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Overestimation of physical activity in a nationally-representative sample of underactive adults with diabetes

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Abstract

Objectives—Using data from the national Health and Retirement Study, we sought to: a) estimate the proportion of U.S. adults with diabetes over age 50 who do not meet physical activity guidelines but believe they are sufficiently active, and b) examine demographic and health-related correlates of such ‘overestimation.’

Research design—Respondents who were classified as underactive according to a detailed activity inventory, but reported exercising at least the ‘right amount’, were designated as overestimating their physical activity. Multiple logistic regression was used to examine the association of demographic and health-related correlates with the odds of overestimation.

Results—Fifty-four percent of the survey sample did not meet physical activity guidelines, and one-quarter of this underactive group overestimated their physical activity. The adjusted odds of overestimation were higher among respondents who held the perception that they were the right weight or underweight (OR=2.42; 95% C.I. = 1.49–3.94), who had good or better self-assessed diabetes control (1.84; 95% C.I. = 1.12–3.04), and who were Black or Hispanic (OR=1.89; 95% C.I. 1.13–3.16). Experiencing shortness of breath reduced the odds of overestimation (OR=0.34; 95% C.I. = 0.19–0.61).

Conclusions—Overestimation of physical activity is common among adults with diabetes, and is associated with the perceptions that one is the right weight and that one has good control of

diabetes, and with being Black or Hispanic. Clinicians should be aware that these factors may affect their patients' beliefs about how much physical activity is adequate.

While regular physical activity benefits almost everyone, it is especially critical for optimizing health among the large and growing segment of the U.S. population with diabetes. Regular physical activity enhances blood glucose control, improves cardiovascular risk factors, and lowers risk of mortality.¹⁻³ The American Diabetes Association has recommended at least 150 minutes per week of moderate-intensity physical activity and/or 90 minutes a week of vigorous exercise;⁴ guidelines comparable to those for the general adult population, including chronically ill adults.⁵ Most adults with diabetes, however, do not meet this threshold and tend to be less active than adults without diabetes.⁶

One little-examined barrier to physical activity is an erroneous belief by underactive people with diabetes that they are, in fact, sufficiently active. Those who hold such a belief may not be motivated to increase their physical activity or even to attend to messages that promote physical activity. A small body of research from Europe suggests that overestimation of one's physical activity occurs in individuals with and without chronic illness, and that it is associated with lower BMI.⁷⁻⁹

The goals of the present study are to: 1) estimate the proportion of U.S. adults with diabetes over age 50 who "overestimate" their physical activity level; i.e., who do not meet physical activity guidelines but believe they are sufficiently active; and 2) examine demographic and health correlates of overestimation.

Method

Data source and sample

The Health and Retirement Study (HRS) conducts biannual surveys on health and economic topics of a nationally-representative sample of Americans over the age of 50. In 2003, the HRS-Diabetes Supplement (HRS-DS) was mailed to the 2,385 adults who reported a physician diagnosis of diabetes in the 2002 HRS interview. Of these, 1,883 participants returned questionnaires. In the current study (n=1621), we excluded proxy respondents (n=193), those of "other" race/ethnicity (n=35), and individuals with sampling weights of zero (n=34).

Measures

Meeting physical activity guidelines—A binary variable indicated achievement of the recommended minutes of weekly moderate and/or vigorous physical activity in the last two weeks. Per Plotnikoff et al.,¹⁰ we first calculated minutes/week of moderate exercise based on seven items about the frequency (times/week) and duration of moderate-intensity activities (e.g., walking for exercise). Minutes of vigorous exercise were based on participation in activities "like running/jogging, biking, tennis, aerobic dance, or hiking." Moderate and vigorous activity minutes were multiplied by 4.0 and 7.5 METs (metabolic equivalent tasks, indicating the intensity of effort), respectively. Individuals who accumulated less than 600 MET-minutes/week (equivalent to 150 minutes/week of moderate activity, 80 minutes of vigorous activity, or any combination thereof) were classified as

underactive. Of the 1621 adults included in the study, 854 (53.4%; weighted percentage) were underactive and form the basis for analysis.

Overestimation—“In the past two weeks, do you feel that you exercised about the right amount, less, or more than you would like?” Those who reported exercising the right amount or more were classified as overestimating their physical activity.

Sociodemographic variables—Age, race (non-Hispanic White vs. non-Hispanic Black and Hispanic; these latter two categories were combined due to small subgroup size), education, and household wealth.

Diabetes characteristics—Years since diagnosis, current insulin use, and self-assessed diabetes control (“How well do you feel your diabetes has been controlled in the last 6 months?”); categorized into poor or fair control vs. good, very good or excellent.

Other chronic conditions—Respondents were asked if they were ever diagnosed with arthritis, cancer, chronic lung disease, coronary heart disease, stroke, or a psychiatric problem.

Functional limitations—Individuals reporting difficulty performing one or more of these tasks “because of a health problem” were classified as having a functional limitation: walking several blocks; walking one block; climbing several flights of stairs without resting; climbing one flight of stairs without resting; stooping, kneeling, or crouching; lifting or carrying weights over 10 pounds; reaching or extending arms above shoulder level; picking up a dime from a table; and pulling or pushing large objects.

Weight perceptions—Respondents were asked “how they would describe their weight right now” (very underweight to very overweight). Responses were dichotomized into *underweight/about the right weight* and *overweight*.

Shortness of breath—Respondent were classified as having shortness of breath if they experienced this symptom while performing certain activities (from lying down flat to climbing several flights of stairs) in the last 4 weeks.

Analysis

Data are from the 2002 HRS Core interview (demographic characteristics, health conditions, and functional limitations) and the 2003 HRS-DS (all other variables). For most variables, no greater than 10% of data were missing. To minimize the loss of cases due to missing data, we used IVEware to multiply impute missing data.¹¹ Data were weighted to reflect the U.S. population of midlife and older adults with diabetes. Standard errors were adjusted to account for the complex sampling design used to select survey respondents.

We used logistic regression to examine the unadjusted and adjusted association of each independent variable with overestimation. For adjusted analyses, variables were entered in two stages. In Model 1, we regressed overestimation on demographic variables. In Model 2,

we added health-related indicators. All analyses were conducted with IVEware and SAS 9.2.¹²

Results

Characteristics of the study sample are found in Table 1. More than a fifth (22.4%) of this underactive sample overestimated their physical activity—that is, they reported doing the right amount of exercise in the past two weeks. Table 2 shows the results of the logistic regression analysis. In unadjusted analysis, each one-year increase in age increased the odds of overestimating physical activity by 4%. Believing oneself to be underweight/about the right weight more than tripled the odds of overestimation. Perceiving oneself to have good-to-excellent diabetes control doubled these odds. Experiencing shortness of breath reduced the odds by 70%. The effect of race had borderline significance. No significant effect was evident for education, wealth, gender, years since diagnosis, insulin use, functional limitations, or comorbid conditions.

With all demographic predictors included simultaneously (Model 1, Table 2), age remained a significant correlate of overestimation. The effect of race/ethnicity increased when other factors were controlled and attained statistical significance (OR=1.80; 95% C.I.=1.10–2.95). Adding health variables to the model (Model 2, Table 2) further increased the effect of race/ethnicity (OR=1.89; 95% C.I.=1.13–3.16). Age, however, was no longer statistically significant. Believing oneself to be the right weight (OR=2.42; 95% C.I.=1.49–3.94) and in good or better diabetes control (1.84; 95% C.I.=1.12–3.04), and experiencing shortness of breath (OR=0.34, 95% CI.=0.19–0.61) also had significant associations with overestimation.

Discussion

Twenty-two percent of U.S. adults age 50 and over with diabetes who do not meet current physical activity guidelines nonetheless believe that they are sufficiently physically active. Of the demographic and health correlates of overestimation examined, perceiving oneself to be the right weight, believing that one's diabetes is in good or better control, and being Black or Hispanic most increased the odds of overestimation.

Perceptions of weight and of diabetes control

Past studies have identified normal or low BMI as a factor in overestimating activity.^{7–9} We used subjective perceptions of body weight rather than BMI because we assumed that these perceptions more directly influence beliefs about the need for exercise. In our weight-conscious society, many people likely associate physical activity with weight control. Similarly, health care providers are less likely to discuss physical activity with non-overweight patients.^{13–15} Notably, regardless of BMI, physical inactivity is a risk factor for diabetes-related cardiovascular comorbidities¹⁶ and is associated with poor health outcomes in general populations as well; e.g., normal-BMI adults with poor aerobic fitness are at higher risk for all-cause and cardiovascular mortality than high-BMI adults with good fitness.¹⁷

The only prior study identified that examined the relationship between perceived diabetes control and self-management behaviors found better self-reported adherence to exercise and diet to be correlated with better perceived diabetes control.¹⁸ It may be that perceiving one's diabetes to be in good control leads a person to believe that he/she is "doing things right" (e.g., engaging in enough physical activity, eating a healthy diet, maintaining an appropriate weight).

Race/Ethnicity and overestimation

Black and Hispanic adults were more likely to overestimate their physical activity than White non-Hispanic adults. Although no prior study was identified that examined the role of race/ethnicity in perceptions of physical activity adequacy, past research has shown Black and Hispanic adults to be more likely than White adults to misperceive overweight as normal weight.^{19–20} As a group, Black adults are less physically active than their White counterparts;⁶ therefore, within-group social norms for activity may partially explain the increased likelihood of overestimation in this group. Notably, at least two studies among chronically ill populations, including adults with diabetes, found that patient race/ethnicity does not affect the likelihood of physician counseling about exercise.^{14, 21}

Shortness of breath and overestimation

Respondents reporting shortness of breath in the last month were *less* likely to overestimate their physical activity. This apparently heightened awareness of activity inadequacy may stem from the fact that adults with shortness of breath experience more difficulty with physical activities on a daily basis, and thus the issue of circumscribed activity is more salient for them. The relationship between shortness of breath and beliefs related to physical activity warrants further investigation.

The limitations of this study should be noted. First, both our "objective" and subjective exercise indicators are based on self-report. As such, they are likely to have correlated error, increasing the concordance between actual and perceived physical activity.⁹ Thus, overestimation in this population may be higher than we have presented here. Second, the binary categorization of meeting the physical activity guidelines allows for no variation in what might be a medically appropriate exercise routine for a given individual. It also means that some of those classified as overestimating their physical activity are actually exercising near the threshold amount. Third, our measures of comorbidity and functional limitations did not capture disease or limitation severity, which may matter more than the simple presence or absence of these conditions. Fourth, the item we used to identify overestimation did not explicitly ask respondents if they believed that they were meeting exercise guidelines. Thus, our subgroup of overestimators likely includes older adults who know that they do not exercise enough (and are content with that) and those who simply do not know that they are not exercising enough. Because intervention strategies might differ for these subgroups, future work should more fully explore the beliefs and perceptions among overestimators. Finally, small subgroup sizes compelled us to combine non-Hispanic Blacks and Hispanics, and to exclude other non-White groups from the analysis. Ideally, each group would be examined separately.

Implications for practice and research

Our results have implications for both clinical practice and health promotion efforts. First and foremost, health care providers should be aware of the potential role that perceptions about weight and diabetes control play in beliefs about physical activity adequacy among adults with diabetes. Clinicians should probe whether these beliefs are serving as a disincentive to exercise. Similarly, clinicians should be aware that Black and Hispanic patients with diabetes may be more likely to think that a lower level of physical activity is adequate. Broader health promotion efforts targeting self-assessed inactive populations may miss those who overestimate their physical activity.⁸ Outreach efforts should thus attempt to foster realistic perceptions of activity levels.^{8–9} Finally, our results suggest the possibility that many people are not aware of the current physical activity guidelines; continued efforts to make these explicit to patients with diabetes are needed.

Our results also point to potentially fruitful areas for future research; e.g., awareness of physical activity guidelines among adults with diabetes, how overestimation affects awareness of and response to physical activity messages, and the relationship between subjective perceptions of body weight and diabetes control on one hand and objective indicators of these characteristics on the other. Addressing misperceptions of physical activity adequacy among adults with diabetes is a novel addition to the arsenal of approaches needed to increase physical activity, a key health behavior for this vulnerable segment of the population.

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Table 1

Sample characteristics for adults age 51 and over with diabetes who do not meet current physical activity guidelines. (n = 854):

	M(SE) or % (n)
<i>Demographic characteristics</i>	
Age (years)	70.0 (0.4)
Black (non-Hispanic) or Hispanic ^a	24.7 (269)
Education	30.2 (292)
Less than high school	37.8 (311)
High school or GED	32.0 (251)
Some college or higher	
Male	41.9 (344)
Wealth (dollars)	208,172 (19,580)
<i>Diabetes characteristics</i>	
Poor or fair self-rated diabetes control	27.2 (230)
Years since diagnosis of diabetes	13.9 (0.6)
Uses insulin	29.7 (257)
<i>Other health characteristics</i>	
Overestimated physical activity	22.4 (195)
One or more comorbid conditions besides diabetes	86.7 (741)
Physical limitation present	87.8 (745)
Self-assessed weight: Underweight or about the right weight ^b	27.9 (248)
Any shortness of breath during past 4 weeks	85.2 (729)

Note. Percentages and means are weighted. Sample numbers (n) are not weighted.

^aBlack =194, Hispanic =75

^bUnderweight=42; About the right weight=206

Table 2

Unadjusted and adjusted odds ratios (95% C.I.) for overestimating physical activity (n=854)

	Unadjusted	Model 1: Demographic variables only	Model 2: Demographic and health variables
<i>Demographic characteristics</i>			
Age (years)	1.04 (1.01–1.07)	1.05 (1.02–1.08)	1.03 (0.99–1.06)
Education			
Less than high school	1.57 (0.93–2.64)	1.15 (0.65–2.04)	1.15 (0.65–2.06)
High school or GED	1.20 (0.63–2.28)	1.06 (0.56–2.04)	1.08 (0.56–2.07)
Some college or higher	1.00	1.00	1.00
Male	0.91 (0.62–1.34)	1.00 (0.65–1.52)	0.96 (0.62–1.49)
Black non-Hispanic or Hispanic	1.57 (0.99–2.51)	1.80 (1.10–2.95)	1.89 (1.13–3.16) ^b
Wealth	1.00 (0.99–1.00) ^a	1.00 (0.99–1.01)	1.00 (0.99–1.01)
<i>Health indicators</i>			
1 chronic conditions in addition to diabetes	1.04 (0.61–1.77)		1.38 (0.67–2.85)
1 limitation in physical functioning	0.73 (0.35–1.51)		1.00 (0.44–2.29)
Perceived underweight or about the right weight	3.25 (2.19–4.82)		2.42 (1.49–3.94) ^c
Any shortness of breath in past 4 weeks	0.31 (0.17–0.53)		0.34 (0.19–0.61)
Uses insulin	0.81 (0.50–1.31)		0.92 (0.50–1.71)
Years since diagnosis of diabetes	1.01 (0.99–1.02)		1.00 (0.99–1.02)
Perceived good, very good, or excellent diabetes control	2.17 (1.41–3.32)		1.84 (1.12–3.04)

Notes:

^aOR = .999; 95% C.I. = 0.994–1.003^bFully adjusted ORs for Black non-Hispanic and Hispanic groups separately are: Hispanic OR=1.97 (0.91–4.26), Black OR= 1.86 (1.03–3.36).^cFully adjusted ORs for self-assessed underweight and right-weight adults separately are: Underweight =1.59 (0.53–4.76), Right weight = 2.59 (1.55–4.34).