% (38/328) had received mental health counseling, 17% (55/328) had received or were receiving special education services, and 18% (58/328) had repeated a grade.

As shown in Table 2, 17% (56/328) of the households interviewed in this school-aged subsample were classified as hungry, 49% (161/328) were classified as at-risk for hunger, and 34% (111/328) were classified as not hungry, virtually identical with the percentages obtained in the Pittsburgh and Allegheny County CCHIP sample as a whole and similar to those found in other CCHIP samples.[4] Children in the 3 hunger groups did not differ significantly with respect to gender, age, or single-parent family status.

PSC Score

The mean PSC score for the sample as a whole was 12.5 [SD, 9.9; range, 0 to 47 (Table 2)]. Hunger status was significantly related to total PSC score. The mean PSC score of hungry children was 18.0, compared with 13.4 for children who were at-risk for hunger and 8.4 for not hungry children, (F, 20.6; df, 2, 325; $P < .0001$). Eight percent of the children (25/328) received scores of 28 or greater on the PSC and were thus classified as "cases." As hypothesized, hungry children were significantly more likely to be classified as dysfunctional by the PSC than not hungry children or children who were at-risk for hunger. Twenty-one percent of hungry children (12/56) were classified as dysfunctional by the PSC, compared with 6% of at-risk for hunger children (10/161) and 3% of not hungry children (3/111; χ^2, 19.4; df, 2; $P < .01$).

CCHIP hunger status was also associated with several other parent-reported indicators of global psychosocial functioning that were assessed on the PSC form. Hungry children were significantly more likely to be receiving special education services (χ^2, 6.8; df, 2; $P < .05$), with 29% of hungry children (16/56), 15% (24/161) of at-risk for hunger children, and 14% (15/111) of not hungry children receiving special education services. Hungry children were also significantly more likely to have a past or current history of mental health counseling than other children in the sample (χ^2, 9.5; df, 2; $P < .01$) with 21% (12/56) of hungry children, 12% (20/161) of at-risk for hunger children, and 5% (6/111) of the not hungry children having a history of mental health counseling. Hunger status also seemed to be related to a child's history of academic failure (repeating a

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TABLE 2. Relationship Between Child Hunger, Background Factors, and Psychosocial Impairment

	Total, n (%)	Hungry, n (%)	At-risk, (n %)	Not Hungry, n (%)
Full sample	720 (100%)	113 (16%)	349 (48%)	258 (36%)
School-age sample	328 (53%)	56 (17%)	161 (49%)	111 (34%)
Gender				
Male	175 (53%)	32 (57%)	82 (51%)	61 (55%)
Female	153 (47%)	24 (43%)	79 (49%)	50 (45%)
Mean age	8.4	8.4	8.5	8.3
Single parent family				
No	120 (37%)	16 (29%)	62 (39%)	42 (38%)
Yes	208 (63%)	40 (72%)	99 (62%)	69 (62%)
History of mental health counseling				
No	290 (88%)	44 (79%)	141 (88%)	105 (95%)
Yes	38 (12%)	12 (21%)	20 (12%)	6 (5%)*
Receiving special education services				
No	273 (83%)	40 (71%)	137 (85%)	96 (87%)
Yes	55 (17%)	16 (29%)	24 (15%)	15 (14%)*
Repeated a grade				
No	270 (82%)	42 (75%)	130 (81%)	98 (88%)
Yes	58 (18%)	14 (25%)	31 (19%)	13 (12%)†
PSC mean score	12.5	18.0	13.4	8.4*
PSC case	25 (8%)	12 (21%)	10 (6%)	3 (3%)*

* $P < .05$, results from 3-way analysis.
† $P < .10$, results from 3-way analysis.

grade), although differences reached only marginal statistical significance ($P < .10$). Twenty-five percent (14/56) of hungry children, 19% (31/161) of the children at-risk for hunger, and 12% (13/111) of not hungry children had repeated a grade.

PSC Items and Hunger Status

Thirty-one of the 35 individual PSC items were significantly ($P < .05$) correlated with hunger status and an additional item was marginally ($P < .10$) correlated, with correlations ranging from $r = .29$ to $r = .08$. Even using a Bonferroni correction to control for multiple significance testing, 22 individual items on the PSC were associated (at $P < .001$) with hunger status.

The six PSC items that had the highest correlations (.21 or higher) with the CCHIP "hungry" category are listed in Table 3. Five of these 6 symptoms could be viewed as symptoms of conduct disorder and the sixth, item number 23: "Wants to be with you more than before," reflects either anxiety or depression. As an example of what these associations mean for children in this sample: 21% of hungry children were rated as fighting often compared with 6% of at-risk for hunger children and 3% of not hungry children. Furthermore, 12% of hungry children, 2.5% of at-risk children, and .9% of not hungry children were rated as often taking things that did not belong to them. Thus, in this sample of poor children, the prevalence of fighting was 7 times higher in families that reported many experiences of hunger than in families that reported none. The prevalence of stealing was 12 times higher in hungry families than in not hungry families.

Factor Scores and Hunger Status

A Principal Component Analysis with Varimax rotation was used to extract factor scores from the PSC. Eight factors that explained 55.2% of the variance of PSC scores were extracted using this analysis (Table 4). Because preliminary analysis of factor scores showed that more than half did not have near-normal distributions, mean factor scores of hungry, at-risk for hunger, and not hungry children were compared using Kruskal-Wallis Analysis of Variance, a nonparametric statistical test. This analysis showed that hungry children had significantly higher mean rank scores on 2 of the 8 factors (Table 5). On the oppositional/aggression factor, hungry children had a mean rank score of 185.8 compared with 169.5 for at-risk for hunger children and 135.9

TABLE 3. Correlations of Pediatric Symptom Checklist Items and Children's CCHIP Status: "Hungry"

PSC Item	Pearson Correlation Coefficient
16. Fights with other children	($r = .29$)
23. Wants to be with you more than before	($r = .25$)
33. Blames other for his/her problems	($r = .25$)
5. Has trouble with a teacher	($r = .22$)
29. Does not listen to rules	($r = .21$)
30. Takes things that do not belong to him/her	($r = .21$)

* All correlations significant at the $P < .05$ level.

TABLE 4. Factors Extracted From the Pediatric Symptom Checklist Using Principal Components Analysis With Varimax Rotation

Factor	% Variance Explained
1. Oppositional behavior/aggression	27.0
2. Attention problems	5.9
3. Irritability/anxiety/worry	4.7
4. Depression	4.1
5. Hyperactivity/impulsivity	4.0
6. Antisocial behavior	3.5
7. School problems	3.1
8. Somatization	2.9

TABLE 5. Mean Rank Factor Score Comparison of Hungry, At-Risk for Hunger, and Not Hungry Children (n = 321)*

Factor	Mean Rank Factor Score		
	Hungry (n = 56)	At-risk (n = 157)	Not Hungry (n = 108)
1. Oppositional behavior/aggression†	185.8	169.5	135.9
2. Attention problems	169.9	162.5	154.2
3. Irritability/anxiety/worry†	192.7	162.5	141.2
4. Depression	162.3	161.3	159.9
5. Hyperactivity/impulsivity	175.9	162.7	150.8
6. Antisocial behavior	163.9	167.9	149.5
7. School problems	178.6	161.0	151.9
8. Somatization	180.2	155.3	159.4

* Cases with missing data on any item were removed for this analysis, resulting in a sample of 321.
† $P < .01$.

for not hungry children ($\chi^2 = 13.21$; $P < .01$). Hungry children also had significantly higher mean rank factor scores on the irritability/anxiety factor (192.7) than at-risk for hunger (163.4) or not hungry (141.2) children ($\chi^2 = 11.6$; $P < .01$). Hungry children had higher scores than at-risk and not hungry children on the other 6 factors as well, although the findings did not reach statistical significance.

DISCUSSION

Studies have consistently shown that poverty is one of the most powerful predictors of psychiatric and functional problems in children.[28] In addition to the lack of money to pay for the basic needs of family life, poverty is also associated with higher rates of marital discord, single parenthood, family dysfunction, family and neighborhood violence, and parental psychopathology than in more advantaged families.[28–32] These multiple stressors put low-income children at significantly greater risk for the development of psychosocial problems than their more advantaged peers.

The data from this study reveal that hunger may constitute another of these poverty-related burdens and seems to have a unique impact on the daily psychosocial functioning of poor children. In this rigorously selected community sample of low-income children, hungry children were 3 times more likely than at-risk for hunger children and 7 times more likely than not hungry children to receive scores indicative of clinical dysfunction on the PSC. Comparison of mean PSC scores also confirmed this

relationship between psychosocial dysfunction and child hunger by showing twice the overall level of symptomatology in hungry than in nonhungry children. The same pattern of at least doubling of risk was found when other indicators of psychosocial dysfunction like special education and repeating a grade were examined. Analysis of specific symptoms revealed that hungry children were 7 to 12 times more likely to exhibit symptoms of conduct disorder than not hungry children. In addition, the PSC case rate (8% in this sample) was consistent with case rates of 7 to 11% found in recent large-scale studies of low-income populations using an oral administration of the PSC,[33,34] although lower than the rate found in earlier studies using the standard written administration with African-American children.[27]

Although poverty puts a child at-risk for dysfunction, the added burden of periodic experiences of hunger may increase the chance of psychosocial dysfunction and may produce some important negative behavioral sequelae. Specifically, the findings from this study suggest that hungry children demonstrate higher levels of anxious and irritable, aggressive and oppositional behaviors than their low-income, but not hungry, peers. These findings complement studies of the behavioral effects of more severe, chronic undernutrition in developing countries which have found that school-age hungry children are more likely to be anxious and irritable, and suggest that the relationship between aggression and hunger should be further explored in future research.[16,17,22,23] Many of the oppositional and aggressive behaviors found prevalent in our sample may be interpreted as an understandable behavioral response to the additional stress and anxiety imposed by periodic hunger. Thus, when health care providers encounter cases of psychosocial dysfunction in their low-income patients, they should be mindful of the possibility of household food shortages and consider food-assistance related interventions such as referrals to food stamp programs, food pantries, school meal, or summer food programs.

A correlational study design like the current one cannot prove a causal relationship between hunger and behavioral problems. Although it is possible that hunger causes the types of behavior problems documented in the current study, it is also possible that hunger is less of a cause than a correlate of still another variable. For example, in families in which the parents are emotionally drained by chronic illness, or in which the constant struggle to make ends meet precludes planning for food purchases, or in which spending for alcohol or drugs receives a higher priority than food, hunger may be more an effect than a cause. Experiences of hunger may occur more often in these families but the other problems may play a larger role in undermining the children's functioning.

Several potential limitations of the current study should be noted. The fact that CCHIP data on the prevalence of food insufficiency and hunger is based on parent reports raises several issues. First, a parent report of multiple family experiences of food insufficiency does not necessarily mean that each child in the family has had the same experience, and even if the children have experienced food insufficiency, it does not follow that they have suffered from a clinically significant state of undernutrition. For now, however, short of inducing hunger in children in a laboratory setting to develop physiological measures, CCHIP seems to provide an acceptable way of estimating the prevalence of hunger and its relationship to other factors. In fact, parent-reported measures of food insufficiency offer methodological advantages more than other hunger measures. Because the CCHIP survey includes questions concerning feelings of deprivation or restricted food choices based on generally accepted norms (ie, being able to purchase enough food to feed everyone in a household without relying on begging, scrounging, stealing, etc.),[3] use of the CCHIP measure allows researchers to quantify the social as well as psychological consequences of food deprivation that are not addressed using biological and/or anthropometric measures alone.

Reliance on parent reports of child psychosocial symptomatology and of child hunger also introduces the possibility of confounding because both reports might be unduly biased by factors such as parental dysfunction or distress.[35,36] This question may be resolved by our ongoing study of the association between parent-reported CCHIP hunger status and child psychosocial functioning using child-report and school record data. Second, the current study, like other CCHIP studies, made use of lay interviewers working under the auspices of a community-based antihunger group, which introduces the possibility of bias. The designers of the CCHIP survey methodology were aware of this bias risk, but determined that it was more than outweighed by the benefit of higher response rates and an interview context that facilitated honest, frank responses to potentially embarrassing and stigmatizing questions.

Whether hunger is a cause or a correlate of aggressive behavior and emotional problems in poor children, the fact that these problems are far more prevalent in children whose parents report multiple experiences of hunger suggests both the possibility of and the need for intervention. Problems such as fighting, stealing, and anxiety are more common in hungry, low-income school-age children in our sample 5 to 10 years before they seem in society as increased rates of violence, underachievement, and substance abuse. Given the enormous emotional and financial impact of the association between repeated episodic hunger and psychosocial dysfunction, further research into this relationship and useful social policy interventions are warranted. Recent federal cuts in the safety net of public assistance to low-income families make this an urgent public policy challenge.

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