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Original Research

An assessment of the relationship of physical activity, obesity, and chronic diseases/conditions between active/obese and sedentary/ normal weight American women in a national sample

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ABSTRACT

Objective: Obesity and physical inactivity are associated with increased rates of chronic diseases and conditions. However, the ‘fit but fat’ theory posits that cardiopulmonary fitness (or physical activity) can mitigate risks to health associated with obesity. The purpose of this study was to compare chronic diseases and conditions of highly active/obese women with inactive/normal weight women.

Study design: This was a cross-sectional study of the 2015 Behavioral Risk Factor Surveillance System data.

Methods: Weighted descriptive statistics were performed to describe the demographic characteristics of the two groups. We calculated odds ratios and adjusted odds ratios for chronic diseases and conditions comparing highly active/obese women with inactive/normal weight women.

Results: Highly active/obese women were more likely to report risk factors (hypertension, high cholesterol, and diabetes) for coronary heart disease (CHD) and cardiovascular disease (CVD) than inactive/normal weight women; however, they did not have increased rates of CVD, CHD, or heart attack and had decreased risk for stroke. Highly active/obese women had increased risk for asthma, arthritis, and depression, but not for cancer, kidney disease, or chronic obstructive pulmonary disease.

Conclusions: Highly active/obese women appear to be staving off the actual development of CHD and CVD; however, further research is needed to understand the long-term health benefits of physical activity among obese women.

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Introduction

It is well established that individuals with normal body mass indices (BMI) have more favorable health outcomes than those with BMIs that indicate one is overweight or obese. The overweight and obese are more likely to have poorer general health, higher rates of chronic diseases, and risk factors for chronic diseases, including cardiovascular disease (CVD), kidney disease, diabetes, skin and other cancers, depression, high blood pressure, and high cholesterol.^{1–7} In addition, it is established that those who meet or exceed the recommended minutes of weekly physical activity (150 min of moderate or 75 min of vigorous intensity of aerobic activity, or equivalent combination) have improved health outcomes compared with those who do not meet the recommendations.^{5,8–11} However, within the last two decades, it has been noted that connections between physical activity, BMI, and health are complex.

Some studies have shown that cardiorespiratory fitness appears to be a protective factor from mortality, regardless of weight status. Lee et al. found that obese men who performed well on treadmill stress tests had lower rates of all-cause and cardiovascular disease mortality than did lean men who performed poorly.¹² Similarly, Wei et al. report that low fitness is an independent predictor of all-cause and cardiovascular disease mortality regardless of BMI classification.¹³ Katzmarzyk et al further report that mortality did not differ between healthy normal weight and healthy obese men after adjusting for fitness.¹⁴ Other researchers conducted a review of the literature that examined the relationship of fitness and all-cause mortality, concluding that high fitness levels and self-reported physical activity were protective against mortality, independent of BMI.¹⁵ Another review of the literature reported that cardiovascular disease and all-cause mortality were higher among individuals with poor cardiopulmonary fitness or physically inactive individuals who were of normal weight compared with individuals with good cardiopulmonary fitness or high physical activity with high BMIs.¹⁶ However, this study also found that obesity, even when coupled with high physical activity, was a greater risk for type II diabetes compared with those with a normal BMI and low physical activity.¹⁶

Other studies show that bodyweight is more predictive of mortality than fitness or physical activity. Stevens et al. report that, although men and women who were fit and overweight or obese had lower mortality rates than those who were not fit and overweight or obese, they had higher mortality rates than those who were unfit and normal weight.¹⁷ Similarly, Högström et al. report that among Swedish men, unfit normal-weight individuals had a 30% lower risk of all-cause death than did those who were fit, but obese.¹⁸

Although there is some evidence that being fit is protective against premature death, whether or not fitness can mitigate the risks of excess weight remains unclear. The notion that physical fitness can mitigate risks to health is referred to as ‘fit but fat’. Fit but fat refers to people with a BMI >30 who also demonstrate high cardiorespiratory fitness.¹⁹ The phenomenon of fit but fat is not uncommon in the United States. Using nationally representative data from the 1999 to 2002 National Health and Nutrition Examination Surveys, Duncan estimated

that about 9% of US adults met the fit but fat definition (obese but with high cardiorespiratory fitness), about 17% were overweight with high fitness, and 30% were normal weight with high fitness.¹⁹

Although research has been conducted examining the relationship of fitness or physical activity and obesity, it often focuses heavily on mortality, cardiovascular disease, and men. There has been limited examination of the link between physical activity and obesity with other chronic conditions such as depression, asthma, arthritis, cancer, chronic obstructive pulmonary disease (COPD), and general health status, although physical activity alone has been shown to reduce these chronic diseases and conditions.^{20–22} In addition, research on the association between chronic diseases and physical activity/obesity in women is sparse.

The purpose of this study was to compare chronic diseases and conditions reported by highly active and obese (based on BMI) women with those reporting to be inactive yet normal weight using self-reported data from the Behavioral Risk Factor Surveillance System (BRFSS). We hypothesize that physically active/obese women would report fewer chronic disease conditions than would a similar group of inactive, normal weight counterparts.

Methods

Study design

This was a cross-sectional study of the 2015 BRFSS data, which is the largest health survey of adults in the United States.

Behavioral Risk Factor Surveillance System

The BRFSS began in 1984 and is conducted every year. The survey is a collaboration between the Centers for Disease Control and Prevention and each state/US territory (50 states plus Guam, Puerto Rico, and the Virgin Islands) and employs a random-digit dial telephone survey that targets non-institutionalized adults who are 18 years and older.²³ Since 2011, the BRFSS has included both cellular and landline telephones to produce generalizability, coverage, and validity of the data. Disproportionate stratified sampling is employed to provide an adequate sample size for smaller demographic areas.²³ Data are weighted for population attributes and non-response.²³ The BRFSS has been found to have high test–retest reliability and concurrent validity when compared with other surveys, participant logs, accelerometers, or other physical activity measures to assess physical activity. The physical activity data are especially reliable for those who report high levels of physical activity.²⁴

The core component of the BRFSS includes items that assess demographic factors, preventative health practices, chronic disease presence, and health risk behaviors. In 2015, participants were questioned extensively about their physical activity behaviors.²⁵ The initial physical activity question was, ‘During the past month, other than your regular job, did you participate in any physical activities such as running, calisthenics, golf, gardening or walking for exercise?’²⁵ Participants who answered ‘yes’ to this item were then asked follow-

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