



Health and weight – gender-specific linkages under heterogeneity, interdependence and resilience factors



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ABSTRACT

Many studies have shown that obesity is a serious health problem for our society. Empirical analyses often neglect a number of methodological issues and relevant influences on health. This paper investigates empirically whether neglecting these items leads to systematically different estimates. Based on data from the German Socio-Economic Panel, this study derives the following results. (1) Many combinations of weight and height lead to the same health status. (2) The relationship between health and body mass index is nonlinear. (3) Underweight strengthens individual health and severe obesity has a clear negative impact on health status. Underweight women are more affected than men but obese men are hit harder than women. (4) The hypothesis has to be rejected that weight has an exogenous influence on health. (5) A worse health status is linked with weight fluctuations and deviations between desired and actual working hours. (6) A healthy diet and long but not too long sleeping contribute to a good health status. Moreover, a good parental education and a high parental social status act favorably on health as does personal high income. (7) Four of the big five components of personality, namely openness, extraversion, conscientiousness and agreeableness, contribute to resilience against health problems.

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1. Introduction

Overweight, especially obesity, but also underweight are globally discussed issues. The major studies on this topic come from the medical literature. However, economists also follow similar issues with a differentiated focus. In particular, the relationship between obesity and labor market outcome is analyzed (Johansson et al., 2009; Sabia and Rees, 2012). Ensuing health problems and their economic consequences have been widely discussed, with various studies mentioning serious health implications, including higher mortality risk, and health problems such as cardiovascular disease, heart attack, stroke, diabetes, cancer, arthritis, gallstones, asthma, cataracts, infertility, snoring and sleep apnea (see, for example, Eliassen et al. (2006), Flegal et al. (2013) and Willett et al. (1995)). Bray (2004) argues that obesity is an epidemic disease that threatens to inundate health and that the effects of obesity come from two factors: the increased mass of adipose tissue and the increased secretion of pathogenetic products from enlarged fat cells. This concept of the pathogenesis

of obesity as a disease allows an easy division of the disadvantages of obesity into those produced by the mass of fat and those produced by the metabolic effects of fat cells. The former category includes the social disabilities coming from the stigma associated with obesity, sleep apnea, which comes in part from increased parapharyngeal fat deposits, and osteoarthritis resulting from the wear and tear on joints from carrying an increased mass of fat. The second category includes the metabolic factors associated with distant effects of products released from enlarged fat cells.

In many developed countries the average weight of people has increased substantially in recent years, which has led to health problems. However, a declining mortality risk over time due to better control of risk factors for heart disease (Gregg et al., 2005) can be observed. Nevertheless, this development has not led to reduced disability risks (Alley and Chang, 2007). Oswald and Powdthavee (2007) following Offer (2006) argue that economic prosperity undermines well-being. Happiness and mental health are worse among heavier people in Britain and Germany. For a given level of body mass index (BMI) they find that people who are

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educated or who have a high income are more likely to view themselves as overweight or even obese.

[Soltoft et al. \(2009\)](#) analyze the relationship between weight, measured by body mass index, and health-related quality of life using data from the Health Survey for England 2003. They find a nonlinear link. The best quality of life was reached at a BMI of 26.0 in men and 24.5 in women. BMI is negatively associated with quality of life for both underweight and obese individuals. At higher BMI values, men reported higher-quality perceptions than women. At lower BMI values, the reverse result is observed: Quality of life is lower in men than women.

[Maclean et al. \(2014\)](#) discuss the influence of personality disorders on body weight and find that women with these characteristics have a significantly higher BMI and are more likely to be obese than otherwise similar women. Only few statistically significant or economically meaningful effects are detected for men. Findings from unconditional quantile regressions demonstrate a positive gradient between personality disorders and BMI in that the effects are greater for higher-BMI respondents.

The aim of another study ([Psouni et al., 2016](#)) is to characterize the patterns of psychological and behavioral characteristics, in relation to body mass index. Cluster analysis identifies two distinct profiles. The first segment relates to more positive results in psychological variables. Interestingly, individuals in the healthy segment correspond to a normal BMI. The second segment relates to more unhealthy behaviors including lower levels of exercise, unhealthy eating and negative psychological variables. As expected, individuals in the second segment had a mean overweight BMI. Furthermore, profiles from the unhealthy segment displayed higher levels of psychological distress and lower self-control.

[Lissner et al. \(1991\)](#) demonstrate that fluctuations in body weight have negative health consequences, independently of obesity and the trend of body weight over time. [Preston et al. \(2012\)](#) confirm this result. They find that higher volatility and increasing trends have large negative effects on mortality for obese people. [Bhattacharya and Sood \(2011\)](#) argue that body mass index should not be regarded as a medical diagnosis: Many classified as “obese” are physically fit as several studies make clear.

Most of these studies suffer from methodological shortcomings. They present their results with the help of descriptive statistics and draw far-reaching conclusions in relation to preventive measures. Normally, authors do not pay enough attention to weight differences between men and women and country-specific peculiarities when the effects on health are investigated. Underweight, normal weight, overweight and obesity should not be defined by the same BMI boundaries for men and women. Furthermore, many studies do not consider any or only consider a limited number of control variables and they also focus on linear relationships. They do not discuss interdependencies between health and weight and they neglect personal characteristics and behavior as determinants of the relationship between weight and health. Medical studies on the one hand, and socioeconomic investigations on the other, should not ignore the results from the other discipline. Specific individual behavior and characteristics, including those developed during youth, are important. All these aspects contribute to the outcome that current connections are insignificant and not stable, that some people or groups exhibit different results and that individual behavior can strengthen resilience against diseases or increase vulnerability. So far, it appears that a strong awareness campaign and public health policy against extreme body weight can avoid a lot of health problems. However, we find that we need specific measures for specific groups.

This empirical paper extends the literature in the following ways: (i) it consistently separates effects by gender; (ii) it takes into

account heterogeneity and interdependencies; (iii) it extends the use of weight groups beyond the traditional international BMI classification and also uses quantiles of the German weight distribution; (iv) it analyzes the importance of personality characteristics and behavior, especially the link between the “Big5” factors, for resilience against various health problems.

One of our major objectives is to show that the influence of underweight and obesity on health status differs between men and women in that the effects depend on many other health determinants that also correlate with weight. The importance of these issues is revealed in several steps:

First, simple specifications are presented that are comparable with other studies.

Second, further health determinants and interdependencies between health and weight are taken into account. This enables the detection of whether weight effects change fundamentally. As health determinants, in particular mother's education, father's social status, schooling, gross wage and the difference between desired and actual working hours are added. Well-educated individuals are better informed than others about behavior that leads to good health, or this was learned from their parents ([Case and Paxson, 2002](#); [Lindahl et al., 2016](#)). More working hours than desired mean stress and this is not good for health. And conversely, fewer working hours than desired mean dissatisfaction combined with psychological problems.

Third, we incorporate variables that are not collected every year in our data set but we guess that they increase resilience or vulnerability in relation to health. We distinguish whether the interviewed people had only slight weight variations in the past, whether they are nonsmokers, whether they eat healthily and whether they sleep longer or shorter than others. Furthermore, we consider characteristics that are inherent or developed during childhood or adolescence, namely whether they are undenominational as characterized by the parents and self-confident, and whether they actively played sports or music during their childhood. We expect that all these are positive influences on health and affect BMI ([Alvarez and Ayas, 2004](#); [Otterbach et al., 2016](#); [Preston et al., 2012](#); [Wehby et al., 2012](#)).

Fourth, we are especially interested in the importance of personality traits. With one exception ([Wehner et al., 2016](#)) this topic was not analyzed in the health-weight context, although in other substantial economic relations personality was investigated ([Becker et al., 2012](#); [Bode et al., 2016](#)). It also seems important for health and weight and may explain why some obese people are healthy while some normal-weight people have enormous problems. When these personality traits, together with all other characteristics, are jointly incorporated as control variables of a health function, strong multicollinearity and consequently insignificant influences have to be expected. As an alternative, a principal component analysis is conducted to bundle the influences and induce independent effects.

Fifth, heterogeneity is exemplarily investigated through the effects of personality traits on the probability of suffering from different diseases.

Sixth, robustness investigations are focused on extended interdependent estimates where resilience factors are incorporated.

2. Data and methods

2.1. Data

The data set used in this study, the German Socio-Economic Panel (SOEP), is a representative annual household survey started in 1984 covering Western Germany at the time that was extended to Eastern Germany in 1990 ([Wagner et al., 2007](#)). Currently, more

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