Food Insecurity Is Associated with Past and Present Economic Disadvantage and Body Mass Index

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ABSTRACT  Fears and experiences of food restriction influence eating behavior but the association between past and present economic disadvantage, food insecurity and body size is poorly understood. Therefore, we examined these associations in a nationwide, representative sample of 25- to 64-y-old Finnish men and women (n = 6506). The respondents were classified by their body mass index (BMI) into four groups: thin, normal, overweight and obese. Economic disadvantage was assessed by three indicators including low household income, unemployment during past 5 y and long-term economic problems in childhood. Food insecurity was assessed by five separate items concerning economic fears and experiences related to sufficient supply of food during the past 12 mo, and a combined scale in which those with affirmative responses to four to five items were classified as hungry. Multivariable logistic regression analyses were conducted using both the BMI grouping and indicators of economic disadvantage as independent variables to predict food insecurity, controlling simultaneously for age, educational attainment and sex. The results showed that low household income, recent unemployment and economic problems in childhood were all predictors of food insecurity. Thin people were most likely to be hungry and showed most food insecurity in five separate items. In addition, obese people reported more buying cheaper food due to economic problems and fears or experiences of running out of money to buy food than did normal weight subjects.


KEY WORDS:  food insecurity  economic disadvantage  body mass index

In affluent societies people are constantly surrounded by food and problems associated with excess energy intake are increasing. Adult obesity is becoming a more serious problem than undernutrition even in many developing countries (1). It is tempting to believe that the availability of food or experience of hunger are not widely experienced serious problems in affluent societies (2), especially because thinness is more common among those with high socioeconomic status and an inverse relationship between body weight and socioeconomic status is often found (3).

Nevertheless, economic constraints are likely to limit the available dietary options in affluent societies. A recent study shows that ~8% of U.S. households were food insecure without hunger, that is, they were concerned about adequate food supply, substituted foods with cheaper ones, and reduced the quality and variety of their diets. Moreover, 4% of the households showed a reduction in food intake during the study (4). Although hunger rates decline with raising income, food insufficiency is not limited to very low income persons and households. Events that jeopardize household budgets, such as losing a job or gaining a new household member, may be associated with food insufficiency (5). Over one-half of food-insufficient individuals have been found to live in employed families (6).

Fears and experiences of food restriction are likely to affect the quality of diet and eating behavior in many ways. Healthy diets tend to cost more than energy-dense food (7–9), and this may influence dietary intake and eating patterns. Lower intake of energy and nutrients has been found among women using emergency food assistance and reporting experiences of hunger (10), and elderly individuals and women from food-insufficient households (11). People with limited resources may decrease their intake of vegetables and fruits and show disordered eating patterns (12). They may also skip meals (13), but choose more energy-dense foods to prevent hunger (14) and consume food in excess when money is again available. Previous studies suggest that both voluntary and involuntary food deprivations result in a variety of cognitive and behavioral changes, such as preoccupation with food and eating (15). In addition to the quantitative and qualitative aspects, hunger or food insecurity also has psychological and social components. Although hunger is managed differently by various households, there tends to be a general sequencing of the experience of hunger. Food anxiety is often experienced first, and the quality of food is generally affected before the intake quantity (16).

The association between body size, economic disadvantage and food insecurity is poorly understood, however. Chronic lack of economic resources may lead to food insufficiency that can result in malnutrition and underweight. In contrast, many
studies show that socioeconomic disadvantage during childhood (17–20), living in a deprived area (21), low income (22,23) or decrease in household income (24), and experiencing unemployment (25,26) increase the risk of weight gain in some population groups, probably mostly due to untoward behavioral changes. Fears of future economic problems may additionally affect body size. According to a recent study, white-collar employees with threatened job security gained weight. This trend could not be explained by changes in smoking, drinking or exercise habits (27). Unfortunately, changes in dietary habits were not evaluated in this study. It is possible that experiences and fears of economic problems lead to food insecurity, which, in turn, may lead to dietary patterns that favor weight gain.

Indeed, some studies suggest that economic problems resulting in food insecurity may contribute to obesity. Cyclical or episodic periods of food insecurity due to economic problems seem to alter eating behavior and promote weight gain in children (14), and a study of rural women of child-bearing age and having children at home showed that food insecurity in the household is related to obesity (28). A recent study by Townsend et al. (29) confirmed that food insecurity, especially adjustments for the quality of food eaten in the household, is positively related to overweight in women in the United States. However, otherwise, we lack studies that address these issues at the population level.

We examined whether economic disadvantage and body size are associated with food insecurity, using a nationwide representative sample of working-aged adults from Finland. We hypothesized that both past and present economic disadvantage are associated with food insecurity. Additionally, we hypothesized that less severe forms of food insecurity, such as food anxiety or impaired quality of diet, may contribute to obesity, whereas more severe forms, when the quantity of food is reduced, are more likely to be associated with thinness.

**MATERIALS AND METHODS**

The data were from a Finnish “Survey on Living Conditions” collected in 1994 by the government statistical authorities, Statistics Finland. The sample satisfactorily represents the noninstitutional population 15 y of age or older. The data were collected by personal face-to-face interviews (n = 8650) with a 73% response rate (30,31). We included only working-aged, i.e., 25- to 64-y-old subjects (n = 6506) in our study. Income data for 1993 were linked from the taxation register, and completed education from the national register of educational degrees at Statistics Finland. Completed educational attainment was categorized into three groups: higher (≥13 y), secondary (10–12 y), and basic (≤9 y). Age was categorized into 5-y age groups.

**Body mass index (BMI)**

BMI was calculated using self-reported information on body height and weight. The subjects were classified according to BMI into four groups: thin (BMI < 20 kg/m²), normal weight (BMI = 20–24.9 kg/m²), overweight (BMI = 25–29.9 kg/m²) and obese (BMI ≥ 30 kg/m²). This classification is widely used and recommended in Finland and other Scandinavian countries (32) and, except for the higher cut-point between normal weight and thinness than that used by the World Health Organization (18.5 kg/m²), it is in agreement with the one recommended by the World Health Organization (1).

**Indicators of economic disadvantage.** Three indicators of economic disadvantage were used. Early economic disadvantage was assessed by asking the respondents to report whether they had had long-term economic problems in their childhood family. Economic insecurity in the recent past was assessed by asking the respondents whether they had experienced unemployment within past 3 y. Current economic situation was assessed by register-based data on house-
although one single item, being without food at least a day, was not significant (Table 2).

Both thinness and obesity were associated with food insecurity, but the association was somewhat stronger among thin people who were most likely to be food insecure by all five single-item indicators. Moreover, the summary scale confirmed that only thinness was associated with hunger. Compared with normal weight people, obese people were also more likely to have fears of running out of money to buy food and to report both experiences of running out of money and buying cheaper food due to economic problems during the past 12 mo. However, obese people were not more likely to report receiving too little food or being without food due to economic problems. Moreover, mildly overweight people were least likely to report that they had too little food due to lack of money.

DISCUSSION

Food insecurity is a complex and multidimensional phenomenon. According to Life Sciences Research Office, food

### TABLE 1

Prevalence of food insecurity among respondents with economic disadvantage and in different body mass index (BMI) groups (n = 6506)

<table>
<thead>
<tr>
<th>Economic disadvantage</th>
<th>Fears of running out of money to buy food (n = 565)</th>
<th>Run out of money to buy food (n = 705)</th>
<th>Had too little food due to lack of money (n = 217)</th>
<th>Bought cheap food due to economic problems (n = 1,657)</th>
<th>Without food for at least a day (no money; n = 104)</th>
<th>Affirmative response to four or five food insecurity items (n = 175)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low household income per consumption unit</td>
<td>1,584 (17.4)</td>
<td>18.9</td>
<td>6.8</td>
<td>41.0</td>
<td>3.0</td>
<td>5.7</td>
</tr>
<tr>
<td>Unemployed within 5 y</td>
<td>2,087 (15.5)</td>
<td>19.0</td>
<td>6.7</td>
<td>38.1</td>
<td>3.6</td>
<td>5.4</td>
</tr>
<tr>
<td>Long-term economic problems in childhood</td>
<td>1,594 (12.5)</td>
<td>16.2</td>
<td>5.7</td>
<td>34.1</td>
<td>2.8</td>
<td>4.9</td>
</tr>
<tr>
<td>BMI, kg/m²</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 20</td>
<td>345 (14.5)</td>
<td>17.4</td>
<td>6.4</td>
<td>35.9</td>
<td>2.9</td>
<td>5.8</td>
</tr>
<tr>
<td>20–24.9</td>
<td>2,957 (8.4)</td>
<td>11.1</td>
<td>3.8</td>
<td>26.5</td>
<td>1.6</td>
<td>2.7</td>
</tr>
<tr>
<td>25–29.9</td>
<td>2,398 (7.8)</td>
<td>9.4</td>
<td>2.5</td>
<td>22.7</td>
<td>1.4</td>
<td>2.3</td>
</tr>
<tr>
<td>&gt; 30</td>
<td>774 (9.8)</td>
<td>11.6</td>
<td>3.1</td>
<td>27.0</td>
<td>1.7</td>
<td>2.7</td>
</tr>
</tbody>
</table>

1 The percentages indicate affirmative responses to respective food insecurity item among those who belong to respective economically disadvantaged group. All differences between affirmative and nonaffirmative questions were statistically highly significant (Pearson χ² tests, P < 0.0001).

2 The percentages indicate affirmative responses to respective food insecurity item in each BMI category. Pearson χ² tests were statistically highly significant for fears of running out of money to buy food (P < 0.0001), experiences of having run out of money to buy food (P < 0.0001), having bought cheaper food due to economic problems (P < 0.0001), having too little food due to lack of money (P = 0.001) and giving affirmative responses to four to five food insecurity items (P = 0.002), and non-significant for being without food for at least a day (P = 0.215).

### TABLE 2

The associations of economic disadvantage and body mass index (BMI) with indicators of food insecurity

<table>
<thead>
<tr>
<th>Economic disadvantage</th>
<th>Fears of running out of money to buy food</th>
<th>Run out of money to buy food</th>
<th>Had too little food due to lack of money</th>
<th>Bought cheap food due to economic problems</th>
<th>Without food for at least a day (no money)</th>
<th>Affirmative response to four or five food insecurity items</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low household income per consumption unit</td>
<td>2.2 (1.8–2.7)</td>
<td>1.6 (1.4–2.0)</td>
<td>1.9 (1.4–2.6)</td>
<td>2.0 (1.8–2.3)</td>
<td>1.3 (0.9–2.0)</td>
<td>2.0 (1.4–2.7)</td>
</tr>
<tr>
<td>Unemployed within 5 y</td>
<td>2.3 (1.9–2.7)</td>
<td>2.2 (1.9–2.6)</td>
<td>2.8 (2.1–3.7)</td>
<td>2.0 (1.8–2.3)</td>
<td>4.2 (2.6–6.6)</td>
<td>2.7 (1.9–3.7)</td>
</tr>
<tr>
<td>Long-term economic problems in childhood</td>
<td>1.9 (1.5–2.3)</td>
<td>2.3 (1.9–2.8)</td>
<td>2.4 (1.8–3.2)</td>
<td>2.0 (1.7–2.3)</td>
<td>2.5 (1.6–3.8)</td>
<td>2.6 (1.9–3.6)</td>
</tr>
<tr>
<td>BMI, kg/m²</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 20</td>
<td>1.6 (1.1–2.2)</td>
<td>1.4 (1.0–1.9)</td>
<td>1.6 (1.0–2.6)</td>
<td>1.2 (0.9–1.6)</td>
<td>2.1 (1.0–4.3)</td>
<td>2.0 (1.2–3.4)</td>
</tr>
<tr>
<td>20–24.9</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>25–29.9</td>
<td>1.1 (0.9–1.3)</td>
<td>1.0 (0.8–1.2)</td>
<td>0.7 (0.5–1.0)</td>
<td>1.0 (0.9–1.2)</td>
<td>0.7 (0.5–1.2)</td>
<td>0.9 (0.6–1.3)</td>
</tr>
<tr>
<td>&gt; 30</td>
<td>1.4 (1.1–1.9)</td>
<td>1.3 (1.0–1.8)</td>
<td>0.9 (0.6–1.5)</td>
<td>1.2 (1.0–1.5)</td>
<td>1.1 (0.6–2.0)</td>
<td>1.1 (0.7–1.8)</td>
</tr>
</tbody>
</table>

1 OR and their 95% CI. Models control for age, sex and educational attainment. All indicators of economic disadvantage and BMI are simultaneously in the models.

2 Reference categories (OR = 1.0) for each three forms of economic disadvantage are those without respective economic disadvantage.
FOOD INSECURITY, ECONOMIC DISADVANTAGE AND BODY SIZE

insecurity exists whenever the availability of nutritionally adequate and safe foods or the ability to acquire acceptable foods in socially acceptable ways is limited or uncertain (35). In addition to material quality and quantity, food insecurity includes psychological and sociocultural dimensions (2,16). Food insecurity is not limited to those who have inadequate nutrient and energy supplies. Food insecurity exists when people lack choice, fear running out of food, or are forced to make major changes in their preferred eating habits due to economic constraints. The results of this study are consistent with this broad scope of food insecurity.

Our results show that economic disadvantage, even in the distant past, is associated with food insecurity, and both thin and obese people are more likely to report experiences and fears of food insecurity. There are several potential explanations for this finding but the current evidence for physiological explanations is likely to be quite limited. Chronic episodes of food insufficiency may lead to weight loss (36), but the majority of current studies do not support an adverse effect of weight loss or weight cycling on metabolism (37). In addition, the evidence linking early undernutrition to future risk of obesity is limited and contradictory (38). Therefore, explanations for our findings should be searched among key social and behavioral factors.

As can be expected, current economic disadvantage, in our study, belonging to the lowest quintile of the household income distribution, was associated with food insecurity. Moreover, both experiencing economic problems in childhood and unemployment within the past 5 years were independently associated with all indicators of food insecurity. In keeping with previous studies (18,39), these findings stress the importance of the life-course perspective and the influence of childhood circumstances on adult life, although pathways underlying these observations are not fully understood. It is known that behavioral models and dietary tastes are established very early (8), and restricting access to palatable foods may affect children’s behavioral response to food (40). In addition, if households turn to cheaper foods with inferior nutritional quality when money is tight (2), then this may result in eating patterns that contribute to childhood obesity (14) and may teach children to use similar behavioral patterns in adulthood. Moreover, sustained economic hardship during adult life increases the risk of having difficulties with daily activities, such as cooking, shopping and managing money (39).

In conclusion, experiences of food deprivation may affect social and psychological security throughout life. Food deprivation may further result in a variety of behavioral and cognitive changes, including preoccupation with food and eating (15). Long-term unemployment is likely to cause special problems even when food is available, because people have to live with chronic economic difficulties (41). There is also some evidence that low socioeconomic status leads to psychosocial stress, promoting central obesity through psychoneuroendocrinological pathways (42).

Although thinness is often found to be associated with higher socioeconomic status (3), thin people in this study were most likely to give affirmative responses to all separate food insecurity items and, furthermore, showed increased risk for hunger. Our results suggest that even in developed welfare states, such as Finland, some people are hit by circumstances in which they are forced to reduce their intake of food due to economic problems. Previous studies have shown that food insecurity and hunger may be common among some special vulnerable groups, such as immigrants (43). However, our data do not allow us to examine whether these people would be overrepresented in our group of thin people. The data were collected during a period of deep economic recession including very high unemployment and increasing long-term unemployment (44). Consequently, economic and social problems increased in Finland. Under such conditions, special vulnerable groups may be borne in which serious weight- and food-related problems, such as thinness due to lack of food, are enhanced (45). Nevertheless, although thin people were most likely to report food insecurity, thinness was quite rare. Only 5% of our sample could be classified as thin, whereas 12% were obese.

Obese people were more likely to report buying cheaper food and having fears or experiences of running out of money to buy food, indicating food anxiety and reduced quality of the diet. It is possible that economic problems enhance food insecurity, which, in turn, may lead to eating patterns that favor the intake of fat-rich food to prevent hunger (14). It is further possible that eating patterns change so that foods are consumed in excess when money is available again.

There are a number of potential caveats in this study. The data are cross-sectional and do not allow causal judgments. BMI was calculated from self-reported data. Moreover, although there is substantial amount of research on the validation of questionnaire-based measures of food insecurity (46–49), the validity of our questions on food insecurity is unknown. The five items included in our study were adapted, without direct validity testing, from a Canadian survey (34). Nevertheless, except for questions that focus on reduced food intake among children, these items cover all other key areas presented in the extensively tested core module of the U.S. Census Bureau’s Food Security Supplement in Current Population Survey (46). Cognitive tests of these food insecurity questions would be vital, as suggested by Alaimo et al. (50).

Unfortunately, we lack such tests in the Finnish setting and it remains unclear what the questionnaire items are strictly measuring from the perspective of the respondents. Furthermore, although previous studies report that food insecurity is associated with decreased nutrient intake (10–12), it is not known how well our items of food insecurity are associated with nutrient intake or the nutritional status. Although hunger and food insecurity were associated with thinness, we do not have information about potential malnutrition in a clinical sense.

This study used population survey data, and this method may not capture the most severely disadvantaged people.

In conclusion, our study suggests that past and present economic disadvantage may give rise to food insecurity, which is likely to be related to abnormal low and high body weight.

To further confirm this finding, we need focused, longitudinal, in-depth studies on the social, behavioral and physiological pathways through which serious food insecurity is produced.

LITERATURE CITED