



# BMI is not related to altruism, fairness, trust or reciprocity: Experimental evidence from the field and the lab



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## HIGHLIGHTS

- Obesity and overweight affect individuals' sociability.
- It is unclear whether these effects translate into differential social preferences.
- In two experiments we explore the relationship between BMI and social preferences.
- BMI is not associated with preferences for altruism, fairness, trust, or reciprocity.

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## ABSTRACT

Over the past few decades obesity has become one of the largest public policy concerns among the adult population in the developed world. Obesity and overweight are hypothesized to affect individuals' sociability through a number of channels, including discrimination and low self-esteem. However, whether these effects translate into differential behavioural patterns in social interactions remains unknown. In two large-scale economic experiments, we explore the relationship between Body Mass Index (BMI) and social behaviour, using three paradigmatic economic games: the dictator, ultimatum, and trust games. Our first experiment employs a representative sample of a Spanish city's population ( $N = 753$ ), while the second employs a sample of university students from the same city ( $N = 618$ ). Measures of altruism, fairness/equality, trust and reciprocity are obtained from participants' experimental decisions. Using a variety of regression specifications and control variables, our results suggest that BMI does not exert an effect on any of these social preferences. Some implications of these findings are discussed.

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## 1. Introduction

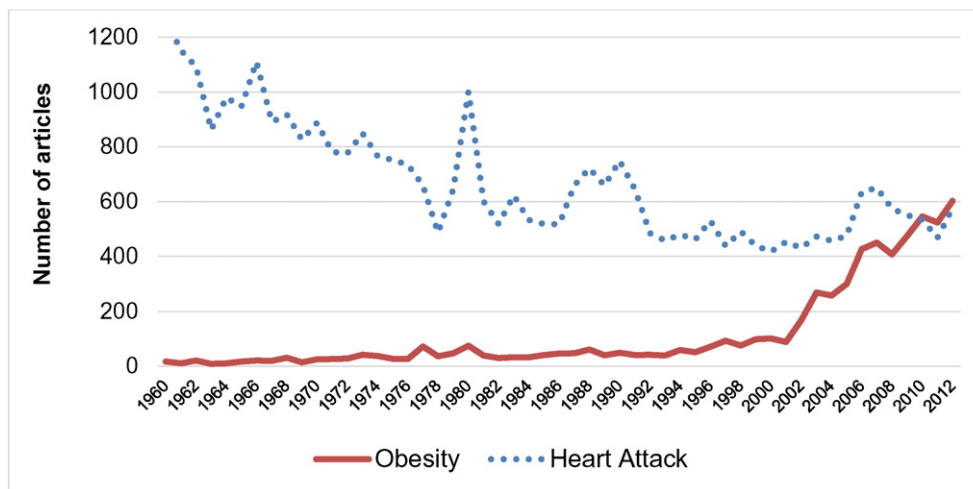
Obesity is increasingly becoming one of the greatest public health challenges in the 21st century. Moreover, nowadays the relevance of obesity goes far beyond the boundaries of the medical world and occupies a central place in the everyday life of developed societies. A clear picture of this evolution is provided in Fig. 1, which illustrates how the term 'obesity' has rapidly migrated into our daily speech, displacing other key health-related terms such as 'heart attack'. This comparison is particularly interesting because 'heart attack' showed similar dynamics long time ago (in particular, in the 1920's and early 30's, in detriment of 'pneumonia' or 'tuberculosis'). In the figure we plot data from *Chronicle* (<http://chronicle.nytlabs.com>), a tool for

graphing the historical usage of words and phrases in New York Times reporting. It can be seen that the number of NYT articles in which 'obesity' features has dramatically increased from one or two dozen per year in the 1960's to more than 500 in the early 2010's (representing about 0.02% and 0.40% of all NYT articles, respectively), with the biggest boom taking place over the last decade. According to this measure, 'obesity' has now reached a similar popularity to 'heart attack' among the general public.

Based on the latest World Health Organisation estimates [82] the number of obese people in the world has almost doubled since 1980s. It is reported that, world-wide, at least 2.8 million people die each year as a consequence of being overweight or obese, and an estimated 35.8 million (2.3%) global illnesses are caused by obesity or being overweight [81]. Obesity and overweight lead to adverse effects on blood pressure, cholesterol, triglycerides and insulin resistance. Risks of type 2 diabetes, coronary heart disease and stroke increase steadily with increasing BMI (body mass index), which is a measure of weight relative

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**Fig. 1.** NYT usage of 'obesity' and 'heart attack' between 1960 and 2012. The figure reports absolute usage. According to *Chronicle*, in relative terms, 'heart attack' featured in about 0.80% of all articles published in NYT in the 60's and 0.40% in the early 2010's; for 'obesity' these values range from <0.03% in the 60's to 0.40% in the early 2010's.

to height [81]. Consequently excess weight puts individuals at massive health risk and it places a huge financial burden on the governments and healthcare systems across the globe.

Apart from these direct effects, BMI has been associated with a large number of indirect influences on people's lives. Many of them have to do with social ties in the sense that obesity and overweight affect not only the individual but also the relationship with others. Correlates of excess weight include low self-esteem [35,40] and self-control [19,57], victimization and bullying among youth [42,64] and in the employment arena [9,31,56,69], social stigma [63], shame [45,72], poor academic performance [12,78], low income and socio-economic status [13,32,36,71,74,83], disadvantageous marriage market outcomes [11,59], low physical attractiveness ratings [60], aggressive behaviour and suicide intentions [17,38], and problematic adolescence behaviour [54,79]. In consequence, obesity and overweight do not only affect health conditions but also impact individuals' sociability.

However, we do not know whether there are more fundamental effects of BMI on social behaviour in general. While some results might intuitively suggest less "social" behaviour (e.g. aggression, victimization, isolation, discrimination and self-discrimination<sup>1</sup>) or at least lower ability to socialise, it is an open question whether these effects translate into less pro-social patterns among high BMI individuals. Our paper fills this gap.

An interesting approach to this issue has been accomplished within the literature on personality traits. Indeed, although some findings have been inconsistent across studies, recent assessments suggest that excess weight (and/or increases in BMI) may be negatively associated with conscientiousness and agreeableness and positively with neuroticism, extraversion and other impulsivity-related traits (e.g. [44,76,80]). This indicates that obese individuals may be characterised by poor quality of social relationships. However, these results are based on survey self-reports thus lacking a direct measurement of individuals' actual behavioural patterns.

Over the last 30 years there has been a boom in systematic studies of social behaviour in controlled lab environments using economic incentives. Behavioural and experimental economists have developed several economic games to measure individual behaviour in a number of areas, such as cooperation, trust, and networks. These games have been extensively used in theory development and empirical inference, not only within economics and the social sciences (e.g. [5,6,25–27,39,49]), but also among the natural sciences (e.g. [14,22,58,62,66]).

While previous experimental economics research has studied the relationship of BMI to risk [3,30] and time preferences [10,20,73], there is

<sup>1</sup> For instance, Proestakis and Branas-Garza [65] show that subjects who consider themselves overweight demand less money as a compensation to fill a questionnaire.

as yet little evidence of a link between BMI and social (other-regarding) preferences. Exploring the relationship between people's BMI and their behaviour in controlled social environments is crucial to understanding whether the influence of obesity and overweight on sociability-related factors translates into different levels of concern among individuals for others' welfare. In fact several experimental studies have shown that social preferences are related to social integration (centrality) in networks [5,46,51].

A number of possible social motives have been discussed in the literature (see [28] for a review), here we will focus on individuals' preferences for altruism, fairness/equality, trust and reciprocity. Based on data from two large-scale economic experiments, this paper tests the hypothesis that these social preferences are related to body weight while controlling for potential confounding factors (such as socio-demographics, cognitive skills, risk and time preferences). Given the prevalence of obesity and overweight in developed societies, the results might be informative for understanding behaviour in the workplace, personal relationships and social interactions in general. Moreover, from a dynamic perspective, a statistically significant relationship might suggest that as the population is becoming more obese, simultaneously our societies are becoming more or less 'other-regarding'.

We analyse two complementary datasets from social preference experiments involving real monetary stakes. The first dataset (the 'city' experiment) is a representative sample of the adult population of a Spanish city while the second one (the 'lab' experiment) is a lab sample of university students from the same city. The use of these two datasets strengthens the validity of our results. Furthermore, the procedures used in both experiments (see *Methods*) minimise potential self-selection problems [24] and experimenter demand effects [84], which may be particularly important in studying the connection between BMI and social behaviour.

## 2. Methods

The city experiment took place between November and December 2010 in the city of Granada, Spain, with a representative sample of 835 citizens between 16 and 89 years old (as shown in Section S7 of the Supplementary materials of [24], the sample was representative of the city in terms of geographical situation of households and of age and gender of participants). All subjects played the experimental games in their own homes supervised by monitors (108 pairs of senior university students acted as interviewers). The lab experiment was conducted in the Granada Lab of Experimental Economics (GLOBE-EGEO) at the University of Granada during October 2011. Across 27 sessions of 20–30 subjects data were collected from a sample of 659 first year

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