



Exploring the relationship between time preference, body fatness, and educational attainment



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ABSTRACT

Obesity is a global health concern. This is the first study to explore if the relationship between body fatness and time preference is consistent across different ways of objectively measuring body fatness. Our second aim is to explore if there are differential associations between educational attainment and being a saver to determine if education can be used to change saving behaviour and subsequently body fatness. This paper uses data on 15,591 individuals from 2010/2011 of the Understanding Society Survey (UK) to explore the relationship between time preference, measured as being a saver and three objective measures of body fatness: BMI, percent body fatness (PBF), and waist circumference (WC). Our findings show that there is a negative relationship between the three measures of body fatness and being a saver. The strongest relationship is found for WC and being a saver for both genders. Overall, a stronger association is found for women than men. Our results suggest that differential effects by educational attainment can be found in the relationship between being a saver and body fatness. Educational interventions to improve savings behaviour and subsequently obesity may be more effective for women with lower levels of education.

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1. Introduction

Obesity is a global public health concern. Obesity is associated with increased risk of specific health conditions such as diabetes, coronary heart disease, stroke, some types of cancer, and osteoarthritis. In 2008, approximately 200 million men and 300 million women worldwide were obese (World Health Organization, 2013). In the UK, approximately 25% of the population is classified as obese (NHS Information Centre for health and social care, 2013). Obesity is prevalent across all social classes in the UK. However, women from lower socioeconomic groups are at a greater risk of being obese. For men, the relationship between socioeconomic status and obesity is less clear cut (Public Health England, 2013).

Time preference is a concept that reflects the degree of impatience of an individual. In the seminal model of the demand for health proposed by Grossman (1972), health behaviours are modelled as investments in health. Choices regarding how much to invest in health can be thought of as being made to maximise

expected discounted utility over the lifetime. Individuals with a higher time preference rate (i.e. those who are more impatient) may be less likely to invest in activities with low levels of instant gratification such as exercise and healthy eating that help to promote a healthy weight.

Fuchs (2004) suggested that factors related to socio-economic status, such as education, may be correlated with time preference. Individuals with lower rates of time preference may be more likely to stay in school or, alternatively, it is possible that additional years of schooling lower time preference rates. Following on from this, those with higher time preference rates may be in lower socioeconomic groups and choose to invest less in health leading to worse health outcomes. This may partially explain health inequalities.

This paper has two main aims. Firstly, to explore if the relationship between time preference and body fatness is consistent across three objective measures of body fatness: Body Mass Index (BMI), waist circumference (WC), and Percent Body Fatness (PBF). Using objective measures of body fatness eliminates all of the biases caused by self-reported measures. There is some evidence that BMI may not be an accurate measure of body fatness (Burkhauser and Cawley, 2008) as it does not separate fat from fat

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free mass. WC and PBF are more accurate representations of the health risks associated with excess weight (Prentice and Jebb, 2001; Ashwell et al., 2012).

The second aim is to explore differential effects on the relationship between educational attainment, savings, and the three body fatness measures. If the relationship between education and savings is not consistent across different levels of educational attainment, interventions related to education may alter time preference, measured by the savings rate, and subsequently body fatness. According to Lusardi and Mitchell (2014) both general knowledge (education) and more specialised knowledge (financial literacy) contribute to better financial decision-making strategies that result in higher savings, our proxy. If general education and financial education impact on individual perceptions of the future, this may also change behaviour related to investments in future health and subsequently health outcomes such as body fatness. A potential association between time preferences and health, particularly strong for specific socioeconomic groups, may be a significant contributing factor to health inequalities (Guthrie et al., 2009). In the UK, such inequalities continue to widen (Marmot, 2010), even in the presence of a well-established welfare state, universal access to free health care and advances in public health practice. Holistic public health policies aiming to modify more general behaviours, not directly linked to health, might be needed to tackle the well documented socioeconomic obesity inequalities (Zaninotto et al., 2009; Zhu et al., 2015). If there are differential effects across educational levels on the relationship between education and savings on body fatness outcomes, this may be one target area that has been overlooked in most public health obesity interventions.

2. Background

2.1. Time preference and socioeconomic status

There have been a number of studies finding a positive relationship between future orientation and socio-economic status (Lamm et al., 1976; Fuchs, 1982; Guthrie et al., 2009). Recent work by Golsteyn et al. (2014) used Swedish longitudinal data where time preference was measured through a questionnaire given to children aged 13 that asked to what extent respondents would prefer \$138 USD (900 SEK) today to \$1380 USD (9000 SEK) in five years' time. They explore how these time preferences responses are associated with educational choices, fertility choices, health, labour market outcomes, and lifetime income over five decades. Results show that higher time preference rates were associated with lower levels of labour supply and lower household income. Fuchs (2004) and Grossman (2006) suggest that educational attainment may be related to time preference and can possibly explain some of the returns to education in terms of higher wages and occupational attainment. A causal pathway between time preference and socioeconomic status, measured as educational attainment, has not been established. Thus, it is not clear if more education would improve time preference rates and subsequently health outcomes. In this paper, we explore if there are differential slopes on being a saver by educational attainment level. This would provide evidence to support educational interventions to change individual's savings behaviour and subsequently health outcomes.

2.2. Time preference and body fatness

There is a growing body of work exploring the relationship between time preference and body fatness. Komlos et al. (2004) use longitudinal data from the US and international cross-sectional data to explore if it is plausible to make a link between obesity

and time preference. They find that lower savings rates and greater debt are associated with a higher time preference rate. This may explain the rising obesity rates from the 1970s, as in the US debt has been rising and savings have been falling. Smith et al. (2005) explore the hypothesis that higher time preference rates are associated with a higher BMI using the National Longitudinal Study of Youth (NLSY). As a proxy for time preference they use data from 1989, when the average respondent was 28, asking if they had put more money in savings than they had withdrawn (saver), had withdrawn more than they saved (dissaver), or if their savings had remained constant over the previous year. They find that when aggregating across ethnicity, higher time preference rates are positively associated with BMI for men with this effect being less strong for women. If the results are disaggregated by ethnicity, a higher time preference rate is positively associated with BMI for black and Hispanic men and black women. Courtemanche et al. (2014), also use the NLSY, but utilise different questions relating to time preference from the 2006 survey on intertemporal trade-offs to estimate a discount rate which is matched with price data from the Cost of Living Index. They find that time preference is positively associated with BMI, the likelihood of being overweight, and obesity. The effect is largest for white males.

The psychological literature has traditionally used the term 'time perspective' which is similar to time preference in that both relate to delayed gratification. However, time perspective takes a more holistic approach, including how individuals orientate themselves towards and think about the future (Adams and Nettle, 2009). Adams and Nettle (2009) use data collected from a community internet message board in urban US ($n = 423$). To proxy for time perspective, a delayed discount rate, Consideration of Future Consequences Scale (CFCS), Zimbardo Time Perspective Inventory (Zimbardo et al., 1997), subjective probability of living until 75, and time period for financial planning were utilised. Results found that future oriented time perspective measured only using the CFCS was positively associated with a lower BMI. Griva et al. (2014) utilise a web-based questionnaire on Greek population ($n = 413$) where time perspective is measured using a short version of the Zimbardo Time Perspective Inventory, which consists of 21 items measuring five dimensions (positive attitude towards the past, negative attitude towards the past, present hedonistic, present fatalistic, and future orientated) on a five point Likert Scale (Griva et al., 2013). They found that being more present orientated was associated with a higher BMI. Whereas, Guthrie et al. (2013) use data from a cross-section of patrons to barber shops and hair salons in the Washington DC area ($n = 525$) and three dimensions of the Zimbardo Time Perspective Inventory (present hedonistic, present fatalistic, and future orientated) and impute mean data for missing data on any dimension ($n = 63$). Results show that time perspective was not significantly associated with obesity. These studies focus on different populations and use different proxies for time perspective which may partially explain the mixed results.

These findings suggest that time preference rates may be a contributing factor to obesity outcomes. What is unclear from these results is what pathways may explain this relationship. Additional information on these pathways will help to design interventions aiming to modify the savings rate, our time preference proxy.

2.3. Weakness of BMI as a measure of body fatness

Burkhauser and Cawley (2008) discuss the short comings of relying on BMI as a measure of body fatness as it does not distinguish body fat from fat free mass such as muscle and bone. Thus, BMI can incorrectly classify some individuals such as athletes as overweight or obese. Additionally, evidence from the medical literature suggests that the location of body fatness is important.

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