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Whose socioeconomic status influences a woman's obesity risk: her mother's, her father's, or her own?

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Background Evidence on the relative influence of childhood vs adulthood socioeconomic conditions on obesity risk is limited and equivocal. The objective of this study was to investigate associations of several indicators of mothers', fathers', and own socioeconomic status, and intergenerational social mobility, with body mass index (BMI) and weight change in young women.

Methods This population-based cohort study used survey data provided by 8756 women in the young cohort (aged 18–23 years at baseline) of the Australian Longitudinal Study on Women's Health. In 1996 and 2000, women completed mailed surveys in which they reported their height and weight, and their own, mother's, and father's education and occupation.

Results Multiple linear regression models showed that both childhood and adulthood socioeconomic status were associated with women's BMI and weight change, generally in the hypothesized (inverse) direction, but the associations varied according to socioeconomic status and weight indicator. Social mobility was associated with BMI (based on father's socioeconomic status) and weight change (based on mother's socioeconomic status), but results were slightly less consistent.

Conclusions Results suggest lasting effects of childhood socioeconomic status on young women's weight status, independent of adult socioeconomic status, although the effect may be attenuated among those who are upwardly socially mobile. While the mechanisms underlying these associations require further investigation, public health strategies aimed at preventing obesity may need to target families of low socioeconomic status early in children's lives.

Keywords Obesity, socioeconomic status, social mobility

Introduction

A global epidemic of obesity currently threatens the health of populations worldwide.[1] Obesity is associated with increased morbidity and mortality from a range of chronic conditions, including cardiovascular disease, type-2 diabetes, and certain cancers, as well as impaired quality of life and mental health.[1] Addressing this public health problem requires a better understanding of the determinants of obesity throughout the lifecourse, in order to identify where and when intervention may be most appropriately targeted.

Obesity is strongly socioeconomically determined among women, such that in developed societies, women of low socioeconomic status are at increased risk of weight gain[2] and the development of overweight and obesity.[3] Poor socioeconomic conditions in both childhood[4] and adulthood[2] have been implicated in obesity risk among adults. However, to date few studies have attempted to establish the relative importance of childhood and adult socioeconomic status in influencing weight gain and obesity risk in adulthood. Of those studies that have

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investigated this issue, results are equivocal. Brunner *et al.*[5] reported inverse associations of both childhood and adult socioeconomic status (father's occupation and participant's employment grade) with several indices of obesity including body mass index (BMI). In general, these associations were stronger for adult socioeconomic status, particularly among women. However, that study (Whitehall II) involved a sample of civil services workers who were all employed in non-manual occupations and were not representative of the general population. In contrast, Blane *et al.*[6] found that adult obesity was inversely associated with childhood socioeconomic status (father's main occupation), but not adult socioeconomic status (own occupation). However that study sample was also non-representative, including only employed men. In a more representative large United Kingdom birth cohort (n = 3035), Langenberg *et al.*[7] found, consistent with the findings of Blane *et al.*[6] that childhood socioeconomic status (father's occupation at age 4 years) was more strongly associated with obesity at age 53 than adult socioeconomic status (occupation of head of household). Similarly, a population-based study of Swedish women[8] found that parental occupation was more strongly inversely associated with indices of current weight and long-term weight change than own occupation. However, further contradictory findings come from a study of women in Scotland,[9] in which adult obesity was not associated with either father's occupation, own occupation, or own education; but was associated with an indicator of cumulative lifetime socioeconomic status based on father's, own first, and own current occupation. However that study also used a non-representative sample of employed women sampled largely from two workplaces. Given the contradictory findings across the limited number of published studies, further research incorporating large population-based samples is required to provide clearer insight into the associations of childhood and adulthood socioeconomic status and obesity.

Very few studies have investigated intergenerational social mobility and obesity, particularly the directional effects of social mobility. Langenberg *et al.*[7] found that men and women who had experienced upward social mobility, defined as having a higher occupational category than that of their father, were less obese at age 53 than those whose socioeconomic status remained low, with levels of obesity among the upwardly mobile intermediate between those of the socioeconomic status group they had left and the one they had joined. These associations of social mobility and obesity were consistent with earlier findings in the same cohort at age 36,[10] although in that previous study the associations held for women only. Other studies have shown cumulative effects of socioeconomic status assessed over the lifecourse on obesity risk in adulthood[9,11] but have not differentiated the effects of upward and downward social mobility on body weight.

None of the studies of socioeconomic status, social mobility, and obesity reviewed above included investigations of mothers' socioeconomic status. This is important for a number of reasons. First, the use of father's occupation as an indicator of participants' childhood socioeconomic status fails to take into account the increasing participation of women in the labour force.[12] Increasingly, research on social inequalities in health is acknowledging the importance of considering women's own socioeconomic position rather than inferring this from measures of husband/partner socioeconomic status; however this increased recognition does not yet appear to be reflected in studies of intergenerational socioeconomic status—that is, the examination of the socioeconomic status of mothers, as well as fathers. Second, there is a trend in many developed countries for growing numbers of single-parent families in which children live in female-headed households, often with mothers who are also employed outside the home.[13,14] Finally, there is evidence that maternal characteristics are more closely associated than paternal characteristics with the health behaviours of their children that might impact obesity risk.[15] The impact of mother's socioeconomic status on obesity risk is, therefore, of interest.

As well as the scarcity of studies conducted with large population-based samples, the existing studies of childhood and adult socioeconomic status and obesity are limited in that with few exceptions[8], most focused exclusively on occupation as an indicator of socioeconomic status. Given the multidimensional nature of socioeconomic status it has been suggested that multiple indicators be used in studies investigating socioeconomic status and health.[16] Furthermore, the existing studies are limited in that they tended to control for only a limited number of covariates (for example, smoking and physical activity only[7]). Only one study[8] investigated childhood and adulthood socioeconomic status and weight change over time. Finally, of the few studies investigating social mobility, the very small numbers of participants experiencing downward social mobility meant that this category could not be examined in detail.[7]

Young women are an important group in which to study obesity risk, since evidence suggests they are at high risk for weight gain and the development of obesity.[17,18] Therefore, this study aimed to investigate associations of several indicators of both childhood (mother's and father's) socioeconomic status, own socioeconomic status in adulthood, and social mobility with obesity in young women. Given that this life stage is characterized by a high risk of weight gain in women, associations of socioeconomic status indicators with both BMI and 4 year prospectively assessed weight change were examined.

Methods

Participants

Data for this study were provided by 8756 participants in the Australian Longitudinal Study on Women's Health (ALSWH), a nation-wide longitudinal study designed to track the health of three age cohorts of Australian women over time. Ethical approval for this study was granted by the University of Newcastle Research Ethics Committee. Details of the recruitment methods and baseline surveys of the ALSWH are described in detail elsewhere.[19] Briefly, the ALSWH sample was selected randomly from the database of Australia's National Health Insurance Commission, the universal provider of basic health insurance that includes all women in Australia. Women from rural and remote areas of Australia were oversampled in order to ensure adequate representation from these groups, as well as women living in metropolitan areas. The focus of this paper is on the younger cohort (aged 18–23 years at baseline).

In 1996, 14779 young women (41% of those invited to participate) completed a mailed self-report baseline survey (Survey 1), which assessed a broad range of women's health issues. Apart from a slight over-representation of tertiary-educated women, comparison with the 1996 National Census showed that the women were broadly representative of the female population in this age group.[19] Four years later, 9689 women (70% of the 13826 Survey 1 respondents who had not subsequently withdrawn from the study, died, or had been lost to follow-up) completed a second mailed follow-up survey (Survey 2). Compared with Survey 2 respondents, non-respondents were more likely to be younger, to be born outside Australia, to have difficulty managing on their available income, and to have lower levels of education.[20] The groups did not differ substantially on measures of self-rated physical or mental health. Women who were pregnant at the time of either survey (n = 695), and women who had had a serious illness (either HIV/AIDS, or cancer) or had difficulty with daily tasks that was likely to have impacted on their weight, were excluded (n = 933). This left a total of 8756 women whose data were used in the present study.

Measures

Socioeconomic status

The socioeconomic status of each participant was calculated at Survey 2 from two indicators (education and occupation), with the same two indicators also used to obtain measures of childhood socioeconomic status from both the mother and father (or other main caregivers) while growing up. Responses for highest educational qualification (own, mother's, and father's) were each categorized as 'up to Year 10 or equivalent', 'Year 12 or equivalent', 'trade/certificate/diploma', or 'tertiary degree/higher degree'. Main occupation (own, mother's, and father's) was categorized as 'manager/professional', 'associate professional', 'tradesperson/clerk/sales', 'service/manual worker/machine operator or driver', or 'no job/not applicable'. It was expected that a proportion of women in this cohort would be studying, and hence the question on own main occupation stated: 'If you are a student, circle the occupation you are studying for'. A variable for intergenerational mobility with respect to mother's education levels was created to reflect consistency or change in education level from mother to daughter according to the following transitions: non-university education for both, university education for both, university (mother) to non-university education (participant), or non-university (mother) to university education (participant). Similar transition variables were created for change in education level from father to daughter. This process was repeated to measure intergenerational change in occupation levels, with categories based on movement between 'Manager/Professional' or 'Other' (non-manager/professional) occupations.

BMI and weight change

In both surveys, participant's BMI [BMI = weight (kg)/height $(m)^2$] was calculated from self-reported height and weight. Since height does not change significantly after age 18,[21] height at Survey 1 was used for calculating BMI at both time points. Both BMI at Survey 2 and the 4 year weight change (kilogrammes) between Surveys 1 and 2 were used as outcome variables in analyses.

Covariates

Based on their established associations with weight, the following variables collected at Survey 2 were controlled for in multiple regression analyses: marital status (classified as never married, or married/separated/divorced/widowed); area of residence (urban, rural, or remote based on an index of distance to the nearest urban centre)[22]; and parity (null parity, one child, or two or more children); cigarette smoking status (never smoker, ex-smoker, currently smoking <10 cigarettes per day, smoking between 10 and 19 cigarettes per day, smoking >20 cigarettes per day); alcohol intake, categorized as low risk drinker, non-drinker, rarely drinks, risky drinker, high risk drinker[23]; and physical activity, derived from reported duration and intensity of activity (categorized as none or low, moderate or high levels of physical activity).[24]

Statistical analyses

Means and standard deviations were calculated for women's BMI and weight change by their mother's, father's, and their own educational level and occupational status. ANOVA (F-test) was used to assess the relationships between BMI at Survey 2, 4 year change in weight, and the two socioeconomic status indicators. Multiple regression models were used to analyse the relationships between: (i) women's BMI at Survey 2 and their own education level and occupational status as well as that of their mother and father, while adjusting for the potential confounding factors of marital status, area of residence, parity, cigarette smoking status, alcohol intake, and physical activity levels; (ii) change in weight, while adjusting for weight at Survey 1 and the potential confounding factors mentioned above. Models 1 and 2 were then rerun with intergenerational mobility of education and occupational status as predictors. Adjusted means and standard deviations for socioeconomic status variables were calculated using the least-squares option of the generalized linear models procedure of SAS 8. Distributions for BMI were only slightly skewed (skewness index 1.4). The results for analysis using untransformed BMI data were reported since analyses with natural log transformation of BMI produced similar results. The possibility of multicollinearity among the socioeconomic variables in the multiple regression models was tested for by using the variance inflation factor (VIF), but was not found to be an issue (VIF < 10).[25]

Results

Tables 1 and 2 list the unadjusted means for the two outcome variables: BMI at Survey 2, and weight change between 1996 and 2000. All measures of socioeconomic status and social mobility were significantly associated with BMI and weight change except for mother to daughter intergenerational mobility regarding change in occupational status (P-value = 0.2).

Table 3 indicates adjusted mean BMI and weight change by measures of socioeconomic status (only significant associations, $P < 0.05$, shown). There was strong evidence for an association between father's occupational status and BMI at Survey 2. Father's occupational status was a stronger predictor of BMI at Survey 2 than women's own educational or occupational status, with women whose fathers were

Table 1 Unadjusted mean BMI and change in body weight between Survey 1 and Survey 2 (standard deviation) for indicators of socioeconomic status

Measures of socioeconomic status	*n*	BMI	*F*	*P*-values	*n*	Change in weight[a]	*F*	*P*-values
Highest educational qualification								
Own			34.4	<0.0001			8.3	<0.0001
Year 10 or less	680	24.7 (5.7)			699	2.5 (8.1)		
Year 12	1742	24.1 (5.2)			1752	3.2 (7.1)		
Trade/apprenticeship/certificate/diploma	1806	24.1 (5.1)			1824	2.6 (7.3)		
University or higher degree	3377	23.1 (4.2)			3400	2.2 (6.0)		
Father's			19.6	<0.0001			3.1	0.02
Year 10 or less	2203	24.1 (4.9)			2227	2.7 (7.0)		
Year 12	725	23.5 (4.6)			720	2.6 (6.5)		
Trade/apprenticeship/certificate/diploma	2070	23.7 (4.8)			2092	2.5 (6.7)		
University or higher degree	1415	22.9 (4.2)			1420	2.1 (6.1)		
Mother's			12.1	<0.0001			5.7	0.0006
Year 10 or less	3107	24.0 (5.0)			3142	2.8 (6.9)		
Year 12	1127	23.7 (4.7)			1141	2.6 (6.7)		
Trade/apprenticeship/certificate/diploma	1356	23.3 (4.6)			1361	2.2 (6.3)		
University or higher degree	1141	23.1 (4.3)			1150	2.0 (6.0)		
Occupational category								
Own			31.7	<0.0001			11.5	<0.0001
Manager/professional	3301	23.2 (4.3)			3326	2.3 (6.2)		
Associate professional	511	23.6 (4.5)			511	2.2 (6.0)		
Tradesperson, clerk, sales	2358	23.9 (4.9)			2384	2.4 (6.7)		
Service, manual worker, machine operator	703	24.2 (5.4)			708	2.4 (7.8)		
No job/not applicable	597	25.4 (5.9)			604	4.2 (8.5)		
Father's			24.7	<0.0001			3.0	0.02
Manager/professional	2905	23.2 (4.5)			2919	2.3 (6.3)		
Associate professional	804	23.6 (4.5)			796	3.0 (6.3)		
Tradesperson, clerk, sales	1646	23.7 (4.6)			1667	2.4 (6.5)		
Service, manual worker, machine operator	1486	24.7 (5.5)			1505	2.8 (7.5)		
No job/not applicable	478	24.4 (5.4)			478	2.4 (7.7)		
Mother's			5.4	0.0002			3.7	0.002
Manager/professional	1962	23.4 (4.5)			1966	2.2 (6.3)		
Associate professional	218	23.6 (4.3)			216	2.1 (6.3)		
Tradesperson, clerk, sales	2044	23.7 (4.8)			2058	2.7 (6.9)		
Service, manual worker, machine operator	1465	24.1 (5.0)			1485	2.5 (7.1)		
No job/not applicable	1664	23.9 (5.1)			1667	2.6 (6.9)		

[a] Adjustment was made for body weight at Survey 1.

managers, professionals, or associate professionals having lower BMI than those whose fathers were service, manual, or machine operators. Women with university or higher degree had a significantly lower BMI than those who had trade, apprenticeship certificate, or diploma qualifications. Mother's education level or occupational status was not associated with BMI at Survey 2, but both own and the mother's education levels were a predictor of weight change. Women who had or whose mother had trade, apprenticeship certificate, or diploma qualifications reported higher weight gain ($P = 0.03$) than those with a university or higher degree.

Table 4 shows the adjusted mean BMI and weight change by measures of social mobility (only significant associations, $P < 0.05$, shown). Both measures of social mobility with respect to fathers' occupation and fathers' education were significantly associated with BMI at Survey 2. Compared with women whose fathers had non-university education, those women who showed educational transitions (either up or down) had lower BMI at Survey 2. Women whose fathers had managerial or professional occupations had the lowest BMI at Survey 2. The BMI at Survey 2 of the upwardly mobile group was no different to that of those who were from the associate professionals/tradesperson group. Weight gain was associated with social

Table 2 Unadjusted mean BMI and change in weight between Survey 1 and Survey 2 (95% CIs) for indicators of social mobility

Measures of social mobility		*n*	BMI	*F*	*P*-values	*n*	Change in weight[a]	*F*	*P*-values
Highest educational qualification									
Father's	Own			36.2	<0.0001			6.7	0.0002
Non-university	Non-university	2713	24.3 (5.2)			2739	2.9 (7.3)		
University or higher degree	Non-university	445	23.0 (4.3)			448	2.2 (6.5)		
Non-university	University or higher degree	2138	23.2 (4.2)			2152	2.3 (6.0)		
University or higher degree	University or higher degree	950	22.8 (4.2)			952	2.0 (5.9)		
Mother's	Own			28.5	<0.0001			7.7	<0.0001
Non-university	Non-university	2997	24.2 (5.2)			3036	2.9 (7.3)		
University or higher degree	Non-university	398	23.7 (4.9)			398	2.1 (6.4)		
Non-university	University or higher degree	2413	23.2 (4.3)			2424	2.3 (6.0)		
University or higher degree	University or higher degree	729	22.9 (3.9)			737	1.9 (5.7)		
Occupational category									
Father's	Own			22.4	<0.0001			3.3	0.02
Others[b] (excluding not in paid job)	Others[b] (excluding not in paid job)	2071	24.2 (5.1)			2076	2.6 (6.9)		
Manager/professional	Others[b] (excluding not in paid job)	1039	23.3 (4.6)			1044	2.0 (6.4)		
Others[b] (excluding not in paid job)	Manager/professional	1401	23.5 (4.5)			1418	2.5 (6.2)		
Manager/professional	Manager/professional	1637	23.0 (4.2)			1644	2.2 (6.0)		
Mother's	Own			12.1	<0.0001			1.7	0.2
Others[b] (excluding not in paid job)	Others[b] (excluding not in paid job)	1900	24.0 (5.0)			1912	2.5 (6.9)		
Manager/professional	Others[b] (excluding not in paid job)	677	23.8 (4.8)			683	2.4 (6.6)		
Others[b] (excluding not in paid job)	Manager/professional	1424	23.3 (4.4)			1438	2.4 (6.3)		
Manager/professional	Manager/professional	1130	23.0 (4.2)			1132	2.0 (5.9)		

[a] Adjustment was made for body weight at Survey 1.
[b] 'Others' included associate professionals, tradespersons, clerks, sales persons, service workers, manual workers, and machine operators.

mobility with respect to mother's educational levels. Those women remaining in low education at both time points (i.e. both mother's and own) showed the greatest weight gains; those remaining in high education showed the least gain; and those upwardly and downwardly mobile showed gains in between these groups.

Discussion

The results of this study suggest that both childhood and adult socioeconomic status are important for obesity risk, but the associations differ for different indices of socioeconomic status and weight. When considered simultaneously, father's socioeconomic status was most consistently (inversely) related to BMI, with own occupation also showing a (non-linear) association. In terms of recent weight change, however, mother's education, as well as own education, was most predictive. These findings of independent associations of obesity with both adult and particularly childhood socioeconomic status support those of several of the limited number of studies that have assessed these associations simultaneously among women.[7,8] Those studies, as did the present study, assessed relatively large representative samples. This may explain the inconsistencies of the findings reported across all three of these studies, compared with those of Brunner *et al.*[5] and Helsop *et al.*,[9] who assessed less representative populations, and reported weaker or non-significant associations of obesity with childhood socioeconomic status (father's occupation) compared with adult[5] or cumulative lifetime[9] socioeconomic status in their samples.

The investigation of mother's socioeconomic status in this study was unique, since to our knowledge no previous studies have considered associations of both mother's and father's BMI with adult obesity. Measures based on father's socioeconomic status (education and occupation) were more consistent predictors of current BMI, while measures based on mother's socioeconomic status (education) were more predictive for weight change. One possible explanation of these differences relates to the differential nature of men's and women's socioeconomic circumstances during their adult lives. Women who are mothers may experience greater fluctuation in their

Table 3 Results from multiple regression models including socioeconomic status of participants and parents: adjusted[a] mean BMI and change in weight between Survey 1 and Survey 2 (95% CIs)

Measures of socioeconomic status	BMI	*P*-values	Change in weight[b]	*P*-values
Highest educational qualification				
Own		0.006		0.03
Year 10 or less	25.0 (24.4–25.6)	0.5	2.9 (2.1–3.6)	0.3
Year 12	25.1 (24.7–25.5)	0.05	3.8 (3.3–4.4)	0.02
Trade/apprenticeship/certificate/diploma	25.4 (24.9–25.8)	0.0006	3.5 (2.9–4.1)	0.4
University or higher degree	24.8 (24.3–25.2)	–	3.3 (2.7–3.9)	–
Father's		0.07		
Year 10 or less	25.3 (24.9–25.7)	0.01		
Year 12	25.0 (24.5–25.5)	0.5		
Trade/apprenticeship/certificate/diploma	25.1 (24.7–25.6)	0.09		
University or higher degree	24.8 (24.3–25.3)	–		
Mother's		NS		0.03
Year 10 or less			3.6 (3.1–4.1)	0.02
Year 12			3.7 (3.1–4.3)	0.03
Trade/apprenticeship/certificate/diploma			3.1 (2.6–3.7)	0.7
University or higher degree			3.0 (2.4–3.7)	–
Occupational category				
Father's		0.0003		NS
Manager/professional	24.8 (24.4–25.3)	<0.0001		
Associate professional	24.9 (24.4–25.4)	0.001		
Tradesperson, clerk, sales	24.9 (24.5–25.4)	0.0003		
Service worker, manual worker, machine operators	25.7 (25.2–26.1)	–		
No job/not applicable	25.0 (24.3–25.6)	0.6		

[a] Adjusted for smoking status, alcohol intake status, physical activity levels, area of residence, parity, and marital status.
[b] Additional adjustment was made for body weight at Survey 1.

Table 4 Results from multiple regression models: adjusted[a] mean BMI and change in weight between Survey 1 and Survey 2 (95% CIs)

Measures of social mobility		BMI	*P*-values	Change in weight[b]	*P*-values
Highest educational qualification					
Father's	Own		0.005		NS
Non-university	Non-university	25.3 (24.8–25.7)	–		
University or higher degree	Non-university	24.5 (23.9–25.2)	0.008		
Non-university	University or higher degree	24.6 (24.2–25.2)	0.002		
University or higher degree	University or higher degree	24.7 (24.1–25.3)	0.02		
Mother's	Own				0.04
Non-university	Non-university		NS	3.7 (3.2–4.2)	–
University or higher degree	Non-university			3.1 (2.3–3.9)	0.09
Non-university	University or higher degree			3.3 (2.7–3.9)	0.05
University or higher degree	University or higher degree			3.0 (2.3–3.7)	0.02
Occupational category					
Father's	Own		0.03		NS
Others[c] (excluding not in paid job)	Others[c] (excluding not in paid job)	25.1 (24.5–25.6)	–		
Manager/professional	Others[c] (excluding not in paid job)	24.5 (24.0–25.1)	0.01		
Others[c] (excluding not in paid job)	Manager/professional	25.0 (24.4–25.5)	0.6		
Manager/professional	Manager/professional	24.6 (24.1–25.1)	0.03		

[a] Adjusted for smoking status, alcohol intake status, physical activity levels, area of residence, parity, and marital status.
[b] Additional adjustment was made for body weight at Survey 1.
[c] 'Others' included associate professionals, tradespersons, clerks, sales persons, service workers, manual workers, and machine operators.

own socioeconomic circumstances than men, owing to women's higher likelihood of multiple entries and exits from the workplace associated with childrearing. Fathers' socioeconomic status may be relatively more stable. Consequently, it may be that fathers' socioeconomic status has more impact in influencing stable household habits, including dietary values, preferences and patterns, and physical activity values and habits. These habits may be acquired and set in place during childhood, leading to long-term influences on the average body weight range maintained by children as they grow into adulthood. Mother's socioeconomic status, on the other hand, may be more influential on shorter-term weight change patterns of young women. Young adulthood is a period characterized by frequent weight loss attempts/dieting.[26] Young women may be more likely to respond to or model their dieting or weight loss attempts on the suggestions or behaviours of their mothers than their fathers.[27] Since dieting and weight management attempts tend to be more common among women of high socioeconomic status,[28] mother's socioeconomic status may be important in influencing which women will attempt to prevent weight gains common during this life stage, and this may explain the socioeconomic status differences in weight change by mother's education observed. Whatever the mechanisms, the present findings suggest that more insight into the early life predictors of adult weight might be gained if future studies incorporated indices of the socioeconomic status of both parents, as well as multiple socioeconomic status indicators (e.g. education, occupation).

While the present results suggest a lasting effect of socioeconomic status of origin on adult body weight, it appears that high BMI is not an inevitable outcome of low childhood socioeconomic status, since adult socioeconomic status was also predictive of body weight. Moreover, the social mobility findings, although slightly less consistent, suggest that improving one's socioeconomic status may be associated with a lower body weight and less weight gain than remaining at a low socioeconomic status. These results support those of the few previous studies that have examined directional effects of social mobility with obesity,[7,10] although in the present study the trends across the four social mobility groups were not always consistent or linear. This may be attributable to the fact that a number of young women may still be acquiring their education or establishing themselves in their occupations, and hence their trajectory from the socioeconomic status group of their parents may not yet be complete. This is consistent with findings that socioeconomic status is less strongly associated with weight gain[2] and other health outcomes[29] in adolescence or young adulthood than in mid-life.

Interestingly, the BMI and magnitude of weight gain among women who were downwardly mobile, as well as those among upwardly mobile women, were generally intermediate between those who remained at low status (highest BMI/weight gain) and those who remained at high status (lowest BMI/weight gain). This pattern is consistent with an 'accumulation' hypothesis,[11] by which a longer duration of exposure to low socioeconomic status (i.e. during both childhood and early adulthood) is associated with greater risk for weight gain and high body mass. The differences between the upwardly and downwardly mobile groups in this study were often small and inconsistent in direction. In future research, data on weight gain and socioeconomic trajectories over a longer follow-up period could enable a greater distinction between the upwardly and downwardly socially mobile groups, which would provide further insight into the nature of socioeconomic influences on weight status across the lifecourse.

Several limitations of the present study should be noted. All measures, including height and weight, were self-reported. There is some evidence that self-reported weight and BMI tend to underestimate actual values, particularly at high body weights.[30,31] However self-reported height and weight have been shown to provide reasonably valid measures of actual height and weight for the purpose of investigating relationships in epidemiological studies.[32] Any weight-related under-reporting in the present study may have served to underestimate the actual relationships of socioeconomic status indicators with BMI and weight change. However, the present findings are not dissimilar to those of other studies that have included objectively assessed indices of weight.[7] As is the case in most previous studies of these issues, childhood socioeconomic status was retrospectively reported. However given that the cohort of women in this sample were young adults, the recall period of recollection was not overly long, and there is evidence that adults are able to retrospectively recall their parents' socioeconomic status with accuracy.[33] Finally, while two indicators of socioeconomic status (education and occupation) were used in this study, other indicators such as income were not examined. It has recently been shown, however, that income is a less consistent predictor of weight change than indices based on education and occupation.[2] Strengths of the study include the use of a large community sample, which also permitted more in-depth analysis of downward social mobility than in previous studies, as well as allowing for the statistical adjustment for a wider range of potential confounders. The inclusion of multiple measures of mother's, father's and own socioeconomic status also represents an advance over previous studies that have tended to focus solely on occupation.

In summary, the present findings suggest that childhood as well as adult socioeconomic conditions may have a long-term impact on body weight among young women, although the associations vary according to the parent for whom socioeconomic status is assessed, as well as the weight outcome under study. Public health strategies aimed at reducing obesity may need to include a focus on early intervention in order to alleviate the lasting effects of childhood disadvantage on obesity risk later in life.

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Competing interests: None.

KEY MESSAGES

- Childhood and adulthood socioeconomic status are independently inversely associated with both BMI and weight change in young women, but associations vary by socioeconomic status indicator, parent on whom childhood measures are based, and weight outcome.
- Intergenerational social mobility is associated with BMI and weight change but associations are complex and not always linear.
- Childhood and social mobility measures based on father's socioeconomic status appear more consistently predictive of BMI, while those based on mother's socioeconomic status appear more predictive of weight change over time in young women.
- There may be a need for public health strategies and policies to focus on early childhood intervention in order reduce the long-term effects of childhood socioeconomic disadvantage on obesity risk later in life.

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