

The association of body mass index with social and economic disadvantage in women and men

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Background	Although an inverse relationship between socioeconomic status and body mass index (BMI) is well documented, broad population studies focusing on the association between BMI and various forms of disadvantage such as unemployment, low income or social isolation are rare.
Methods	A nationwide, representative sample of 25–64-year-old Finnish subjects (n = 6016) was classified according to their BMI into four groups: 'thin' (BMI <20), 'normal' (BMI 20–24.9), 'overweight' (BMI 25–29.9) and 'obese' (BMI ≥30). Multivariable analyses using logistic regression were conducted with this BMI-grouping as an independent variable to predict social and economic disadvantage, controlling simultaneously for age, educational attainment, region of residence, and limiting long-standing illness.
Results	In women, overweight was associated with current unemployment and obesity with long-term unemployment as well as absence of close friends outside the family circle. Both overweight and obesity were associated with low individual earnings. Obese women were also most likely to have low household disposable and individual incomes; a similar pattern was seen among thin women. A small subgroup of thin men were socially and economically disadvantaged with all our indicators whereas excess body weight was not problematic for men.
Conclusions	Deviant body weight is associated with social and economic disadvantage in a gender-specific and partly curvilinear way. In particular, obese women face multiple social and economic disadvantage.
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The prevalence of obesity has risen recently in Europe^{1,2} as well as in the US³ and it is an increasingly well-recognized public health problem. In the affluent societies obesity is more common among the low socioeconomic groups, especially in women.^{2,4} Recent studies indicate that differences in body mass index between educational groups have even been increasing during the last few decades.^{5,6} The reasons for this are not well understood. It has been suggested that genetic factors may play a role here. In addition, the causal relationship between social status and body weight may be bidirectional: obesity affects social status and vice versa.⁷ Low socioeconomic status and economic constraints may restrict behavioural options such as access to healthy foods or safe exercise.⁸ Furthermore, specific problems such as low income level,⁹ unemployment^{10–12} and social isolation¹³ may increase the likelihood of weight changes.

Since obesity is negatively valued in affluent societies it is likely to contribute to social and economic disadvantage; it may increase social discrimination and hamper socioeconomic advancement, whatever the original cause of obesity. Low educational attainment or health-related problems among those with deviant body weight may further contribute to employment difficulties and economic problems.

Indeed, studies on unemployment and income have reported problems related to body weight. Discrimination against obese job applicants, especially women, has been documented in simulated job interviews^{14,15} and occasionally in the labour market,^{16,17} however population-based surveys have failed to confirm this¹⁸ and report only thinness related problems among unemployed males.^{10,18}

Inconsistent results are reported for studies based on self-reported income data. Obese women have higher rates of poverty^{19,20} and obese adolescent women earn less than their non-obese peers. However, there does not seem to be such a

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clear relationship between obesity and income in young males.^{17,19,21} Jeffery *et al.*²² found a curvilinear association for family income in women: the highest incomes were seen in normal weight women and the lowest among the obese. Among men, the lowest incomes were seen among the thinnest subjects.

External appearance plays an important role in social relationships, and subjects with divergent body size may be regarded as being less attractive than their 'normal' peers.²³ Obese people tend to avoid social situations^{24,25} which can increase feelings of loneliness and the risk of social exclusion. Previous studies have suggested that obese adolescents¹⁹ and subjects with very low or high body weight are less likely to marry,²² whereas entrance to marriage is also associated with weight gain in both sexes²⁶ or in men only.²⁷ So far there seems to be no consensus about any consistent relationship between marital status and obesity.

Previous studies have mostly concentrated on a specific problem at a time or studies have been conducted among selected groups of people only. Mostly the analyses have not controlled for weight-related factors other than age or smoking. There is a lack of broad population studies using a multidimensional framework to examine weight-related social and economic problems and a need to include other factors that may be associated with these problems, such as educational attainment, region of residence and health status, in addition to gender and age.

The aim of this study was to examine the association of body mass index (BMI) with several dimensions of social and economic disadvantage after controlling for a number of confounders. This was done in a representative population survey in Finland, with special reference to differences between women and men. We address the problem whether deviant body weight associates with social and economic disadvantages; the cross-sectional design of our study does not allow the study of causal relationships.

Material and Methods

The data derive from the nationwide Finnish 'Survey of Living Conditions' collected in 1994 by the government statistical authorities, Statistics Finland. The sample satisfactorily represents the non-institutional population aged ≥ 15 years. The data were collected by computer-aided personal face-to-face interviews ($n = 8650$, 73% response rate).^{28,29} We excluded all women with children < 4 years old and included only 25–65-year-old subjects ($n = 6016$, 45% female). Individual and household income for 1993 was linked to the data from the taxation register and completed education from the national register of educational degrees at Statistics Finland.

Body mass index

The body mass index (BMI) was calculated using self-reported information on body height and weight (weight [kg]/height [m^2]). The subjects were classified according to BMI into four groups: 'thin' (BMI $< 20 \text{ kg/m}^2$), 'normal' (BMI $20\text{--}24.9 \text{ kg/m}^2$), 'overweight' (BMI $25\text{--}29.9 \text{ kg/m}^2$), 'obese' (BMI $\geq 30 \text{ kg/m}^2$).

Indicators of social and economic disadvantage

Two indicators of employment status were used. Currently unemployed included all respondents who were out of paid work, but who were available for work and were looking for a job. The

long-term unemployed included those who had been unemployed for > 24 months within the past 5 years.

Three different indicators of low income were used: (1) low household disposable income per consumption unit (lowest fifth) calculated using the OECD formula;³⁰ (2) low gross individual earnings (less than half of the median); (3) low net individual income after income transfers and taxes (lowest fifth).

Social isolation was estimated using three different indicators: (1) living without a partner (not married or cohabiting); (2) absence of close and trustworthy friends outside the family circle; and (3) permanent or frequent feelings of loneliness.

Controlled variables

Age was categorized into 5-year age groups.

Region of residence was divided into four broad categories: Southern, Western, Eastern, and Northern Finland.

Completed educational attainment was categorized into three groups: (1) 'High' (≥ 13 years); (2) 'Secondary' (about 10–12 years); and (3) 'Basic' (≤ 9 years).

The subjects' health status was classified as follows:³¹ (1) no long-standing illness; (2) long-standing illness that does not limit daily activities; (3) long-standing illness that limits daily activities at least to some extent; and (4) long-standing illness that limits daily activities to a great deal.

Logistic regression analysis

The statistical analysis was performed using multivariable logistic regression analysis with the GLIM program package.^{32,33} Models were fitted with BMI-grouping as an independent variable to examine associations with our indicators of social and economic disadvantage. To control for age, educational attainment, region of residence and limiting long-standing illness these variables were fitted in the model before the BMI variable. All analyses were made separately for men and women.

The results are presented as odds ratios (OR) and their 95% confidence intervals (CI). The normal weight group serves as the reference category with an odds ratio (OR) equal to 1.00.

Results

Descriptive analysis in Table 1 shows that age as well as proportion of low education were positively associated with body weight. The proportion of those married or cohabiting was largest for the overweight group for both genders. Living in Southern Finland was most common in the thin group particularly for women. Limiting long-standing illness was most prevalent among obese women and men. The proportion of the currently unemployed was highest in overweight and obese women, and in thin men. Highest average income was found for the normal weight subjects in men and women, except for gross individual earnings which were equal for both thin and normal weight women.

The analysis was then continued using multivariable logistic regression analysis. In women, overweight was associated with current unemployment (OR = 1.4, 95% CI : 1.0–1.8) whereas obese women were most likely to report long-term unemployment (OR = 2.5, 95% CI : 1.5–4.2) (Table 2). In men, in contrast, thinness was associated with long-term unemployment (OR = 2.2, 95% CI : 1.0–5.0). A similar association, although not statistically significant, was found for thin men's current unemployment.

Table 1 Subject characteristics by body mass index (BMI)

	BMI (kg/m ²)			
	<20	20–24.9	25–29.9	≥30
Women (n)	238	1301	816	348
Age, mean, years	39.4	42.5	48.3	49.2
Only basic education, %	26.0	32.1	45.2	50.0
Married or cohabiting, %	66.1	69.8	72.5	67.8
From Southern Finland, %	60.4	50.7	46.2	41.1
Limiting long-standing illness, %	30.7	26.3	39.6	45.7
Currently unemployed, %	12.7	12.4	16.6	16.3
Mean household income per consumption unit, FIM ^a	76 985	81 068	80 732	73 964
Mean gross individual earnings, FIM	77 647	77 531	63 808	54 061
Mean individual net income after transfers, FIM	118 284	120 330	110 396	100 607
Men (n)	60	1370	1478	405
Age, mean, years	40.3	41.7	44.7	46.8
Only basic education, %	30.0	28.4	36.6	44.2
Married or cohabiting, %	51.7	74.2	78.9	75.8
From Southern Finland, %	53.3	49.7	44.1	41.2
Limiting long-standing illness, %	31.2	23.1	27.5	38.3
Currently unemployed, %	20.0	14.8	13.7	17.0
Mean household income per consumption unit, FIM	71 840	81 655	81 248	79 027
Mean gross individual earnings, FIM	80 119	103 526	100 274	86 231
Mean individual net income after transfers, FIM	140 335	168 185	164 447	149 418

^a Finnish Marks.**Table 2** The association of social and economic disadvantage with body mass index (BMI) among women and men. Odd ratios and their 95% confidence intervals by BMI group (models control for age, education, region of residence and limiting long-standing illness)

	BMI (kg/m ²)			
	<20	20–24.9	25–29.9	BMI ≥30
Women				
Currently unemployed	1.1 (0.7–1.7)	1.0	1.4 (1.0–1.8)	1.2 (0.9–1.8)
Long-term unemployment	1.4 (0.7–2.8)	1.0	1.2 (0.7–1.9)	2.5 (1.5–4.2)
Low household income per consumption unit	1.5 (1.0–2.1)	1.0	0.9 (0.7–1.2)	1.6 (1.1–2.2)
Low gross individual earnings	1.2 (0.9–1.7)	1.0	1.2 (1.0–1.5)	1.5 (1.1–2.0)
Low net individual income after transfers	1.6 (1.1–2.3)	1.0	1.2 (0.9–1.6)	1.7 (1.2–2.3)
Not married or cohabiting	1.1 (0.8–1.5)	1.0	0.8 (0.7–1.0)	1.0 (0.8–1.3)
No close friends	1.3 (0.7–2.5)	1.0	1.2 (0.8–1.7)	1.8 (1.1–2.8)
Feeling lonely	1.2 (0.7–2.1)	1.0	0.6 (0.4–1.0)	1.0 (0.6–1.7)
Men				
Currently unemployed	1.7 (0.9–3.1)	1.0	1.0 (0.8–1.2)	1.2 (0.9–1.7)
Long-term unemployment	2.2 (1.0–5.0)	1.0	0.9 (0.6–1.2)	1.0 (0.6–1.6)
Low household income per consumption unit	1.9 (1.1–3.4)	1.0	0.8 (0.7–1.0)	0.8 (0.6–1.1)
Low gross individual earnings	1.6 (0.9–2.9)	1.0	0.8 (0.7–1.0)	1.0 (0.8–1.3)
Low net individual income after transfers	1.8 (1.0–3.4)	1.0	0.8 (0.6–1.0)	0.9 (0.7–1.3)
Not married or cohabiting	2.2 (1.3–3.9)	1.0	0.9 (0.7–1.1)	1.1 (0.8–1.4)
No close friends	0.9 (0.4–2.0)	1.0	0.9 (0.8–1.2)	1.0 (0.7–1.4)
Feeling lonely	4.3 (2.0–9.3)	1.0	0.7 (0.5–1.1)	1.1 (0.7–1.9)

In women, obesity was associated with low individual or household income according to all three indicators (OR = 1.5–1.7). Overweight women were also more likely to have low individual earnings (OR = 1.2, 95% CI: 1.0–1.5). Additionally, even thinness in women was associated with low household disposable and individual income after transfers (OR = 1.5–1.6). Among men, thinness was associated with low income according to all

three indicators (OR = 1.6–1.9) whereas overweight men were least likely to have low incomes.

Overweight women were most likely to be married or cohabiting and they also had least feelings of loneliness. However, obese women were most likely to report no close relationships outside their family circle (OR = 1.8, 95% CI: 1.1–2.8). In men, thinness was associated with feelings of loneliness (OR = 4.3,

95% CI : 2.0–9.3) and living without a partner (OR = 2.2, 95% CI : 1.3–3.9).

Discussion

This study suggests that deviant body weight is related to social and economic disadvantage in a gender-specific and partly curvilinear way. In women, high BMI was associated with unemployment and low income irrespective of the indicators used, whereas thinness showed a slightly weaker association with low household income and individual income after transfers. In men, this pattern was different. Only thinness was associated with unemployment, low income and social isolation whereas high BMI was not associated with any studied social or economic disadvantage.

Women with excess body weight were more likely to have experienced unemployment, although this pattern was not fully consistent: overweight women were more likely to be currently unemployed than other women, whereas obesity was clearly associated with long-term unemployment. Our cross-sectional design does not permit firm explanations to be given. However, several potential ones can be presented. First, it is possible that the unemployed gain weight.¹¹ Secondly, since subjects who have suffered from long-term unemployment are entitled to short-time public employment programmes in Finland, our obese women who had more long-term unemployment were probably more likely to have this kind of temporal employment. In addition, self-employed people, including farmers, were over-represented among the obese (data not shown), so problems experienced in the labour market may have contributed to the career choice of the obese. Whatever the reason, according to our results obese women face economic disadvantage since they were more likely to have low incomes than other women. This finding is in accordance with earlier studies based on self-reported income data.^{19–22} The direction of causality, however, remains an open question in our cross-sectional sample. Overweight and obese women may be downwardly mobile if they face discrimination in the labour market. Another possibility is that low income contributes to the likelihood of obesity. Previous studies have associated low income with unhealthy eating habits and weight gain.⁸ The association between low income and weight gain clearly needs further examination, including the direction of causality.

Thin women also had an increased risk of low household disposable and net individual incomes whereas their gross individual earnings were comparable to normal weight women. Taken together with the findings concerning unemployment, i.e. no association between thinness and unemployment, this suggests that the income problems among thin women are not necessarily borne in the labour market, but related to other kinds of disadvantage not studied here.

For women with varying body weight our results show fairly similar associations with all measures of social isolation. Obese women were most likely to report a lack of close friends outside their family circle but did not differ in any other measures of social isolation. This may suggest a family-oriented lifestyle among obese females and problems in making friends or uneasiness with unfamiliar people. Nevertheless, obese women did not complain about loneliness. In fact, overweight women were least likely to report feelings of loneliness or living without

a partner. This suggests that among Finnish adults obesity is not associated with any form of serious social isolation.

For men we failed to find any associations between excess body weight and socioeconomic disadvantage. Like some previous studies we found thinness to be associated with unemployment^{10,18} and low incomes.²² Thin men also suffered from feelings of loneliness and were likely to live without a partner. If women dislike underweight men,²³ selective mating might explain these findings. In addition, poor financial status and long periods of unemployment are further handicaps in the marriage market. These findings may also reflect heavy drinking,¹⁰ depression or other serious problems which we were unable to capture with our measures. However, thinness among men was very rare, therefore these results must be interpreted with caution.

Finally, two potential caveats of our study have to be considered: cross-sectional data does not allow firm causal judgements, and BMI was calculated from self-reported data. First, we have looked at deviant body weight as contributing to social and economic disadvantage but the possibility of reverse causality cannot be ruled out. However, the interpretation of the associations presented in this paper is in accordance with a number of other studies examining body weight as a determinant of social and economic disadvantage.^{14–17,19,21} Secondly, if BMI is calculated from self-reported data the prevalence of obesity is clearly underestimated, and a flat slope syndrome is seen: overweight subjects tend to underreport their BMI whereas thin people do the reverse.^{34–36} In general, BMI is underestimated in all socioeconomic groups³⁴ but there seems to be gender differences. More deviation in both directions has been found in men's self-reports³⁵ whereas women mostly underreport body weight.^{34,35} However, these biases are less pronounced when using face-to-face interviews,³⁶ as in the present study, since the interviewer can react to obvious discrepancies between observed stature and reported values. Except for thin men,³⁵ the effect of self-reported data is likely to be conservative. Consequently, the patterns found in this study are likely to be underestimated rather than overestimated. On the other hand, the strength of this nationwide study is register-based education and income data that covers the whole population and lacks the potential bias related to self-reports commonly used in other surveys.

We conclude that obese women are socially and economically disadvantaged. Thin men's handicap seems to be only a marginal phenomenon, which needs further confirmation. Compared to this, obese women's disadvantage covers large proportions of adult women. Social and economic disadvantages need to be paid more attention in obesity treatment and public health policies. Moreover, to alleviate the possible discrimination against the obese women it is necessary to consider the role of the labour market and community at large: what can be done about avoiding stigmatizing the obese? Our study suggests that acceptable and desirable ideals of body weight and shape, which are deeply embedded in the socio-cultural attitudes and values of modern society, are associated with socioeconomic disadvantage, particularly among women.

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