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Section: International comparison of health determinants

Patterns of body weight in middle-aged and older Americans, by gender and race, 1993–2000

Summary

Objectives: Despite evidence of poor health outcomes associated with excessive weight gain or loss, longitudinal patterns of body weight over the adult life course have not been fully described. This article seeks to address this by examining body weight patterns for middle-aged and older adults.
Methods: Panel data from the Health and Retirement Study (HRS) original cohort and the original cohort of the Asset and Health Dynamics Among the Oldest Old (AHEAD) study are used to compare, by social group, characteristics of respondents and non-respondents, baseline weight (1993 and 1994) to year 2000 weight, and explore various weight change trajectories over time.
Results: Overall, a greater proportion of middle-aged adults are heavier over time than at baseline and a greater proportion of older adults lose weight over time compared to baseline. Examining the transitions across weight trajectories for all of the social groups suggests considerable variability.
Conclusions: These findings suggest that differing physiologic and social or environmental experiences may have implications for body weight patterns. Understanding these patterns by race/ethnicity and gender could provide insight into health disparities among different social groups.

Keywords: BMI – Obesity – Longitudinal analysis – Weight change trajectories.

The specter of a worldwide epidemic of obesity has alarmed health care providers and policy makers in developed and developing nations alike (World Health Organization 1998). Obesity is of such concern because of its associations with poor health outcomes for individuals and substantial economic burdens to society (McIntyre 1998). In the United States, where a major public health initiative seeks to raise the proportion of normal weight adults from 42% to 60% (U.S. Department of Health and Human Services 2000), the percentage of the population that is overweight or obese has increased dramatically in recent decades (National Heart Lung and Blood Institute 1998). Although the aging of the American population alone cannot explain this finding, data from the National Health and Nutrition Examination Surveys (NHANES) and the Behavioral Risk Factor Surveillance System (BRFSS) do suggest that body mass index (BMI) increases throughout the adult life span until early old age (Mokdad et al. 1999; Galuska et al. 1996; Flegal 2000; Flegal et al. 1998). This indicates that the second half of life may present an important focus for obesity research.

The NHANES and BRFSS programs utilize repeated cross-sectional studies to describe weight trends. While providing important information, these aggregate time series data can mask off-setting individual-level changes. To investigate the latter requires longitudinal data in which the same panel of respondents is observed or interviewed repeatedly over time. There is little documentation of longitudinal patterns of body weight for American adults even though obesity is a profound issue in the U.S., and particularly so for minority groups in which obesity is known to be high (Lee et al. 2001). As Lee et al. (2001) note, this gap in knowledge is unfortunate: "Understanding patterns of weight change over time may allow us to identify critical periods for emphasizing prevention of weight gain, because we have little success currently with long-term maintenance of weight loss" (Lee et al. 2001). Given the strong link between overall health and health risk, such an understanding may help target public

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health interventions at particular points in the life course, and for certain subgroups, to prevent or reduce weight-related disease and disability.

Moreover, increasing evidence points to excessive weight gain or loss as an important marker for disease and disability; and greater weight variability (or weight cycling) has been found to predict mortality for both men and women (Andres et al. 1993; Reynolds et al. 1999; Lissner et al. 1999). Although the causal pathways linking individual-level weight change and health are likely to be complex, such findings suggest the possibility of considering longitudinal patterns of body weight, in addition to cross-sectional distributions of BMI, as a useful public health indicator. This article takes a step in that direction with the goal of using public release panel data to describe patterns of body weight over time for middle-aged and older American adults. Further, because differing physiological and socio-environmental experiences might result in varying body weight patterns, we present the results by race and gender. Doing so may provide insight into how body weight, especially excess body weight, contributes to health disparities in subgroups of the U.S. adult population.

Methods

Data

To describe patterns in body weight, we use longitudinal data from two cohorts of the Health and Retirement Study (HRS): 1) the original HRS cohort – middle-aged adults and 2) the original Asset and Health Dynamics Among the Oldest Old cohort – older adults. The HRS is an on-going biennial study of middle-aged and older Americans conducted by the University of Michigan with funding from the U.S. National Institute on Aging. When the study first began, the original HRS cohort and the original AHEAD cohort were two different but parallel studies. Then, in 1998 (and each subsequent wave thereafter) both cohorts were merged together and referred to as the Health and Retirement Study. The purpose of the study is to better understand mental and physical health, employment, retirement planning, family support systems, insurance coverage, and financial status in the second half of life. The design and content of the surveys have been detailed elsewhere (Burkhauser & Gertler 1995). HRS data products are made available to the research community via their website (http://hrsonline.isr.umich.edu). In this paper, we present original analyses of selected HRS public use data sets.

The original HRS cohort is a U.S. national probability sample of 12652 respondents 51–61 years of age in 1992 (and their spouses of any age); reinterview data were collected from these respondents in 1994, 1996, 1998, and 2000. The Study of Asset and Health Dynamics Among the Oldest Old (AHEAD) original cohort is a national probability sample of 8222 men and women aged 70 and older at their first interview in 1993 (and their spouses of any age); reinterview data were collected from these respondents in 1995, 1998, and 2000. The data include over-samples of Latinos and African American respondents to ensure adequate minority group representation. The analyses presented here were restricted to age-eligible adults (i.e., non-age-eligible spouses were excluded) in the middle-aged and older adult cohorts, leaving 7727 and 7234, respectively, for our analyses. For purposes of these analyses, we utilize the 1993/1994, 1995/1996, 1998, and 2000 data in order to examine four consistent time points for the two age cohorts.

Measurement

Body mass index (BMI) (weight in kilograms/height in meters^2) was calculated from self-reported height (measured in feet and inches at 1993/1994) and self-reported weight (measured in pounds at each interview). We categorized BMI according to the U.S. National Heart Lung and Blood Institute (National Heart, Lung, and Blood Institute 1998) guidelines for body weight: underweight = BMI < 18.5, normal weight = BMI 18.5–24.9, overweight = BMI 25.0–29.9, and obese I = BMI 30.0–34.9, obese II = BMI 35.0–39.9 and obese III = BMI 40 and over.

Two questions ascertained respondents' self-reports of their race/ethnicity: "Do you consider yourself Hispanic or Latino?" and "Do you consider yourself primarily White or Caucasian, Black or African American, American Indian, or Asian, or something else?" Our analyses included Black Americans (non-Hispanic), Latinos, and Whites (non-Hispanic). The relatively small percentage of respondents who did not self-identify as one of these groups was excluded from the analyses.

The HRS questionnaire was developed in consultation with panels of substantive experts from the various topic areas. Included in the health section of the questionnaire is the question, "Have you gained or lost ten or more pounds in the last two years?" For the purposes of these analyses, we use the gain or loss of greater than 10 pounds in two years as an indicator of clinically meaningful weight change. Because this question is not asked at every data collection (a number of questions are rotated in and out of the HRS questionnaire to reduce respondent burden), we used this self-reported weight measure at each reinterview to calculate whether or not there had been a greater than ten pound gain or loss since the previous interview.

Analysis

Data were analyzed using SAS v8.2 and IVEware (Raghunathan et al. 2000*)* software to account for the weighting and complex sample design of the HRS (Heeringa & Connor 1995). We conducted three sets of analyses, with each set generating two tables: one table for the original HRS cohort (middle-aged) and one table for the original AHEAD cohort (older age). Results are shown separately for Black men, Latino men, White men, Black women, Latina women, and White women. In addition, we compiled aggregate-level descriptive statistics for BMI by age and gender (Appendices 1–2).

The first set of analyses used logistic regression to compare the demographic and health characteristics of people who responded at each interview with the characteristics of those who dropped out (e.g., because of death, refusal to participate, loss to follow up). Tables 1–2 present the results of those analyses, utilizing the maximum number of cases available for each variable.

Table 1 Comparison of 1994 sociodemographic and health characteristics for respondents vs non-respondents, by race and gender, HRS original cohort

	Respondents		Non-respondents (as of 2000)	
	Mean	S.D.	Mean	S.D.
Black-American men	(n = 439)		(n= 64)	
education (years)	11.0	2.6	10.7	3.0
age (years)	58.0	2.4	58.1	2.6
weight (pounds)	191.4	27.0	189.2	40.4
underweight (%)	1.5		9.2	
overweight (%)	71.7		50.7	
self-rated good health (%)	66.7		31.9	
Latino men	(n = 255)		(n = 20)	
education (years)	9.3	3.8	8.5	4.2
age (years)	57.4	2.7	56.7	2.4
weight (pounds)	178.6	23.6	198.1	64.1
underweight (%)	0.0		0.0	
overweight (%)	75.3		70.0	
self-rated good health (%)	66.0		31.9	
White men	(n = 2584)		(n = 205)	
education (years)	13.2	2.9	12.3	3.1
age (years)	57.8	3.3	58.8	3.4
weight (pounds)	191.8	32.6	187.9	43.5
underweight (%)	0.3		1.7	
overweight (%)	72.3		65.9	
self-rated good health (%)	85.0		39.8	
Black-American women	(n = 710)		(n = 65)	
education (years)	11.6	2.2	10.9	2.6
age (years)	57.7	2.4	59.3	2.3
weight (pounds)	176.5	28.4	173.3	37.3
underweight (%)	0.7		3.5	
overweight (%)	82.2		62.8	
self-rated good health (%)	63.3		28.8	
Latina women	(n = 333)		(n = 21)	
education (years)	8.6	3.6	9.4	3.3
age (years)	57.6	2.6	58.9	2.3
weight (pounds)	155.3	25.4	151.8	46.3
underweight (%)	1.3		6.1	
overweight (%)	71.5		59.8	
self-rated good health (%)	51.3		18.7	
White women	(n = 2919)		(n = 112)	
education (years)	12.7	2.5	12.0	2.4
age (years)	57.9	3.4	58.3	3.8
weight (pounds)	155.9	34.4	151.5	41.5
underweight (%)	1.6		9.5	
overweight (%)	54.9		47.8	
self-rated good health (%)	83.9		44.7	

Notes: Data in this table are weighted and adjusted for the complex survey design. Statistically significant relationships, across race-gender categories, exist ($p < 0.05$) for self-rated good health, underweight (with the exception of Black-American women and Latina women), age (with the exception of Black-American and Latino men and White women), education (with the exception of Black-American and Latino men and Latina women), and weight (only for Latino men)

Table 2 Comparison of 1993 sociodemographic and health characteristics for respondents vs nonrespondents, by race and gender, AHEAD original cohort

	Respondents		Nonrespondents (as of 2000)	
	Mean	S.D.	Mean	S.D.
Black-American men	(n = 217)		(n = 131)	
education (years)	8.0	3.4	7.1	3.5
age (years)	76.3	3.8	78.7	5.2
weight (pounds)	177.7	22.8	167.2	26.6
underweight (%)	1.8		4.5	
overweight (%)	63.4		48.7	
self-rated good health (%)	55.9		44.9	
Latino men	(n = 106)		(n = 58)	
education (years)	6.3	4.1	6.6	3.7
age (years)	75.7	4.2	80.2	6.3
weight (pounds)	166.0	18.7	154.5	20.5
underweight (%)	1.1		3.9	
overweight (%)	61.3		52.8	
self-rated good health (%)	55.7		41.0	
White men	(n = 1573)		(n = 741)	
education (years)	11.9	3.4	11.0	3.6
age (years)	75.8	5.1	78.9	6.3
weight (pounds)	176.9	28.4	167.7	31.1
underweight (%)	0.9		4.9	
overweight (%)	59.6		45.4	
self-rated good health (%)	75.2		49.2	
Black-American women	(n = 452)		(n = 200)	
education (years)	8.9	3.0	8.4	2.7
age (years)	77.2	4.3	79.4	5.0
weight (pounds)	161.6	23.0	145.4	22.0
underweight (%)	2.2		7.1	
overweight (%)	71.8		49.1	
self-rated good health (%)	53.5		37.7	
Latina women	(n = 185)		(n = 58)	
education (years)	6.3	3.6	5.1	3.3
age (years)	76.9	4.2	78.4	6.0
weight (pounds)	145.2	20.6	146.3	23.5
underweight (%)	3.1		3.7	
overweight (%)	62.7		72.6	
self-rated good health (%)	50.3		42.6	
White women	(n = 2576)		(n = 937)	
education (years)	11.7	3.0	10.8	3.5
age (years)	77.1	5.8	80.5	7.2
weight (pounds)	143.3	28.0	136.9	31.7
underweight (%)	3.8		9.0	
overweight (%)	45.8		35.4	
self-rated good health (%)	72.1		50.3	

Notes: Data in this table are weighted and adjusted for the complex survey design. Statistically significant relationships, across race-gender categories, exist ($p < 0.05$) for self-rated good health (with the exception of Latino men and women), underweight (with the exception of Latino men and women), age (with the exception of Latina women), education (with the exception of Black-American women and Latino men), and weight (with the exception of Latina women), and overweight (with the exception of Latino men and women and Black–American men)

The two remaining sets of analyses were restricted to respondents who participated in each of the four data collections: 1993/1994, 1995/1996, 1998, and 2000. Tables 3–4 are formatted in accordance with Lewis et al. (2000), who presented distributions of BMI categories at baseline to 1995-1996 for participants in the CARDIA study of young adults. Our Tables 3–4 show the distributions of BMI categories at 1993/1994 and 2000 for each of the six race by gender groups. The final set of analyses (Tables 5–6) delineated patterns of individual-level change in body weight across the four data collections. We determined whether each respondent had gained or lost greater than 10 pounds in each two-year interval between interviews. Respondents who gained greater than 10 pounds were coded with a G for that interval, respondents who lost greater than 10 pounds were coded with an L for that interval, and respondents who remained stable (i.e. gained or lost less than or equal to 10 pounds) were coded with an S for that interval. Thus, an individual's pat-

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Table 3 Number and percentage of respondents in body mass index categories, 1994 and 2000, by race and gender, HRS original cohort

	Black-American men				Black-American women				Latino men				Latina women				White men				White women			
	1994		2000		1994		2000		1994		2000		1994		2000		1994		2000		1994		2000	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
< 18.5	6	1.7	8	2.5	5	0.8	6	1.1	0	0.0	1	0.3	4	1.4	3	0.8	5	0.2	5	0.2	41	1.4	37	1.2
18.5–24.9	94	25.9	104	28.4	109	17.2	102	16.0	59	25.8	51	22.4	78	27.6	68	24.0	655	27.7	575	24.6	1158	44.2	1032	39.3
25.0–29.9	176	44.6	154	39.7	246	38.9	234	36.6	119	49.6	116	49.3	111	38.4	109	37.5	1159	49.6	1145	48.3	856	32.7	904	34.9
30.0–34.9	86	22.4	92	23.2	160	25.5	165	26.3	45	20.0	53	22.2	73	23.6	76	25.5	430	18.1	484	20.8	407	15.6	421	15.8
35.0–39.9	21	5.0	22	5.1	62	9.8	73	12.0	10	3.8	9	4.0	23	7.5	34	10.8	92	3.8	124	5.1	96	3.7	136	5.3
≥ 40.0	2	0.4	5	1.1	52	7.8	54	8.1	2	0.9	5	1.8	4	1.6	3	1.4	20	0.8	28	1.1	64	2.5	92	3.5
N	385	100.0	385	100.0	634	100.0	634	100.0	235	100.0	235	100.0	293	100.0	293	100.0	2361	100.0	2361	100.0	2622	100.0	2622	100.0

Notes: Data in this table are weighted and adjusted for the complex survey design. Relationships are statistically significant ($p < 0.001$) within race-gender categories

Table 4 Number and percentage of respondents in body mass index categories, 1993 and 2000, by race and gender, AHEAD original cohort

	Black-American men				Black-American women				Latino men				Latina women				White men				White women			
	1993		2000		1993		2000		1993		2000		1993		2000		1993		2000		1993		2000	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
< 18.5	2	1.2	7	4.0	7	2.0	23	7.0	1	0.5	0	0.0	4	2.4	11	6.1	9	0.8	22	1.8	62	3.0	157	7.6
18.5–24.9	56	37.4	63	43.7	87	25.8	114	34.6	26	30.6	31	37.6	50	34.6	60	41.2	452	38.1	547	45.2	1016	50.2	1058	52.5
25.0–29.9	63	45.3	55	39.0	132	39.9	118	35.7	42	55.0	39	48.9	57	39.7	45	33.0	595	48.0	507	41.5	676	33.2	593	29.4
30.0–34.9	16	11.8	14	10.2	79	25.1	49	14.9	9	11.3	8	11.7	28	17.7	27	17.1	127	11.0	105	9.0	213	11.0	167	8.2
35.0–39.9	6	3.6	5	3.2	17	5.3	20	6.2	2	2.6	1	0.6	4	2.8	2	1.2	25	1.9	24	2.2	42	2.0	39	1.9
≥ 40.0	1	0.8	0	0.0	7	1.9	5	1.7	0	0.0	1	1.2	4	2.8	2	1.5	2	0.2	5	0.3	13	0.6	8	0.4
N	144	100.0	144	100.0	329	100.0	329	100.0	80	100.0	80	100.0	147	100.0	147	100.0	1210	100.0	1210	100.0	2022	100.0	2022	100.0

Notes: Data in this table are weighted and adjusted for the complex survey design. Relationships are statistically significant ($p < 0.001$) within race-gender categories

Table 5 Patterns of body weight change between 1994 and 2000, by race and gender, HRS original cohort

	Black-American men		Black-American women		Latino men		Latina women		White men		White women	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
SSS	202	52.0	276	43.3	123	54.1	167	57.2	1409	59.9	1559	60.5
SSL	17	4.5	30	4.9	9	4.4	14	5.0	106	4.5	118	4.8
SSG	22	5.0	39	6.0	21	8.4	18	5.8	114	4.6	109	4.2
SLS	11	2.5	19	3.0	10	4.3	5	1.6	58	2.4	77	2.8
SLL	1	0.1	7	1.2	1	0.4	0	0.0	5	0.3	7	0.2
SLG	11	3.1	27	4.2	4	1.5	14	4.9	53	2.1	49	1.9
SGS	18	5.3	30	4.8	10	3.5	9	2.8	117	5.1	121	4.6
SGL	7	2.3	18	2.7	5	2.1	6	1.8	42	1.7	43	1.6
SGG	0	0.0	4	0.6	1	0.3	1	0.2	13	0.5	12	0.4
LSS	16	3.7	25	3.7	8	3.4	10	3.3	72	3.0	80	3.1
LSL	5	1.5	7	1.0	0	0.0	0	0.0	10	0.5	5	0.2
LSG	8	1.6	13	2.1	2	0.9	5	1.5	21	0.8	17	0.7
LLS	1	0.2	4	0.5	0	0.0	3	1.1	4	0.2	4	0.2
LLL	0	0.0	1	0.1	1	0.3	0	0.0	1	0.1	1	0.0
LLG	2	0.5	0	0.0	1	0.6	0	0.0	6	0.3	6	0.2
LGS	6	1.8	14	2.6	5	2.3	6	2.2	60	2.5	58	2.1
LGL	3	1.0	9	1.7	1	0.4	3	1.1	18	0.8	12	0.4
LGG	2	0.4	2	0.3	0	0.0	1	0.3	6	0.2	13	0.5
GSS	24	6.4	48	7.4	7	4.2	14	5.0	124	5.2	146	5.8
GSL	5	1.3	15	2.4	3	1.2	3	1.0	23	1.0	29	1.1
GSG	4	1.3	4	0.6	3	1.2	5	1.4	18	0.8	26	1.0
GLS	11	2.7	20	3.1	8	3.9	6	1.7	27	1.2	38	1.5
GLL	1	0.2	4	0.8	0	0.0	0	0.0	6	0.3	2	0.1
GLG	4	1.0	11	1.8	3	0.9	4	1.3	26	1.1	20	0.7
GGS	4	1.1	5	1.0	3	1.1	1	0.3	14	0.5	22	1.0
GGL	0	0.0	1	0.3	1	0.2	1	0.5	10	0.4	7	0.3
GGG	3	0.6	0	0.0	1	0.4	0	0.0	0	0.0	3	0.1

Notes: Data in this table are weighted. S = Stable: less than or equal to 10 lb. weight gain or loss. L = Loss: greater than 10 lb. weight loss. G = Gain: greater than 10 lb. weight gain. The first letter represents the weight change between 1994 and 1996. The second letter represents the weight change between 1996 and 1998. The third letter represents the weight change between 1998 and 2000

tern of weight is designated by a three-letter code. For example, someone who gained greater than 10 pounds in the first interval, remained stable within 10 pounds in the second interval, and gained greater than 10 pounds in the third would be coded G-S-G. Tables 5-6 show the frequencies of the various patterns found in our data by gender/race.

Results

Tables 1–2 compare 1993/1994 characteristics for respondents who remain in the survey through 2000 with those who become non-respondents. The most striking difference between the respondents and non-respondents is the poorer self-rated health of the latter. With the exception of older Latino(a) men and women, a greater proportion of middle-aged and older adults who remain in the study report good (i.e., self-rated good, very good, or excellent) health. Interestingly, there is a statistically significant difference between respondents and non-respondents with regard to underweight as well. With the exception of middle-aged Black American and Latina women and older Latino(a) men and women, non-respondents are more often underweight. Age appears to have a greater impact on response in older adults than in middle-aged adults. With the exception of older Latina women, respondents are younger than non-respondents. And, in three out of the six race-gender categories (i.e., White men and Black-American and Latina women) respondents' and non-respondents' ages differ statistically for middle-aged adults.

Tables 3–4 show that there are statistically significant differences in weight for both middle-aged and older adults between baseline and year 2000 weight distributions. Overall, it appears that a greater proportion of middle-aged adults fall into the heavier BMI classifications of 30.0–34.9 and 35.0–39.9 by year 2000 compared to baseline. This suggests weight gain over time in this cohort. The opposite pattern is true for older adults. In general, a greater proportion fall into the lower end of the BMI classifications (i.e., 18.5–24.9 and less than 18.5) by year 2000 compared to baseline, suggesting weight loss in older ages.

The most common weight pattern for each race-gender group in each age cohort is stability (Tables 5–6). However, considerable weight variability is evident when reviewing all of the weight trajectories found. For example, among

Table 6 Patterns of body weight change between 1993 and 2000, by race and gender, AHEAD original cohort

	Black-American men		Black-American women		Latino men		Latina women		White men		White women	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
SSS	54	39.0	111	32.9	41	48.9	61	44.8	717	59.8	1 157	57.9
SSL	15	9.6	36	10.8	4	5.1	13	7.9	104	8.4	168	8.3
SSG	7	4.7	18	5.5	3	3.9	5	2.9	32	2.6	59	2.8
SLS	11	7.8	27	8.6	4	5.2	10	6.1	68	5.5	128	6.7
SLL	6	3.5	7	2.3	0	0.0	3	1.9	17	1.4	31	1.5
SLG	7	5.5	14	4.2	7	9.4	5	3.4	27	2.3	48	2.2
SGS	5	2.6	8	2.3	4	4.2	5	3.0	36	3.3	54	2.7
SGL	1	0.6	12	3.7	1	0.9	4	2.3	15	1.1	34	1.9
SGG	1	0.6	0	0.0	0	0.0	0	0.0	2	0.2	6	0.3
LSS	7	7.1	23	7.3	4	5.2	8	5.6	54	4.2	98	5.1
LSL	1	0.6	9	3.0	0	0.0	6	4.1	18	1.5	22	1.0
LSG	0	0.0	4	1.1	3	4.5	2	1.3	4	0.7	26	1.2
LLS	1	0.6	13	4.3	0	0.0	1	0.6	7	0.6	20	1.0
LLL	1	0.6	1	0.3	0	0.0	0	0.0	3	0.2	4	0.2
LLG	0	0.0	1	0.3	0	0.0	2	0.9	1	0.1	6	0.2
LGS	4	2.6	9	2.7	0	0.0	4	2.2	19	1.4	24	1.3
LGL	7	4.2	4	1.1	0	0.0	3	2.1	5	0.3	8	0.5
LGG	1	1.1	0	0.0	0	0.0	2	1.3	0	0.0	4	0.2
GSS	4	2.6	8	2.6	4	5.1	3	1.8	36	2.9	48	2.4
GSL	5	3.5	4	1.3	1	1.4	2	1.4	15	1.2	16	0.8
GSG	0	0.0	3	0.9	0	0.0	2	1.2	3	0.3	7	0.3
GLS	2	1.6	5	1.9	3	3.8	3	1.9	10	0.9	19	0.9
GLL	1	0.9	2	0.5	1	1.1	2	1.6	3	0.3	7	0.4
GLG	1	0.6	5	2.0	1	1.4	1	0.4	8	0.5	3	0.2
GGS	0	0.0	0	0.0	0	0.0	1	0.6	3	0.2	3	0.1
GGL	0	0.0	1	0.4	0	0.0	1	0.5	1	0.1	6	0.3
GGG	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Notes: Data in this table are weighted. S = Stable: less than or equal to 10 lb. weight gain or loss. L = Loss: greater than 10 lb. weight loss. G = Gain: greater than 10 lb. weight gain. The first letter represents the weight change between 1993 and 1995. The second letter represents the weight change between 1995 and 1998. The third letter represents the weight change between 1998 and 2000

middle-aged Black-American men, Black-American women, White men, and White women, the second most common pattern next to weight stability is gaining weight and then remaining the same over the next two time frames. For middle-aged Latino(a) men and women, the second most common pattern next to weight stability is remaining the same weight over the first and second time frames and gaining weight in the third. In contrast, with the exception of Latino men, the second most common pattern for older adults is stability over the first and second time frames and weight loss in the third. For older Latino men, that pattern is remaining the same in the first time frame, losing weight in the second, and gaining in the third.

Discussion

Taken together, the trends shown in Tables 3–6 are consistent with findings from earlier cross-sectional surveys, as reviewed by Flegal and her colleagues (Flegal 2000; Flegal et al. 1998). Middle-age appears to be a time of life associated with weight gain, reinforcing concerns about the health prospects for today's overweight and obese youth. In contrast, older age is often marked by weight loss. Although data on intentional vs unintentional weight loss is often lacking from studies of weight change, this decline in older age is likely to be associated with underlying disease, physiologic changes, and social-psychological factors such as depression (Kotz et al. 1999).

The relatively high BMI status of minority group members has been noted previously, but is not well understood (Kumanyika 1993). Given the complex, multifactorial nature of overweight and obesity (Aronne 1998), more research on the biological, social, environmental, and cultural determinants and outcomes of weight gain or loss is needed (Kumanyika 1993). Sensitivity to diverse populations also must be a priority in the development and implementation of prevention or treatment programs for obesity (National Heart, Lung and Blood Institute 1998). For example, Americans who are older, black, or of lower socio-economic status are more likely to underestimate their weight status relative to medically defined classifications, which suggests that public health guidelines for weight loss may not be efficacious without consideration of differing normative judgments about body weight across socio-cultural groups (Chang & Christakis 2001).

Similarly, gender is an important dimension for work in this area. Although, on average, women's BMI is lower than men's, at the 75th percentile of the BMI distribution – and above – women have higher BMIs than men (Williamson 1993). That is, the prevalence of BMI ≥ 25 is higher for men than for women, whereas the prevalence of BMI ≥ 30 is higher for women than for men (Flegal 2000). Put another way, women show greater variability in body weight and weight change than do men (Williamson 1993). That BMI appears to vary by socio-economic status and race more so for women than for men suggests a stronger association between weight and women's social and cultural roles (Flegal 2000).

Both stability and variability in weight status are illustrated in Tables 5–6. This pattern is consistent with recent results from another U.S. study, which found that about half of adults in the middle range of BMI in 1986 were in roughly the same weight category in 1999. The remainder had gained or lost a substantial amount of weight over the 13-year period (The University of Michigan News and Information Services 2001; Andreassi 2002). Stafford and his co-investigators note that the findings of weight change confirm anecdotal accounts of weight mobility or the "yo-yo diet effect" (The University of Michigan News and Information Services 2001; Andreassi 2002). There is some evidence that weight variability of this sort may be an independent health risk for cardiovascular disease and mortality, although more research is needed to explicate the direction and nature of the relationship (Blair et al. 1993; Kushner 1993). Interestingly, Tables 5 and 6 suggest that weight variability may be more prevalent in Black American and Latino respondents, compared to the White respondents. If so, this pattern may be associated with poorer health outcomes in the minority group members.

In addition to documenting patterns of weight change, our analyses demonstrate an association between body weight and sample attrition (Tables 1 and 2). Particularly striking is the relatively large percentage of underweight respondents among those who died or became non-respondents by 2000. This is consistent with evidence that underweight, as well as obesity, may be a risk factor for mortality. For example, a 13-year study of all-cause mortality among Canadian adults concluded that underweight, overweight, and obese adults (ages 20–69) were all at greater risk of mortality compared to those at normal weight (Katzmarzyk et al. 2001). The public health implications of such findings continue to be debated, however, because of the potential confounding effects of smoking, subclinical and co-morbid disease, age, and sex on the relationship between body weight and longevity.

Several cautions are appropriate when interpreting these data: First, the Health and Retirement Study measure of BMI is based on self-reported height and body weight, without verification of the measurements. Respondents' reports of height and weight may be biased (Kuskowska-Wolk et al. 1992), although at least two studies have found such self-reports to be quite accurate (Stunkard & Albaum 1981; Troy et al. 1995). When respondents were unable to participate in an interview, proxy information was accepted. This may add additional measurement error. Second, BMI is a measure of excess body weight rather than excess body fat. Because body composition varies with age, race, and gender, people at the same BMI do not necessarily have the same percentage of body fat or the same risk for adverse outcomes (Flegal 2000; Aloia et al. 1997; Reid 1997). Third, BMI does not indicate how weight is distributed over the body, which may also be an important and independent health risk. For example, previous research suggests that older women with low BMI but high waist-hip ratio (abdominal obesity) have a higher risk of death than heavier women who have a lower waist-hip ratio (Folsom et al. 2000).

Because different BMI cut-points would change the percentages of underweight, normal weight, overweight, and obese respondents, findings from this study are not necessarily directly comparable with results from earlier U.S. or international studies. The cut-points we used are consistent with the classification system promoted by the 1997 WHO Consultation on Obesity (World Health Organization 1998) and by the U.S. NHLBI (National Heart, Lung, and Blood Institute 1998). Debate continues, however, as to whether the definition of "overweight" as a BMI of 25–29.9 is appropriate. Whereas the NHLBI Guidelines (National Heart, Lung, and Blood Institute 1998) point to the increased risk of morbidity associated with a BMI of 25–29.9, Strawbridge and colleagues (Strawbridge et al. 2000) concluded that this designation could not be justified on the basis of mortality. In addition, they noted that current interpretations of the guidelines stigmatize too many people and fail to adequately address the health risks of an emphasis on weight loss and low BMI (Strawbridge et al. 2000). This is not to undermine the importance of research on body weight, but to emphasize the need for careful and objective study of what can be an emotionally and politically charged topic.

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Zusammenfassung

Muster der Körpergewichtsveränderungen von Amerikanern mittleren und höheren Alters in Abhängigkeit von Geschlecht und ethnischer Zugehörigkeit, 1993–2000

Fragestellung: Trotz nachweislich negativer gesundheitlicher Folgen von extremen Gewichtszunahmen oder -verlusten, wurden Körpergewichtsveränderungen im Verlauf des Erwachsenenalters bisher nicht umfassend anhand von Längsschnittstudien untersucht. Dieser Artikel versucht dies nun, indem die Verlaufsmuster der Körpergewichtsveränderungen bei Erwachsenen mittleren und höheren Alters untersucht werden.

Methoden: Erhebungsdaten der ursprünglichen Kohorten der „Health and Retirement Study" (HRS, Gesundheit im Ruhestand) und der „Asset and Health Dynamic Among the Oldest Old Study" (AHEAD, Vermögen und Gesundheitsdynamik bei Senioren) wurden analysiert, um Vergleiche zwischen sozialen Gruppierungen, Antwortenden und nicht Antwortenden, Anfangsgewicht (1993 und 1994) und Gewicht im Jahr 2000 vorzunehmen und um verschiedene Gewichtsveränderungskurven im Zeitverlauf zu erforschen.

Ergebnisse: Im Vergleich zum Ausgangsgewicht nimmt ein höherer Prozentsatz der Erwachsenen mittleren Alters im Verlauf der Jahre an Gewicht zu während ein grösserer Anteil der Erwachsenen höheren Alters im Verlauf der Jahre an Gewicht verliert. Eine Untersuchung der Wechsel zwischen den Gewichtsveränderungskurven für alle sozialen Gruppierungen weist auf beachtliche Schwankungen hin.

Schlussfolgerungen: Die Resultate deuten darauf hin, dass unterschiedliche physiologische, soziale und umweltbedingte Faktoren den Körpergewichtsverlauf beeinflussen können. Ein Verständnis dieser Verlaufsmuster in Abhängigkeit von Geschlecht und ethnischer Zugehörigkeit kann Einblick in gesundheitliche Ungleichheiten zwischen verschiedenen sozialen Gruppierungen geben.

Résumé

Profils de poids corporel chez des Américains d'âge moyen ou avancé, selon le sexe et l'origine ethnique, 1993–2000

Objectifs: Malgré les preuves qu'un gain ou une perte de poids excessive sont associés à un mauvais état de santé, les profils longitudinaux de poids corporel au cours de l'âge adulte n'ont pas encore été complètement décrits. Cet article le fait en examinant le profil de poids corporel d'adulte d'âge moyen et avancé.

Méthodes: Les données des cohortes originales de la Health and Retirement Study (HRS) et de la Asset and Health Dynamic Among the Oldest Old (AHEAD) Study sont utilisées pour comparer, par groupe social, les caractéristiques de participants et non participants, le poids en début de suivi (1993 et 1994) et son évolution jusqu'en l'an 2000, et explorer plusieurs trajectoires de changements de poids au cours du temps.

Résultats: De façon générale, une plus grande proportion d'adultes d'âge moyen prennent du poids au cours du temps et une plus grande proportion d'adultes d'âge avancé perdent du poids au cours du temps. L'examen des trajectoires de poids corporel dans tous les groupes sociaux suggère qu'il existe une énorme variabilité.

Conclusions: Ces résultats suggèrent que différentes expériences physiologiques, sociales ou environnementales peuvent avoir des implications sur le profil de poids corporel. La compréhension de ces profils par origine ethnique ou sexe peut aider à mieux comprendre les inégalités de santé entre les différents groupes sociaux.

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Appendix

Appendix 1 10th, 25th, 50th, 75th, and 90th percentiles; means; and standard deviations of body mass index by gender and 5-year age categories, 1994–2000

Age Group (years)		N	10P	25P	50P	75P	90P	Mean	S.D.
50–54	1994								
	Male	647	22.9	24.7	27.0	29.5	32.1	27.4	4.1
	Female	798	21.2	23.0	25.7	30.0	33.8	27.0	5.6
	1996								
	Male	647	23.0	24.9	27.0	29.7	33.5	27.6	4.3
	Female	792	21.3	23.1	26.5	30.1	35.0	27.4	5.9
	1998								
	Male	648	23.1	25.1	27.3	30.0	33.5	27.8	4.3
	Female	800	21.3	23.6	26.6	30.8	35.3	27.7	6.1
	2000								
	Male	591	23.1	25.1	27.4	30.4	33.5	28.1	4.5
	Female	742	21.3	23.6	26.6	31.0	35.8	28.0	6.3
55–59	1994								
	Male	1559	22.8	24.6	26.8	29.8	32.7	27.4	4.2
	Female	1821	20.9	22.9	25.8	29.3	33.8	26.8	5.4
	1996								
	Male	1560	22.8	24.8	27.1	30.1	33.2	27.6	4.3
	Female	1814	21.0	23.1	26.0	30.0	34.3	27.0	5.4
	1998								
	Male	1560	22.9	24.8	27.1	30.3	33.5	27.7	4.3
	Female	1819	21.0	23.2	26.3	30.2	34.3	27.1	5.5
	2000								
	Male	1438	22.9	24.8	27.3	30.4	33.5	27.8	4.4
	Female	1664	21.3	23.4	26.5	30.4	35.0	27.4	5.7
60–64	1994								
	Male	1128	22.8	24.4	26.6	29.5	32.3	27.2	4.0
	Female	1350	21.1	23.2	25.8	30.0	33.7	27.0	5.4
	1996								
	Male	832	22.8	24.4	26.6	29.7	32.4	27.3	4.1
	Female	1005	21.1	23.3	26.3	29.9	34.5	27.2	5.7
	1998								
	Male	1123	22.7	24.4	27.0	29.8	32.8	27.3	4.2
	Female	1343	21.1	23.3	26.3	30.0	34.5	27.2	5.6
	2000								
	Male	1015	22.7	24.5	27.1	29.8	33.0	27.5	4.3
	Female	1249	21.1	23.3	26.6	30.1	34.7	27.3	5.6

Notes: Source of data is the Health and Retirement Study, original cohort. Data in this table are weighted

Appendix 2 10th, 25th, 50th, 75th, and 90th percentiles; means; and standard deviations of body mass index by gender and 5-year age categories, 1993–2000

Age Group (years)		N	10P	25P	50P	75P	90P	Mean	S.D.
70–74	1993								
	Male	868	22.2	23.7	25.8	28.1	31.0	26.3	3.8
	Female	1231	20.4	22.3	25.1	28.3	31.6	25.8	4.6
	1995								
	Male	866	22.0	23.7	25.8	28.3	31.3	26.2	3.9
	Female	1231	20.1	22.3	24.9	28.2	31.3	25.5	4.6
	1998								
	Male	868	21.7	23.6	25.7	28.0	30.8	25.9	3.9
	Female	1230	19.8	22.0	24.8	28.2	31.3	25.3	4.7
	2000								
	Male	725	21.4	23.3	25.8	28.1	30.7	26.0	3.9
	Female	1104	19.5	21.9	24.6	28.0	30.9	25.1	4.7

Appendix 2 (continued)

Age Group (years)		N	10P	25P	50P	75P	90P	Mean	S.D.
75–79	1993								
	Male	537	22.1	23.7	25.7	27.6	30.0	25.9	3.4
	Female	904	20.4	22.3	25.0	28.3	31.3	25.6	4.8
	1995								
	Male	536	21.9	23.4	25.3	27.8	30.0	25.7	3.5
	Female	906	19.9	21.9	24.7	27.8	31.2	25.3	4.8
	1998								
	Male	536	21.1	22.8	25.0	27.4	30.1	25.2	3.7
	Female	902	19.4	21.6	24.2	27.5	31.0	24.9	4.8
	2000								
	Male	421	20.5	22.5	24.9	27.5	30.3	25.2	3.9
	Female	769	19.2	21.4	24.0	26.9	30.9	24.6	4.8
80–84	1993								
	Male	325	21.1	22.8	25.1	27.3	29.1	25.2	3.4
	Female	629	19.4	21.4	24.2	27.4	30.8	24.7	4.7
	1995								
	Male	323	20.8	22.5	24.9	27.2	29.1	25.0	3.5
	Female	629	18.9	21.1	23.8	26.9	30.5	24.4	4.8
	1998								
	Male	323	19.8	22.2	24.3	26.7	29.5	24.5	3.6
	Female	620	18.3	20.6	23.2	26.6	30.2	23.8	4.7
	2000								
	Male	237	19.7	21.7	24.2	26.3	29.3	24.4	3.9
	Female	458	18.3	20.3	23.0	26.5	29.3	23.7	4.7
85–89	1993								
	Male	116	21.1	22.6	24.3	26.5	28.0	24.6	2.9
	Female	255	19.9	21.6	24.2	27.3	30.1	24.6	4.2
	1995								
	Male	115	20.2	22.3	24.1	26.3	27.4	24.2	3.1
	Female	254	19.2	21.3	23.8	26.6	29.5	24.2	4.2
	1998								
	Male	115	19.8	21.7	23.6	25.1	27.3	23.7	3.1
	Female	251	18.6	20.9	22.9	25.7	29.1	23.5	4.0
	2000								
	Male	58	20.4	21.6	23.5	25.1	27.4	23.7	3.2
	Female	170	18.2	20.7	22.7	25.8	29.3	23.3	4.3
90–94	1993								
	Male	20	20.2	21.3	23.4	25.1	27.5	23.6	3.7
	Female	80	19.7	21.5	23.3	25.4	28.2	23.6	3.3
	1995								
	Male	20	20.0	21.3	22.6	23.7	26.6	23.1	3.8
	Female	80	19.5	20.8	23.0	25.0	26.6	23.1	3.5
	1998								
	Male	20	19.6	21.6	22.8	25.8	28.1	23.4	3.4
	Female	80	18.2	19.2	21.3	24.4	28.2	22.4	4.4
	2000								
	Male	8	19.6	19.8	21.1	23.6	27.3	22.0	2.3
	Female	35	18.0	19.7	21.6	23.8	26.4	22.0	3.5
95–99	1993								
	Male	3	25.8	25.8	27.3	27.9	27.9	26.9	1.2
	Female	17	17.4	18.3	22.5	26.3	29.3	23.2	4.6
	1995								
	Male	3	22.9	22.9	25.1	25.8	25.8	24.4	2.0
	Female	17	17.4	18.6	20.6	24.8	28.9	22.2	4.8
	1998								
	Male	3	21.8	21.8	26.6	27.1	27.1	24.8	4.5
	Female	17	15.4	15.9	21.7	22.9	29.5	20.4	4.2
	2000								
	Male	1	23.4	23.4	23.4	23.4	23.4	23.4	0.0
	Female	7	19.1	20.1	23.2	27.3	28.0	23.5	3.5

Notes: Source of data is the Health and Retirement Study, AHEAD original cohort. Data in this table are weighted