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Do envy and compassion pave the way to unhappiness? Social preferences and life satisfaction in a Spanish city

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ABSTRACT

Mounting evidence shows that people's self-reported life satisfaction (LS) is negatively related to income inequality. Under the interpretation that the relationship between macro-level variables and LS reflects individuals' social preferences, this finding indicates that most people display inequality-averse preferences. We explore the relationship between self-reports on inequality aversion and LS in a citywide representative survey/experiment conducted in Spain. If self-reported well-being can be used to infer people's social preferences, LS should correlate negatively with both "envy" and "compassion" scores (i.e., how much one *suffers* from disadvantageous and advantageous inequality, respectively). We find that LS relates negatively to envy *but* positively to compassion, which would imply that suffering from observing poorer others, paradoxically, increases well-being. Using an incentivized Dictator Game as a measure of generous behavior, we reject the hypothesis that the positive link between compassion and LS is actually driven by generosity. We discuss how these findings could indicate that the way LS is used to assess social preferences in the population should be revised.

Keywords: competitiveness, dictator game, generosity, happiness, inequality aversion, life satisfaction

1. INTRODUCTION

The assumption of traditional economic models that individuals care only about their own material self-interest has been consistently challenged by the data: people's choices in inter-personal contexts reveal that individuals are concerned with others' welfare in either a positive or negative way (Camerer 2003, Fehr & Schmidt 2006). In this sense, it is said that individuals display distributional (outcome-based) social preferences, which are typically modeled by introducing elements related with the welfare of relevant others into individuals' utility functions (Fehr & Schmidt 1999, Bolton & Ockenfels 2000, Charness & Rabin 2002). Results from laboratory and field experiments have contributed decisively to these advances.

In recent years, self-reports on subjective well-being—happiness or life satisfaction (LS)—are being increasingly used to empirically test theories of social preferences. Evidence from survey self-reports conveniently combined with macro- and/or micro-data on income indeed suggests that it is not only one's own income but also that of relevant others what influences well-being (Clark & D'Ambrosio 2014, Ferrer-i-Carbonell & Ramos 2014). In the context of social preferences, these results appear to give support to the interpretation of self-reported well-being as an appropriate, interpersonally comparable proxy for utility (see, e.g., Ng 1997 and Stutzer & Lalive 2004 in different contexts). In this vein, the evidence substantiates the notion that people exhibit social preferences and has served to bridge the gap between the often disconnected happiness and experimental literatures.

One important link between these research traditions has been established around an empirical regularity observed within Western and economically developed societies: more unequal income distributions are recurrently found to be associated with lower subjective well-being ratings in both cross-sectional and longitudinal analyses (Morawetz et al. 1977, Alesina et al. 2004, Blanchflower & Oswald 2004, Wilkinson & Pickett 2006, Grosfeld & Senik 2010, Oishi et al. 2011, Oshio & Kobayashi 2011, Delhey & Dragolov 2014; but see Clark 2003 and Rözer & Kraaykamp 2013 for conflicting results). Upon this evidence, it has been suggested that, on average, people dislike unequal outcomes, as advocated by

influential social preferences models of inequality aversion built on experimental results (Fehr & Schmidt 1999, Bolton & Ockenfels 2000).[1]

Here we contribute to this literature by exploring the relationship between the LS reported by participants in a citywide representative survey/experiment and their attitudes towards income inequality as measured by their responses to two novel survey questions.

Making use of these measures, this paper exploits individual heterogeneity in attitudes towards payoff comparisons (Clark & Senik 2010). In particular, we examine how the intensity of one's own inequality aversion relates to subjective well-being, whether such a relationship complies with the theoretical predictions and, if not, why. Inter-individual differences are quite central in the social preferences experimental literature but have not received so much attention in happiness research, which usually focuses on average or aggregate values (e.g., by looking at the coefficients of population-level variables on income distribution in regressions estimating individual well-being). There are, however, exceptions that analyze the interaction between population and individual factors in order to identify which types of individuals are more inequality averse (that is, for whom the correlation between inequality and well-being is more negative; e.g., Alesina et al. 2004, Ferrer-i-Carbonell & Ramos 2010, Grosfeld & Senik 2010, Oshio & Kobayashi 2011).

Crucially for our analyses, the existence of individual heterogeneity in social preferences straightforwardly entails that the impact of others' income on well-being should be stronger for those agents who exhibit greater intensity of social preferences, that is, those whose utilities are more sensitive to others' income. In other words, more inequality-averse individuals, as measured by any method, are expected to show a stronger negative correlation between inequality and well-being.

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[1] Yet the income distribution can matter for self-regarding individuals as well. Indeed, from the point of view of narrow self-interest, the prospect of being in a different position of the income scale in the future may affect well-being depending on how likely the different scenarios are (e.g., how much social mobility exists in a society) and how risk-averse the individual is (see, e.g., Hirschman and Rothschild 1973, Alesina et al. 2004, Senik 2004, 2008). Accordingly, "behind the veil of ignorance", a selfish individual's "inequality aversion" is identical to her risk aversion and is therefore measured by the concavity of the utility function (Mas-Collel et al. 1995). Inequality may also be regarded as negative for self-interest if it is perceived to be linked to an increase of criminal activities, insecurity and the like (Elgar & Aitken 2010, Delhey & Dragolov 2014). However, self-interest cannot account for the whole range of empirical results on the relationship between income distribution and well-being (e.g., Clark & D'Ambrosio 2014 and Ferrer-i-Carbonell & Ramos 2014).

We are aware of two studies that have approached the question of whether "more inequality-averse individuals are more inequality averse" according to the correlation between inequality and self-reported well-being (Biancotti & D'Alessio 2008, Rözer & Kraaykamp 2013). However, although their findings seem to be in line with the theoretical predictions, none of them can directly address the question due to the lack of information about respondents' pure preferences over inequality. Using a variety of survey questions on values, Biancotti and D'Alessio (2008) concluded that the effect of inequality on well-being is more negative for people with more "moderate" (defined as the tendency to take mild stands on issues rather than extreme ones) and "inclusive" (defined as the degree of support for a social model that grants equal rights to everyone) inclinations. The most recent attempt was made in Rözer & Kraaykamp (2013), where inequality was found to be more negatively related to well-being for respondents with more egalitarian norms (from the question "Incomes should be made more equal versus we need larger income differences as incentives"). Although the latter approach is indeed close to the heart of the issue, the question used does not measure preferences over inequality in the strict sense but whether inequality is perceived as an incentive or *should* be reduced, thus inducing particularly important connotations. One of the contributions of this paper is to provide a survey-based measurement of inequality aversion which can avoid this concern.

Our novel items are aimed at proxying the *alpha* (intensity of aversion to disadvantageous inequality: "envy") and *beta* (intensity of aversion to advantageous inequality: "compassion") parameters of the Fehr-Schmidt (1999) model of inequality aversion. In particular, respondents are asked to rate how much they dislike having less/more money than others, beyond the importance of their own absolute income level. Note that following previous literature (e.g., Fehr & Camerer 2007, Corgnet et al. 2015, Bárcena-Martín et al. 2016), we use the terms "envy" and "compassion" to refer to people's aversion to disadvantageous and advantageous inequality, respectively, regardless of whether individuals truly feel these specific emotions when they earn less/more than others.

These measures thus also enable us to study comparison asymmetries. While the effects on subjective well-being of general measures of inequality, such as the Gini index, have been extensively studied, asymmetries in the direction of income comparisons (Fehr & Schmidt 1999) are only starting to

be explored in a systematic way (D'Ambrosio & Frith 2012, Cojocaru 2014, Bárcena-Martín et al. 2016; for an early analysis, see Ferrer-i-Carbonell 2005). However, the results are somewhat inconclusive. In fact, although there is agreement that most people dislike having less money than others (i.e., disadvantageous inequality), whether having more money than others is also perceived negatively or, rather, positively remains open to debate in the happiness literature (see Clark & D'Ambrosio 2014 for a recent overview). That is, in contrast to what experiments using tasks such as the Dictator Game clearly suggest (Forsythe et al. 1994, Fehr & Schmidt 1999, 2006), happiness research has been unable to confirm the existence of compassion in the population. As part of our empirical strategy, we will combine our survey measures with experimental data from a Dictator Game which will allow us to obtain a more complete picture (see Research Question and Hypotheses).

Along these lines, the observation that individuals in general feel happier the higher their relative income position within the reference group, once controlling for one's own absolute income, is pervasive in happiness research (McBride 2001, Easterlin 2003, Ferrer-i-Carbonell 2005, Luttmer 2005, Clark et al. 2008, Graham 2009, Easterlin et al. 2010, Helliwell & Huang 2010). This finding complies with social preferences theories as well; concretely, with the so-called *competitive* (relative payoff) preferences where decreasing others' payoffs always increases the individual's well-being (also referred to as "spitefulness"; e.g., Charness & Rabin 2002, Fehr & Schmidt 2006). In other words, all else constant, an increase in the reference group's income makes the individual worse-off, not only when others have more than oneself. However, while such a finding is common in the happiness literature, experimental evidence of the *prevalence* of these preferences that imply "negative compassion" is less frequent and mostly arises from interactions in which inter-individual competition is salient (Fliessbach et al. 2007, Herrmann & Orzen 2008, Bault et al. 2011, Kimbrough & Reiss 2012, Sheremeta 2013, Barrós-Loscertales et al. 2016). Behaviors consistent with spitefulness are observed in experiments without an explicit competitive framing as well, but such patterns are far from representing the majority of subjects, at least in Western countries (e.g., Van Lange 1999, Herrmann et al. 2008, Espín et al. 2012, 2015, Brañas-Garza et al. 2014, Corgnet et al. 2015).

In this regard, it must be pointed out that the Fehr-Schmidt model also assumes $\alpha_i \geq \beta_i$ so that envy is stronger than compassion. This implies that if the median-income individual in a society is inequality averse (i.e., α_i, $\beta_i > 0$), then she would "on average" be competitive as well, since disadvantageous comparisons loom larger than advantageous comparisons.[2] That is, if we characterize as competitive those individuals whose well-being generally decreases as others' payoffs increase, in aggregate terms—which is the usual level of analysis of happiness research—the two types of preferences are neither necessarily easy to distinguish from each other nor even theoretically incongruent (Hopkins 2008). At the individual level, however, the implications of the two accounts clearly differ: while inequality aversion increases with both envy and compassion, competitiveness increases with envy but decreases with compassion. This also means that even if both parameters were non-negative as assumed by the inequality aversion model, individuals who score higher in envy *and* lower in compassion can still be considered as more competitive, whereas those scoring higher in both measures can be considered as more inequality averse, all else equal. In this vein, our inequality aversion measures can provide interesting insights into competitive preferences as well, which will allow us to approach the question of why experimental and happiness research seem to arrive at different conclusions regarding the prevalence of "competitiveness" in the population (see Methods). A more detailed theoretical approach to inequality aversion and competitive preferences, and how they are interrelated, is provided in the Electronic Supplementary Material.

2. RESEARCH QUESTION AND HYPOTHESES

Despite the increasing use of the combination of population-level variables with well-being data to infer inequality aversion parameters, the application of heterogeneous preferences to happiness research has important implications that have been largely overlooked. To put it simply, why are inhabitants of countries with higher levels of inequality, all else constant, unhappier than people from less unequal

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[2] The expression "on average" refers here to the comparison with an "average" other, that is, to the sign of the first derivative of the utility function with respect to others' income. However, when comparisons are perceived asymmetrically it should be noted that, for constant values of both alpha and beta, the likelihood of being ("on average") competitive decreases with income rank as does the relative frequency of disadvantageous comparisons. See the Electronic Supplementary Material for further details.

places? Taking into account preference heterogeneity, the reason must be that at least *some* individuals dislike inequality and pull down the aggregate level of well-being in the presence of inequality. It follows that, in the absence of confounding factors, for a constant (non-zero) level of inequality, the more inequality averse the individual the lower her well-being. Nonetheless, the literature lacks an in-depth analysis of such a basic connection. Although a suggestive observation was reported by Rözer and Kraaykamp (2013), who found that people with more egalitarian norms (although with the aforementioned limitation associated with the measure used) are generally unhappier, the authors disregard comparison asymmetries in their study. In the context of heterogeneous social preferences with comparison asymmetries, the above arguments thus suggest a primary hypothesis to be tested:

(H1) Individuals who are more averse to inequality in either direction (advantageous or disadvantageous) should, on average, be unhappier, all things equal. That is, if inequality reduces the satisfaction derived from one's own payoff as modeled in Fehr & Schmidt (1999), for any given personal income and income distribution with non-zero inequality, **both alpha (envy) and beta (compassion) should be negatively related to LS** since more *inequality-averse* individuals *suffer* more from observed inequality.

The rejection of H1 would cast doubts on the appropriateness of using self-reported well-being data to assess social preferences in the population. However, this hypothesis responds to a rather strict approach to the problem in the sense that other typically uncontrollable factors related to well-being are assumed to be orthogonal to inequality aversion. Our dataset will also allow us to partially test this seemingly strong assumption that, nonetheless, is implicit in most happiness research on social preferences. Indeed, there are reasons to think that compassion and LS might not show the predicted negative correlation due to confounding factors. To be more specific, we hypothesized that a fundamental reason for the rejection of H1 may be that generosity distorts the relationship between LS and inequality aversion. The reasoning goes that more inequality-averse individuals, in particular those with stronger compassion concerns (i.e., higher beta), should be more likely to perform generous acts (Fehr & Schmidt 1999). Since there is evidence that prosocial actions increase subjective well-being (Dunn et al. 2008, Aknin et al. 2012, Anik et al. 2013), it might be the case that observed inequality indeed reduces the well-

being of compassionate individuals but that the relationship is compensated, or even reversed, by generous actions that in turn increase well-being. That is, if generous behavior mediates the relationship between well-being and compassion in the hypothesized direction:

(H2) Beta (compassion) scores should predict generosity, generosity should predict LS and, crucially, **the relationship between beta scores and LS should be negative after controlling for generosity**.

To test this hypothesis, we make use of participants' experimental choices in a Dictator Game (Forsythe et al. 1994) with real monetary stakes as a measure of generous behavior. Indeed, giving in the Dictator Game has been found to correlate positively with well-being ratings (Konow & Earley 2008). This analysis is complemented with a self-reported generosity measure.

In a related paper, Charness & Grosskopf (2001) analyzed the relationship between happiness and distributional decisions in a laboratory experiment with university students playing a series of mini-dictator games. They found that individuals willing to reduce others' payoffs below their own tended to be unhappier. In similar experiments using a variety of economic games, Konow & Earley (2008) and Koch (2015) observed a positive correlation between generous behavior and self-reported well-being. These results seem to suggest a positive effect of compassion on well-being, which would therefore be inconsistent with H1, but also indicate that generosity may be distorting the predicted relationship, as hypothesized in H2.

3. METHODS

The survey/experiment was conducted in Granada (Spain) from November 23rd to December 15th 2010. A total of 835 individuals aged 16 to 91 years old participated in the study. Detailed information on the protocol, including the survey and experimental instructions, can be found in Exadaktylos et al. (2013) and the project webpage (https://sites.google.com/site/experimentalcity/home).

3.1. *Sampling*

A stratified random method was used to obtain the sample. The city of Granada is divided into nine geographical districts, which served as sampling strata. A proportional random method was applied within

each stratum to minimize sampling errors and ensure geographical representativeness. In particular, the sample was constructed in four sequential steps: 1) We randomly selected a number of sections proportional to the number of sections within each district; 2) we randomly selected a number of streets proportional to the number of streets within each section; 3) we randomly selected a number of buildings proportional to the number of buildings on each street; and finally, 4) we randomly selected a number of apartments proportional to the number of apartments within each building. This method ensures a geographically representative sample. This sampling procedure also resulted in a representative sample of the city's population in terms of age and gender (see Table S7 in the supplementary materials of Exadaktylos et al. 2013).

The sample consisted of individuals who agreed to complete the survey when the interviewers asked them to participate. Being interviewed in their own apartments increases the participation rate by decreasing opportunity costs, and to some extent prevents the selection bias that could exist when volunteers are required to come to the lab. One out of ten participants was randomly selected to be paid according to one randomly selected decision (out of five) in the experimental games. The average earnings among winners, including those winning nothing (18.75%), were €9.60.

3.2. *Protocol and interviewers*

The interviewers were 216 senior university students enrolled in a course on "Field Experiments" in the fall of 2010. The students underwent ten hours of training in the methodology of economic field experiments, conducting surveys, and sampling procedures. They worked in pairs in the field (108 pairs of interviewers). Their performance was linked to their final grade in the course. The interviews were carefully monitored by the main researchers in real time by means of a web-based system and follow-up calls to randomly selected participants in order to ensure the reliability of the data collected.

The interviewers introduced themselves to the prospective participants and explained that they were carrying out a study for the University of Granada. One interviewer always read the questions aloud, while the other noted down the respondent's answers to the survey questions. For the experimental decisions, the procedure was modified in order to ensure double-blind anonymity (see next subsection). On average, the survey/experiment lasted for 40 minutes. In the first part, extensive information on the participants was

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collected, including, among others, socio-demographics, life satisfaction, inequality aversion, generosity, social capital, and self-esteem. In the second part, participants made five decisions corresponding to three paradigmatic games of research on social behavior, namely the Dictator Game, the Ultimatum Game and the Trust Game.

3.3. *Experimental games*

At the beginning of the second part, and before any details were given about each decision in particular, the participants received some general information about the nature of the experimental economic games according to standard procedures. In particular, participants were informed that: (i) the five decisions involved real monetary payoffs coming from a national research project endowed with a specific budget for this purpose; (ii) 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; (iii) one of every ten participants would be randomly selected to be paid, and the exact payoff would be determined by a randomly selected decision (role/game); (iv) matching and payment would be implemented within the following few days; and (v) the procedures ensured double-blind anonymity by using a decision sheet, which they would place in the envelope provided and then seal. Thus, participants' decisions would remain forever blind in the eyes of the interviewers and the randomly matched participant.

Once the general instructions had been given, the interviewer read aloud the details for each experimental decision separately. After every instruction set, the participants were asked to write down their decisions privately and proceed to the next task. To control for possible order effects on the decisions, the order both between and within games was randomized across participants, resulting in 24 different orders (always setting aside the two decisions of the same game).

In the Dictator and Ultimatum Game, the participants had to split a pie of €20 between themselves and another anonymous participant. The subjects decided which share of the €20 they wanted to transfer to the other participant. In the case of the Ultimatum Game, 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 Ultimatum Game, we used the strategy method in which subjects had to state

their willingness to accept or reject each of the proposals. In the Trust Game, the trustor had to decide whether to pass €10 or €0 to the trustee. In the event that the trustor passed €0, she 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 himself or keep all €40 without sending anything back, in which case the trustor earned nothing. After all the observations had been collected, the participants were randomly matched in pairs and one out of every ten were paid the money earned (if any) from one randomly selected decision, depending on their response and that of their partner (see Exadaktylos et al. 2013).

Ethics statement: All participants were informed about the content of the study prior to participating. Identical instructions were read aloud by the interviewers. Since literacy was not a requirement to participate (this was necessary to obtain a representative sample), we could not ask the participants to read and sign the IC. Oral informed consent was obtained from all the participants included in this paper. Only those who accepted were allowed to participate. Anonymity was always preserved (in compliance with Spanish Law 15/1999 on Personal Data Protection) by randomly assigning a numerical code to identify the participants in the system. No association was ever made between their real names/addresses and the results. As is standard in socioeconomic experiments, no ethical concerns were involved other than preserving the anonymity of the participants. No deception was used. This procedure (including the consent process) was checked and approved by the Vice-dean of Research of the School of Economics of the University of Granada; the institution hosting the experiments. At that time there was no official IRB committee at the School of Economics.

3.4. *Measures of life satisfaction, inequality aversion and generosity*

The measure of life satisfaction was given by the respondent's answer to the following standard question (7-point Likert scale from "totally unsatisfied" to "totally satisfied"): "*Generally speaking, how satisfied are you with your life?*" (block 3, item 1)

Self-reported inequality aversion was captured by the following two items of the questionnaire:

- **Alpha (envy)**: "*I am not worried about how much money I have, what worries me is that there are people that have more money than I have.*" (block 2, item 16)

- **Beta (compassion)**: "*I am not worried about how much money I have, what worries me is that there are people that have less money than I have.*" (block 2, item 3)

Individuals answered using a showcard displaying a 1-to-7 Likert scale where 1 corresponds to "totally disagree", and 7 to "totally agree". Therefore, respondents scoring high in the alpha (beta) item were reporting a strong aversion to disadvantageous (advantageous) inequality. Importantly, we proxy the weight on well-being of income comparisons relative to the weight of personal income by using a starting sentence common to both items: "*I am not worried about how much money I have, (...)*". By controlling for both measures in the regressions below, we rule out the possibility that this starting sentence drives the results. That is, we aim to attain the importance each individual gives to disadvantageous and advantageous comparisons beyond her own income. This design feature somewhat reduces the rigidity regarding the specific functional form used to model social preferences. Moreover, this method also increases—with the aid of a proper set of control variables—the comparability of the inequality aversion measures between individuals and, we argue, brings our measures closer to the essence of Fehr-Schmidt's alpha and beta parameters: how much does one value payoff-inequality *in comparison* to the own absolute payoff?

An implicit characteristic of the design of the inequality aversion items we employ is that we cannot disentangle whether an individual scoring the minimum (i.e., "totally disagree") in either measure is virtually indifferent to others' payoffs (i.e., a low but non-negative alpha or beta) or, instead, even likes inequality in that domain (i.e., negative alpha or beta). However, we may still assume without loss of accuracy that, for a constant income level, individuals scoring high in both alpha and beta measures are *more* inequality averse than those scoring low, who can be either self-interested or "inequality seeking". In addition, the higher the alpha and the lower the beta, the "*more competitive*" (the first derivative of the utility function with respect to others' payoffs is *more* negative) the individual is assumed to be (see Electronic Supplementary Material). The combination of both scores as a factorial design thus allows classifying individuals according to their general propensity to be (i) more inequality averse (higher alpha and higher beta); (ii) less inequality averse (lower alpha and lower beta); (iii) more competitive (higher

alpha and lower beta); or (iv) less competitive (lower alpha and higher beta) than others. This classification is shown in Table 1.

Table 1

Lastly, as stated above, among the five incentivized experimental decisions that the participants made after answering the questionnaire, we are interested in the Dictator Game (DG), which in contrast to the Ultimatum and the Trust games is free of strategic and reciprocal concerns (e.g., Charness & Rabin 2002, Espín et al. 2016). In the DG, participants had to split a pie of €20 between themselves and another randomly-matched anonymous participant. Individuals decided which share of the €20, in €2 increments, they wanted to transfer to the other participant by privately marking down their choices on the decision card which was subsequently placed in an envelope. Hence, this decision reveals the respondent's generosity, while avoiding the typical problems associated with self-reports. Nonetheless, the survey also contains a self-reported measure of generosity ("*I usually give money to beggars in the street if they need it*" [block 2, item 14]; same 7-point scale used for the inequality aversion measures), which can provide interesting insights into the main variables and the relationships under study.

3.5. *Basic statistics and additional variables*

After excluding the 76 observations with missing values in any of the variables used, we arrived at a sample size of 759 individuals. Table 2 presents the descriptive statistics (min, max, mean and SD) of the variables of interest of this study. The first block refers to LS and social preferences/behavior measures—including inequality aversion, DG giving and self-reported generosity ("*SR giving*")—while the second block is devoted to control variables. Among these, we distinguish between (a) socio-demographic and other basic controls, and (b) social capital values and *eudaimonic* well-being. Spearman and Pearson zero-order correlations of the LS and social preferences/behavior variables with all the remaining variables are displayed in Table A1 of the Electronic Supplementary Material.

Table 2

The average score on LS is 5.47 (between 1 and 7) and within the range typically observed in the country (e.g., Casas et al. 2013, Blanchflower & Oswald 2011). Panel (a) of Figure 1 shows the distribution of responses to the life satisfaction question.

With regards to inequality aversion, it can be observed in Table 2 that respondents generally scored higher on beta than alpha (the difference is significant according to a two-tailed Wilcoxon sign-rank test: $p < 0.001$), indicating that they reported to be less envious than compassionate. Indeed, as shown in panels (b) and (c) of Figure 1, whereas 46.90% of individuals stated that they completely disagreed with being envious (i.e., they chose category "1"), only 19.5% completely disagreed with being compassionate. On the other hand, 14.10% reported one of the three highest envy scores but this percentage increases to 41.63% when it comes to compassion scores. While it might be argued that this observation results from a "desire for social approval" (Edwards 1957, Levitt & List 2007) as participants answered verbally to the survey questions, the participants' behavior in the DG contrasts with such an interpretation. The fact that the mean DG donation is nearly 40% of the €20 pie indeed suggests that compassion concerns are present in the sample even when decisions are anonymous and behaving prosocially is personally costly. Moreover, the modal offer was the equal split, with a relative frequency of 58.76%, and only 16.21% offered zero (see Figure 1, panel d). This average DG behavior is within the range typically observed in field and representative experiments (e.g., Henrich et al. 2006, Bellemare et al. 2008, Cardenas & Carpenter 2008). Finally, the modal response to the self-reported generosity (*SR giving*) item was "completely disagree" (30.43%), whereas 29.25% of individuals scored one of the three highest categories (Figure 1, panel e). The latter percentages suggest that while the respondents' desire for social approval might have raised (reduced) the mean compassion (envy) scores, such a desire did not lead individuals to self-report extremely high levels of prosociality in every survey item; thus, the effect need not be large. Moreover, we find no reason to think that such an effect has altered the relationship between individuals' responses to the LS and the inequality aversion survey items.

Figure 1

The richness of our dataset allows us to use a large battery of control variables. In particular, as displayed in the second block of Table 2, we employed:

(a) Socio-demographic and other basic controls. Here we include a variable capturing the respondent's opinion on the prevalence of *effort vs. luck* (i.e., whether the respondent believes that success in life is

primarily due to "*effort*" rather than luck).[3] The *effort* variable is added to our set of basic controls because the perception that income disparities are due to luck could exacerbate the prevalence of inequality-averse preferences (Alesina et al. 2004, Alesina & Glaeser 2004). To put it differently, unequal outcomes are less likely to be considered as unfair—and consequently unsatisfactory—when individuals are fully responsible for their income levels than when inequalities arise from "nature" (Hoffman et al. 1994, Ruffle 1998, Cherry et al. 2002). See the Electronic Supplementary Material for a description of the remaining variables included in this group.

(b) Social capital values and eudaimonic well-being. Social capital values: *trust in others* (respondents who believe that most people can be trusted are coded as "*trust-others*"),[4] *trust in public institutions* (in particular, individuals responding "quite a lot" or a "great deal" in a question regarding how much they trust in the public administration are coded as "*trust-institutions*"),[5] and activity in *voluntary organizations* ("*volunteer*": hours per week).[6] Eudaimonic well-being: *self-esteem* (individuals with values above the median in a composite index of four items[7] are classified as "*high self-esteem*").

Social capital values arguably constitute a potential confounding factor in the relationship between social preferences and well-being. Trust in others and voluntary activity are intimately linked to altruism and prosocial behavior in general (Berg et al. 1995, McAllister 1995), whereas trust in public institutions may have to do with whether social outcomes are perceived to be fair (Frey & Stutzer 2010, Cojocaru 2014).

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[3] The question was as follows: "You think that success in life depends mostly on (only one option): a) Luck; b) Effort".
[4] The question was as follows: "Generally speaking, do you believe that: a) Most people can be trusted; b) You must be very prudent when interacting with people".
[5] The question was: "Using the scale appearing on the card, how much trust do you have in the public administration?: none at all, not very much, quite a lot, a great deal, hard to answer".
[6] The questions were as follows: "Are you a member of a voluntary organization – for example the Red Cross, an NGO, political party, sports club, church choir, economic association…?: Yes, No".
(If s/he is a member):
"How many hours do you spend on this kind of activity per week?"
[7] The question was as follows: "At this point, you have to answer if you agree or disagree with the following statements on a scale between 1 and 7 like the one on the card. 1 means that you completely disagree and 7 means that you completely agree while 4 is the neutral point.
  I think I am a valuable person, at least in comparison with others. (self-esteem 1)
  I think I have many good characteristics. (self-esteem 2)
  I am capable of doing things as well as other people do. (self-esteem 3)
  I have a positive attitude towards myself. (self-esteem 4)"
Construct validity was established using factor analysis and internal consistency was determined by the Cronbach alpha statistical test: the instrument showed a Cronbach alpha of 0.75, which is considered appropriate.

Thus, given the objective of this study, controlling for social capital variables provides an interesting robustness check.

On the other hand, *eudaimonia* refers to a state of well-being that derives from factors such as self-determination, the realization of deeply-held values and the development of meaning in life (Ryan & Deci 2001). Thus, while LS (as well as happiness) questions are aimed at capturing the hedonic element of well-being, self-esteem questions serve to proxy eudaimonic well-being (at least in one of its multiple components; see Clark 2015). Since empirical measures of hedonic and eudaimonic well-being are typically strongly correlated (Waterman 1993, Diener & Diener 2009, Clark 2015), by controlling for self-esteem, we will be able to reduce the scope for eudaimonia to be driving the relationship between social preferences and LS. Note that the concept of utility in modern economics, also in the realm of social preferences, is most congruent with the hedonic, not the eudaimonic, approach to well-being (e.g., Kahneman 1994). For the goal of this study it is therefore essential to be able to concentrate as much as possible on the intrinsically hedonic element behind individuals' responses to the LS question. Moreover, this control is important since recent research suggests that eudaimonia plays a key role in the relationship between generous behavior and well-being (Konow & Earley 2008, Koch 2015).

4. RESULTS

4.1. *Envy, compassion and life satisfaction*

An analysis of the correlates of envy and compassion is presented in the Electronic Supplementary Material. Here we focus on the relationship between our novel measures and life satisfaction. In Figure 2, we show the mean life satisfaction (assuming cardinality) for each score of the envy and compassion measures. Table 3 displays the output of an ordered logistic regression estimating the individuals' LS scores (between 1 and 7) as a function of the two inequality aversion measures. In the left-hand regressions (columns 1a-4a), the individuals' raw scores (between 1 and 7) in the envy and compassion survey items are introduced as explanatory variables. Since the inequality aversion scores are admittedly ordinal and non-continuous, for the right-hand regressions (columns 1b-4b), envy and compassion are transformed into binary variables taking the value of one if the individual reported an above-median score

in each case and zero otherwise.[8] With the latter method we are able to classify respondents according to the observed distribution of choices, which may be particularly important due to the possible influence of socially desirable responding on participants' self-reports (see the relevant discussion in the Methods section). In columns (1a) and (1b) we show the regressions without control variables. In columns (2a) and (2b), socio-demographic and basic controls are added to the estimations. Social capital variables are added in columns (3a) and (3b), while the effect of eudaimonic well-being is also controlled for in columns (4a) and (4b).

Figure 2

Table 3

It can be observed that *envy* is *negatively* associated with LS according to all regression specifications, whereas a *positive* effect is found for *compassion* (all $ps < 0.05$). Figure 2 shows that mean LS decreases from 5.55 in score 1 of envy to 5.17 in score 7. For compassion, mean LS increases from 5.36 to 5.76. Neither the inclusion of socio-demographic and basic controls nor controlling for social capital variables and eudaimonia systematically affect the relationship between our inequality aversion measures and life satisfaction. Zero-order correlations also yield qualitatively similar significant relationships (Table A1). In sum, the prediction of a negative effect of envy on LS is confirmed by the data. Yet these results lead us to reject H1, according to which compassion should also be negatively related to LS. To get an impression of the magnitude of these effects, note that a proportional odds-ratios analysis indicates average reductions (increases) of about 10% in the odds of increasing one LS score for an increase of one raw envy (compassion) score. In the case of the binary inequality aversion variables, these percentages range between 28% and 39%.

With regards to the control variables, our results are generally consistent with the expectations (see the Electronic Supplementary Material for the results on socio-demographic and basic controls). Importantly, the *effort* variable yields positive and (marginally) significant coefficients in all but one regression specification. That the coefficient of *effort* is reduced by about 10% when *self-esteem* is

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[8] Note that due to the observed distribution of choices, such a classification leaves 53% of participants with an above-median score in envy (i.e., all those respondents scoring above the minimum level—category 1: "completely disagree") and 42% with an above-median score in compassion (i.e., categories 5 to 7).

included in the model (columns 4a and 4b) indicates that eudaimonic well-being may partially drive such a relationship. This result might suggest that people display a self-serving bias regarding the grounds of their (good) personal accomplishments and tend to think that these are due to their own effort rather than luck, while the opposite happens for bad outcomes (see Alesina & Glaeser 2004; an interesting experimental approach to self-serving biases on justice principles can be found in Rodríguez-Lara & Moreno-Garrido 2012). On the other hand, generalized *trust in others*, but not in *institutions*, is a significant and positive predictor of LS. Activity in *voluntary* organizations also seems to increase well-being, although its effect is weaker and not robust to all model specifications. Similar results have been found for instance in Helliwell & Wang (2011), Bartolini et al. (2013), Ateca-Amestoy et al. (2014) and Carl & Billari (2014). Finally, eudaimonic well-being is strongly associated with LS, as expected (Waterman 1993, Diener & Diener 2009, Clark 2015).

4.2. *Inequality aversion, competitiveness and life satisfaction*

The above results suggest that life satisfaction decreases with the degree of competitiveness (higher alpha and lower beta) of the individual and not with her degree of inequality aversion. In order to further explore this finding, we combine the alpha and beta scores into general measures of competitiveness and inequality aversion grounded in the classification of individuals presented in Table 1. In particular, we first simply define the level of *competitiveness* of an individual as the difference between her envy and compassion raw scores (i.e., alpha minus beta; range -6 to 6, mean (SD) = -1.617 (2.664); see panel (a) of Figure A1 in the Electronic Supplementary Material for the complete distribution) and her *inequality aversion* as the sum of both scores (range 2 to 14, mean (SD) = 6.486 (2.783); see panel (b) of Figure A1). Figure 3 shows the mean LS for each score of both variables. For visual clarity, the four highest scores (which only account for about 7% of the sample in both cases) are collapsed into one category in the figure. Both measures are included as explanatory variables in columns (1a)-(4a) of Table 4, where the dependent variable is again LS and the four model specifications replicate those of Table 3.[9] As before, we also implement a second statistical strategy based on the observed distribution of responses to the envy

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[9] For the sake of brevity, here we do not report the coefficients of the control variables since they are very similar to those shown in Table 3. The complete regressions can be found in Table A3 of the Electronic Supplementary Material.

and compassion survey items; the results of which are shown in columns (1b)-(4b). In the latter specifications, we characterize individuals as being the (i) *most inequality averse* (above-median score in both items: "*Most IA*", rel. freq. = 0.212); (ii) *least inequality averse* (below-median score in both items: "*Least IA*", rel. freq. = 0.265); (iii) *most competitive* (above-median alpha and below-median beta: "*Most COMP*", rel. freq. = 0.319) or (iv) *least competitive* (below-median alpha and above-median beta: "*Least COMP*", rel. freq. = 0.204) within the sample, and then make pairwise comparisons between all four groups in the regressions.

Figure 3

Table 4

It can be seen from columns (1a)-(4a) of Table 4 that *inequality aversion* is largely insignificant in explaining individuals' well-being ($ps > 0.7$) while *competitiveness* is a negative and strong predictor ($ps \leq 0.001$) in all four model specifications (the results are nearly identical when each measure is introduced in a separate regression). Indeed, as Figure 3 shows, the minimum score of *inequality aversion* is associated with a mean LS of 5.39, whereas the last category reports a mean LS of 5.41. For *competitiveness*, mean LS decreases from 5.71 to 5.02. According to an odds-ratio analysis, each increment in the competitiveness variable reduces the odds of increasing one LS score by almost 10% (recall that *competitiveness* has 13 possible values). The estimates from the regressions using the binary categorizations of respondents (columns 1b-4b) confirm these findings. Specifically, there is no significant difference in the LS ratings of the *most* compared to the *least inequality-averse* individuals ($ps > 0.7$), while the difference between the *most* and the *least competitive* individuals is highly significant ($ps \leq 0.002$) in all models. In addition, for some specifications, marginally significant differences also arise between the most competitive and the least/most inequality-averse individuals. The comparison between the most and the least competitive respondents is indeed substantial: the latter have on average 90%-100% higher odds of increasing one LS score than the former. Note that similar odds ratios are obtained for variables traditionally strongly correlated with LS such as being *healthy* or having a *university* degree. Indeed, only the *self-esteem* variable and the comparison between *married* and *divorced* individuals yield

clearly stronger variations in LS than "*Most COMP* vs. *Least COMP*", while the comparison between low (i.e., < €1000 per month) and medium-high (€2000-€4000) *income* groups results in about half its effect.

4.3. *Compassion or "just" generosity?*

We have shown that compassion is positively related to LS even after controlling for a large battery of controls, including social capital values and eudaimonic well-being, in contrast to the predictions of H1. Admittedly, however, important factors might still be overlooked, one of which is closely linked to compassion: generosity. Generous behavior may indeed underlie an *illusory* positive relationship between compassion and well-being. The argument goes that high-beta individuals more than compensate for the disutility they suffer from observing poorer others by means of generous acts, which may give rise to sentiments of "warm-glow" (Andreoni 1990) that in turn increase well-being. In fact, generous and other prosocial behaviors have been found to correlate positively with activations in the neural circuitry of reward (Harbaugh et al. 2007, Tabibnia & Lieberman 2007) as well as with subjective well-being ratings (Phelps 2001, Konow & Earley 2008, Koch 2015), and some evidence even suggests such a causal relationship (Dunn et al. 2008, Aknin et al. 2012, Anik et al. 2013). This argument entails that the positive relationship between compassion and LS could be dramatically mediated by generosity.

In order to test this hypothesis (H2), we make use of the respondents' choices in the incentivized Dictator Game. Table 5 replicates the four basic model specifications presented in Table 3 but now *DG giving* is included as an explanatory variable (we do not show here the estimates of the controls, which can be found in Table A4). The regressions in columns (1a)-(4a) do not include the inequality aversion measures. It can be seen that *DG giving* is a positive, although weak, predictor of LS, which thus supports the first part of the argument (see also Table A1). Generous people are indeed more satisfied with life. When we control for *self-esteem*, nonetheless, the coefficient of DG slightly decreases (by 7%) and turns insignificant (column 4a). This may reflect that eudaimonic well-being is partially driving the relationship between generosity and LS (Konow & Earley 2008, Koch 2015), but its role is in any case far less pronounced than in previous studies. Yet note that eudaimonic well-being is less thoroughly assessed here and we have only analyzed a proxy for one of its components, self-esteem.

However, when we include the inequality aversion measures in columns (1b)-(4b), the significant effect of DG generosity completely vanishes. Specifically, the coefficient of *DG giving* falls by between 22% (model 1) and 28% (model 4). A similar pattern is observed if we use the self-reported measure of respondents' generosity, *SR giving*. Although the regression analyses (columns 1a-4a, Table A5) and, especially, the zero-order correlations (Table A1) suggest a positive but rather weak effect of *SR giving* on LS, such an effect disappears when inequality aversion measures are included in the analyses (columns 1b-4b). In this case, the coefficient of *SR giving* is reduced by 20%-31%. In contrast, alpha and beta remain significant at the 5% level after controlling for either generosity measure.

Table 5

Generosity is therefore *not* mediating the relationship between compassion and well-being, which clearly contrasts with the last and crucial part of the above argument. What is more, Table A6 shows that beta is a strong positive determinant of generosity in both cases (tobit regressions with left and right censoring for *DG giving* in columns 1a-3a; Ordered logit for *SR giving* in columns 1b-3b), as expected, whereas alpha does not yield significant estimates. Taken together, these results indicate that the positive relationship of LS with generosity is driven to a large extent by an underlying third variable: compassion.

5. DISCUSSION

There is overwhelming evidence that inhabitants of more unequal places are unhappier. This has been taken to suggest that people display inequality-averse social preferences. However, this interpretation entails a negative correlation between the degree of inequality aversion and well-being at the individual level, but no previous research has directly addressed such a link. The present study sheds new light on the relationship between well-being and distributional social preferences. Our first main observation can be summarized as follows: the link between our novel survey-based preference measures, in particular compassion, and LS is inconsistent with the predictions that emanate from the direct translation of individuals' preferences into well-being ratings (H1). More specifically, we observe that envy (intensity of aversion to disadvantageous inequality; *alpha* in Fehr & Schmidt 1999) is indeed negatively related to LS

but the relationship between compassion (intensity of aversion to disadvantageous inequality; *beta*) and LS is positive, in contrast to the predictions.[10]

The current data also reject the hypothesis that individuals with higher compassion (more than) compensate for the disutility associated to advantageous inequality by means of generous acts that increase their well-being—which would mean that other factors influencing happiness are not orthogonal to inequality aversion, as was the initial assumption. This view would imply that generous acts mediate the positive relationship between compassion and LS, as stated in H2. However, the results do not support such a claim, since we find that Dictator Game donations (as well as self-reported generosity) are no longer related to LS when compassion is controlled for. Indeed, it is compassion that importantly drives the relationship between generosity and LS given that it is a strong predictor of both variables. Although we must admit that other possible confounders in the relationship between compassion and LS may have been disregarded in the current study, it is hard to think that they can be accounted for using the typical survey data.

The observed relationships ultimately imply that those individuals characterized as the "most competitive" (high envy and low compassion) in our sample are the least satisfied. This is not to say, nevertheless, that on average our respondents display competitiveness since they are rather generous in the DG and report higher compassion than envy, thus revealing non-competitive preferences[11] and apparently also contradicting one basic assumption of the Fehr-Schmidt model (i.e., $\alpha_i \geq \beta_i$). Interestingly, recent revealed-preference experimental studies have found that the envy parameter is indeed lower than the compassion parameter for a majority of subjects (Beranek et al. 2015, Corgnet et al. 2015). Note here, however, that our survey items were not designed to capture negative values of the parameters (which are not uncommon according to the literature; see, for example, Fehr & Schmidt 2006, Beranek et al. 2015,

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[10] Note that if we define individual preferences as "equality seeking" instead of inequality averse, in the sense that full inequality acts as the baseline situation and any departure from it (towards more equality) increases the utility obtained from one's own payoff, the predicted relationship of LS with either alpha or beta would be positive rather than negative, but never of opposite signs.

[11] Moreover, as we discuss in the Electronic Supplementary Material, pure competitive preferences predict a strong negative correlation between beta and alpha, but we find their relationship to be non-significant.

Corgnet et al. 2015) and thus our characterization of competitive preferences is particularly limited by this fact.

Our explanation for these results is that more compassionate individuals, even if they truly suffer more from observing advantageous inequality (and they demonstrate their suffering by means of costly generous acts), are more likely to anchor their LS ratings to the well-being of those whose situation makes them suffer, that is, of those who are much worse off. As a result, more compassionate individuals paradoxically report higher levels of well-being in the presence of advantageous inequality. To put it differently, the self-reported LS of more compassionate individuals, in contrast to their true well-being, would *increase* as the poor become poorer. This could explain why happiness studies appear to be inconclusive regarding people's attitudes to advantageous inequality (Clark & D'Ambrosio 2014). Although this anchoring effect is more evident in the case of compassionate individuals as it even leads to reverse the sign of the relationship between (advantageous) inequality and well-being, it is fair to think that more envious individuals also self-report "lower-than-true" LS ratings because they are more likely to compare with individuals who are much better off. Therefore, the negative impact of disadvantageous inequality on well-being might also be exacerbated by self-reported data. These two effects may indeed help understand why competitive preferences feature more prominently in the happiness literature than the experimental evidence would support.

One important implication of our findings is therefore that self-reported well-being, in the way it is currently used, may not be a good measure when it comes to analyzing distributional social preferences. We infer from the data that one possible reason is that the group with which respondents compare themselves for rating their own well-being changes along with social preferences, thus creating an endogeneity problem that seriously challenges the assumption of interpersonal comparability of well-being ratings. It might be argued that such endogeneity responds to the use of self-enhancement strategies to maximize well-being (Falk & Knell 2004). However, the results of Clark and Senik (2010) suggest that factors other than self-enhancement determine individuals' choices of comparison benchmarks.

Future research is nonetheless warranted. Given the static approach adopted in this paper, the natural next step is to extend the present findings from a dynamic perspective, which also allows dealing

with reverse causality problems. It would be interesting to make use of longitudinal surveys to estimate with panel data whether, as our results suggest, the impact of increases in (particularly worse-off) others' income on self-reported well-being is, for a constant level of envy, more negative precisely for individuals with higher compassion scores. In addition, before drawing firmer conclusions, future research should also examine other factors beyond generosity that can potentially affect the relationship between LS and inequality aversion at the individual level, taking into account that economic transactions may differ from social transactions in important ways. Finally, although our measures of inequality aversion are deliberately developed to be gathered in a self-reported manner, which allows their inclusion in large-scale surveys, future research should try to extend these results to revealed-preference measures of inequality aversion (e.g., Charness & Rabin 2002, Corgnet et al. 2015). The fact that our compassion measure strongly predicts donations of real money in the Dictator Game nonetheless suggests that these self-reports are valid in the assessment of inequality aversion.

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Table 1. Classification according to the combination of alpha (*envy*) and beta (*compassion*)

	HIGH BETA	LOW BETA
HIGH ALPHA	*most inequality averse*	*most competitive*
LOW ALPHA	*least competitive*	*least inequality averse*

Table 2. Descriptive statistics

Variables	*min*	*max*	*mean*	*SD*
Life satisfaction and social preferences/behavior				
Life satisfaction	1	7	5.474	1.239
Inequality aversion				
Alpha (envy)	1	7	2.435	1.789
Beta (compassion)	1	7	4.051	2.054
Measures of generosity				
DG giving	0	20	7.916	4.300
Self-reported generosity (SR giving)	1	7	3.252	2.030
Control variables				
a) Socio-demographic and basic controls				
Age	16	89	37.751	16.920
Gender (male)*	0	1	0.462	0.490
Household size	1	14	3.178	1.369
Number of children	0	9	1.100	1.471
Household monthly income				
(comp.) *< €1000**	0	1	0.173	0.380
[€1000, €2000)*	0	1	0.325	0.469
[€2000, €4000)*	0	1	0.403	0.491
≥ €4000*	0	1	0.097	0.297
Educational level				
(comp.) *Less than secondary**	0	1	0.215	0.411
Secondary education*	0	1	0.457	0.498
University education*	0	1	0.328	0.470
Marital status				
Single*	0	1	0.508	0.500
(comp.) *Married**	0	1	0.372	0.484
Cohabiting*	0	1	0.038	0.192

Divorced/separated*	0	1	0.041	0.198
Widowed*	0	1	0.041	0.198
Occupation				
Unemployed*	0	1	0.470	0.499
Private sector worker*	0	1	0.209	0.407
(comp.) Public sector worker*	0	1	0.129	0.336
Self-employed/entrepreneur*	0	1	0.086	0.280
Retired*	0	1	0.105	0.307
Other controls				
Health status (healthy) *	0	1	0.788	0.409
Smoking status (smoker)*	0	1	0.319	0.466
Religious denomination (non-believer)*	0	1	0.316	0.465
Effort vs. Luck (effort)*	0	1	0.835	0.371
b) Social capital values & eudaimonic well-being				
Trust-others*	0	1	0.245	0.430
Trust-institutions*	0	1	0.325	0.469
Activity in voluntary organizations (volunteer)	0	56	0.683	3.120
Eudaimonia (High self-esteem)*	0	1	0.498	0.500

Notes: * dummy variable. $N = 759$ in all cases.

Table 3. Social preferences and life satisfaction

Dep. Var.: LS	alpha/beta – continuous				alpha/beta – binary			
	(1a)	(2a)	(3a)	(4a)	(1b)	(2b)	(3b)	(4b)
Alpha (envy)	-0.101**	-0.102**	-0.101**	-0.112**	-0.323**	-0.362**	-0.359**	-0.343**
	(0.043)	(0.047)	(0.048)	(0.046)	(0.142)	(0.154)	(0.157)	(0.152)
Beta (compassion)	0.091**	0.088**	0.092**	0.091**	0.323**	0.300**	0.329**	0.291**
	(0.037)	(0.038)	(0.039)	(0.039)	(0.133)	(0.137)	(0.138)	(0.143)
Age		-0.081**	-0.086**	-0.082**		-0.087**	-0.092**	-0.087**
		(0.039)	(0.040)	(0.038)		(0.040)	(0.040)	(0.039)
Age^2		0.001**	0.001**	0.001**		0.001**	0.001**	0.001**
		(0.000)	(0.000)	(0.000)		(0.000)	(0.000)	(0.000)
Male		0.268*	0.258*	0.263*		0.259*	0.248*	0.249*
		(0.143)	(0.144)	(0.140)		(0.142)	(0.144)	(0.140)
Household size		0.061	0.053	0.049		0.065	0.056	0.052
		(0.055)	(0.052)	(0.050)		(0.053)	(0.050)	(0.049)
Number of children		0.020	0.039	0.005		0.018	0.037	0.003
		(0.098)	(0.097)	(0.097)		(0.097)	(0.096)	(0.096)
[€1000, €2000)		0.331	0.343	0.333		0.346	0.355	0.346
		(0.248)	(0.252)	(0.257)		(0.247)	(0.251)	(0.256)
[€2000, €4000)		0.406**	0.432**	0.448**		0.410**	0.436**	0.452**

		(0.203)	(0.201)	(0.220)		(0.204)	(0.202)	(0.221)
≥ €4000		0.058	0.025	0.102		0.109	0.075	0.158
		(0.279)	(0.276)	(0.291)		(0.276)	(0.274)	(0.290)
Secondary educ		0.360*	0.371*	0.398*		0.394*	0.409*	0.437**
		(0.205)	(0.210)	(0.204)		(0.205)	(0.210)	(0.204)
University educ		0.571***	0.566**	0.630***		0.616***	0.613***	0.676***
		(0.217)	(0.223)	(0.217)		(0.219)	(0.226)	(0.221)
Single		-0.526	-0.546	-0.469		-0.541*	-0.564*	-0.492
		(0.328)	(0.334)	(0.318)		(0.326)	(0.333)	(0.321)
Cohabiting		-0.690*	-0.714*	-0.789**		-0.662*	-0.686*	-0.766**
		(0.362)	(0.372)	(0.386)		(0.374)	(0.386)	(0.400)
Divorced/separated		-1.286***	-1.341***	-1.317***		-1.266***	-1.320***	-1.300***
		(0.388)	(0.391)	(0.359)		(0.384)	(0.387)	(0.356)
Widowed		-0.824	-0.806	-0.938		-0.862	-0.851	-0.979*
		(0.591)	(0.579)	(0.575)		(0.589)	(0.576)	(0.574)
Unemployed		-0.572**	-0.514**	-0.386*		-0.520**	-0.460*	-0.339
		(0.230)	(0.235)	(0.232)		(0.229)	(0.236)	(0.231)
Private sector		-0.701***	-0.639**	-0.649**		-0.659**	-0.596**	-0.608**
		(0.258)	(0.267)	(0.264)		(0.258)	(0.268)	(0.264)
Self-employed		-0.503*	-0.506*	-0.514*		-0.494	-0.497*	-0.500*
		(0.304)	(0.297)	(0.298)		(0.304)	(0.298)	(0.301)
Retired		-0.716*	-0.775*	-0.805**		-0.710*	-0.773*	-0.789*
		(0.422)	(0.419)	(0.402)		(0.427)	(0.425)	(0.408)
Healthy		0.682***	0.669***	0.605***		0.668***	0.652***	0.591***
		(0.189)	(0.190)	(0.194)		(0.189)	(0.189)	(0.194)
Smoker		-0.282**	-0.291**	-0.384***		-0.287**	-0.297**	-0.385***
		(0.142)	(0.143)	(0.142)		(0.144)	(0.145)	(0.144)
Non-believer		-0.344**	-0.367**	-0.356**		-0.336**	-0.356**	-0.344**
		(0.160)	(0.159)	(0.162)		(0.160)	(0.160)	(0.164)
Effort		0.359*	0.348*	0.312		0.382*	0.370*	0.339*
		(0.202)	(0.198)	(0.194)		(0.204)	(0.199)	(0.197)
Trust-others			0.356**	0.335**			0.357**	0.335**
			(0.148)	(0.155)			(0.148)	(0.153)
Trust-institutions			-0.062	-0.067			-0.057	-0.062
			(0.161)	(0.156)			(0.162)	(0.159)
Volunteer			0.035	0.037*			0.038*	0.040*
			(0.022)	(0.022)			(0.022)	(0.022)
High self-esteem				0.930***				0.899***
				(0.135)				(0.134)
Chi²	12.14***	146.84***	162.57***	249.44***	13.13***	159.56***	171.81***	230.33***
Pseudo R²	0.0062	0.0484	0.0518	0.0715	0.0053	0.0479	0.0514	0.0699
Observations	759	759	759	759	759	759	759	759

Notes: Ordered logit estimates. Robust standard errors clustered on interviewers are presented in parentheses. *, **, *** denote significance at the 10, 5 and 1 percent level, respectively.

Table 4. Social preferences and life satisfaction (II)

Dep. Var.: LS	alpha/beta – continuous				alpha/beta – binary			
	(1a)	(2a)	(3a)	(4a)	(1b)	(2b)	(3b)	(4b)
Inequality Aversion	-0.005	-0.007	-0.005	-0.011				
	(0.029)	(0.031)	(0.032)	(0.031)				
Competitiveness	-0.096***	-0.095***	-0.096***	-0.101***				
	(0.028)	(0.029)	(0.030)	(0.029)				
Most IA vs. *Least IA*					-0.002	-0.062	-0.032	-0.054
					(0.210)	(0.216)	(0.218)	(0.218)
Most COMP vs. *Least COMP*					-0.655***	-0.665***	-0.694***	-0.644***
					(0.189)	(0.206)	(0.209)	(0.206)
Most IA vs. *Least COMP*					-0.362	-0.370	-0.381	-0.383
					(0.223)	(0.240)	(0.242)	(0.238)
Most COMP vs. *Least IA*					-0.295	-0.356*	-0.355*	-0.316
					(0.185)	(0.187)	(0.189)	(0.193)
Most COMP vs. *Most IA*					-0.293*	-0.294	-0.313*	-0.261
					(0.168)	(0.180)	(0.181)	(0.190)
Least IA vs. *Least COMP*					-0.360	-0.308	-0.349	-0.328
					(0.226)	(0.221)	(0.222)	(0.227)
Chi^2	12.14***	146.84***	162.57***	249.43***	13.23***	160.90***	173.38***	232.21***
Pseudo R^2	0.0062	0.0484	0.0518	0.0715	0.0053	0.0479	0.0514	0.0699
Observations	759	759	759	759	759	759	759	759

Notes: Ordered logit estimates. Robust standard errors clustered on interviewers are presented in parentheses. *, **, *** denote significance at the 10, 5 and 1 percent level, respectively. The complete regressions can be found in Table A3 of the Electronic Supplementary Material.

Table 5. Dictator generosity and life satisfaction

Dep. Var.: LS	without controlling for alpha/beta				controlling for alpha/beta			
	(1a)	(2a)	(3a)	(4a)	(1b)	(2b)	(3b)	(4b)
DG giving	0.029**	0.027*	0.027*	0.025	0.022	0.021	0.021	0.018
	(0.014)	(0.016)	(0.016)	(0.016)	(0.014)	(0.016)	(0.016)	(0.016)
Alpha (envy)					-0.100**	-0.100**	-0.100**	-0.111**
					(0.044)	(0.047)	(0.048)	(0.046)
Beta (compassion)					0.083**	0.082**	0.085**	0.085**
					(0.037)	(0.038)	(0.039)	(0.039)
Chi^2	4.37***	110.95***	131.99***	220.03***	17.00***	147.19***	164.69***	251.38***
Pseudo R^2	0.0016	0.0443	0.0475	0.0664	0.0071	0.0492	0.0525	0.0720
Observations	759	759	759	759	759	759	759	759

Notes: Ordered logit estimates. Robust standard errors clustered on interviewers are presented in parentheses *, **, *** denote significance at the 10, 5 and 1 percent level, respectively. The complete regressions can be found in Table A4 of the Electronic Supplementary Material

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Figure 1. Distribution of responses

(a)   (b)   (c)

(d)   (e)
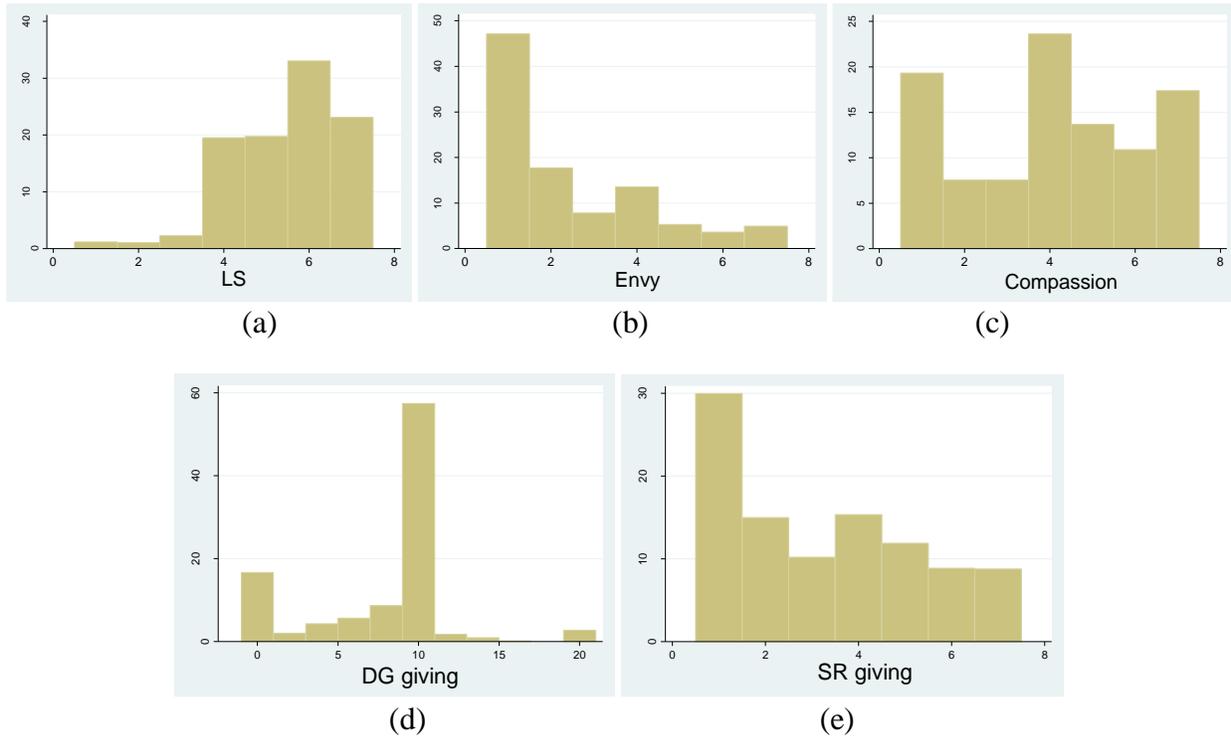
Figure 2. Mean LS for each envy (continuous line) and compassion (dashed line) score. Error bars represent 1 SE of the mean

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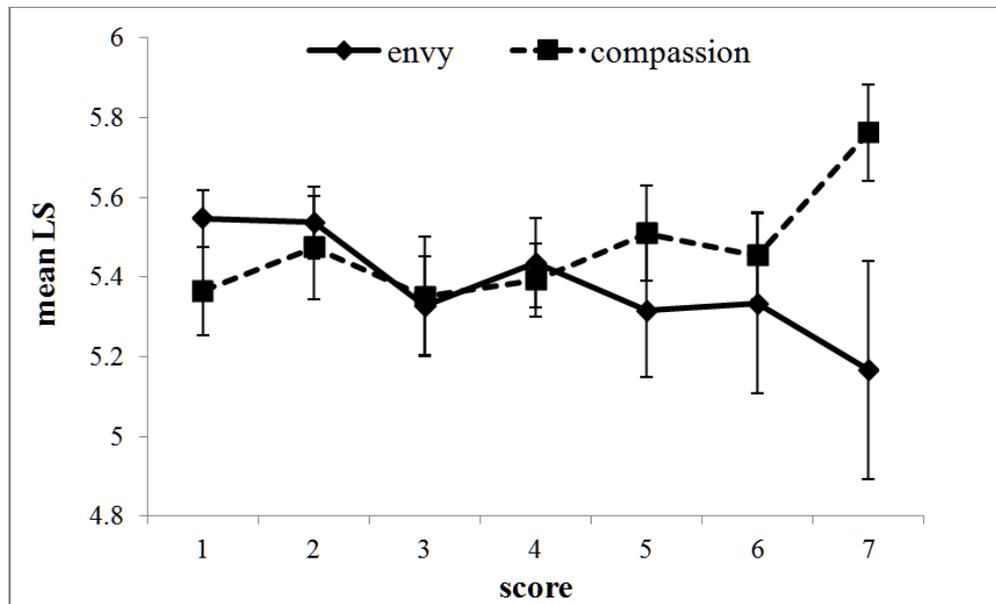
Figure 3. Mean LS for each inequality aversion (continuous line) and competitiveness (dashed line) score. The four highest scores of each measure are collapsed into one category for visual clarity. Error bars represent 1 SE of the mean
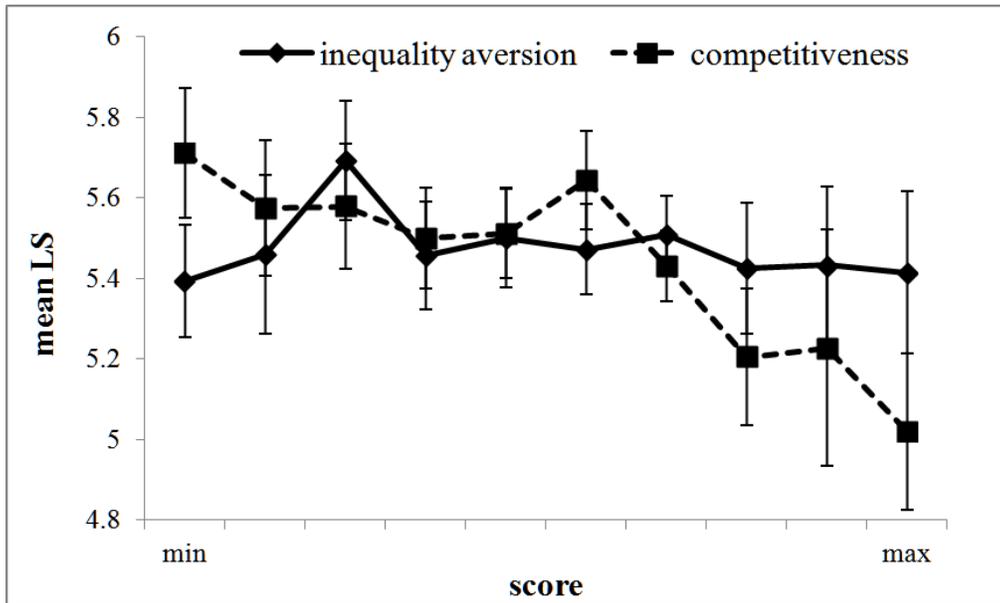
Electronic Supplementary Material

for

Do envy and compassion pave the way to unhappiness? Social preferences and life satisfaction in a Spanish city

A1. Theoretical foundations and preferences over relative payoffs

As is standard, individuals' subjective well-being is assumed to be a positive monotonic transformation of utility. Let us put the inequality aversion account into a mathematical form in terms of the alpha and beta parameters. In the Fehr-Schmidt (1999) model (see Equation 1), payoff disparities reduce the individual's utility. Specifically, in a group of size n, the utility derived by individual i from the payoff vector $X = (x_1, \ldots, x_n)$ is defined as:

$$U_i(X) = x_i - \alpha_i \frac{1}{n-1} \sum_{j \neq i} \max \{x_j - x_i, 0\} - \beta_i \frac{1}{n-1} \sum_{j \neq i} \max \{x_i - x_j, 0\}, \quad (1)$$

where $\alpha_i, \beta_i \geq 0$ refer to individual i's aversion to disadvantageous (i.e., envy) and advantageous inequality (i.e., compassion), respectively.[12] Thus, for a self-regarding individual indifferent to others' payoffs, $\alpha_i = \beta_i = 0$, so that utility equals her own payoff.

Equation (2) displays a prototypical example of competitive preferences (see Charness & Rabin 2002 and Fehr & Schmidt 2006), where the degree of competitiveness is captured by parameter c.

$$U_i(X) = x_i + c_i \frac{1}{n-1} \sum_{j \neq i} (x_i - x_j) \quad (2)$$

If we translate these preferences in terms of the envy and compassion parameters, we obtain that $\alpha_i = -\beta_i = c_i > 0$ (Hopkins 2008). By relaxing, however, this definition to account for asymmetries as to whether comparisons are advantageous or disadvantageous and by being agnostic about the range of possible values for alpha and beta, we can assume that an individual's degree of competitiveness is an increasing function of a convex combination of α_i and $-\beta_i$, *ceteris paribus*.[13]

A2. Description of socio-demographic and other basic controls

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[12] Note that this model relates to self-centered inequality aversion, that is, preferences over payoff-disparities among other individuals are not directly but indirectly accounted for.

[13] It is straightforward to see that in a society of size $n > 2$ with symmetric income distribution, the first derivative of the utility of the median individual (who faces an identical number of disadvantageous than advantageous comparisons, $(n - 1) / 2$) with respect to others' incomes equals exactly $(-\alpha + \beta) / 2$, which would be negative— indicating competitiveness—if $\alpha > \beta$, irrespective of the exact values of alpha and beta. However, for an individual with a non-central rank within society, also within an asymmetric society, her degree of competitiveness still increases with alpha and decreases with beta, even if the sign of the derivative is not negative so that the individual is not truly competitive, strictly defined.

Socio-demographic controls (for the categorical variables, "(comp.)" denotes the omitted category): *age*, *gender*, *household size* (number of members, including the respondent), *number of children* of the respondent, net *household monthly income* (four categories: < €1000, [€1000, €2000), [€2000, €4000), and ≥ €4000), highest *educational level* completed (three categories: less than secondary education, secondary education, and university education), *marital status* (five categories: single, married, cohabiting, divorced/separated, and widowed),[14] and *occupation* (five categories: unemployed, private sector worker, public sector worker, self-employed/entrepreneur, and retired; note that "not-working" respondents are included within unemployed respondents, thus increasing the percentage of unemployed by about 15% with respect to the official statistics, and that those respondents receiving any type of pension benefits are classified as retired).[15]

Other basic controls include: *health status* (individuals reporting good or very good health are classified as "*healthy*"), *smoking status* (whether the respondent is a "*smoker*"), *religious denomination* (whether the respondent is a "*non-believer*"), and opinion on the prevalence of *effort vs. luck* (whether the respondent believes that success in life is primarily due to "*effort*" rather than luck).[16]

A.3. Determinants of self-reported envy and compassion

In this section, we will uncover the correlates of our two novel measures of inequality aversion. Table A2 displays the outcomes of ordered logistic regressions estimating the individuals' raw scores, between 1 and 7, in the alpha (*envy*, column 1) and beta (*compassion*, column 2) items as a function of each other and all the control variables. It can be observed that there is no significant relationship between alpha and beta when we control for other variables (note that their zero-order correlation is insignificant as well, as shown in Table A1). This is an interesting finding since according to pure competitive preferences

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[14] For visual clarity, we selected *married* as the comparison group because it is the category reporting the highest number of significant comparisons in the regressions estimating LS.

[15] For visual clarity, we selected *public sector worker* as the comparison group because it is the category reporting the highest number of significant comparisons in the regressions estimating LS.

[16] The question was as follows: "You think that success in life depends mostly on (only one option): a) Luck; b) Effort".

(as defined above, i.e., $\alpha = -\beta > 0$) we should expect the two measures to be strongly negatively correlated. Individuals indeed seem to treat advantageous and disadvantageous comparisons differently.

Secondly, *older* subjects report less envy and more compassion, although in the former case the relationship is only marginally significant and slightly convex (see notes in Table A2). In addition, *smokers* and those who think that *effort* is more important than luck in determining life success are less envious. The latter result is interesting as it suggests that sentiments of envy are more likely to arise among individuals who think that their inferior status is due to (bad) luck (Alesina & La Ferrara 2005). However, such an argument cannot be extrapolated to advantageous-inequality aversion since *effort* is largely insignificant in predicting compassion. *Males*, on the other hand, report lower compassion scores. Regarding the social capital variables, we find that trust in *institutions* is positively associated with compassion while activity in *voluntary* organizations is (marginally) negatively associated with envy. The latter result seems reasonable but, according to the interpretation that those individuals who trust more in institutions are more likely to consider social outcomes as fair (Frey & Stutzer 2010, Cojocaru 2014), the former result is somehow contrary to expectations.

As shown in Table A1, zero-order correlations also yield a significant positive relationship of envy with *[€1000, €2000)* and a negative relationship with *≥€4000* (indeed the comparison between these two income groups is marginally significant in the regression: $p = 0.059$) and *retired* (which in the regression is close to significance when compared with *private sector worker*: $p = 0.105$). However, the effect of *smoking* status on envy is no longer significant when controls are excluded. Hence, we can safely add to the above that high-income individuals are less envious than low- to medium-income individuals. In the case of compassion, apart from the relationships mentioned earlier, we observe significant positive zero-order correlations with *number of children*, *less than secondary education*, *married*, *widowed* and *retired* (in fact, the comparisons between *retired* and both *unemployed* and *private sector worker* are significant in the regression as well: $ps < 0.05$), while negative correlations are found with *secondary education, single*, *unemployed*, *healthy* and *non-believer*. Arguably, most of the significant correlations of beta seem, however, intimately related to the fact that older individuals are more compassionate than younger

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individuals (although retired individuals still report stronger compassion than other occupation groups after controlling for age).

A4. Life satisfaction on socio-demographic and basic controls

With regards to the control variables, our results are generally consistent with the expectations. We observe the well-known U-shaped relationship between *age* and LS (e.g., Blanchflower & Oswald 2008, Weiss et al. 2012, Schwandt 2013). Also, *males* are marginally more satisfied than females (here the literature has reported mixed results: Clark & Oswald 1994, Stack & Eshleman 1998, Alesina et al. 2004, Graham & Felton 2006). In terms of economic status, it is shown that LS increases with household *income* but the relationship suffers a large drop when it comes to top-earning households (see also Table A1). Note, however, that a regression with the income dummies as the only explanatory variables yields significant positive coefficients for the three groups. The coefficients are 0.502 ($p = 0.023$), 0.771 ($p < 0.001$) and 0.644 ($p = 0.016$) for the *[€1000, €2000)*, *[€2000, €4000)* and ≥*€4000* dummies, respectively. This indicates that adding the control variables both reduces the magnitude and increases the curvature of the income effect,[17] which also ultimately suggests that the inclusion of our set of controls poses a hard test for any relationship under scrutiny. Similar non-monotonic relationships have been reported in previous work (e.g., Proto & Rustichini 2012, 2013) even in the specific case of the city of Granada (Guardiola & Guillén-Rollo 2015).

As expected, LS increases monotonically with *education* (Blanchflower & Oswald 2004) and *married* respondents are generally more satisfied than other marital-status groups (Wood et al. 1989, Stack & Eshleman 1998). In addition, *public sector workers* reported higher LS than all other labor-force groups (Luechinger et al. 2010). But contrary to what might be expected (Clark & Oswald 1994, Guardiola & Guillén-Rollo 2015), *unemployed* respondents are not the least satisfied group in our sample (*private sector workers* and *retired* generally reported lower LS scores according to the model estimations, although not significantly different from the unemployed). Such a departure may have to do with two facts. First, as mentioned above, our unemployment variable is capturing not only strictly-defined

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[17] If we include alpha and beta in the model, the three coefficients remain significant and fairly similar (*ps* < 0.05).

unemployed individuals but also those respondents who were neither working/retired nor looking for a job (basically students and househusbands/wives). Second, private sector workers' worries/uncertainty about job continuity, as well as cutbacks in wages and pension benefits associated with the financial crisis and the strict fiscal austerity policies carried out in Spain since May 2010, may have also pulled down the well-being of workers and retirees. Similar results and arguments can be found in the literature (e.g., Luechinger et al. 2010). Interestingly, the coefficient of unemployment is reduced by one-fourth when *self-esteem* is controlled for (columns 4a and 4b; unemployment even turns non-significant in the latter regression), thus suggesting an important mediating role of eudaimonic well-being. As expected, *healthy,* non-*smoking* and religious (*believers*) individuals are more satisfied (Lim & Putnam 2010, Shahad & West 2012, Garrido et al. 2013, Sabatini 2014, Vázquez et al. 2015).

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Supplementary figures

Figure A1. Distribution of *competitiveness* and *inequality aversion*

(a)   (b)
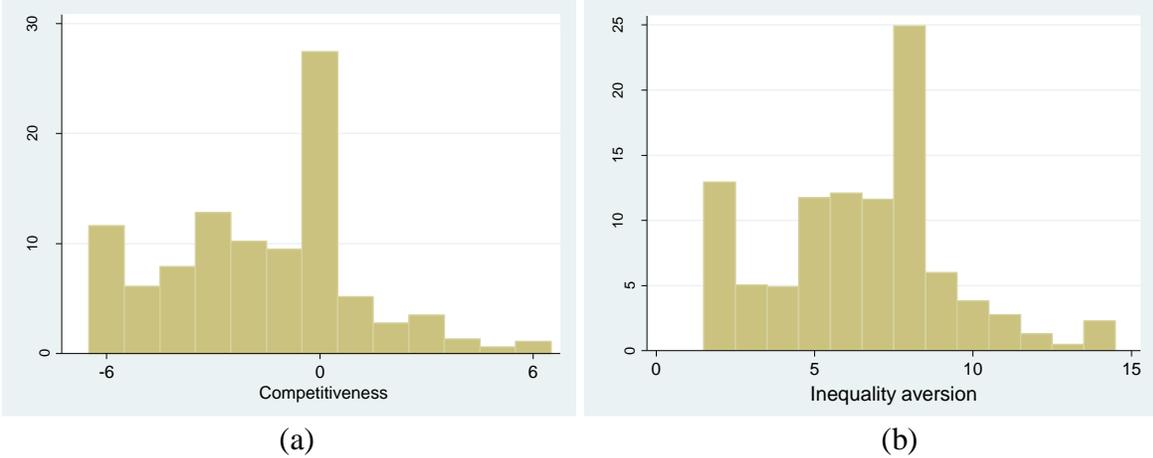
Supplementary tables

Table A1. Zero-order correlations for the main variables

	Life satisfaction		Alpha (envy)		Beta (compassion)		DG giving		SR giving	
	Spearman	*Pearson*	*Spearman*	*Pearson*	*Spearman*	*Pearson*	*Spearman*	*Pearson*	*Spearman*	*Pearson*
Life satisfaction	1	1								
Alpha (envy)	-0.0979***	-0.0801**	1	1						
Beta (compassion)	0.0971***	0.0853**	0.0209	0.0442	1	1				
DG giving	0.0567	0.0669*	-0.0166	-0.0179	0.1856***	0.1824***	1	1		
SR giving	0.0739**	0.0621*	0.0008	0.0054	0.2584***	0.2687***	0.0502	0.0671*	1	1
Age	0.0400	0.0296	-0.0907**	-0.0648*	0.2633***	0.2794***	0.1775***	0.1297***	0.1709***	0.1839***
Gender (male)	0.0372	0.0395	0.0313	0.0242	-0.1088***	-0.1069***	-0.0713**	-0.0556	0.0316	0.0373
Household size	0.0753**	0.0723**	0.0277	0.0185	-0.0595	-0.0267	-0.0201	0.0034	-0.0619**	-0.0346
Number of children	0.0612*	0.0398	-0.0577	-0.0065	0.2307***	0.2236***	0.1784***	0.1406***	0.1201***	0.1302***
< €1000	-0.1369***	-0.1393***	0.0065	0.0187	-0.0087	-0.0098	-0.0030	-0.0007	0.0416	0.0442
[€1000, €2000)	-0.0134	-0.0026	0.0621**	0.0576	0.0435	0.0388	0.0052	0.0058	0.0158	0.0233
[€2000, €4000)	0.1066***	0.0952***	-0.0225	-0.0196	-0.0468	-0.0454	0.0170	0.0236	-0.0489	-0.0503
≥ €4000	0.0199	0.0248	-0.0692*	-0.0824**	0.0197	0.0264	-0.0325	-0.0473	0.0028	-0.0101
Less than secondary	-0.0910**	-0.1174***	-0.0129	0.0307	0.1055***	0.1010***	0.0542	0.0461	0.0996***	0.1186***
Secondary education	-0.0166	-0.0012	0.0440	0.0253	-0.1084***	-0.1055***	-0.1289***	-0.1112***	-0.0758**	-0.0838**
University education	0.0972***	0.1040***	-0.0355	-0.0538	0.0227	0.0235	0.0894**	0.0777**	-0.0067	-0.0147
Single	-0.0621**	-0.0364	0.0382	0.0268	-0.2181***	-0.2104***	-0.1660***	-0.1407***	-0.1714***	-0.1807***
Married	0.1461***	0.1305***	-0.0165	-0.0101	0.1705***	0.1641***	0.1414***	0.1280***	0.1258***	0.1277***
Cohabiting	-0.0488	-0.0653*	-0.0045	-0.0139	-0.0250	-0.0251	-0.0132	-0.0185	-0.0022	-0.0010
Divorced/separated	-0.1269***	-0.1275***	-0.0137	-0.0167	0.0119	0.0143	0.0931**	0.0815**	0.0398	0.0499
Widowed	-0.0256	-0.0360	-0.0382	-0.0129	0.1467***	0.1408***	-0.0064	-0.0207	0.0880**	0.0958***
Unemployed	-0.0732**	-0.0519	0.0559	0.0307	-0.1514***	-0.1484***	-0.1421***	-0.1240***	-0.1293***	-0.1403***
Private sector	-0.0496	-0.0612*	0.0436	0.0360	-0.0475	-0.0444	0.0475	0.0432	-0.0275	-0.0271
Public sector	0.1267***	0.1222***	-0.0380	-0.0123	0.0601*	0.0574	0.0725**	0.0514	0.0476	0.0452
Self-employed	0.0234	0.0273	-0.0324	-0.0244	0.0148	0.0130	0.0123	0.0257	0.0660*	0.0688*
Retired	0.0250	0.0071	-0.0776**	-0.0619*	0.2299***	0.2256***	0.0776**	0.0646*	0.1346 ***	0.1520***
Healthy	0.1558***	0.1780***	-0.0134	-0.0270	-0.0807**	-0.0828**	-0.0771**	-0.0927**	-0.0916**	-0.0977***
Smoker	-0.1258***	-0.1365***	-0.0595	-0.0399	-0.0490	-0.0502	-0.0308	-0.0247	-0.0483	-0.0431
Non-believer	-0.1007***	-0.0957***	0.0038	-0.0132	-0.1220***	-0.1164***	-0.0980***	-0.1119***	-0.1138***	-0.1206***
Effort	0.0991***	0.1185***	-0.0862**	-0.1066***	-0.0119	-0.0114	0.1286***	0.1153***	0.0583	0.0533
Trust-others	0.0691*	0.0861**	-0.0069	-0.0118	-0.0468	-0.0441	0.0114	0.0098	0.0611*	0.0486
Trust-institutions	0.0444	0.0519	-0.0057	-0.0053	0.1003***	0.0977***	0.0117	0.0189	0.0827**	0.0718**
Volunteer	0.0315	0.0705*	-0.0394	-0.0671*	0.0359	0.0221	-0.0112	0.0184	0.0393	0.1036***
High self-esteem	0.2330***	0.2186***	0.0023	0.0304	0.0281	0.0213	-0.0082	0.0110	0.0126	0.0336

Notes: *, **, *** denote significance at the 10, 5 and 1 percent level, respectively.

Table A2. Determinants of envy and compassion

Dep. Vars.:	Envy	Compassion
	(1)	(2)
Alpha (envy)		0.069
		(0.046)
Beta (compassion)	0.063	
	(0.044)	
Age	-0.054*	0.018**
	(0.031)	(0.008)
Age²	0.00045	(†)
	(0.000)	
Gender (male)	0.205	-0.431***
	(0.142)	(0.140)
Household size	0.003	0.007
	(0.056)	(0.058)
Number of children	0.041	0.035
	(0.093)	(0.085)
[€1000, €2000)	0.176	-0.066
	(0.212)	(0.203)
[€2000, €4000)	-0.020	-0.246
	(0.219)	(0.197)
≥ €4000	-0.392	0.023
	(0.350)	(0.236)
Secondary educ	0.034	0.055
	(0.246)	(0.230)
University educ	0.073	-0.018
	(0.224)	(0.227)
Single	-0.264	-0.078
	(0.290)	(0.292)
Cohabiting	-0.371	-0.105
	(0.528)	(0.441)
Divorced/separated	-0.005	-0.258
	(0.379)	(0.370)
Widowed	-0.219	0.374
	(0.500)	(0.486)
Unemployed	0.061	-0.352
	(0.252)	(0.281)
Private sector	0.225	-0.303
	(0.289)	(0.293)
Self-employed	-0.143	0.014
	(0.345)	(0.324)
Retired	-0.553	0.493
	(0.473)	(0.344)
Healthy	-0.172	-0.042
	(0.225)	(0.182)
Smoker	-0.334**	-0.003
	(0.161)	(0.149)
Non-believer	-0.019	-0.119
	(0.160)	(0.150)
Effort	-0.389**	-0.151
	(0.198)	(0.195)

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Trust-others	0.060	-0.151
	(0.155)	(0.150)
Trust-institutions	-0.025	0.290**
	(0.159)	(0.141)
Volunteer	-0.054*	0.016
	(0.028)	(0.025)
High self-esteem	0.028	0.069
	(0.156)	(0.150)
Chi^2	31.79	117.16***
Pseudo R^2	0.0158	0.0370
Observations	759	759

Notes: Ordered logit estimates. Robust standard errors clustered on interviewers are presented in parentheses. *, **, *** denote significance at the 10, 5 and 1 percent level, respectively.

$^{(+)}$Age^2 is not controlled for because the effect of age on beta is completely linear. Age^2 is included in the estimations of alpha because there exists a weak convexity, although age^2 does not yield significance (p=0.2).

Table A3. Social preferences and life satisfaction (II)

Dep. Var.: LS	alpha/beta - continuous				alpha/beta – binary			
	(1a)	(2a)	(3a)	(4a)	(1b)	(2b)	(3b)	(4b)
Inequality Aversion	-0.005	-0.007	-0.005	-0.011				
	(0.029)	(0.031)	(0.032)	(0.031)				
Competitiveness	-0.096***	-0.095***	-0.096***	-0.101***				
	(0.028)	(0.029)	(0.030)	(0.029)				
Most IA vs. *Least IA*					-0.002	-0.062	-0.032	-0.054
					(0.210)	(0.216)	(0.218)	(0.218)
Most COMP vs. *Least COMP*					-0.655***	-0.665***	-0.694***	-0.644***
					(0.189)	(0.206)	(0.209)	(0.206)
Most IA vs. *Least COMP*					-0.362	-0.370	-0.381	-0.383
					(0.223)	(0.240)	(0.242)	(0.238)
Most COMP vs. *Least IA*					-0.295	-0.356*	-0.355*	-0.316
					(0.185)	(0.187)	(0.189)	(0.193)
Most COMP vs. *Most IA*					-0.293*	-0.294	-0.313*	-0.261
					(0.168)	(0.180)	(0.181)	(0.190)
Least IA vs. *Least COMP*					-0.360	-0.308	-0.349	-0.328
					(0.226)	(0.221)	(0.222)	(0.227)
Age		-0.081**	-0.086**	-0.082**		-0.087**	-0.092**	-0.087**
		(0.039)	(0.040)	(0.038)		(0.040)	(0.040)	(0.039)
Age²		0.001**	0.001**	0.001**		0.001**	0.001**	0.001**
		(0.000)	(0.000)	(0.000)		(0.000)	(0.000)	(0.000)
Male		0.268*	0.258*	0.263*		0.259*	0.247*	0.247*
		(0.143)	(0.144)	(0.140)		(0.142)	(0.144)	(0.140)
Household size		0.061	0.053	0.049		0.065	0.056	0.051
		(0.055)	(0.052)	(0.050)		(0.053)	(0.050)	(0.049)
Number of children		0.020	0.039	0.005		0.018	0.037	0.003
		(0.098)	(0.097)	(0.097)		(0.097)	(0.096)	(0.096)
[€1000, €2000)		0.331	0.343	0.333		0.346	0.357	0.349
		(0.248)	(0.252)	(0.257)		(0.251)	(0.255)	(0.260)
[€2000, €4000)		0.406**	0.432**	0.448**		0.411**	0.436**	0.453**
		(0.203)	(0.2019)	(0.220)		(0.204)	(0.203)	(0.221)
≥ €4000		0.058	0.025	0.102		0.109	0.076	0.158
		(0.279)	(0.276)	(0.291)		(0.276)	(0.274)	(0.290)
Secondary educ		0.360**	0.371*	0.398*		0.395*	0.410**	0.438**
		(0.205)	(0.210)	(0.204)		(0.205)	(0.210)	(0.204)
University educ		0.571***	0.566**	0.630***		0.616***	0.613***	0.676***
		(0.217)	(0.223)	(0.217)		(0.219)	(0.226)	(0.221)
Single		-0.526	-0.546	-0.469		-0.541*	-0.564*	-0.492
		(0.328)	(0.334)	(0.318)		(0.326)	(0.333)	(0.321)
Cohabiting		-0.690**	-0.714*	-0.789**		-0.662*	-0.685*	-0.766*
		(0.362)	(0.372)	(0.386)		(0.374)	(0.386)	(0.400)
Divorced/separated		-1.286***	-1.341***	-1.317***		-1.267***	-1.322***	-1.304***
		(0.388)	(0.391)	(0.359)		(0.386)	(0.390)	(0.360)
Widowed		-0.824	-0.806	-0.938		-0.863	-0.853	-0.985*
		(0.591)	(0.579)	(0.575)		(0.591)	(0.578)	(0.576)
Unemployed		-0.572**	-0.514**	-0.386*		-0.520**	-0.460*	-0.339
		(0.230)	(0.235)	(0.232)		(0.230)	(0.236)	(0.231)
Private sector		-0.701***	-0.639**	-0.649**		-0.659**	-0.595**	-0.607**
		(0.258)	(0.267)	(0.264)		(0.258)	(0.268)	(0.264)
Self-employed		-0.503*	-0.506*	-0.514*		-0.494	-0.496*	-0.500*
		(0.304)	(0.297)	(0.298)		(0.304)	(0.298)	(0.300)
Retired		-0.716*	-0.775*	-0.805**		-0.709*	-0.772*	-0.787*
		(0.422)	(0.419)	(0.402)		(0.428)	(0.426)	(0.409)
Healthy		0.682***	0.669***	0.605***		0.668***	0.652***	0.590***

		(0.189)	(0.190)	(0.194)		(0.189)	(0.190)	(0.195)
Smoker		-0.282**	-0.291**	-0.384***		-0.287**	-0.297**	-0.385***
		(0.142)	(0.143)	(0.142)		(0.144)	(0.145)	(0.144)
Non-believer		-0.344**	-0.367**	-0.356**		-0.336**	-0.356**	-0.343**
		(0.160)	(0.159)	(0.162)		(0.161)	(0.161)	(0.163)
Effort		0.359*	0.348*	0.312		0.382*	0.369*	0.338*
		(0.202)	(0.198)	(0.194)		(0.204)	(0.199)	(0.198)
Trust-others			0.356**	0.335**			0.358**	0.336**
			(0.148)	(0.155)			(0.148)	(0.154)
Trust-institutions			-0.062	-0.067			-0.056	-0.061
			(0.161)	(0.156)			(0.162)	(0.159)
Volunteer			0.035	0.037*			0.038*	0.040*
			(0.022)	(0.022)			(0.022)	(0.022)
High self-esteem				0.930***				0.900***
				(0.135)				(0.133)
Chi^2	12.14***	146.84***	162.57***	249.43***	13.23***	160.90***	173.38***	232.21***
Pseudo R^2	0.0062	0.0484	0.0518	0.0715	0.0053	0.0479	0.0514	0.0699
Observations	759	759	759	759	759	759	759	759

Notes: Ordered logit estimates. Robust standard errors clustered on interviewers are presented in parentheses. *, **, *** denote significance at the 10, 5 and 1 percent level, respectively.

Table A4. Dictator generosity and life satisfaction

Dep. Var.: LS	without controlling for alpha/beta				controlling for alpha/beta			
	(1a)	(2a)	(3a)	(4a)	(1b)	(2b)	(3b)	(4b)
DG giving	0.029**	0.027*	0.027*	0.025	0.022	0.021	0.021	0.018
	(0.014)	(0.016)	(0.016)	(0.016)	(0.014)	(0.016)	(0.016)	(0.016)
Alpha (envy)					-0.100**	-0.100**	-0.100**	-0.111**
					(0.044)	(0.047)	(0.048)	(0.046)
Beta (compassion)					0.083**	0.082**	0.085**	0.085**
					(0.037)	(0.038)	(0.039)	(0.039)
Age		-0.078**	-0.083**	-0.079**		-0.082**	-0.087**	-0.082**
		(0.039)	(0.040)	(0.038)		(0.039)	(0.039)	(0.037)
Age^2		0.001**	0.001**	0.001**		0.001**	0.001**	0.001**
		(0.000)	(0.000)	(0.000)		(0.000)	(0.000)	(0.000)
Male		0.228	0.215	0.220		0.270*	0.260*	0.264*
		(0.141)	(0.143)	(0.140)		(0.142)	(0.144)	(0.141)
Household size		0.063	0.053	0.049		0.060	0.053	0.049
		(0.054)	(0.050)	(0.048)		(0.055)	(0.052)	(0.050)
Number of children		0.020	0.038	0.005		0.015	0.034	0.000
		(0.096)	(0.096)	(0.096)		(0.097)	(0.096)	(0.097)
[€1000, €2000)		0.325	0.329	0.321		0.339	0.350	0.340
		(0.253)	(0.255)	(0.261)		(0.249)	(0.252)	(0.257)
[€2000, €4000)		0.400*	0.419**	0.432*		0.421**	0.446**	0.460**
		(0.210)	(0.207)	(0.225)		(0.206)	(0.203)	(0.222)
≥ €4000		0.140	0.102	0.183		0.086	0.053	0.126
		(0.289)	(0.287)	(0.299)		(0.284)	(0.281)	(0.295)
Secondary educ		0.379**	0.393*	0.417**		0.365*	0.376*	0.400*
		(0.204)	(0.209)	(0.204)		(0.205)	(0.210)	(0.204)
University educ		0.578***	0.574**	0.638***		0.565***	0.559**	0.620***
		(0.221)	(0.227)	(0.224)		(0.217)	(0.223)	(0.218)
Single		-0.491	-0.519	-0.442		-0.519	-0.540	-0.465
		(0.331)	(0.338)	(0.323)		(0.327)	(0.333)	(0.318)
Cohabiting		-0.625*	-0.651*	-0.730*		-0.675*	-0.699*	-0.778**
		(0.372)	(0.385)	(0.402)		(0.361)	(0.370)	(0.386)
Divorced/separated		-1.295***	-1.347***	-1.337***		-1.308***	-1.362***	-1.339***
		(0.394)	(0.398)	(0.363)		(0.390)	(0.393)	(0.361)
Widowed		-0.715	-0.711	-0.849		-0.783	-0.767	-0.902
		(0.586)	(0.575)	(0.570)		(0.587)	(0.575)	(0.571)
Unemployed		-0.570**	-0.513**	-0.382		-0.554**	-0.498**	-0.372
		(0.234)	(0.239)	(0.237)		(0.232)	(0.237)	(0.234)
Private sector		-0.724***	-0.662**	-0.666**		-0.699***	-0.638**	-0.648**
		(0.252)	(0.262)	(0.259)		(0.256)	(0.265)	(0.262)
Self-employed		-0.480	-0.477	-0.482		-0.501*	-0.507*	-0.514*
		(0.308)	(0.303)	(0.304)		(0.302)	(0.296)	(0.298)
Retired		-0.662	-0.716*	-0.738*		-0.718*	-0.778*	-0.807**
		(0.429)	(0.430)	(0.411)		(0.422)	(0.420)	(0.403)
Healthy		0.727***	0.710***	0.640***		0.703***	0.689***	0.623***
		(0.202)	(0.202)	(0.208)		(0.197)	(0.197)	(0.201)
Smoker		-0.256*	-0.264**	-0.357**		-0.284**	-0.293**	-0.385***
		(0.143)	(0.144)	(0.142)		(0.143)	(0.144)	(0.143)
Non-believer		-0.329**	-0.350**	-0.340**		-0.330**	-0.353**	-0.345**
		(0.161)	(0.161)	(0.164)		(0.160)	(0.160)	(0.163)
Effort		0.348*	0.333*	0.308		0.326	0.315	0.282
		(0.206)	(0.200)	(0.199)		(0.205)	(0.200)	(0.197)
Trust-others			0.332**	0.315**			0.355**	0.334**
			(0.147)	(0.154)			(0.148)	(0.155)
Trust-institutions			-0.039	-0.047			-0.063	-0.069
			(0.162)	(0.159)			(0.160)	(0.157)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Volunteer			0.039*	0.041*			0.035	0.037*
			(0.022)	(0.022)			(0.022)	(0.022)
High self-esteem				0.912***				0.926***
				(0.135)				(0.135)
Chi^2	4.37***	110.95***	131.99***	220.03***	17.00***	147.19***	164.69***	251.38***
Pseudo R^2	0.0016	0.0443	0.0475	0.0664	0.0071	0.0492	0.0525	0.0720
Observations	759	759	759	759	759	759	759	759

Notes: Ordered logit estimates. Robust standard errors clustered on interviewers are presented in parentheses. *, **, *** denote significance at the 10, 5 and 1 percent level, respectively.

Table A5. Self-reported generosity and life satisfaction

Dep. Var.: LS	without controlling for alpha/beta				controlling for alpha/beta			
	(1a)	(2a)	(3a)	(4a)	(1b)	(2b)	(3b)	(4b)
SR giving	0.068	0.071*	0.063	0.063	0.047	0.057	0.047	0.047
	(0.042)	(0.042)	(0.042)	(0.043)	(0.043)	(0.042)	(0.043)	(0.043)
Alpha (envy)					-0.100**	-0.101**	-0.101**	-0.111**
					(0.043)	(0.047)	(0.048)	(0.046)
Beta (compassion)					0.079**	0.077**	0.082**	0.082**
					(0.038)	(0.039)	(0.039)	(0.040)
Age		-0.075*	-0.081**	-0.076**		-0.080**	-0.085**	-0.081**
		(0.039)	(0.040)	(0.037)		(0.039)	(0.039)	(0.037)
Age²		0.001**	0.001**	0.001**		0.001**	0.001**	0.001**
		(0.000)	(0.000)	(0.000)		(0.000)	(0.000)	(0.000)
Gender (male)		0.205	0.195	0.201		0.250*	0.244*	0.248*
		(0.140)	(0.142)	(0.138)		(0.141)	(0.143)	(0.139)
Household size		0.061	0.052	0.048		0.059	0.053	0.049
		(0.053)	(0.049)	(0.048)		(0.054)	(0.051)	(0.050)
Number of children		0.031	0.047	0.014		0.023	0.040	0.006
		(0.096)	(0.096)	(0.095)		(0.096)	(0.097)	(0.096)
[€1000, €2000)		0.341	0.344	0.337		0.354	0.363	0.353
		(0.247)	(0.250)	(0.255)		(0.244)	(0.248)	(0.253)
[€2000, €4000)		0.425**	0.438**	0.454**		0.440**	0.459**	0.475**
		(0.205)	(0.202)	(0.222)		(0.202)	(0.200)	(0.220)
≥ €4000		0.138	0.099	0.188		0.084	0.049	0.129
		(0.286)	(0.284)	(0.297)		(0.280)	(0.277)	(0.293)
Secondary educ		0.379*	0.390**	0.418**		0.365*	0.374*	0.400*
		(0.204)	(0.210)	(0.203)		(0.205)	(0.210)	(0.203)
University educ		0.589***	0.583**	0.652***		0.574***	0.567**	0.632***
		(0.222)	(0.229)	(0.225)		(0.217)	(0.224)	(0.218)
Single		-0.458	-0.488	-0.409		-0.493	-0.517	-0.440
		(0.325)	(0.333)	(0.316)		(0.323)	(0.329)	(0.312)
Cohabiting		-0.658*	-0.684*	-0.759*		-0.700*	-0.723*	-0.799**
		(0.380)	(0.392)	(0.408)		(0.364)	(0.374)	(0.389)
Divorced/separated		-1.297***	-1.342***	-1.323***		-1.314***	-1.361***	-1.331***
		(0.390)	(0.393)	(0.357)		(0.388)	(0.391)	(0.358)
Widowed		-0.785	-0.776	-0.914		-0.836	-0.816	-0.950*
		(0.577)	(0.567)	(0.562)		(0.579)	(0.569)	(0.565)
Unemployed		-0.569**	-0.519**	-0.382		-0.555**	-0.504**	-0.373*
		(0.230)	(0.236)	(0.234)		(0.228)	(0.234)	(0.231)
Private sector		-0.712***	-0.655**	-0.660**		-0.690***	-0.633**	-0.643**
		(0.254)	(0.264)	(0.262)		(0.257)	(0.267)	(0.264)
Self-employed		-0.496	-0.493	-0.497		-0.514*	-0.518*	-0.526*
		(0.309)	(0.304)	(0.304)		(0.302)	(0.296)	(0.297)
Retired		-0.677	-0.724*	-0.747*		-0.732*	-0.785*	-0.814**
		(0.424)	(0.425)	(0.405)		(0.418)	(0.416)	(0.399)
Healthy		0.719***	0.701***	0.634***		0.699***	0.683***	0.620***
		(0.194)	(0.195)	(0.200)		(0.190)	(0.190)	(0.194)
Smoker		-0.249*	-0.256*	-0.353**		-0.278**	-0.287**	-0.381***
		(0.141)	(0.141)	(0.140)		(0.141)	(0.142)	(0.141)
Non-believer		-0.327**	-0.350**	-0.336**		-0.328**	-0.353**	-0.341**
		(0.157)	(0.157)	(0.160)		(0.157)	(0.157)	(0.160)
Effort		0.361*	0.353*	0.327*		0.333	0.328	0.295
		(0.202)	(0.198)	(0.195)		(0.203)	(0.199)	(0.194)
Trust-others			0.316**	0.298*			0.343**	0.320**
			(0.147)	(0.155)			(0.150)	(0.157)
Trust-institutions			-0.044	-0.050			-0.066	-0.070
			(0.161)	(0.157)			(0.159)	(0.155)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Volunteer			0.035	0.038*			0.032	0.034
			(0.021)	(0.022)			(0.021)	(0.021)
High self-esteem				0.918***				0.931***
				(0.137)				(0.136)
Chi^2	2.63***	114.38***	134.08***	215.17***	12.96***	146.31***	165.34***	253.97***
Pseudo R^2	0.0018	0.0448	0.0476	0.0668	0.0070	0.0495	0.0525	0.0722
Observations	759	759	759	759	759	759	759	759

Notes: Ordered logit estimates. Robust standard errors clustered on interviewers are presented in parentheses. *, **, *** denote significance at the 10, 5 and 1 percent level, respectively.

Table A6. The effect of envy and compassion on Dictator and self-reported generosity

	Dep. Var.: *DG giving*			Dep. Var.: *SR giving*		
	(1a)	(2a)	(3a)	(1b)	(2b)	(3b)
Alpha (envy)	-0.087	-0.068	-0.124	-0.008	0.008	0.104
	(0.108)	(0.103)	(0.411)	(0.048)	(0.051)	(0.160)
Beta (compassion)	0.470***	0.409***	1.613***	0.240***	0.213***	0.777***
	(0.101)	(0.105)	(0.444)	(0.040)	(0.041)	(0.169)
Age		0.000	-0.009		-0.010	-0.013
		(0.088)	(0.088)		(0.031)	(0.032)
Age^2		0.000	0.000		0.000	0.000
		(0.001)	(0.001)		(0.000)	(0.000)
Male		-0.272	-0.324		0.266**	0.228*
		(0.420)	(0.423)		(0.132)	(0.136)
Household size		0.025	0.025		-0.016	-0.013
		(0.175)	(0.177)		(0.048)	(0.048)
Number of children		0.252	0.250		-0.102	-0.103
		(0.247)	(0.245)		(0.099)	(0.099)
[€1000, €2000)		-0.452	-0.460		-0.465**	-0.465**
		(0.602)	(0.609)		(0.218)	(0.221)
[€2000, €4000)		-0.679	-0.636		-0.550***	-0.529**
		(0.635)	(0.641)		(0.210)	(0.214)
≥ €4000		-2.042*	-1.896*		-0.587**	-0.508**
		(1.049)	(1.044)		(0.252)	(0.254)
Secondary educ		-0.170	-0.141		-0.121	-0.118
		(0.610)	(0.615)		(0.268)	(0.272)
University educ		0.620	0.611		-0.208	-0.219
		(0.592)	(0.587)		(0.251)	(0.256)
Single		-0.390	-0.389		-0.652***	-0.629***
		(0.855)	(0.858)		(0.241)	(0.241)
Cohabiting		-0.214	-0.163		-0.247	-0.192
		(1.376)	(1.393)		(0.379)	(0.385)
Divorced/separated		1.292*	1.371*		0.069	0.127
		(0.724)	(0.730)		(0.428)	(0.429)
Widowed		-2.201**	-2.234**		0.221	0.217
		(1.019)	(1.019)		(0.392)	(0.390)
Unemployed		-0.888	-0.879		-0.280	-0.279
		(0.588)	(0.586)		(0.216)	(0.208)
Private sector		-0.026	-0.001		-0.144	-0.139
		(0.593)	(0.591)		(0.235)	(0.232)
Self-employed		-0.125	-0.148		0.293	0.280
		(0.824)	(0.813)		(0.313)	(0.315)
Retired		-0.069	-0.034		0.214	0.210
		(0.988)	(1.007)		(0.424)	(0.423)
Healthy		-1.097**	-1.174**		-0.306*	-0.355**
		(0.494)	(0.507)		(0.177)	(0.177)
Smoker		-0.043	-0.060		-0.117	-0.117
		(0.396)	(0.403)		(0.137)	(0.138)
Non-believer		-0.854*	-0.836*		-0.292*	-0.291**
		(0.488)	(0.485)		(0.150)	(0.148)
Effort		1.684***	1.709***		0.357**	0.350**
		(0.644)	(0.642)		(0.162)	(0.157)
Trust-others		0.286	0.295		0.271*	0.267*
		(0.505)	(0.505)		(0.155)	(0.155)
Trust-institutions		-0.048	-0.033		0.267*	0.269*
		(0.441)	(0.436)		(0.139)	(0.141)
Volunteer		0.027	0.035		0.069***	0.072***
		(0.042)	(0.042)		(0.026)	(0.024)

	(1a)	(2a)	(3a)		(1b)	(2b)	(3b)
High self-esteem		-0.116	-0.178			-0.009	-0.025
		(0.380)	(0.379)			(0.140)	(0.142)
Cons	5.891***	7.159**	8.230***				
	(0.625)	(2.797)	(2.719)				
F / Chi^2	11.10***	3.23***	2.94***		36.85***	154.73***	171.99***
Pseudo R^2					0.0190	0.0400	0.0378
Observations	759	759	759		759	759	759

Notes: Tobit estimates with left and right censoring for DG giving in columns (1a)-(3a); ordered logit estimates for SR giving in columns (1b)-(3b). In columns (3a) and (3b), alpha and beta are included as binary variables. Robust standard errors clustered on interviewers are presented in parentheses. *, **, *** denote significance at the 10, 5 and 1 percent level, respectively.

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