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

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

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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.

Keywords: BMI; ultimatum game; dictator game; trust game; economic experiments; obesity; social preferences

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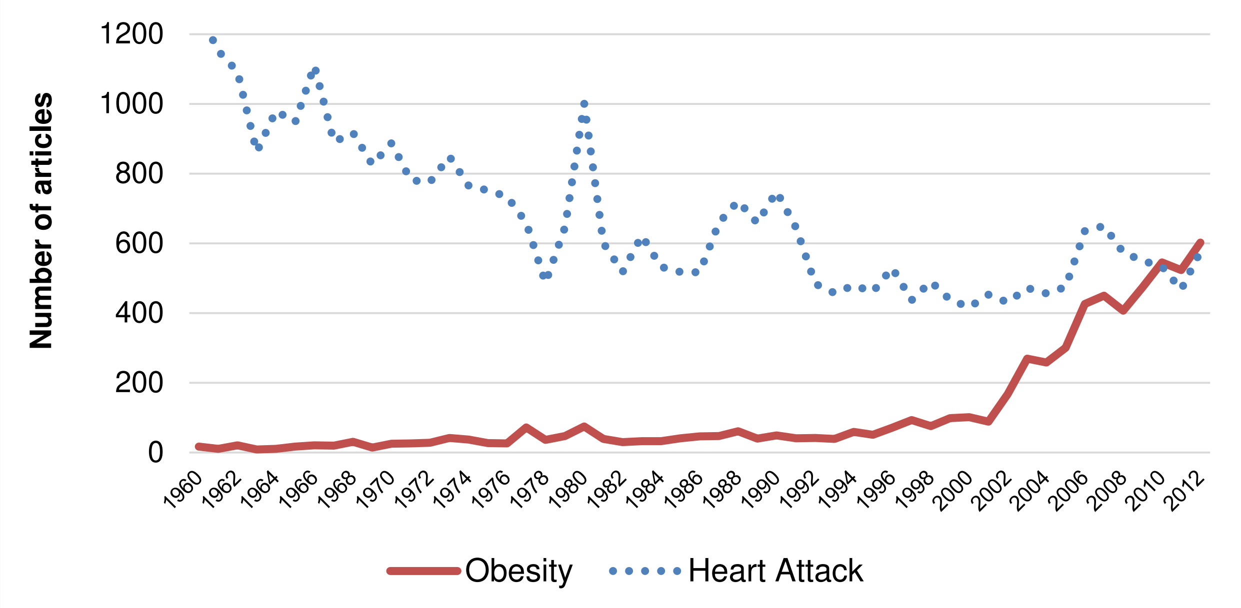
1. Introduction

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 Figure 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 (WHO 2014) 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 (WHO 2009). 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 to height (WHO 2009).

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.

Figure 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 less than 0.03% in the 60’s to 0.40% in the early 2010’s.



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 (Hesketh et al 2004, Griffith et al 2010) and self-control (Nederkoorn et al 2006, Elfhag and Morey 2008), victimization and bulling among youth (Janssen et al 2004, Puhl and Luedicke 2012) and in the employment arena (Rothblum et al 1990, Cawley 2004, Garcia and Quintana-Domeque 2006, Morris 2006), social stigma (Puhl and Latner 2007), shame (Sjöberg et al 2005, Keith et al 2009), poor academic performance (Taras and Potts-Datema 2005, Chomitz et al 2009), low income and socio-economic status (Sobal and Stunkard 1989, Zhang and Wang 2004, Cohen et al 2006, Garcia and Quintana-Domeque 2009, Scharoun-Lee et al 2009, Grow et al 2010), disadvantageous marriage market outcomes (Oreffice and Quintana-Domeque 2010, Chiappori et al 2012), low physical attractiveness ratings (Oreffice and Quintana-Domeque 2015), aggressive behaviour and suicide intentions (Eaton et al 2005, Heneghan et al 2012), and problematic adolescence behaviour (Ter Bogt et al 2006, McClure et al 2012). 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[3]) 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 consciousness and agreeableness and positively with neuroticism, extraversion and other impulsivity-related traits (e.g. Sutin et al 2011, Jokela et al 2013, Vainik et al 2015). 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

[3] For instance, Proestakis and Brañas-Garza (2015) show that subjects who consider themselves overweight demand less money as a compensation to fill a questionnaire.

and experimental economists have developed several economic games to measure individual behaviour in a number of areas, such as cooperation, trust, networks, etc. These games have been extensively used in theory development and empirical inference, not only within economics and the social sciences (e.g. Fehr and Gächter 2000, Fehr and Fischbacher 2004, Henrich et al 2004, Falk and Heckmann 2009, Brañas-Garza et al 2010, 2014a, LeVeck et al 2014), but also among the natural sciences (e.g. Nowak et al 2000, Perc and Szolnoki 2008, Rand and Nowak 2011, Espín et al 2012, Cuesta et al 2015).

While previous experimental economics research has studied the relationship of BMI to risk (Anderson and Mellor 2008, Galizzi and Miraldo 2010) and time preferences (Smith et al 2005, Chabris et al 2008, Epstein et al 2010), there is 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 (Leider et al 2009, Brañas-Garza et al 2010, Kovarik et al 2012).

Among the social motives in the literature, here we will focus on individuals' preferences for altruism, fairness/equality, trust and reciprocity (see Fehr and Schmidt 2006 for a review). 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 (Exadaktylos et al 2013) and experimenter demand effects (Zizzo 2010), 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 Exadaktylos et al 2013, 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 to 30 subjects data were collected from a sample of 659 first year undergraduate students. Further information on the procedures used for the city and lab experiments can be found in Exadaktylos et al (2013) and Brañas-Garza et al (2014b), respectively.

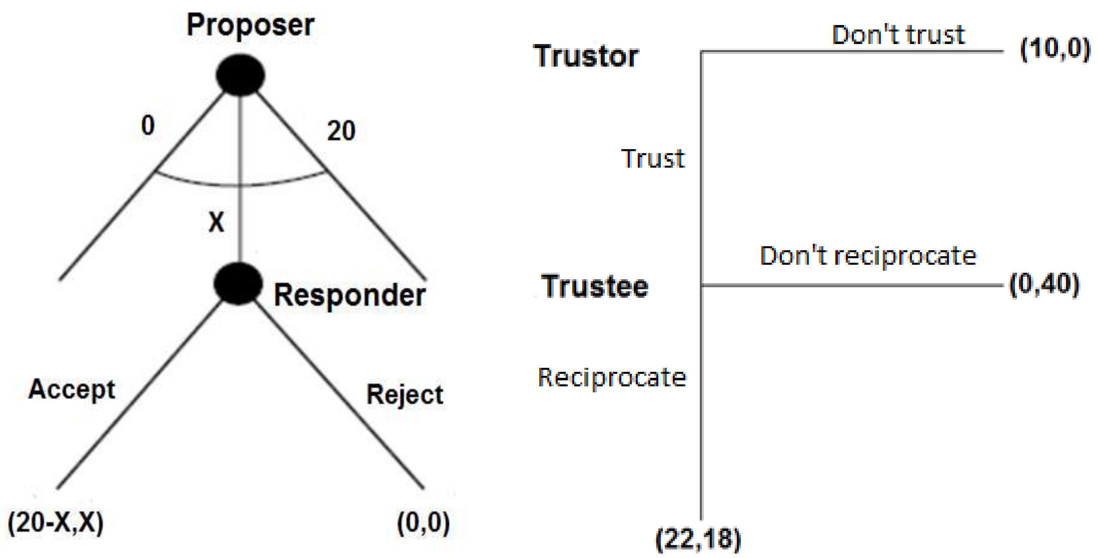
In both studies, subjects completed the exact same survey/experiment. After an identical questionnaire, each participant made five experimental decisions with real monetary incentives. Our experimental design consists of three canonical two-player games: *Dictator Game (DG)*, *Ultimatum Game (UG)* and *Trust Game (TG)*. Decisions were made in random order and all participants played both roles of each game. For each decision, participants would be matched with a different anonymous participant selected at random. One out of every ten participants was randomly selected for real payment. In order to preserve independence between decisions, participants were instructed that they would be paid for real according to only one randomly selected role.

In the *DG* (Forsythe et al 1994), participants had to split an amount of €20 between themselves and another anonymous participant. Subjects decided which share of the €20 they wanted to transfer to the other participant (in €2 increments).

Similarly, in the *UG* (Güth et al 1982), the 1st player (the proposer) had to suggest a way to split a €20 pie between him/herself and another anonymous participant by making an offer to the 2nd player (the responder). However the implementation was upon acceptance of the offer by the randomly matched responder. In case of rejection neither participant earned anything. For the role of the responder in the UG we used the strategy method in which subjects have to state in advance their willingness to accept or reject each of the possible proposals (Mitzkewitz and Nagel 1993). The responder's Minimum Acceptable Offer (MAO) is the minimum amount of money that the subject would accept (Figure 2, left panel) and will be our measure for responder behaviour.

In the *TG* (a strategy-method, binary version developed by Ermisch et al 2009), the trustor (1st player) had to decide whether to pass €10 or €0 to the trustee (2nd player). In case of passing €0, the trustor earned €10 and the trustee nothing. If she passed €10, the trustee would receive €40 instead of €10 (money was being quadrupled). The trustee, conditional on the trustor having passed the money had to decide whether to send back €22 and keep €18 for him/herself or keep all €40 without sending anything back, in which case the trustor did not earn anything (Figure 2, right panel).

Figure 2. Ultimatum (left) and Trust (right) Games in strategic form. The figure shows the payoffs (in €) associated to each of the possible outcomes of the games for first and second movers, respectively.



As mentioned earlier, each of these decisions is associated with a different social preference. While the DG measures *altruism*, the 1st player's decision in the UG measures *strategic altruism* insofar as generous offers can stem from the fear of rejection. The 2nd UG player captures sense of self-centred *fairness*. (Note that under the umbrella of "self-centred fairness" we include negative reciprocity and the two forms of envy most commonly used to explain responder behaviour from an outcome-based viewpoint, i.e. inequality-aversion and spite-based envy (Fehr and

Schmidt 2006 and Brañas-Garza et al 2014b). In the TG, the 1st player's decisions are driven by *trust* whereas the 2nd player's choices reflect *positive reciprocity*.

At the beginning of both experiments participants received some general information about the nature of the experimental economic games according to standard procedures. In particular, participants were informed that:

- The five decisions involved real monetary payoffs coming from a national research project endowed with a specific budget for this purpose.
- The monetary outcome would depend only on the participant's decision or on both his/her own and another randomly matched participant's decision, whose identity would forever remain anonymous.
- One of every ten participants would be randomly selected to be paid, and the exact payoff would be determined by a randomly selected role.

Both experiments applied procedures that ensured absolute double-blind anonymity. Thus, participants' decisions would remain *forever* blind in the eyes of the interviewers, the researchers, and the randomly matched participant. In the city experiment, once the general instructions had been given, the interviewer read the details for each experimental decision separately. After every instruction set participants were asked to write their decisions privately in a decision card and proceed to the next task. Once all the five decisions were made, participants introduced their decision card in an envelope and sealed it[4]. However, in the lab

[4] As one of the referees pointed out a critical issue is whether subjects in the field understood the experimental rules. Although the interviewers were instructed to ensure that participants understood the instructions before making their decisions, this is still a valid concern. To address this issue we check the existence of multiple switching on UG responder choice (i.e. accept an offer and reject a higher one), which is the most difficult of the five decisions. Multiple switching prevents obtaining a reliable MAO and indicates that the individual misunderstood the game instructions. Among those who completed the whole survey in the city sample (809), 778 were able to report a reliable MAO, representing 96% of cases. In the lab sample, this percentage is 98%. We consider that this gives us a valuable indication that most participants, more so those included in the analyses due to having

experiment these steps were taken on the computers as students received their instructions on their screens. In both experiments, to control for possible order effects on decisions, the sequence both between and within games was randomized across participants, resulting in 24 different orders (always setting aside the two decisions of the same game). The average earnings among winners, including those winning €0 (18.75% in the city and 11.43% in the lab), were €9.60 and €10.43 for the city and lab experiments, respectively.

In the city experiment subjects did not know about the experimental nature of the study before accepting to participate. It was only after completing the first seven survey blocks that they were informed of the content of the experimental decisions. This procedure, added to the fact that participants did not have to move to the lab, reduced the scope for self-selection bias to influence the results (see Exadaktylos et al 2013). In the lab experiment students were invited to visit the lab by the Dean of the School of Economics, so that they did not attend to earn money but to see the lab, thus also reducing potential self-selection problems – more than 70% of all registered students participated in this activity – (Abeler and Nosenzo 2014). Once students were placed in their respective cubicles (which impeded visual contact between them) they were invited to complete the survey and play the experimental games on the computers: no one refused.

In the questionnaire, along with other extensive information on socio-demographic, psychological and personality variables, participants were asked to self-report their weight and height. Participants' BMI was calculated using the following standard formula: $BMI = Weight(kg)/Height(m)^2$. It must be noted that there is an obvious issue concerning self-reported measures of weight and height: self-reports may not

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reliable values, understood correctly the instructions. In addition, note that in the main regressions we control for cognitive skills, which serves as a proxy for the participants' level of understanding.

provide the true picture of individuals' actual BMI figures. Indeed, the clinical literature generally agrees that self-reported data is inappropriate for precise measures of obesity prevalence (Kuczmarski et al 2001, Brener et al 2003, McAdams et al 2007). However, self-reported and measured BMI values are highly correlated ($r \approx 0.90$; e.g. Spencer et al 2002) and self-reports are considered valid for identifying relationships, for instance, in epidemiological research (Huber 2007, McAdams et al 2007, Stommel and Schoenborn 2009). Importantly, the combination of experimental decisions and a long multifaceted survey minimises potential demand effects (Zizzo 2010) in the sense that it is unlikely that participants make a conscious or unconscious link between their answers to particular survey questions (in this case, weight and height) and behaviour in the games.

3. Results

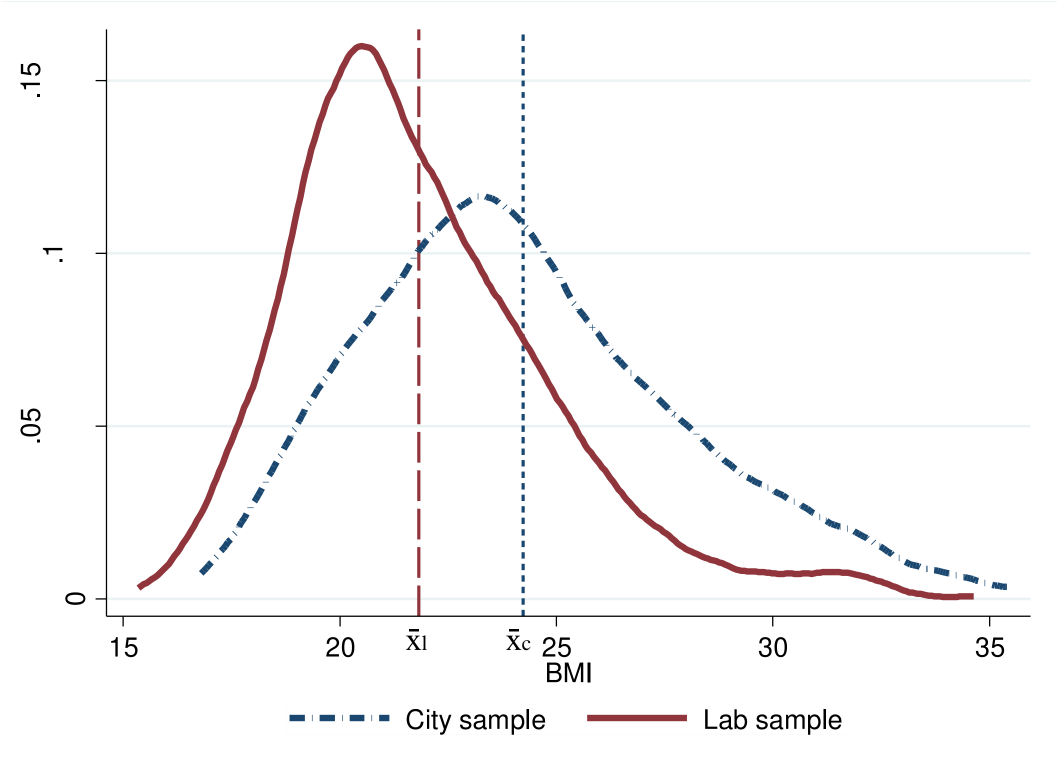
3.1 The Data

The lab sample shows smaller mean and variance in the distribution of BMI than the city sample. This means that, as expected, the lab data does not describe accurately the real BMI distribution of the adult population. University students are on average younger and considered to be more physically active than the representative population, thus have lower average BMI levels. This results in the lab BMI distribution being skewed to the left (Figure 3). Two-tailed t-tests (assuming equal variances and not) comparing the means of the city ($\bar{x}_c$) and lab BMI distributions ($\bar{x}_l$) reject the null hypothesis of equal means (p<0.001). (Table A1 in Appendix shows that normality is rejected for both the lab and the city samples.)

However, the advantage of the lab experiment is that it adds control. Control is the main characteristic of lab experiments since in the field it is almost impossible to have the same level of supervision of procedures and execution. Experiments run in the field are typically richer in terms of variability, representativeness, etc. but lack the precision and credibility that the results obtained under lab conditions provide. Put differently, while the field prioritises external over internal validity of results, the opposite pattern holds for lab experiments (e.g. Loewenstein 1999, Harrison and List 2004).

Besides adding control, the lab dataset provides another important advantage. In our lab sample the average age is 19.05, with most observations being concentrated around that value (SD=2.17). In contrast, in the city sample the average age is 37.46 and there is high variation (SD=16.97). In sum, our two experiments complement each other. The use of both samples will thus minimise internal and external validity concerns and add credibility to the findings.

Figure 3. Comparison of city and lab BMI. The blue line is representing the city sample (N=753) while the brown line is referring to the lab sample (N=618). $\bar{x}_c$ = 24.23 (3.69) refers to the mean (SD) of the BMI distribution in the city sample, $\bar{x}_l$= 21.83 (2.96) refers to the mean (SD) of the BMI distribution in the lab sample.



Now we turn to the descriptive statistics of our data. Note first that from the initial samples we excluded those observations with missing values in any of the variables used for the statistical analyses (in total 77 in the city sample and 41 in the lab sample). According to spearman correlations, in both samples older individuals and individuals with lower cognitive skills are more likely to be excluded for this reason (*ps*<0.01 in the city and *ps*<0.1 in the lab) as are married individuals (*p*=0.011) in the city and males (*p*=0.055) in the lab; higher BMI is marginally associated with the likelihood of being excluded in the city sample (*p*=0.070). In addition, the standard 'mean±3*SD' rule for detecting BMI outliers excluded 5 extra observations from the city sample (no outliers were detected in the lab experiment). This procedure leads to final sample sizes of 753 and 618 for the city and lab experiments, respectively.

Table 1 presents the minimum, maximum, mean and standard deviation of the BMI-related and game-behaviour variables, separately for the city and lab samples. In the last column, we show the results of a series of statistical tests comparing both samples. As expected, the samples differed significantly in terms of age and BMI, but not in gender composition.

Regarding behaviour in the games, *DG offer* and *UG offer* refer to the amount (between €0 and €20) transferred to the 2nd player in the dictator and ultimatum games, respectively. *UG mao* refers to the minimum acceptable offer stated by the participant when deciding as responder in the ultimatum game (between €0 and €10). On the other hand, *trustor* is a dummy variable that takes the value of 1 if the subject passed the money (€10) to the trustee in the trust game, and 0 if she/he did not. Finally, t*rustee*=1 if the subject reciprocated the trustor's trust (€22, €18), and =0 otherwise (€0, €40). On average participants' offers in the DG were marginally higher in the lab compared to the city sample, whereas the difference in UG offers did not reach statistical significance. Mean UG MAOs were however higher in the city sample, that is, the sense of self-centred fairness appears to be stronger among ordinary people. Lastly, while there were no differences in TG trustor decisions, the lab participants were more likely to reciprocate as trustees than the city participants. (See Figure A1 for the distribution of choices in the games, separately for the city and lab experiments.) Note that given the recruitment method used, students in the lab were "pseudo-volunteers", who have been previously found to be more pro-social than the typical participants in economic experiments (Eckel and Grossman 2000). This might have raised the average level of pro-social behaviour observed in our lab experiment. Tables A2 and A3 report spearman correlations between the five behavioural measures for the city and lab samples, respectively.

3.2 BMI and social preferences

Tables 2 and 3 summarize the results of a series of regressions estimating game behaviour as a function of BMI and a set of control variables (socio-demographics, cognitive skills and economic preferences; see the Appendix for a detailed description of the controls used). The full regressions including estimates for all control variables are available in Appendix Tables A4 and A5 (for the sake of completeness we also display regressions without controls in Tables A6 and A7). Five models are presented for each sample: DG and UG offers are the dependent variables in models (1) and (2), respectively, which are based in Tobit regressions with left and right censoring. Model (3) estimates UG MAOs using OLS. Finally, models (4) and (5) are Probit regressions estimating behaviour as TG Trustor and Trustee, respectively. The same model specifications are used in Exadaktylos et al (2013) and Brañas-Garza et al (2014a). For each of these models we performed two regressions in which we explore the linear relationship between *BMI* and behaviour in that game (left column) as well as their quadratic relationship (by adding BMI squared, *BMIsq*, as a regressor; right column).

Table 2 displays the regression results obtained from the city dataset. It is noteworthy that only one significant effect arises across all the ten regressions. A non-linear, convex relationship is observed between BMI and UG offers (i.e. strategic altruism), but the coefficients are just marginally significant and small in magnitude. When controls are excluded (Table A6), this relationship remains similar (note that, according to the joint significance Chi^2 statistic, the model is no longer significant, so that we cannot reject that the coefficients of BMI and BMIsq are jointly equal to zero; indeed, the same hypothesis cannot be rejected either in the model with controls of Table 2, p=0.15). Also, a marginally significant, positive linear effect of BMI on DG offers appears in the model without controls. Given that the coefficient of BMI is largely insignificant in the main model estimating DG offers (p=0.81, Table 2), we can infer that the relationship observed in Table A6 is spurious and driven by other control variables with which BMI is correlated. All the remaining estimates of either BMI or BMIsq are far from significant (*ps*>0.4 in Table 2; *ps*>0.3 in Table A6).

A graphical method based on locally weighted regressions (Lowess smoothing) is used to identify possible higher-order polynomial relationships or more complex patterns (without accounting for the control variables though). Figure 4 displays the results: no clear pattern is observed beyond what we have already mentioned. One might wonder whether the width of the age range analysed in the city sample (between 16 and 89 years old) could help to blur the effect of BMI on social behaviour. To alleviate this concern we performed the same regressions restricting the sample to individuals between 20 and 50 years old (as suggested by a reviewer, this would limit the possible role of height growth before the 20's, and height shrinkage after the 50's). In these regressions (*n*=511), we do not find any significant result (even the marginally significant non-linear effect found for UG offers turns insignificant, all *ps*>0.16; these analyses are available upon request from the authors).

Figure 4. Lowess smoothing: Game behaviour as a function of BMI (city sample)

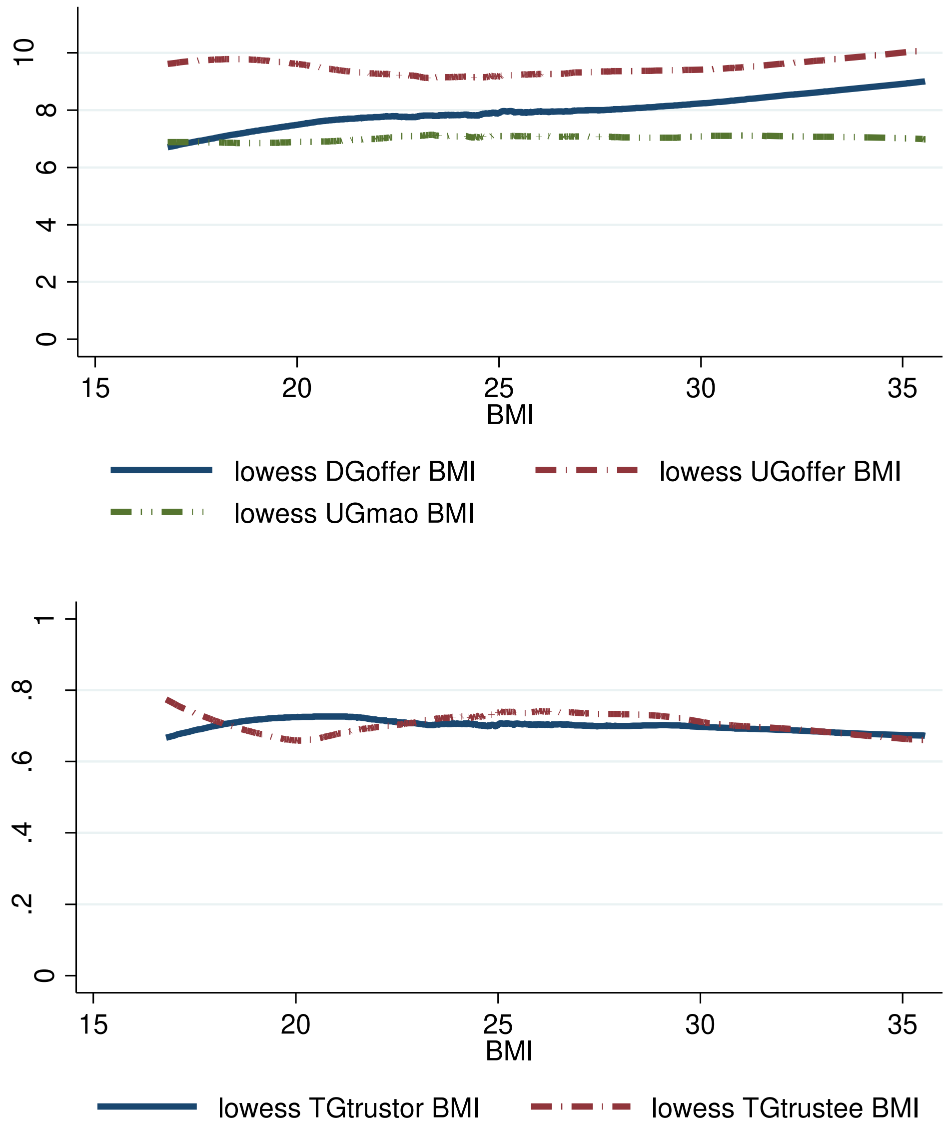
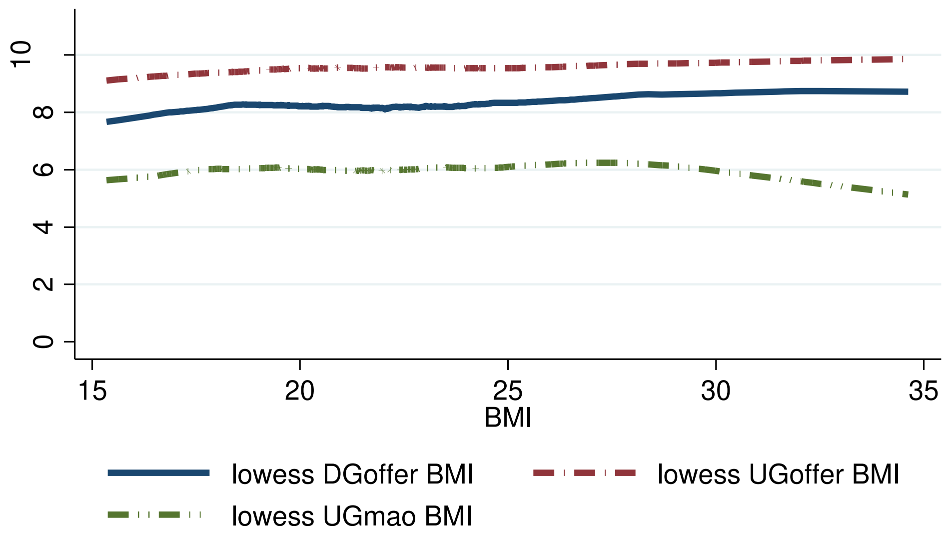
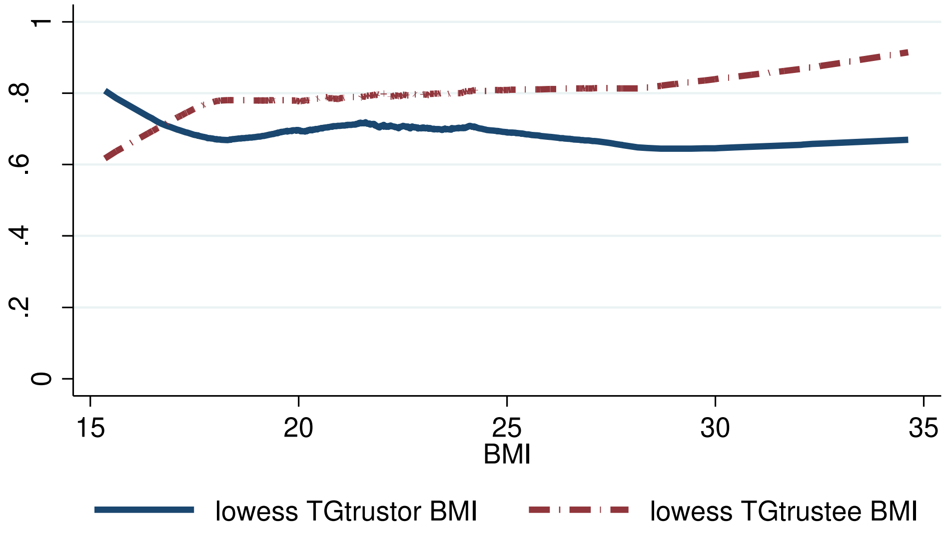


Table 3 presents the same regression models for the lab sample. Here, none of the linear or non-linear effects of BMI are significant (models without control variables do not report any significant estimate either; see Table A7). The only effect that is close to significance is that (linear) on TG trustee (*p*=0.11 in Table 3; *p*=0.17 in Table A7). All the remaining coefficients are largely insignificant again (*ps*>0.3 in Table 3;

ps>0.4 in Table A7). Lowess smoothing supports these null results; more complex patterns are neither observed (see Figure 5). Also note that the results are qualitatively similar if we exclude participants older than 26 (8 observations, who are age outliers according to the 'mean±3*SD' rule): the smaller p-value we obtain is 0.16 (available upon request from the authors).

Figure 5. Lowess smoothing: Game behaviour as a function of BMI (lab sample)





It is also important to note that over half of the city and lab samples chose to offer 10 or more in the DG and UG. We converted DG and UG offers into a binary variable (1=10 or more, and 0=<10) and repeated the regressions (using probit models instead of tobit) of Tables 2 and 3 for both DG and UG offers. In these regressions the p-values of BMI and BMIsq are even higher in both samples (all ps>0.44) compared to the original regressions in Tables 2 and 3 (these analyses are also available upon request).

All in all, the most salient result from these two sets of regressions is the lack of significant results. Although one marginally significant non-linear effect of BMI on strategic altruism is observed in the city dataset, it is economically small and not robust to different specifications. We also analysed the interaction of BMI with the basic demographic controls in order to test whether the (non) effects of BMI on game behaviour differ across genders or age groups. None of the interactions yield significant estimates in either sample (*ps*>0.25 in the city sample and *ps*>0.19 in the lab sample; available upon request). We can therefore conclude that, across the two samples under scrutiny, preferences for altruism, fairness, trust or reciprocity are basically unrelated to BMI.

As robustness check, we conducted two extra exercises. First, in Tables A8 and A9 we performed the same regressions but, instead of using BMI as a continuous explanatory variable, we defined dummy variables for *overweight* (25≤BMI<30) and *obesity* (BMI≥30). Second, for the models presented in Tables A10 and A11 we substituted BMI for an index of body fat percentage, the *CUN-BAE*, recently developed by Gómez-Ambrosi et al (2012). The conclusions drawn from these regressions are qualitatively the same: some marginally significant effects arise but none of them are robust. In particular, obese individuals were less likely to reciprocate as TG trustees in the city but not in the lab sample. Estimated body fat percentage (*CUN-BAE*) shows a non-linear, convex relationship with UG MAOs in the city but not in the lab sample, while a similar effect is observed on trustee choices in the lab but not in the city (in both cases, however, either the linear or the quadratic terms are not significant). Yet, the p-values are all greater than 0.09.

4. Discussion

Using data obtained from two large-scale experiments, we examined whether participants' BMI is associated with social behaviour in economic games. Previous studies have established that obesity and overweight status affect some aspects of sociality (e.g. Janssen et al 2004, Eaton et al 2005, Sjöberg et al 2005) and covary with several personality traits which are also known to influence individuals' social relationships (Sutin et al 2011, Jokela et al 2013, Vainik et al 2015). However, we do not find support for the hypothesis that these effects translate into differential social preferences. To be more specific, we do not find evidence that in general altruism, fairness, trust, or reciprocity are associated with BMI in either a representative or a student sample. Neither linear nor non-linear systematic effects are observed.

It is therefore tempting to speculate that the massive variation in BMI toward increasing obesity rates in the developed world is unlikely to have a direct impact on the average levels of social preferences of its citizens. Yet, this issue should studied by means of within-individual analyses and is thus an interesting hypothesis to be tested in future research using longitudinal data. Given that our results are based on two Spanish samples and that this is, to the best of our knowledge, the first study looking at the relationship between BMI and social preferences, further studies should also examine whether these findings can be extended to other countries/regions. Indeed, different cultures have different attitudes towards obesity and body weight "ideals" (Altabe 1998, Paeratakul et al 2002), and this might influence the relationship under study.

An important issue here is that some of the variables associated with the sociability of obese individuals, such as shame or stigmatisation (Sjöberg et al 2005, Puhl and Latner 2007, Keith et al 2009), have to do with the perception and/or behaviour of others. Our experimental decisions were however made under conditions of anonymity. According to the above, hence, it might be that high-BMI people change their social behaviour in the presence of others, or of cues of being watched (in the general population, these types of cues have been found to influence, for instance, cooperation behaviour; see Bateson et al 2006), or that other individuals display differential patterns when they know that their partner is obese (e.g. Liu et al 2013).

Another potential avenue for experimental research in this area could involve subjects who self-select into the experiment. Along these lines, it might interesting to explore whether subjects who report their BMI during the recruitment process behave differently compared to those who report their BMI during the experiment (so that body weight concerns become salient). These are all promising directions for future research.

Acknowledgements

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Table 1. Descriptive Statistics

	City dataset				Lab dataset				
Variable	*Min*	*Max*	*Mean*	*SD*	*Min*	*Max*	*Mean*	*SD*	*p-value*
BMI	16.80	35.55	24.23	3.69	15.35	34.63	21.83	2.93	0.000***
gender(male)	0	1	0.46	0.50	0	1	0.42	0.49	0.230
age	16	89	37.46	16.97	17	42	19.05	2.17	0.000***
DG offer	0	20	7.84	4.31	0	20	8.22	3.37	0.074*
UG offer	0	20	9.31	2.96	0	20	9.52	1.68	0.138
UG mao	0	10	7.02	3.55	0	10	6.02	3.08	0.000***
Trustor	0	1	0.70	0.45	0	1	0.70	0.46	0.766
Trustee	0	1	0.71	0.45	0	1	0.79	0.41	0.001***

Notes: P-values in the last column correspond to the results of two-tailed tests comparing both samples. T-tests were performed in all cases except for *gender*, *trustor* and *trustee*, which were tested using Fisher's exact test. * p-value< .1 , ** p-value< .05 , *** p-value< .01

Table 2. City Sample

	DG offer (1)		*UG offer* (2)		*UG mao* (3)		*Trustor* (4)		*Trustee* (5)	
BMI	0.013	-0.015	-0.007	-0.743*	-0.005	0.362	-0.008	-0.068	-0.012	0.027
	(0.806)	(0.978)	(0.834)	(0.056)	(0.913)	(0.424)	(0.600)	(0.650)	(0.486)	(0.866)
BMIsq		0.001		0.014*		-0.007		0.001		-0.001
		(0.959)		(0.061)		(0.421)		(0.687)		(0.803)
constant	6.955***	7.304	10.782***	19.662***	3.379**	-1.020	0.642	1.376	0.269	-0.213
	(0.002)	(0.306)	(0.000)	(0.000)	(0.035)	(0.850)	(0.265)	(0.461)	(0.669)	(0.919)
adj/pseudo R^2					0.075	0.076	0.041	0.041	0.087	0.087
log likelihood	-2018.881	-2018.880	-1873.157	-1870.862			-435.996	-435.916	-410.844	-410.810
F/chi^2	3.06***	3.09***	2.00***	2.10***	2.18***	2.11***	62.98***	70.60***	96.99***	97.44***
controls	Yes		Yes		Yes		Yes		Yes	
N	753		753		753		753		753	

Notes: Dependent variables are displayed on top of the columns. Tobit estimates for models (1) and (2), OLS for model (3) and Probit for models (4) and (5). Robust standard errors are clustered on interviewers (108 groups). Controls include gender, age, age squared, marital status, unemployment, household income, household size, educational level, cognitive skills and risk and time preferences. All regressions also control for order effects. P-values in parentheses. * p-value< .1 , ** p-value< .05 , *** p-value< .01

Table 3. Lab sample

	DG offer (1)		*UG offer* (2)		*UG mao* (3)		*Trustor* (4)		*Trustee* (5)	
BMI	0.005	-0.16	0.019	0.115	0.033	0.419	-0.012	-0.067	0.036	0.143
	(0.927)	(0.750)	(0.345)	(0.506)	(0.452)	(0.345)	(0.529)	(0.722)	(0.114)	(0.461)
BMIsq		0.004		-0.002		-0.008		0.001		-0.002
		(0.740)		(0.562)		(0.384)		(0.770)		(0.574)
constant	17.265**	19.115*	9.348***	8.283**	11.866*	7.583	-1.574	-0.957	5.468	4.401
	(0.027)	(0.053)	(0.001)	(0.013)	(0.076)	(0.374)	(0.563)	(0.780)	(0.310)	(0.442)
adj/pseudo R^2					0.078	0.079	0.046	0.046	0.056	0.057
log likelihood	-1592.178	-1592.126	-1183.893	-1183.810			-359.605	-359.564	-298.628	-298.510
F/chi²	2.15***	2.10***	79.03***	78.19***	47.91***	46.49***	36.96*	37.25	31.75	31.91
controls	Yes		Yes		Yes		Yes		Yes	
N	618		618		618		618		618	

Notes: Dependent variables are displayed on top of the columns. Tobit estimates for models (1) and (2), OLS for model (3) and Probit for models (4) and (5). Robust standard errors are clustered at the individual level. Controls include gender, age, age squared, unemployment, household income, household size, cognitive skills and risk and time preferences. All regressions also control for order effects. P-values in parentheses. * p-value< .1 , ** p-value< .05 , *** p-value< .01

References

Abeler, J., & Nosenzo, D. (2014). Self-selection into laboratory experiments: pro-social motives versus monetary incentives. *Experimental Economics, 18(2),* 195-214.

Altabe, M. (1998). Ethnicity and Body Image: Quantitative and Qualitative Analysis. *International Journal of Eating Disorders, 23,* 153-159.

Anderson, L. R., & Mellor, J. M. (2008). Predicting health behaviors with an experimental measure of risk preference. *Journal of Health Economics, 27(5),* 1260–1274.

Bateson, M., Nettle, D., & Roberts, G. (2006). Cues of being watched enhance cooperation in a real-world setting. *Biology letters, 2(3),* 412-414.

Brañas-Garza, P., Cobo-Reyes, R., Espinosa, M. P, Jiménez, N., Kovárík, J., & Ponti, G. (2010). Altruism and social integration. *Games and Economic Behavior, 69,* 249–257.

Brañas-Garza, P., Espín A. M., & Neuman S. (2014a). Religious Pro-Sociality? Experimental Evidence from a Sample of 766 Spaniards. *PLoS ONE, 9(8),* e104685.

Brañas-Garza, P., Espín, A. M., Exadaktylos, F., & Herrmann, B. (2014b). Fair and unfair punishers coexist in the Ultimatum Game. *Scientific Reports, 4,* 6025.

Brener, N. D., McManus, T., Galuska, D. A., Lowry, R., & Wechsler, H. (2003). Reliability and validity of self-reported height and weight among high school students. *Journal of Adolescent Health, 32(4),* 281-287.

Cawley J. (2004). The Impact of Obesity on Wages. *Journal of Human Resources, 34(2),* 451-474.

Chabris, C. F., Laibson, D., Morris, C., Schuldt, J., & Taubinsky, D. (2008). Individual Laboratory-Measured Discount Rates Predict Field Behavior. *Journal of Risk and Uncertainty, 37(2-3),* 237–269.

Chiappori, P.A., Oreffice, S. & Quintana-Domeque, C. (2012). Fatter Attraction: Anthropometric and Socioeconomic Matching on the Marriage Market. *Journal of Political Economy*, *120(4),* 659–695.

Chomitz, V. R., Slining, M. M., McGowan, R. J., Mitchell, S. E., Dawson, G. F., & Hacker, K. A. (2009). Is There a Relationship Between Physical Fitness and Academic Achievement? Positive Results From Public School Children in the Northeastern United States. *Journal of School Health, 79(1),* 30–37.

Cohen, D. A., Finch, B. K., Bower, A., & Sastry, N. (2006). Collective efficacy and obesity: The potential influence of social factors on health. *Social Science & Medicine, 62(3),* 769–778.

Cuesta, J. A., Gracia-Lázaro, C., Ferrer, A., Moreno Y., & Sánchez, A. (2015). Reputation drives cooperative behaviour and network formation in human groups. *Scientific Reports, 5,* 7843.

Curry, O. S., Price, M. E., & Price, J. G. (2008). Patience is a Virtue: Cooperative People have Lower Discount Rates. *Personality and Individual Differences*, *44,* 778–783.

D'Agostino, R. B., Belanger, A., & D'Agostino, R.B., Jr. (1990). A suggestion for using powerful and informative tests of normality. *The American Statistician, 44,* 316-321.

Eaton, D. K, Lowry, R., Brener, N. D., Galuska, D. A., & Crosby, A. E. (2005). Associations of body mass index and perceived weight with suicide ideation and suicide attempts among us high school students. *Archives of Pediatrics & Adolescent Medicine*, *159(6),* 513–519.

Eckel, C., & Grossman, P. (2000). Volunteers and Pseudo-Volunteers: The Effect of Recruitment Method in Dictator Experiments. *Experimental Economics*, *3(2),* 107-120.

Elfhag, K., & Morey, L. C. (2008). Personality traits and eating behavior in the obese: poor self-control in emotional and external eating but personality assets in restrained eating. *Eating Behaviors, 9(3),* 285-293.

Epstein, L. H., Salvy, S. J., Carr, K. A., Dearing, K. K., & Bickel, W. K. (2010). Food reinforcement, delay discounting and obesity. *Physiology & Behavior, 100(5),* 438-445.

Ermisch, J., Gambetta, D., Laurie, H., Siedler, T., & Uhrig, S. C. N. (2009). Measuring people's trust. *Journal of the Royal Statistical Society Series A, 172(4),* 749-769.

Espín, A. M., Brañas-Garza, P., Herrmann, B., & Gamella, J. F. (2012). Patient and impatient punishers of free-riders. *Proceedings of the Royal Society B: Biological Sciences, 279(1749),* 4923-4928.

Espín A. M., Exadaktylos, F., Herrmann, B., & Brañas-Garza, P. (2015). Short- and Long-run Goals in Ultimatum Bargaining. *Frontiers in Behavioral Neuroscience, 9,* 214.

Exadaktylos, F., Espín, A. M., & Brañas-Garza, P. (2013). Experimental subjects are not different. *Scientific Reports, 3(1213),* 1-6.

Falk, A., & Heckman, J. J. (2009). Lab experiments are a major source of knowledge in the social sciences. *Science, 326(5952),* 535-538.

Fehr, E., & Fischbacher, U. (2003). The nature of human altruism. *Nature*, *425(6960),* 785-791.

Fehr, E., & Gächter, S. (2000). Cooperation and Punishment in Public Goods Experiments. *The American Economic Review, 90(4),* 980-994.

Fehr, E., & Schmidt, K. M. (2006). The economics of fairness, reciprocity and altruism–experimental evidence and new theories. *Handbook of the Economics of Giving, Altruism and Reciprocity, 1,* 615-691.

Forsythe, R., Horowitz, J. L., Savin, N. E., & Sefton, M. (1994). Fairness in Simple Bargaining Experiments. *Games and Economic Behavior*, *6(3),* 347-369.

Galizzi, M., & Miraldo, M. (2010). Are You What You Eat? Experimental Evidence on Health Habits and Time and Risk Preferences. *Working Papers 9792, Imperial College, London, Imperial College Business School.*

Garcia, J., & Quintana-Domeque, C. (2006). Obesity, employment and wages in Europe. *Advances in Health Economics and Health Services Research, 17,* 187-217.

Garcia, J., & Quintana-Domeque, C. (2009). Income and body mass index in Europe. *Economics & Human Biology, 7,* 73-83.

Gómez-Ambrosi, J., Silva, C., Catalán, V., Rodríguez, A., & Galofré, J. C. et al. (2012). Clinical usefulness of a new equation for estimating body fat. *Diabetes Care*, *35,* 383-388.

Güth, W., Schmittberger, R., & Schwarz, B. (1982). An experimental analysis of ultimatum bargaining. *Journal of Economic Behavior and Organization*, *3(4),* 367–388.

Griffith, L. J., Parsons, T. J., & Hill, A. J. (2010). Self-esteem and quality of life in obese children and adolescents. *International Journal of Pediatric Obesity, 5(4),* 282-304.

Grow, H. M. G., Cook, A. J., Arterburn, D. E., Saelens, B. E., Drewnowski, A., & Lozano, P. (2010). Child obesity associated with social disadvantage of children's neighborhoods. *Social Science & Medicine*, *71(3),* 584-591.

Harrison, G. W., & List, J. A. (2004). Field experiments. *Journal of Economic Literature*, *42(4),* 1009-1055.

Heneghan, H. M., Heinberg, L., Windover, A., Rogula, T., & Schauer, P. R. (2012). Weighing the evidence for an association between obesity and suicide risk. *Surgery for Obesity and Related Diseases*, *8(1),* 98–107.

Henrich, J., Boyd, R., Bowles, S., Camerer, C., Fehr, E., & Gintis, H. (2004). *Foundations of human sociality: Economic experiments and ethnographic evidence from fifteen small-scale societies*. Oxford University Press.

Hesketh, K., Wake, M., & Waters, E. (2004). Body mass index and parent-reported self-esteem in elementary school children: evidence for a causal relationship. *International Journal of Obesity*, *28(10),* 1233-1237.

Huber, L. R. B. (2007). Validity of self-reported height and weight in women of reproductive age. *Maternal and Child Health Journal*, *11(2),* 137-144.

Janssen, I., Craig, W. M., Boyce, W. F., & Pickett, W. (2004). Associations between overweight and obesity with bullying behaviors in school-aged children. *Pediatrics*, *113(5),* 1187-1194.

Johnson, M. W., & Bickel, W. K. (2002). Within-subject comparison of real and hypothetical money rewards in delay discounting. *Journal of the Experimental Analysis of Behavior*, *77,* 129–146.

Jokela, M., Hintsanen, M., Hakulinen, C., Batty, G.D., Nabi, H., Singh-Manoux, A., & Kivimäki, M. (2013). Association of personality with the development and persistence of obesity: a meta-analysis based on individual-participant data. *Obesity Reviews, 4(4),* 315-323.

Keith, L., Gillanders, D., & Simpson, S. (2009). An exploration of the main sources of shame in an eating-disordered population. *Clinical Psychology & Psychotherapy*, *16(4),* 317–327.

Kovarik, J., Brañas-Garza, P., Cobo, R.; Espinosa, M. P.; Jimenez, N. & Ponti, G. (2010). Prosocial behavior and degree heterogeinity social networks. *Physica A: Statistical mechanics and its Applications 391: 849-853.*

Kuczmarski, M. F., Kuczmarski, R. J., & Najjar, M. (2001). Effects of age on validity of self-reported height, weight, and body mass index: findings from the Third National Health and Nutrition Examination Survey, 1988–1994. *Journal of the American Dietetic Association*, *101(1)*, 28-34.

Lagorio, C. H., & Madden, G. J. (2005). Delay Discounting of Real and Hypothetical Rewards III: Steady-state Assessments, Forced-choice Trials, and All Real Rewards. *Behavioral Processes, 69,* 173–187.

LeVeck, B. L., Hughes, D. A., Fowler, J. H., Hafner-Burton, E., & Victor, D.G. (2014). The Role of Self-Interest in Elite Bargaining. *Proceedings of the National Academy of Sciences, 111,* 18536–41.

Liu, P. J., Campbell, T. H., Fitzsimons, G. J., & Fitzsimons, G. M. (2013). Matching choices to avoid offending stigmatized group members. *Organizational Behavior and Human Decision Processes, 122(2),* 291-304.

Leider, S., Mobius, M., Rosenblat, T., Quoc-Anh, D. (2009). Directed altruism and enforced reciprocity in social networks. *The Quarterly Journal of Economics*, *124 (4),* 1815–1851.

Loewenstein, G. (1999). Experimental economics from the vantage-point of behavioural economics. *The Economic Journal*, *109(453),* 25-34.

McAdams, M. A., Van Dam, R. M., & Hu, F. B. (2007). Comparison of Self-reported and Measured BMI as Correlates of Disease Markers in U.S. Adults. *Obesity, 15,* 188-196.

McClure, H. H., Eddy, J. M., Kjellstrand, J. M., Snodgrass, J. J., & Martinez, C. R. Jr. (2012). Child and Adolescent Affective and Behavioral Distress and Elevated Adult Body Mass Index. *Child Psychiatry & Human Development, 43(6),* 837-854.

Mitzkewitz, M., & Nagel, R. (1993). Experimental results on ultimatum games with incomplete information. *International Journal of Game Theory, 22(2),* 171-198.

Morris, S. (2006). Body Mass Index and Occupational Attainment. *Journal of Health Economics*, *25,* 347-364.

Nederkoorn, C., Braet, C., Eijs, Y. V., Tanghe, A., & Jansen, A. (2006). Why obese children cannot resist food: The role of impulsivity. *Eating Behaviors*, *7(4),* 315-322.

Nowak, M. A., Page, K. M., & Sigmund, K. (2000). Fairness Versus Reason in the Ultimatum Game. *Science, 289(5485),* 1773–1775.

Oreffice S., & Quintana-Domeque C. (2010). Anthropometry and socioeconomics among couples: Evidence in the United States. *Economics & Human Biology, 8,* 373–384.

Oreffice S., & Quintana-Domeque C. (2015). Beauty, Body Size and Wages: Evidence from a Unique Data Set, mimeo.

Paeratakul, S., White, M. A., Williamson, D. A., Ryan, D. H., & Bray, G. A. (2002). Sex, Race/Ethnicity, Socioeconomic Status, and BMI in Relation to Self-Perception of Overweight. *Obesity Research, 10(5),* 345–350.

Perc, M., & Szolnoki, A. (2008). Social diversity and promotion of cooperation in the spatial prisoner’s dilemma game. *Physical Review*, *77(1),* 011904.

Puhl, R. M., & Latner, J. D. (2007). Stigma, obesity, and the health of the nation's children. *Psychological Bulletin*, *133(4),* 557.

Puhl, R.M., & Luedicke, J. (2012). Weight-Based Victimization Among Adolescents in the School Setting: Emotional Reactions and Coping Behaviors. *Journal of Youth and Adolescence, 41(1),* 27-40.

Proestakis, A., & Branas-Garza, P. (2015). Eliciting self-weight bias in a field experiment. *Middlesex University London*, Mimeo.

Rand, D. G. & Nowak, M. A. (2011). The evolution of antisocial punishment in optional public goods games. *Nature Communications, 2(8),* 434.

Reynolds, B., Ortengren, A., Richards, J. B., & de Wit, H. (2006). Dimensions of impulsive behavior: Personality and behavioral measures. *Personality and Individual Differences*, *40(2),* 305-315.

Rosval, L., Steiger, H., Bruce, K., Israël, M., Richardson, J., & Aubut, M. (2006). Impulsivity in women with eating disorders: problem of response inhibition, planning, or attention?. *International Journal of Eating Disorders*, *39(7),* 590-593.

Rothblum, E. D., Brand, P. A., Miller, C. T., & Oetjen, H. A. (1990). The relationship between obesity, employment discrimination, and employment-related victimization. *Journal of Vocational Behavior*, *37(3),* 251-266.

Royston, P. (1991c). sg3.5: Comment on sg3.4 and an improved D'Agostino test. *Stata Technical Bulletin, 3,* 23–24. Reprinted in *Stata Technical Bulletin Reprints,1,* 110–112.

Scharoun-Lee, M., Adaira, L. S, Kaufman, J. S., & Gordon-Larsen, P. (2009). Obesity, race/ethnicity and the multiple dimensions of socioeconomic status during the transition to adulthood: A factor analysis approach. *Social Science & Medicine*, *68(4),* 708–716.

Sjöberg, R. L., Nilsson, K. W., & Leppert, J. (2005). Obesity, shame, and depression in school-aged children: a population-based study. *Pediatrics*, *116(3),* e389-e392.

Smith, P. K, Bogin, B., & Bishai, D. M. (2005). Are time preference and body mass index associated? Evidence from the National Longitudinal Survey of Youth. *Economics & Human Biology*, *3(2),* 259-270.

Sobal, J., & Stunkard, A. J. (1989). Socioeconomic status and obesity: a review of the literature. *Psychological Bulletin*, *105(2),* 260.

Spencer, E. A., Appleby, P. N., Davey, G. K., & Key, T. J. (2002). Validity of self-reported height and weight in 4808 EPIC–Oxford participants. *Public Health Nutrition, 5(4),* 561-565.

Sutin, A. R., Ferrucci, L., Zonderman, A. B., & Terracciano, A. (2011). Personality and obesity across the adult life span. *Journal of Personality and Social Psychology, 101(3),* 579-592.

Stommel, M., & Schoenborn, C. A. (2009). Accuracy and usefulness of BMI measures based on self-reported weight and height: findings from the NHANES & NHIS 2001-2006. *BMC public health*, *9(1),* 421.

Taras, H., & Potts-Datema, W. (2005). Obesity and student performance at school. *Journal of School Health*, *75(8),* 291-295.

Ter Bogt, T. F., van Dorsselaer, S. A., Monshouwer, K., Verdurmen, J. E., Engels, R. C., & Vollebergh, W. A. (2006). Body mass index and body weight perception as risk factors for internalizing and externalizing problem behavior among adolescents. *Journal of Adolescent Health*, *39(1),* 27-34.

Vainik, U., Mõttus, R., Allik, J., Esko, T., & Realo, A. (2015). Are Trait-Outcome Associations Caused by Scales or Particular Items? Example Analysis of Personality Facets and BMI. *European Journal of Personality,* n/a-n/a. doi:10.1002/per.2009

World Health Organization (2009). *Global Health Risks. Mortality and burden of disease attributable to selected major risks.* Geneva: WHO.

World Health Organization (2014). *Global Status Report on noncommunicable diseases.* Geneva: WHO.

Zhang, Q., & Wang, Y. (2004). Socioeconomic inequality of obesity in the United States: do gender, age, and ethnicity matter? *Social Science & Medicine*, *58(6),* 1171–1180.

Zizzo, D.J. (2010). Experimenter demand effects in economic experiments. *Experimental Economics*, *13(1),* 75-98.

Appendix

Variables description

The definitions of control variables that are not self-explanatory are the following:

In the regressions using the city sample, **marital status** groups are compared against "single", which is the omitted category (marital status controls are not included in the regressions for the lab sample because virtually all subjects were single); **household income** refers to self-reported net household monthly income and consists of 10 categories corresponding to €0-€4,500 (in €500 increments); **education** refers to the subject's educational level and has 9 categories from "did not study at all" to "graduate university degree" (in the lab sample, the education variable is not included because its value was the same for all subjects); **nperhousehold** measures the number of individuals living in the subject's household.

Risk 1, risk 2 and risk 3 refer to the subject's attitudes toward financial risk and are dummy variables where 1 means that the subject chose the risky option, and 0 that s/he chose the non-risky option. Risk attitudes are controlled for since payments were probabilistic and both the UG and the TG involve some strategic risk. The risk questions are the following:

> **Risk 1**: 1 if option b, 0 if option a in the question: "We flip a coin. Choose one of the following options: a. Take 1.000 Euros no matter if it is heads or tails; b. Take 2.000 Euros if it is heads and nothing if it is tails".
>
> **Risk 2:** 1 if option a, 0 if option b in the question: "Choose one of the following options: a. Take a lottery ticket with 80% chance of winning 45 Euros and 20% chance of winning nothing; b. Take 30 Euros".

Risk 3: 1 if ‘Yes’, 0 if ‘No’ in the question: “Would you accept the following deal? We flip a coin. If it is heads you win 1,500 Euros and if it is tails you lose 1,000 Euros”.

Note that **risk 1** captures “risk-loving” in the domain of gains when both the risky and the non-risky option have the same expected value. **Risk 2** captures risk-loving in the gains domain as well, but in a question where the risky option yields a higher expected value than the non-risky one. Finally, **risk 3** captures risk loving when the risky option involves possible losses.

Impatience corresponds to the number of impatient choices the subject made in an inter-temporal choice task and captures preference for sooner-smaller rewards over larger but more delayed rewards (see Espín et al 2015 for further details on this survey-based discounting task). For eliciting impatience, hypothetical rewards were used due to logistical reasons and because previous evidence has shown that the use of real (vs. hypothetical) incentives does not significantly change the distribution of individual inter-temporal choices (see, e.g. Johnson and Bickel 2002, Lagorio and Madden 2005). Due to their large number, observations with missing values on this variable (subjects who made inconsistent choices in the task) are adjusted to the mean in order not to disproportionately reduce sample size. The measure of impatience is included as a control since the payments of the experiment were delayed, and because impatience has been found to affect behaviour in strategic social interactions (Curry et al 2008, Espín et al 2012, 2015). In addition, time and risk preferences are considered two key dimensions of impulsivity (Reynolds et al 2006), which is thought to be an important determinant of eating disorders and obesity (e.g. Nederkoorn et al 2006, Rosval et al 2006, Epstein et al 2010).

Cogn skills corresponds to the cognitive abilities of a subject measured by the number of correct answers to the following five questions:

1. If the probability of being infected by an illness is 10%, how many persons of a group of 1000 would be infected by that kind of illness? (N if s/he cannot/do not want to answer).

2. If there are 5 persons that own the winning lottery ticket and the prize to be shared is two million Euros, how much money would each person receive?

3. Suppose that you have €100 in a savings account and the rate of interest that you earn from the savings is 2% per year. If you keep the money in the account for 5 years, how much money would you have at the end of these 5 years?:

   a. More than €102

   b. €102 exactly

   c. Less than €102

   d. S/he cannot/ do not want to answer

4. Suppose that you have €100 in a savings account. The account accumulates a 10% rate of interest per year. How much money would you have in your account after two years?

5. The total cost of a bat and a ball is 1.10 Euros. The bat costs 1 Euro more than the ball. How many cents does the ball cost?

Appendix tables

Table A1. BMI skewness/kurtosis tests for normality

Sample	N	p(Skewness)	p(Kurtosis)	adj. chi^2	p>chi^2
City	753	0.000***	0.680	34.45	0.000***
Lab	618	0.000***	0.000***	73.47	0.000***

Notes: Skewness/kurtosis tests for normality (D'Agostino et al 1990) with correction for overall Chi^2 and its significance level (Royston 1991). * p-value< .1 , ** p-value< .05 , *** p-value< .01.

Table A2. Spearman correlations between social preference measures (city sample; *N*=753)

	DG offer	*UG offer*	*UG mao*	*Trustor*
UG offer	0.409***			
	(0.000)			
UG mao	0.053	0.080**		
	(0.145)	(0.028)		
Trustor	0.136***	0.123***	-0.001	
	(0.000)	(0.001)	(0.970)	
Trustee	0.303***	0.211***	-0.048	0.306***
	(0.000)	(0.000)	(0.187)	(0.000)

Notes: P-values in parentheses. * p-value< .1 , ** p-value< .05 , *** p-value< .01

Table A3. Spearman correlations between social preference measures (lab sample; *N*=618)

	DG offer	*UG offer*	*UG mao*	*Trustor*
UG offer	0.335***			
	(0.000)			
UG mao	0.034	0.114***		
	(0.395)	(0.005)		
Trustor	0.064	0.017	-0.077*	
	(0.112)	(0.669)	(0.056)	
Trustee	0.229***	0.121***	-0.018	0.160***
	(0.000)	(0.003)	(0.664)	(0.000)

Notes: P-values in parentheses. * p-value< .1 , ** p-value< .05 , *** p-value< .01

Table A4. City sample

	DG offer (1)		*UG offer* (2)		*UG mao* (3)		*Trustor* (4)		*Trustee* (5)	
BMI	0.013	-0.015	-0.007	-0.743*	-0.005	0.362	-0.008	-0.068	-0.012	0.027
	(0.806)	(0.978)	(0.834)	(0.056)	(0.913)	(0.424)	(0.600)	(0.650)	(0.486)	(0.866)
BMIsq		0.001		0.014*		-0.007		0.001		-0.001
		(0.959)		(0.061)		(0.421)		(0.687)		(0.803)
gender(male)	-0.455	-0.450	0.038	0.157	-0.200	-0.260	-0.090	-0.080	0.077	0.070
	(0.272)	(0.271)	(0.875)	(0.518)	(0.422)	(0.340)	(0.353)	(0.425)	(0.505)	(0.547)
age	0.006	0.006	-0.026	-0.018	0.125***	0.122***	0.005	0.006	0.011	0.010
	(0.944)	(0.941)	(0.625)	(0.728)	(0.003)	(0.004)	(0.788)	(0.765)	(0.605)	(0.625)
agesq	0.000	0.000	0.000	0.000	-0.001***	-0.001**	0.000	0.000	0.000	0.000
	(0.995)	(0.992)	(0.660)	(0.756)	(0.010)	(0.013)	(0.758)	(0.736)	(0.865)	(0.887)
married	1.067	1.067	0.292	0.313	-1.340***	-1.351***	0.254	0.255	0.112	0.112
	(0.119)	(0.118)	(0.464)	(0.426)	(0.006)	(0.006)	(0.124)	(0.122)	(0.554)	(0.556)
divorced	2.105***	2.104***	0.237	0.230	-0.972	-0.969	-0.073	-0.075	0.245	0.246
	(0.008)	(0.008)	(0.744)	(0.749)	(0.228)	(0.231)	(0.793)	(0.787)	(0.429)	(0.428)
widow	-0.081	-0.077	0.215	0.329	0.448	0.390	0.209	0.218	0.425	0.418
	(0.941)	(0.943)	(0.735)	(0.599)	(0.546)	(0.605)	(0.472)	(0.452)	(0.258)	(0.272)
cohabiting	-0.130	-0.128	-0.847*	-0.801*	-0.530	-0.553	0.473*	0.476*	-0.232	-0.235
	(0.914)	(0.916)	(0.059)	(0.076)	(0.450)	(0.431)	(0.054)	(0.051)	(0.454)	(0.450)
unemployed	-0.554	-0.555	-0.042	-0.041	0.284	0.285	0.163	0.162	-0.096	-0.095
	(0.202)	(0.203)	(0.867)	(0.869)	(0.341)	(0.341)	(0.109)	(0.111)	(0.448)	(0.451)
householdincome	-0.135	-0.135	0.020	0.022	0.050	0.049	0.006	0.006	-0.021	-0.021
	(0.238)	(0.238)	(0.737)	(0.717)	(0.444)	(0.456)	(0.799)	(0.790)	(0.440)	(0.436)
nperhousehold	0.051	0.051	-0.055	-0.056	0.245**	0.245**	-0.075*	-0.076*	-0.052	-0.052
	(0.744)	(0.744)	(0.632)	(0.625)	(0.025)	(0.024)	(0.070)	(0.070)	(0.208)	(0.207)
education	0.073	0.073	0.066	0.066	-0.099	-0.099	0.001	0.001	0.013	0.013
	(0.534)	(0.534)	(0.389)	(0.392)	(0.141)	(0.143)	(0.965)	(0.967)	(0.630)	(0.631)
risk1	-0.411	-0.412	-0.071	-0.084	1.109***	1.116***	-0.068	-0.068	-0.381**	-0.380**
	(0.449)	(0.448)	(0.821)	(0.788)	(0.003)	(0.003)	(0.604)	(0.600)	(0.017)	(0.017)
risk2	0.787*	0.788*	-0.070	-0.048	-0.067	-0.077	0.179*	0.181*	-0.099	-0.100
	(0.059)	(0.060)	(0.797)	(0.858)	(0.834)	(0.808)	(0.095)	(0.090)	(0.358)	(0.354)
risk3	2.090***	2.092***	1.138***	1.183***	-0.665	-0.687	0.781***	0.786***	0.530***	0.528***
	(0.001)	(0.001)	(0.005)	(0.004)	(0.228)	(0.216)	(0.000)	(0.000)	(0.005)	(0.006)
cogn skills	-0.126	-0.126	-0.050	-0.042	0.227**	0.223**	0.019	0.020	0.107**	0.106**
	(0.490)	(0.491)	(0.607)	(0.667)	(0.038)	(0.044)	(0.663)	(0.647)	(0.012)	(0.012)
impatience	-0.093	-0.093	-0.063	-0.064	0.099**	0.100**	-0.001	-0.001	-0.001	-0.001
	(0.259)	(0.259)	(0.108)	(0.101)	(0.032)	(0.031)	(0.955)	(0.949)	(0.972)	(0.974)
constant	6.955***	7.304	10.782***	19.662***	3.379**	-1.020	0.642	1.376	0.269	-0.213
	(0.002)	(0.306)	(0.000)	(0.000)	(0.035)	(0.850)	(0.265)	(0.461)	(0.669)	(0.919)
adj/pseudo R^2					0.034	0.034	0.041	0.041	0.087	0.087
log likelihood	-2018.881	-2018.880	-1873.157	-1870.862			-435.996	-435.916	-410.844	-410.810
F/chi^2	3.06***	3.09***	2.00***	2.10***	2.18***	2.11***	62.98***	70.60***	96.99***	97.44***
N	753		753		753		753		753	

Notes: Dependent variables are displayed on top of the columns. Tobit estimates for models (1) and (2), OLS for model (3) and Probit for models (4) and (5). Robust standard errors are clustered on interviewers (108 groups). All regressions control for order effects. P-values in parentheses. * p-value< .1 , ** p-value< .05 , *** p-value< .01

Table A5. Lab sample

	DG offer (1)		*UG offer* (2)		*UG mao* (3)		*Trustor* (4)		*Trustee* (5)	
BMI	0.005	-0.160	0.019	0.115	0.033	0.419	-0.012	-0.067	0.036	0.143
	(0.927)	(0.750)	(0.345)	(0.506)	(0.452)	(0.345)	(0.529)	(0.722)	(0.114)	(0.461)
BMIsq		0.004		-0.002		-0.008		0.001		-0.002
		(0.740)		(0.562)		(0.384)		(0.770)		(0.574)
gender(male)	-0.216	-0.198	-0.097	-0.107	-0.062	-0.104	0.128	0.135	-0.043	-0.054
	(0.525)	(0.565)	(0.489)	(0.443)	(0.820)	(0.710)	(0.289)	(0.270)	(0.737)	(0.678)
age	-0.950	-0.944	-0.008	-0.010	-0.730	-0.741	0.214	0.215	-0.556	-0.57
	(0.175)	(0.177)	(0.973)	(0.964)	(0.214)	(0.208)	(0.375)	(0.372)	(0.272)	(0.266)
agesq	0.024	0.024	0.000	0.001	0.016	0.017	-0.004	-0.004	0.013	0.013
	(0.127)	(0.129)	(0.924)	(0.911)	(0.206)	(0.199)	(0.448)	(0.444)	(0.277)	(0.271)
unemployed	0.721	0.722	-0.282	-0.281	0.443	0.445	-0.142	-0.142	0.053	0.052
	(0.396)	(0.395)	(0.449)	(0.450)	(0.517)	(0.515)	(0.625)	(0.624)	(0.862)	(0.863)
householdincome	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(0.368)	(0.383)	(0.772)	(0.755)	(0.408)	(0.377)	(0.147)	(0.141)	(0.928)	0.957
nperhousehold	-0.128	-0.127	-0.052	-0.052	0.225*	0.223*	-0.020	-0.020	0.042	0.041
	(0.459)	(0.461)	(0.441)	(0.438)	(0.083)	(0.087)	(0.721)	(0.722)	(0.488)	(0.498)
risk1	0.812*	0.808*	-0.088	-0.086	0.546	0.555	0.505***	0.504***	0.124	0.126
	(0.079)	(0.080)	(0.696)	(0.702)	(0.165)	(0.159)	(0.009)	(0.009)	(0.527)	(0.521)
risk2	-0.457	-0.453	-0.128	-0.130	-0.018	-0.023	0.034	0.034	-0.273**	-0.276**
	(0.160)	(0.162)	(0.379)	(0.374)	(0.948)	(0.932)	(0.779)	(0.775)	(0.033)	(0.031)
risk3	0.594	0.598	-0.274	-0.277	-0.210	-0.221	0.256	0.257	-0.136	-0.138
	(0.147)	(0.144)	(0.339)	(0.334)	(0.600)	(0.582)	(0.150)	(0.148)	(0.425)	(0.421)
cogn skills	0.056	0.052	0.120	0.123	-0.187	-0.178	-0.039	-0.040	0.190**	0.193**
	(0.790)	(0.806)	(0.113)	(0.106)	(0.259)	(0.287)	(0.594)	(0.584)	(0.013)	(0.012)
impatience	0.092	0.091	0.038	0.039	0.067	0.069	0.010	0.010	-0.022	-0.022
	(0.186)	(0.188)	(0.258)	(0.251)	(0.246)	(0.232)	(0.672)	(0.673)	(0.379)	(0.385)
constant	17.265**	19.115*	9.348***	8.283**	11.866*	7.583	-1.574	-0.957	5.468	4.401
	(0.027)	(0.053)	(0.001)	(0.013)	(0.076)	(0.374)	(0.563)	(0.780)	(0.310)	(0.442)
adj/pseudo R^2					0.036	0.036	0.046	0.046	0.056	0.057
log likelihood	-1592.178	-1592.126	-1183.893	-1183.810			-359.605	-359.564	-298.628	-298.510
F/chi^2	2.15***	2.10***	79.03***	78.19***	47.91***	46.49***	36.96*	37.25	31.75	31.91
N	618		618		618		618		618	

Notes: Dependent variables are displayed on top of the columns. Tobit estimates for models (1) and (2), OLS for model (3) and Probit for models (4) and (5). Robust standard errors are clustered at the individual level. All regressions control for order effects. P-values in parentheses. * p-value< .1 , ** p-value< .05, *** p-value< .01

Table A6. City sample

	DG offer (1)		*UG offer* (2)		*UG mao* (3)		*Trustor* (4)		*Trustee* (5)	
BMI	0.089*	0.033	0.007	-0.654*	0.008	0.325	-0.006	-0.021	0.012	0.132
	(0.077)	(0.955)	(0.834)	(0.089)	(0.852)	(0.415)	(0.654)	(0.882)	(0.355)	(0.325)
BMIsq		0.001		0.013*		-0.006		0.000		-0.002
		(0.924)		(0.087)		(0.431)		(0.914)		(0.372)
constant	5.357***	6.049	9.137***	17.323***	6.850***	2.921	0.688**	0.877	0.273	-1.205
	(0.000)	(0.408)	(0.000)	(0.000)	(0.000)	(0.553)	(0.031)	(0.624)	(0.389)	(0.471)
adj/pseudo R^2					0.001	0.001	0.000	0.000	0.001	0.001
log likelihood	-2054.998	-2054.993	-1892.689	-1890.707			-454.771	-454.765	-449.937	-449.571
F/chi^2	3.14*	1.58	0.04	1.47	0.03	0.36	0.20	0.21	0.85	1.78
controls	NO		NO		NO		NO		NO	
N	753		753		753		753		753	

Notes: Dependent variables are displayed on top of the columns. Tobit estimates for models (1) and (2), OLS for model (3) and Probit for models (4) and (5).

Robust standard errors are clustered on interviewers (108 groups). P-values in parentheses. * p-value< .1 , ** p-value< .05, *** p-value< .01

Table A7. Lab sample

	DG offer (1)		*UG offer* (2)		*UG mao* (3)		*Trustor* (4)		*Trustee* (5)	
BMI	0.023	-0.218	0.016	0.059	0.004	0.174	-0.005	0.066	0.027	0.047
	(0.637)	(0.658)	(0.402)	(0.767)	(0.927)	(0.654)	(0.774)	(0.710)	(0.170)	(0.806)
BMIsq		0.005		-0.001		-0.004		-0.002		0.000
		(0.619)		(0.823)		(0.656)		(0.687)		(0.917)
constant	7.611***	10.357*	9.160***	8.681***	5.947***	3.999	0.640	-0.167	0.215	-0.006
	(0.000)	(0.072)	(0.000)	(0.000)	(0.000)	(0.377)	(0.110)	(0.935)	(0.622)	(0.998)
adj/pseudo R^2					0.001	0.002	0.000	0.000	0.003	0.003
log likelihood	-1611.732	-1611.622	-1202.659	-1202.643			-377.132	-377.056	-315.633	-315.629
F/chi^2	0.22	0.27	0.70	0.37	0.01	0.10	0.08	0.25	1.89	1.91
Controls	NO		NO		NO		NO		NO	
N	618		618		618		618		618	

Notes: Dependent variables are displayed on top of the columns. Tobit estimates for models (1) and (2), OLS for model (3) and Probit for models (4) and (5).

Robust standard errors are clustered at the individual level. P-values in parentheses. * p-value< .1 , ** p-value< .05, *** p-value< .01

Table A8. City sample

	DG offer (1)	*UG offer* (2)	*UG mao* (3)	*Trustor* (4)	*Trustee* (5)
obese	-0.050	0.142	0.236	-0.096	-0.343*
	(0.945)	(0.746)	(0.654)	(0.615)	(0.090)
overweight	-0.721	-0.152	-0.188	-0.037	-0.093
	(0.110)	(0.625)	(0.567)	(0.767)	(0.504)
gender(male)	-0.326	0.038	-0.194	-0.096	0.081
	(0.417)	(0.871)	(0.425)	(0.314)	(0.486)
age	0.013	-0.025	0.127***	0.005	0.009
	(0.875)	(0.639)	(0.003)	(0.805)	(0.667)
agesq	0.000	0.000	-0.001***	0.000	0.000
	(0.962)	(0.675)	(0.010)	(0.774)	(0.952)
married	1.168*	0.285	-1.347***	0.254	0.140
	(0.083)	(0.475)	(0.006)	(0.133)	(0.458)
divorced	2.095***	0.223	-0.990	-0.072	0.264
	(0.008)	(0.757)	(0.218)	(0.797)	(0.392)
widow	0.034	0.223	0.464	0.202	0.418
	(0.975)	(0.724)	(0.529)	(0.493)	(0.268)
cohabiting	-0.112	-0.858*	-0.541	0.471*	-0.224
	(0.928)	(0.058)	(0.439)	(0.055)	(0.469)
unemployed	-0.575	-0.050	0.275	0.162	-0.097
	(0.186)	(0.840)	(0.356)	(0.114)	(0.445)
householdincome	-0.137	0.021	0.051	0.006	-0.022
	(0.232)	(0.728)	(0.435)	(0.792)	(0.417)
nperhousehold	0.052	-0.054	0.247**	-0.076*	-0.055
	(0.740)	(0.642)	(0.025)	(0.069)	(0.185)
education	0.065	0.066	-0.099	0.001	0.012
	(0.581)	(0.390)	(0.137)	(0.966)	(0.670)
risk1	-0.386	-0.084	1.093***	-0.069	-0.375**
	(0.479)	(0.788)	(0.003)	(0.598)	(0.019)
risk2	0.771*	-0.062	-0.056	0.179*	-0.107
	(0.066)	(0.819)	(0.859)	(0.093)	(0.327)
risk3	2.127***	1.145***	-0.654	0.778***	0.529***
	(0.001)	(0.005)	(0.231)	(0.000)	(0.005)
cogn skills	-0.123	-0.049	0.229**	0.019	0.104**
	(0.506)	(0.620)	(0.035)	(0.671)	(0.014)
impatience	-0.098	-0.064	0.098**	-0.001	-0.001
	(0.235)	(0.104)	(0.035)	(0.962)	(0.966)
constant	7.304***	10.593***	3.179***	0.480	0.049
	(0.000)	(0.000)	(0.008)	(0.335)	(0.925)
adj/pseudo R^2			0.034	0.041	0.090
log likelihood	-2017.622	-1872.913		-435.989	-409.626
F/chi^2	3.08***	2.11***	2.21***	66.36***	98.68***
N	753	753	753	753	753

Notes: Dependent variables are displayed on top of the columns. Tobit estimates for models (1) and (2), OLS for model (3) and Probit for models (4) and (5). Robust standard errors are clustered on interviewers (108 groups). All regressions control for order effects. P-values in parentheses. * p-value< .1 , ** p-value< .05 , *** p-value< .01 . **Descriptive statistics**: a.) Obese: x̄: 0.087 SD: 0.282 Min: 0 Max: 1 b.) Overweight: x̄: 0.266 SD: 0.442 Min: 0 Max: 1

Table A9. Lab sample

	DG offer (1)	*UG offer* (2)	*UG mao* (3)	*Trustor* (4)	*Trustee* (5)
obese	0.112	-0.019	-0.088	0.041	0.551
	(0.917)	(0.938)	(0.917)	(0.925)	(0.254)
overweight	0.304	0.126	0.549	-0.175	0.338
	(0.495)	(0.455)	(0.113)	(0.297)	(0.105)
gender(male)	-0.226	-0.077	-0.046	0.121	-0.009
	(0.497)	(0.583)	(0.862)	(0.308)	(0.942)
age	-0.912	0.015	-0.643	0.185	-0.521
	(0.194)	(0.948)	(0.278)	(0.447)	(0.299)
agesq	0.023	0.000	0.014	-0.003	0.012
	(0.144)	(0.996)	(0.272)	(0.530)	(0.304)
unemployed	0.737	-0.282	0.460	-0.146	0.046
	(0.385)	(0.446)	(0.504)	(0.614)	(0.880)
householdincome	0.000	0.000	0.000	0.000	0.000
	(0.389)	(0.775)	(0.442)	(0.160)	(0.853)
nperhousehold	-0.128	-0.049	0.228*	-0.021	0.045
	(0.456)	(0.459)	(0.079)	(0.704)	(0.451)
risk1	0.833*	-0.089	0.570	0.498**	0.127
	(0.070)	(0.692)	(0.149)	(0.010)	(0.515)
risk2	-0.457	-0.125	-0.012	0.032	-0.269**
	(0.160)	(0.390)	(0.964)	(0.788)	(0.035)
risk3	0.607	-0.276	-0.202	0.253	-0.126
	(0.139)	(0.335)	(0.614)	(0.156)	(0.464)
cogn skills	0.056	0.119	-0.187	-0.038	0.186**
	(0.791)	(0.117)	(0.261)	(0.601)	(0.015)
impatience	0.092	0.038	0.067	0.010	-0.022
	(0.185)	(0.261)	(0.244)	(0.673)	(0.390)
constant	16.916**	9.467***	11.552*	-1.474	5.816
	(0.030)	(0.001)	(0.087)	(0.589)	(0.273)
adj/pseudo R^2			0.037	0.047	0.058
log likelihood	-1591.974	-1184.030		-359.267	-410.884
F/chi^2	2.09***	79.27***	47.13***	36.96	35.64
N	618	618	618	618	618

Notes: Dependent variables are displayed on top of the columns. Tobit estimates for models (1) and (2), OLS for model (3) and Probit for models (4) and (5). Robust standard errors are clustered at the individual level. All regressions control for order effects. P-values in parentheses. * p-value< .1 , ** p-value< .05 , *** p-value< .01 . **Descriptive statistics**:

a.) Obese: x̄: 0.017 SD: 0.132 Min: 0 Max: 1 b.) Overweight: x̄: 0.118 SD: 0.323 Min: 0 Max: 1

Table A10. City sample

	DG offer (1)		*UG offer* (2)		*UG mao* (3)		*Trustor* (4)		*Trustee* (5)	
BF%	0.011	0.040	-0.013	-0.084	0.002	0.169	-0.005	-0.043	-0.008	-0.032
	(0.767)	(0.793)	(0.595)	(0.424)	(0.947)	(0.102)	(0.599)	(0.282)	(0.526)	(0.435)
BF%sq		-0.001		0.001		-0.003*		0.001		0.000
		(0.836)		(0.481)		(0.095)		(0.326)		(0.523)
gender(male)	-0.331	-0.319	-0.091	-0.120	-0.193	-0.125	-0.154	-0.168	-0.017	-0.027
	(0.526)	(0.553)	(0.747)	(0.676)	(0.601)	(0.735)	(0.263)	(0.220)	(0.915)	(0.866)
age	0.003	0.001	-0.022	-0.016	0.124***	0.109**	0.007	0.010	0.012	0.015
	(0.969)	(0.992)	(0.677)	(0.759)	(0.004)	(0.012)	(0.751)	(0.637)	(0.556)	(0.493)
agesq	0.000	0.000	0.000	0.000	-0.001**	-0.001**	0.000	0.000	0.000	0.000
	(0.996)	(0.972)	(0.679)	(0.760)	(0.011)	(0.030)	(0.742)	(0.620)	(0.835)	(0.751)
married	1.062	1.068	0.310	0.293	-1.352***	-1.313***	0.254	0.244	0.111	0.102
	(0.120)	(0.120)	(0.435)	(0.462)	(0.006)	(0.007)	(0.124)	(0.142)	(0.561)	(0.589)
divorced	2.102***	2.103***	0.246	0.240	-0.977	-0.962	-0.072	-0.073	0.245	0.243
	(0.009)	(0.008)	(0.734)	(0.742)	(0.225)	(0.231)	(0.795)	(0.792)	(0.429)	(0.430)
widow	-0.089	-0.065	0.236	0.179	0.436	0.569	0.211	0.176	0.426	0.402
	(0.935)	(0.954)	(0.709)	(0.787)	(0.558)	(0.442)	(0.467)	(0.547)	(0.259)	(0.274)
cohabiting	-0.135	-0.139	-0.833*	-0.827*	-0.538	-0.553	0.473*	0.478*	-0.232	-0.230
	(0.911)	(0.908)	(0.064)	(0.066)	(0.442)	(0.435)	(0.053)	(0.050)	(0.456)	(0.460)
unemployed	-0.555	-0.541	-0.040	-0.070	0.283	0.354	0.163	0.146	-0.096	-0.106
	(0.202)	(0.215)	(0.873)	(0.777)	(0.344)	(0.242)	(0.110)	(0.164)	(0.446)	(0.416)
householdincome	-0.135	-0.134	0.019	0.016	0.051	0.059	0.006	0.004	-0.021	-0.022
	(0.238)	(0.239)	(0.748)	(0.789)	(0.440)	(0.378)	(0.800)	(0.866)	(0.443)	(0.425)
nperhousehold	0.051	0.049	-0.055	-0.049	0.245**	0.231**	-0.075*	-0.072*	-0.052	-0.050
	(0.744)	(0.752)	(0.632)	(0.660)	(0.025)	(0.032)	(0.071)	(0.091)	(0.209)	(0.235)
education	0.073	0.071	0.065	0.069	-0.098	-0.109	0.001	0.004	0.013	0.015
	(0.533)	(0.548)	(0.396)	(0.370)	(0.143)	(0.103)	(0.963)	(0.891)	(0.627)	(0.594)
risk1	-0.413	-0.410	-0.063	-0.066	1.103***	1.112***	-0.068	-0.071	-0.382**	-0.385**
	(0.447)	(0.453)	(0.842)	(0.833)	(0.003)	(0.002)	(0.602)	(0.585)	(0.016)	(0.016)
risk2	0.788*	0.787*	-0.074	-0.070	-0.063	-0.073	0.179*	0.181*	-0.098	-0.096
	(0.059)	(0.060)	(0.784)	(0.794)	(0.842)	(0.816)	(0.094)	(0.089)	(0.361)	(0.371)
risk3	2.088***	2.083***	1.141***	1.154***	-0.666	-0.695	0.782***	0.788***	0.531***	0.538***
	(0.001)	(0.001)	(0.005)	(0.005)	(0.228)	(0.210)	(0.000)	(0.000)	(0.005)	(0.005)
cogn skills	-0.126	-0.126	-0.050	-0.051	0.227**	0.229**	0.019	0.019	0.107**	0.107**
	(0.490)	(0.491)	(0.607)	(0.599)	(0.038)	(0.035)	(0.662)	(0.667)	(0.012)	(0.012)
impatience	-0.092	-0.093	-0.064	-0.062	0.100**	0.096**	-0.001	0.000	-0.001	0.000
	(0.260)	(0.257)	(0.105)	(0.116)	(0.032)	(0.040)	(0.955)	(0.988)	(0.973)	(0.992)
constant	6.986***	6.634**	10.917***	11.741***	3.226**	1.340	0.595	1.038	0.180	0.465
	(0.001)	(0.023)	(0.000)	(0.000)	(0.022)	(0.427)	(0.263)	(0.119)	(0.757)	(0.532)
adj/pseudo R^2					0.034	0.037	0.041	0.042	0.087	0.088
log likelihood	-2018.869	-2018.846	-1873.047	-1872.686			-435.999	-435.475	-410.884	-410.664
F/chi^2	3.07***	2.98***	1.95***	1.91***	2.19***	2.53***	63.02***	66.11***	97.01***	99.45***
N	753		753		753		753		753	

Notes: Dependent variables are displayed on top of the columns. Tobit estimates for models (1) and (2), OLS for model (3) and Probit for models (4) and (5). Robust standard errors are clustered on interviewers (108 groups). All regressions control for order effects. P-values in parentheses. * p-value< .1 , ** p-value< .05 , *** p-value< .01 . BF% was calculated using the following formula: BF% = –44.988 + (0.503 x age) + (10.689 x sex) + (3.172 x BMI) – (0.026 x BMIsq) + (0.181 x BMI x sex) – (0.02 x BMI x age) – (0.005 x BMIsq x sex) + (0.00021 x BMIsq x age) where male = 0 and female = 1 for sex, and age in years. **Descriptive statistics**: BF%: x̄: 27.94 SD: 8.20 Min: 6.98 Max: 50.08

Table A11. Lab sample

	DG offer (1)		*UG offer* (2)		*UG mao* (3)		*Trustor* (4)		*Trustee* (5)	
BF%	0.001	-0.071	0.011	-0.02	0.021	0.118	-0.007	-0.020	0.021	0.072*
	(0.967)	(0.533)	(0.347)	(0.666)	(0.397)	(0.212)	(0.515)	(0.632)	(0.104)	(0.095)
BF%sq		0.001		0.001		-0.002		0.000		-0.001
		(0.485)		(0.442)		(0.288)		(0.753)		(0.226)
gender(male)	-0.197	-0.279	0.039	0.005	0.185	0.293	0.042	0.028	0.210	0.273
	(0.652)	(0.550)	(0.834)	(0.982)	(0.596)	(0.408)	(0.790)	(0.867)	(0.223)	(0.127)
age	-0.949	-0.944	-0.011	-0.009	-0.738	-0.744	0.216	0.216	-0.565	-0.627
	(0.175)	(0.176)	(0.961)	(0.968)	(0.209)	(0.205)	(0.370)	(0.368)	(0.266)	(0.241)
agesq	0.024	0.024	0.000	0.000	0.017	0.017	-0.004	-0.004	0.013	0.015
	(0.127)	(0.127)	(0.917)	(0.920)	(0.204)	(0.202)	(0.445)	(0.445)	(0.274)	(0.251)
unemployed	0.719	0.699	-0.281	-0.291	0.445	0.474	-0.142	-0.144	0.053	0.066
	(0.397)	(0.411)	(0.450)	(0.436)	(0.515)	(0.489)	(0.625)	(0.620)	(0.861)	(0.827)
householdincome	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(0.366)	(0.381)	(0.770)	(0.786)	(0.408)	(0.385)	(0.147)	(0.142)	(0.935)	(0.994)
nperhousehold	-0.127	-0.127	-0.052	-0.051	0.224*	0.223*	-0.020	-0.020	0.042	0.040
	(0.460)	(0.462)	(0.441)	(0.442)	(0.084)	(0.084)	(0.722)	(0.724)	(0.492)	(0.504)
risk1	0.810*	0.798*	-0.088	-0.093	0.548	0.564	0.505***	0.502***	0.125	0.135
	(0.079)	(0.084)	(0.697)	(0.682)	(0.163)	(0.153)	(0.009)	(0.010)	(0.524)	(0.496)
risk2	-0.456	-0.471	-0.128	-0.136	-0.018	0.004	0.034	0.032	-0.274**	-0.269**
	(0.160)	(0.150)	(0.379)	(0.354)	(0.946)	(0.989)	(0.778)	(0.793)	(0.032)	(0.036)
risk3	0.594	0.591	-0.274	-0.275	-0.210	-0.208	0.256	0.255	-0.137	-0.136
	(0.148)	(0.149)	(0.339)	(0.338	(0.600)	(0.605)	(0.150)	(0.151)	(0.424)	(0.426)
cogn skills	0.056	0.050	0.121	0.119	-0.186	-0.179	-0.039	-0.040	0.191**	0.196**
	(0.791)	(0.812)	(0.112)	(0.120)	(0.262)	(0.281)	(0.593)	(0.585)	(0.013)	(0.010)
impatience	0.092	0.093	0.038	0.039	0.067	0.065	0.010	0.010	-0.022	-0.024
	(0.186)	(0.179)	(0.257)	(0.250)	(0.244)	(0.256)	(0.672)	(0.666)	(0.380)	(0.353)
constant	17.331**	18.137**	9.516***	9.853***	12.127*	11.142*	-1.677	-1.526	5.809	5.861
	(0.026)	(0.021)	(0.000)	(0.000)	(0.069)	(0.098)	(0.536)	(0.577)	(0.280)	(0.295)
adj/pseudo R^2					0.036	0.036	0.046	0.046	0.056	0.059
log likelihood	-1592.181	-1591.976	-1183.882	-1183.695			-359.593	-359.548	-298.567	-297.918
F/chi^2	2.15***	2.07***	78.76***	78.29***	47.99***	1.84	37.00*	37.23	31.74	34.11
N	618		618		618		618		618	

Notes: Dependent variables are displayed on top of the columns. Tobit estimates for models (1) and (2), OLS for model (3) and Probit for models (4) and (5). Robust standard errors are clustered at the individual level. All regressions control for order effects. P-values in parentheses. * p-value< .1 , ** p-value< .05 , *** p-value< .01 . BF% was calculated using the following formula: BF% = –44.988 + (0.503 x age) + (10.689 x sex) + (3.172 x BMI) – (0.026 x BMIsq) + (0.181 x BMI x sex) – (0.02 x BMI x age) – (0.005 x BMIsq x sex) + (0.00021 x BMIsq x age) where male = 0 and female = 1 for sex, and age in years. **Descriptive statistics**: BF%: x̄: 21.84 SD: 6.84 Min: 1.98 Max: 45.75

Appendix figures

Figure A1. Distribution of game variables