

# The Impact of Self-Perceived Relative Income on Life Satisfaction: Evidence from British Panel Data

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This is the first article that uses panel data to investigate the impact of individuals' self-perceived relative income on life satisfaction. Analyses show that the self-perceived relative income has a significant impact on life satisfaction, but the impact is asymmetric. The decline in life satisfaction is much more significant due to perceiving a lower relative income in comparison to the rise in life satisfaction because of perceiving a higher relative income. Absolute income is only significantly and positively associated with life satisfaction in the pooled ordinary least squares estimations, but the association is never significantly different from zero when individual fixed effects are controlled. Household savings have a positive but small impact on life satisfaction. Among different financial-related shocks, people's self-perceived relative income varies the most due to changes in household net income, total savings, and employment status.

**JEL Classification:** C23, C25, D31, D63, I31, J31, Z13

## 1. Introduction

A burgeoning literature investigates the role of income comparisons in determining subjective well-being (SWB) (e.g., Hamermesh 1977; Clark and Oswald 1996; Clark, Frijters, and Shields 2008). One set of studies found that having higher (lower) income than a reference group leads to higher (lower) SWB for individuals, including job satisfaction (e.g., Hamermesh 1977; Cappelli and Sherer 1988; Clark and Oswald 1996; Gao and Smyth 2010), financial satisfaction (e.g., Clark, Senik, and Yamada 2013), and life satisfaction or happiness (e.g., McBride 2001; Blanchflower and Oswald 2004; Ferrer-i-Carbonell 2005; Luttmer 2005; Clark, Frijters, and Shields 2008; Clark and Senik 2010). For example, using cross-sectional data from the British Household Panel Survey, Clark and Oswald (1996) find that overall work satisfaction of an individual is significantly and negatively correlated with the estimated wage level of the respondents' co-workers. Using individual level panel data from German Socio-Economic Panel, Ferrer-i-Carbonell (2005) shows that an individual's general life satisfaction is negatively correlated with the average income level of the reference group, but that it is positively correlated with the distance between their own income and the reference group's income. Oshio, Nozaki, and Kobayashi (2011) draw similar conclusions using General Social Survey data from China, Japan, and South Korea.

Despite the consensus in the results of previous studies, one major shortcoming is that the identification of the income or wealth of the reference groups was rather arbitrary. In these studies, a common method of defining the income of the reference group was to treat all people in a category (usually defined by the researcher based on age, gender, profession, etc.) as the reference group and to use the average income of the group as the comparison benchmark (e.g., McBride

2001; Blanchflower and Oswald 2004; Luttmer 2005; Distante 2013; Peng 2017). This group-average approach of income comparison might be problematic, however, because the selection of the reference group is rather arbitrary, the relevance of the reference group defined this way may be questionable. In fact, using multiple data sets, Pfaff (2013) shows that using the group-average reference income approach tends to obtain estimates with different inferences and signs. In contrast to this approach, there is evidence suggesting that people are more likely to compare their incomes to local reference groups such as friends and colleagues, rather than with general social groups, such as the average income of the city where they live (e.g., Mayraz, Wagner, and Schupp 2009; Senik 2009; Clark and Senik 2010; Clark, Senik, and Yamada 2013).

Alternatively, McBride (2001), Van Praag (2011), and Pfaff (2013) suggest that self-perceived relative income is a better measure of relative income. As stated in McBride (2001), “[I]deally, a direct measure of relative income is the relative income perceived by the individual himself/herself.” Evidence using self-perceived relative income has been rare until recently due to the lack of available data.

Since Senik (2009), a handful of recent studies employ data on self-perceived relative income positions to provide evidence showing that income comparison is important in determining SWB. For example, using the Life in Transition Survey, which covers 28 post-transition countries, Senik (2009) provides direct evidence on the effects of relative income on well-being. In the survey, respondents reveal their level of agreement with statements indicating that they have done better than their high school classmates, their colleagues, their parents, or their lives back in 1989. Interviewees can choose answers ranging from “strongly agree” to “strongly disagree.” Using data on these questions, the author utilizes direct measurement of relative income against different reference groups. She finds that local reference groups, such as one’s former high school classmates or colleagues, are more important than self-ranking in the social ladder when explaining the relationship between relative income and life satisfaction. She also suggests that if they believe they do better than these reference groups, the respondents in her sample have higher life satisfaction.

Mayraz, Wagner, and Schupp (2009) take advantage of a novel question in the 2008 pretest module of the German Socio-Economic Panel Study (SOEP). The question asks respondents to rank their relative income against various reference groups that consist of people who have the same gender, the same profession, or the same age as the respondent, as well as of the respondent’s co-workers, friends, or neighbors. Their results suggest that relative income is significantly correlated with life satisfaction for men but not for women. They also suggest that living in a high-income neighborhood increases happiness.<sup>1,2</sup>

Yet, using self-perceived relative income positions faces the potential endogeneity problem caused by omitted variables in finding causal links between relative income and SWB. As discussed in Senik (2009), omitted variables, especially unobservable personality traits that have been shown to be important determinants of SWB (e.g., Emmons and Diener 1985; Diener, Oishi, and Lucas 2003), may cause potential endogeneity problems, such as reverse causality. For instance, people with higher SWB are more likely to report higher self-perceived relative income. Ferrer-i-Carbonell

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<sup>1</sup> Some more examples are Knight, Song, and Gunatilaka (2009), De la Garza et al. (2012), Dumludag (2014), Asadullah, Xiao, and Yeoh (2018), Goerke and Pannenberg (2015); Wolbring, Keuschnigg, and Negele (2016), Huang et al. (2016), and Reyes-Garcia et al. (2016).

<sup>2</sup> In another line of research, Chang (2013), Falk and Knell (2004), and some other studies find a positive correlation between relative income and SWB. They bridge the correlation between relative income and SWB through the identity channel. They suggest that an increase in relative income leads to self-improvement or an enhancement in self-identity where an individual gains positional identity and a higher level of SWB.

and Frijters (2004) and Knight, Song, and Gunatilaka (2009) both suggest that exploiting panel data to control for time-invariant personality traits is crucial to acquire consistent estimates of relative income on SWB.

Therefore, to address the endogeneity problem discussed above, and to provide more evidence that is closer to a causal finding, I contribute to the literature by providing the first piece of evidence by employing panel data to mitigate the endogeneity problem caused by unobservable personality traits while examining the impacts of self-perceived relative income on SWB. One concern regarding this approach is that some individual unobservables may change over time, although in this study, this is less of a concern because the data contain only elderly people who are less likely to have significant changes in their personalities.<sup>3</sup> In addition, these elderly people were interviewed by the survey administrators within a short time period.<sup>4</sup> Therefore, the estimation based on the panel data should arguably hold constant a significant amount of the personality traits that may affect both the outcome and the main explanatory variables.

This article also enriches the relative income-SWB literature by providing direct evidence from the United Kingdom by utilizing information on self-perceived relative income. In this article, I collect data from the English Longitudinal Study of Aging (ELSA), which is a nationally representative study targeting the elderly in Britain. In the data of ELSA, a set of questions were asked regarding an individual's SWB and self-perceived income positions. Specifically, survey respondents reported their general life satisfaction and self-perceived relative income in comparison with their friends, colleagues, and neighbors.<sup>5</sup> Potential determinants of self-perceived relative income are also investigated in the present article.

This study also benefits from the large sample size of the ELSA data. Most of the previous studies in the literature employed small data samples with fewer than 1000 observations. This study is based on a data sample of more than 20,000 observations, which ensures greater precision of the estimations.

The main findings of the article are as follows. First, favorable self-perceived income positions in comparison to friends, colleagues, and neighbors are significantly and positively related to life satisfaction. Higher self-perceived relative income raises individual life satisfaction. Second, the impact of income comparisons on life satisfaction is asymmetric. People respond more strongly to unfavorable relative income positions than to favorable ones. In other words, people are more dissatisfied with lower relative income than they are happy with a higher relative income. Third, the

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<sup>3</sup> While personality traits have been found to develop over time in the psychology literature, see Roberts, Wood, and Caspi (2008) and Read et al. (2006) as examples for evidence suggesting that personality traits are more stable for people in older age. For instance, Roberts, Wood, and Caspi (2008) stated that "people become more socially dominant, agreeable, conscientious, and emotionally stable with age," which is known as the "maturity principle" in the personality psychology literature.

<sup>4</sup> More than half the survey respondents were interviewed more than once in four years. The rest of them finished several interviews in six years.

<sup>5</sup> Another line of research (e.g., Van Praag 1971; Van Praag and Frijters 1999; Stutzer 2004; Stutzer and Frey 2004) studies people's income aspirations and welfare (happiness) employing data on explicitly measured relative income (originated at the Leyden school headed by Bernard Van Praag and known as the Leyden approach). The Income Evaluation Questions employed in these studies ask survey respondents to report their standard for being "good" or "bad" in terms of income and/or their desired level of income which is sufficient to meet their needs (income aspiration). Relationship between people's income aspirations (internal income comparison) and welfare (happiness) and determinants of income aspirations are investigated in these projects. Differently, the self-perceived relative income against various reference groups, including friends, colleagues, and neighbors, show an individual's understanding of his/her position in income comparisons to *others*. Therefore, my study fits in the latter literature which emphasize on understanding income "comparisons" against different reference groups consisting of other people (external income comparison) and SWB.

results suggest a positive but relatively weaker correlation between absolute income and SWB. Specifically, absolute income is only significantly and positively correlated with life satisfaction in the pooled ordinary least squares (OLS) estimations, but the relationship is never significantly different from zero when individual fixed effects are controlled. The results also show that absolute household savings is positively correlated with life satisfaction, but the magnitude of the association is small. Fourth, estimates of self-perceived relative income from fixed effects regressions are in accordance with those obtained from pooled OLS estimations in the present article and the previous literature, although the coefficients obtained from fixed effects models are always smaller. This finding confirms that time-invariant personality traits do explain some of people's SWB. The estimates of self-perceived relative income, however, remain both economically and statistically significant even after time-invariant personality traits are controlled. Finally, I find that among employment status, household size, and all the financial-related variables studied in the analyses, employment status and disposable income, including net income and savings, are the most important determinants of self-perceived income. Having higher income and savings as well as being employed lead to a more favorable self-perceived position in income comparisons with friends, colleagues, and neighbors.

The rest of the article is organized as follows. I describe the data in section 2. Section 3 explains the empirical model. Results are reported in section 4. Section 5 presents some robustness checks. I conclude in section 6.

## **2. Data**

The data used in this article are collected from four waves (2004–2005, 2006–2007, 2008–2009, and 2010–2011) of the ELSA. The ELSA is a widely used data set targeting the population of 50-year-old and older people in Britain.<sup>6</sup> ELSA is conducted every two years and nationally representative. ELSA collects detailed information on elderly people's demographics, physical health, and psychological function status, economic conditions as well as well-being. Some households are interviewed over time. Although some households exit the study, and some new households are added, the ELSA maintains a large sample size. I use four waves (wave 2–5) of ELSA in this study because information on self-perceived relative financial situations is provided in these waves. To control for individual-specific personality traits over time, the sample is restricted to respondents who are interviewed in at least two waves of ELSA.<sup>7</sup>

### *Subjective Well-Being*

Since wave 2, ELSA has included information on respondents' self-rated life satisfaction, which is widely used in the literature to measure SWB. Specifically, the respondents were asked to report how much they agree or disagree with the following statement: "I am satisfied with my life."

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<sup>6</sup> Some of the survey respondents interviewed, who are the spouses or offspring of elderly people, are younger than 50 years old. I drop these observations and restrict the sample to people who are at least 50 years old. Including those younger population in the sample does not affect the results (Supporting Information Table S2).

<sup>7</sup> The full sample contains 37,933 observations. When restricting the sample to respondents who are 50 years old or older, 1004 observations are dropped. To restrict the sample to respondents with non-missing information, 9954 observations are dropped. Another 2473 observations are dropped when the sample is restricted to respondents who participated at least in two waves of the survey. Eventually the working sample contains 24,502 observations.

**Table 1.** The Distribution of Answers to the Statement of “I Am Satisfied with My Life”

	Frequency	%
Strongly agree	3733	15.24
Agree	12,473	50.91
Slightly agree	3768	15.38
Neither agree nor disagree	1651	6.74
Slightly disagree	1468	5.99
Disagree	1048	4.28
Strongly disagree	361	1.47
<i>N</i>	24,502	100

Notes: The data are from wave 2 to 5 of the English Longitudinal Study of Aging. The sample is restricted to survey respondents who are at least 50 years old. Respondents who respond to only one wave of the ELSA are dropped.

The choices include i) “strongly agree,” ii) “agree,” iii) “slightly agree,” iv) “neither agree nor disagree,” v) “slightly disagree,” vi) “disagree,” and vii) “strongly disagree.”<sup>8</sup>

Table 1 presents the distribution of the answers to the life satisfaction question. Around 15% of respondents strongly agree and 51% agree that they are satisfied with their lives. In total, about 6% of the respondents disagree or strongly disagree with the statement of being satisfied with his/her life, while the remaining 28% of the respondents only slightly agree, slightly disagree or neither agree nor disagree with the statement. The majority (around 80%) of the sample are satisfied with their lives.<sup>9</sup>

### *Self-Perceived Relative Income*

From wave 2 through the fifth wave of ELSA, survey respondents were asked questions regarding their self-perceived relative financial situations. Specifically, respondents were asked to report their relative income by responding to the following questions: “*Compared to the financial situation of other people living around here (noted as neighbors henceforth)/ most of your friends/ work colleagues, would you say your household is.....*” Respondents may choose an answer among i) “*much worse off*,” ii) “*a bit worse off*,” iii) “*about the same*,” iv) “*better off*,” and v) “*much better off*.”<sup>10</sup> In this article, I use the self-perceived financial situation as a proxy for self-perceived relative income. But “financial situation,” as a broader idea, may cover not only income but also wealth.<sup>11</sup> This is especially true in this study because more than half of the survey respondents in the working sample are retired. To address this concern, I control for the respondents’ total net household savings to account for variations in wealth. It does not affect the results. This suggests that the correlation between an individual’s SWB and relative financial situation is not conditional on the savings or wealth of the individual.

<sup>8</sup> Respondents who do not answer the life satisfaction question and who claim that the question is not applicable to them are dropped.

<sup>9</sup> This figure is consistent with other work using British data. For example, using the data of the British Household Panel Survey for 1996–2007, Distant (2013) shows that around 75% of the sample are very satisfied with their lives. Peng (2017) using the British Household Panel Survey shows similar numbers.

<sup>10</sup> Respondents can also reply to indicate that they do not have friends or work colleagues when the reference group is friends or work colleagues in the survey questions, and I treat these cases as *not applicable*. They can also answer “*I don’t know*” if the respondents are not aware of their relative income compared with the three reference groups of *friends*, *colleagues*, and *people living around here*.

<sup>11</sup> Because wealth is also an important determinant of SWB, the self-perceived relative financial situation could be more desirable than a simple self-perceived relative income when studying income comparisons and SWB.

**Table 2.** The Distribution of Self-Perceived Positions of Income Comparisons

	In Comparison to...		
	Friends	Colleagues	Neighbors
Much better off	726 (3.04)	857 (9.66)	1265 (5.36)
A bit better off	3862 (16.16)	2672 (30.13)	5094 (21.58)
About the same	14,258 (59.65)	3917 (44.17)	12,928 (54.77)
A bit worse off	4131 (17.28)	1111 (12.53)	3565 (15.10)
Much worse off	927 (3.88)	312 (3.52)	752 (3.19)
<i>N</i>	23,904 (100)	8869 (100)	23,604 (100)

Notes: The data are from wave 2 to 5 of the English Longitudinal Study of Aging. The sample is restricted to survey respondents who are at least 50 years old. Respondents who respond to only one wave of the ELSA are dropped. This table does not contain respondents who indicated that they do not know their relative income in comparisons to the reference groups or that they are not applicable to make income comparisons to the reference groups. The sample sizes are slightly different from those in Table 5 because, here, I restrict the sample to respondents who responded to all these questions on self-perceived relative income questions. The results are not affected by the restrictions. The figures in the parentheses are percentages.

Chi-square test of the distribution between answers on *Friends* and *Colleagues*, *p*-value: 0.000.

Chi-square test of the distribution between answers on *Friends* and *Neighbors*, *p*-value: 0.000.

Chi-square test of the distribution between answers on *Colleagues* and *Neighbors*, *p*-value: 0.000.

Friends, colleagues, and neighbors are the three reference groups determined by the ELSA. The predetermination of the reference groups mitigates concerns about people intentionally comparing their income to a specific reference group that has a better or worse financial situation. In addition, employing friends, colleagues, and neighbors as the reference groups is meaningful because these groups have been shown to be some of the most relevant reference groups with regard to income comparisons (e.g., Clark and Senik 2010).

The distribution of respondents’ self-perceived relative income is presented in Table 2. Regardless of the reference group, respondents’ self-perceived relative incomes follow a normal distribution. Approximately 60% of the sample hold the view that when compared to their friends, they have about the same income. The “about the same” category accounts for 44% and 55% of the working sample when the benchmarks are the incomes of colleagues and neighbors, respectively. Around 3–10% of the sample estimate their income to be much higher than the income of the reference groups, while around 3–4% of the respondents report having a much lower income than that of the reference groups. It is noteworthy that only a small share of the sample claim that they do not know their relative income compared with the reference groups. This suggests that income comparison is relevant to most of the population.

In all of the analyses, I control for a set of covariates commonly used in the happiness literature, including age, gender, net income and savings of the household, self-reported health status, marital status, and employment status.<sup>12</sup> To address potential time trend in life satisfaction, wave fixed effects are controlled in all regressions. The summary statistics of these control variables are presented in Table 3. Around 52% of the sample are female. Because the ELSA studies elderly people who are at least 50 years old, the average age of the sample is around 64 years with a standard deviation (SD) of 8.5 years. Approximately 70% of respondents are currently married (including remarried). Another 24% are separated, divorced, or widowed. The remaining 6% are single and never married. More than 80% of the respondents report good to excellent health. Within the sample, about 40% of the respondents were employed last month. The total number of observations in our baseline estimations is 24,502.

<sup>12</sup> Because I employ panel data for the analyses, I only include time-varying covariates. Educational level and the number of children are not included in the estimations because there is no variation in these two variables during the sample period for the elderly people under study.

**Table 3.** Summary Statistics of Covariates

Variables	Details	Mean	Std. Dev.
Total household income	Logged weekly total net household income (including wage, pension, asset income, etc.)	5.920	0.779
Total household saving	Logged total net household savings (including money saved in bank, saving accounts and other safe savings)	8.895	2.694
Female	Dummy variable (=1) if the individual is female	0.516	0.500
Age	Age of the individual	64.03	8.506
<i>Marital status</i>			
Married	Dummy variable if the individual is currently married	0.699	0.459
Single	Dummy variable (=1) if the individual is never married	0.063	0.244
Separated/divorced/ widowed	Dummy variable (=1) if the individual is currently separated with his/her spouse, divorced or widowed	0.238	0.426
<i>Health status</i>			
Excellent	Dummy variable (=1) if the individual reports excellent health	0.173	0.378
Very good	Dummy variable (=1) if the individual reports very good health	0.345	0.476
Good	Dummy variable (=1) if the individual reports good health	0.296	0.457
Fair	Dummy variable (=1) if the individual reports fair health	0.140	0.347
Poor	Dummy variable (=1) if the individual reports poor health	0.045	0.207
Employed last month	Dummy variable (=1) if the individual was employed in the preceding month to the survey interview	0.397	0.489
<i>N</i>		24,502	

Notes: The data are from wave 2 to 5 of the English Longitudinal Study of Aging. The sample is restricted to survey respondents who are at least 50 years old. Respondents who respond to only one wave of the ELSA are dropped. Age is collapsed at 99 if the respondent's age is older than 90 years.

### 3. Empirical Model

To estimate the impact of self-perceived relative income on SWB, I estimate the following equation using pooled OLS:

$$SWB_{i,t} = \alpha_0 + \alpha_1 RY_{i,t} + \alpha_2 \Omega_{i,t} + \lambda_t + \varepsilon_{i,t} \quad (1)$$

where  $RY_{i,t}$  is the main explanatory variable, the self-perceived relative income in comparison to different reference groups of individual  $i$ . Specifically,  $RY_{i,t}$  is a set of indicators representing different relative income positions, including “*much better off*,” “*a bit better off*,” “*about the same*,” “*a bit worse off*,” and “*much worse off*.” In the baseline results,  $RY_{i,t}$  also include “*I don't know*” and “*not applicable*.” I estimate Equation 1 using perceived relative income compared to friends, colleagues, and neighbors separately.

The dependent variable  $SWB_{i,t}$  is a cardinal measure of SWB ranging from 1 to 7, where a higher value stands for a higher level of life satisfaction as described above in section 2.  $\Omega_{i,t}$  is a vector of covariates, including total net household income, total net savings, age, and gender of the

respondents.<sup>13</sup> It also includes respondents' self-reported health status and marital status, as well as recent employment status.  $\lambda_t$  stands for wave fixed effects.  $\varepsilon_{i,t}$  is the error term.

The greatest threat to finding a potential causal link between self-perceived relative income and SWB is that both the outcome and the explanatory variables could be affected by the personalities of respondents. A happier person is more likely to report a higher level of well-being as well as better relative income. Therefore, I estimate the following linear fixed effect model:

$$SWB_{i,t} = \beta_0 + \beta_1 RY_{i,t} + \beta_2 \Theta_{i,t} + \mu_i + \lambda_t + \varepsilon_{i,t} \tag{2}$$

In Equation 2, the dependent variable and the main explanatory variable are individual  $i$ 's life satisfaction and self-perceived relative income status at year  $t$ , respectively.  $\Theta_{i,t}$  is a set of covariates similar to  $\Omega_i$  from Equation 1 except that the gender of the respondent is no longer included due to individual fixed effects.

I exploit individual fixed effects  $\mu_i$  to remove from the estimations the bias caused by unobservable time-invariant personality traits which could be correlated with both SWB and subjective relative income. The identification relies on the assumption that (i) unobservables which affect respondents' SWB and self-reported relative income mainly come from personality traits and (ii) introducing individual fixed effects can largely capture these unobservables so that exogenous variation on self-perceived relative income can be identified. To examine the validity of the fixed effects strategy in the setting in the current article, I conduct two tests. First, if the fixed effects strategy is valid, I should find insignificant association between SWB in the current time period and self-perceived relative income perceived in the future period, conditional on contemporaneous values of self-perceived relative income. Therefore, I reestimate Equation 2 by introducing the leading terms of the self-perceived relative income into the equation. Second, I implement a placebo test where I replace the outcomes in Equation 2 with self-reported health status and reestimate the equation. It is plausible that self-reported health status and self-perceived relative income may be linked through (i) SWB and (ii) some unobservable personal characteristics. I expect to find insignificant association between self-reported health status and self-perceived relative income because the impact from unobservable personal characteristics would be eliminated should the identification strategy be valid, conditional on controlling for SWB. Results of both tests, reported in Tables 6 and 7, suggest that the identification strategy is valid.

In the models depicted by Equation 2, the SWB is treated as a cardinal variable; however, it is widely understood that self-reported happiness or life satisfaction may be treated as ordinal as well. Therefore, in addition to the model depicted by Equation 2, I also consider  $SWB_{i,t}$  as an ordinal variable and estimate an ordered logit model with fixed effects. The results are reported in Supporting Information Table S4.

Lastly, I estimate the following equation to investigate how people's self-perceived relative income responds to changes in financial variables including various types of income, wealth and debt, as well as employment status and household size which may affect the financial situations within a household.

$$RY_{i,t} = \gamma_0 + \gamma_1 FV_{i,t} + \gamma_2 \Theta_{i,t} + \mu_i + \lambda_t + \nu_{i,t} \tag{3}$$

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<sup>13</sup> Total net household income is imputed by ELSA at the benefit unit level. Simply put, the net total income of the household is divided by the number of people who benefit from the income in the household.



In Equation 3, the dependent variables are the self-perceived relative income of respondents. The value of the dependent variable ranges from i) “much worse” to v) “much better.” Therefore, a higher value in the dependent variable indicates a higher level of self-perceived relative income in comparison to the reference groups. I estimate Equation 3 separately for all three reference groups. The main explanatory variable  $FV_{i,t}$  is the set of financial variables, including total household net income, total household net saving, total value of the primary house, total investment, total financial debt, and total primary housing mortgage debt. I also include employment status and household size because these two variables are important determinants of subjectively measured relative income. Similar to the estimations on Equation 2, a full set of time-varying covariates, wave fixed effects, and individual fixed effects are controlled for in all regressions. All standard errors are clustered at the individual level.

## 4. Empirical Results

### *How Important Is Income Comparison?*

Table 4 contains the baseline results showing the impacts of self-perceived relative income positions on an individual’s general life satisfaction. In Table 4, the dependent variable is the cardinal scales of life satisfaction ranging from 1 to 7, where a higher value stands for higher life satisfaction.<sup>14</sup> The omitted category of the self-perceived position in income comparison is the “*much better*” category. Columns 1–3 display the results without including individual fixed effects. Columns 4–6 report results obtained from fixed effects regressions.

In column 1 of Table 4, the reference group is *friends*. The results show that when compared to the “*much better*” (the omitted) group, individuals in all other relative income positions have a lower propensity for being satisfied with their lives. Specifically, the group of individuals who perceive their income to be a bit higher than or about the same as their friends’ are 0.15 and 0.20 points lower in life satisfaction, respectively. Individuals who perceive a bit lower or much lower income than their friends’ are 0.60 and 1.3 points lower in life satisfaction, respectively. The results show similar patterns when the reference groups are work colleagues and neighbors. It is noteworthy that friends and neighbors are seemingly more relevant than colleagues, as the magnitude of the coefficients of income comparison against friends and neighbors are larger than that when colleagues is the reference group. For instance, the negative impact on people’s life satisfaction of perceiving much lower income than their friends’ is around 0.5 points larger in absolute value than that of perceiving much lower income than colleagues’.

People who are not aware of their relative income and those who select being “not applicable” for income comparisons also have significantly lower life satisfaction on average. Among all the control variables, total household income and saving are positively related to life satisfaction, although the magnitudes of the coefficients are rather small compared to those of self-perceived relative income positions. People who are never married and who are divorced, widowed, or separated are much less satisfied with their lives in comparison to the omitted group of people who are married. Better health status is related to

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<sup>14</sup> I also construct the dependent variable as a dummy taking the value of 1 if the individual is “strongly agree,” “agree,” or “slightly agree” with the statement, “I am satisfied with my life,” otherwise 0. The results are displayed in Supporting Information.

Table 4. Self-Perceived Relative Income and Life Satisfaction

Variables	In Comparison to...					
	(1) Friends	(2) Colleagues	(3) Neighbors	(4) Friends	(5) Colleagues	(6) Neighbors
Pooled OLS						
<i>Self-perceived positions of income comparison</i>						
A bit better off	-0.145*** (0.054)	-0.107** (0.051)	-0.179*** (0.043)	-0.038 (0.050)	-0.020 (0.044)	-0.040 (0.038)
About the same	-0.200*** (0.053)	-0.169*** (0.052)	-0.281*** (0.043)	-0.088* (0.051)	-0.013 (0.046)	-0.101** (0.041)
A bit worse off	-0.602*** (0.059)	-0.492*** (0.064)	-0.646*** (0.050)	-0.197*** (0.056)	-0.095* (0.056)	-0.213*** (0.047)
Much worse off	-1.285*** (0.088)	-0.849*** (0.113)	-1.157*** (0.087)	-0.495*** (0.080)	-0.294*** (0.100)	-0.441*** (0.077)
Don't know	-0.522*** (0.089)	-0.354*** (0.092)	-0.549*** (0.067)	-0.243*** (0.081)	-0.138* (0.077)	-0.188*** (0.060)
Not applicable	-1.088*** (0.147)	-0.163*** (0.060)	0.082 (0.256)	-0.375*** (0.136)	0.080 (0.053)	0.224 (0.221)
Female	0.006 (0.023)	-0.002 (0.023)	0.009 (0.023)			
Log (total household income)	0.059*** (0.014)	0.093*** (0.014)	0.066*** (0.014)	0.002 (0.013)	0.008 (0.013)	0.002 (0.013)
Log (total household saving)	0.031*** (0.005)	0.047*** (0.005)	0.039*** (0.005)	0.015*** (0.005)	0.017*** (0.005)	0.016*** (0.005)
50 ≤ age < 60	0.065 (0.284)	0.165 (0.272)	0.047 (0.284)	0.585* (0.310)	0.616** (0.305)	0.611** (0.306)
60 ≤ age < 70	0.321 (0.283)	0.416 (0.271)	0.310 (0.283)	0.730** (0.307)	0.756** (0.302)	0.754** (0.303)
70 ≤ age < 80	0.485* (0.283)	0.603** (0.271)	0.500* (0.283)	0.723** (0.304)	0.756** (0.299)	0.752** (0.300)
80 ≤ age < 90	0.475* (0.281)	0.596** (0.269)	0.495* (0.281)	0.644** (0.298)	0.670** (0.293)	0.664** (0.294)

(Continues)

Table 4. Continued

Variables	In Comparison to...					
	(1) Friends	(2) Colleagues	(3) Neighbors	(4) Friends	(5) Colleagues	(6) Neighbors
	Pooled OLS					
<i>Marital status</i>						
Never married	-0.417*** (0.054)	-0.435*** (0.057)	-0.433*** (0.055)	-0.155 (0.169)	-0.160 (0.168)	-0.153 (0.168)
Widowed/separated/divorced	-0.225*** (0.028)	-0.258*** (0.029)	-0.250*** (0.028)	-0.092*** (0.035)	-0.097*** (0.035)	-0.097*** (0.035)
<i>Self-reported health status</i>						
Very good	-0.208*** (0.023)	-0.203*** (0.024)	-0.200*** (0.023)	-0.052*** (0.020)	-0.053*** (0.020)	-0.051** (0.020)
Good	-0.518*** (0.027)	-0.520*** (0.028)	-0.509*** (0.028)	-0.132*** (0.025)	-0.134*** (0.025)	-0.130*** (0.025)
Fair	-0.874*** (0.038)	-0.912*** (0.039)	-0.883*** (0.038)	-0.250*** (0.037)	-0.252*** (0.037)	-0.246*** (0.037)
Poor	-1.551*** (0.066)	-1.636*** (0.068)	-1.567*** (0.066)	-0.626*** (0.066)	-0.636*** (0.067)	-0.624*** (0.066)
Employed last month	0.019 (0.026)	0.073* (0.040)	0.019 (0.026)	0.009 (0.027)	0.104*** (0.037)	0.014 (0.027)
N	24,502	24,502	24,502	24,502	24,502	24,502
Adjusted R-squared	0.186	0.159	0.177	0.612	0.610	0.611

Notes: The dependent variable is the cardinal life satisfaction ranging from 1 to 7, where higher value stands for higher life satisfaction. The mean of the dependent variable is around 5.44. The omitted category of self-perceived relative income is the "much better off" group. The omitted categories of marital status and health status are the "married" and "excellent" groups, respectively. The omitted age group is age  $\geq 90$ . All regressions also include wave dummies. Standard errors are clustered at the individual level and reported in parentheses.

\*\*\* $p < 0.01$ .

\*\* $p < 0.05$ .

\* $p < 0.1$ .

higher life satisfaction.<sup>15</sup> The results suggest that being employed in the preceding month to the survey interviews does not affect an individual's life satisfaction.

The results using the fixed effects model are presented in columns 4–6 in Table 4. After controlling for individual fixed effects, the positive and monotonic impacts of self-perceived relative income positions on life satisfaction still hold. Better position in income comparisons leads to higher life satisfaction. The coefficients of relative income positions are smaller compared to those obtained from the OLS estimations, however. The hypothesis predicts that personality traits may be correlated with both life satisfaction and self-perceived relative income in the same direction. Hence, the estimates tend to be augmented with the absence of personality traits as covariates. Therefore, the smaller coefficients obtained from fixed effects estimations are in line with the prediction of the hypothesis suggesting that time-invariant unobservable personality traits indeed lead to upward biased results. Once unobservable personality traits are controlled for in the estimations, the coefficients of self-perceived relative income attenuate. The coefficients of relative income in Table 4 columns 4–6 remain significant, both economically and statistically.

Changes in absolute household net income over time have no impact on life satisfaction, but saving is positively correlated with the life satisfaction of elderly people. Possible explanations for the insignificant coefficients of household net income in the fixed effects models are twofold. First, the household income used in the present article is net income which has limited variation over time for a specific individual. This is especially true for the elderly group in our sample. The average value of the changes in individuals' weekly total net income in two consecutive waves is only around 38 pounds among the respondents. Second, in the present article, I differentiate net household income and savings so that I can test for the correlation between "wealth" and life satisfaction as mentioned in section 2. Results suggest that "wealth" (represented here by savings) is strongly and positively associated with life satisfaction. In the previous literature, the income variable is usually the total (gross) household income instead of net income. In the present article, the effect of household income on life satisfaction is largely captured by total household savings in the analyses implemented.<sup>16,17</sup>

The coefficients of total net income are indifferent from zero and statistically insignificant regardless of the reference group, while those of total savings remain positive and significant. I display the results using a life satisfaction dummy as the dependent variable in Supporting Information Tables S5 and S6. The results do not change.

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<sup>15</sup> Because the self-perceived health status used in the analyses is subjective and contemporaneous, it might be more appropriate to use objectively measured health variables. The reason why I employ self-reported health status is threefold. First, self-reported overall health status has been widely used in the literature because self-perceived health status is a strong determinant of an individual's SWB. Similar to the case of relative income, I hold the point that how the respondents understand or feel about their own health status could be more powerful in predicting life satisfaction than does objective health. Second, to examine if the results are sensitive to dropping self-reported health from the equations, I reestimated all the equations excluding the health dummies, and the results remain intact. Results (of Table 4 excluding self-reported health status) using the same sample are reported in Supporting Information Table S1. The results are similar to the baseline results. Third, due to data limit, there is no consistent measure of objective and overall health status of the survey respondents in ELSA.

<sup>16</sup> Dropping total household savings from the estimations doubles the magnitude of the coefficients of household net income, but the coefficients remain statistically insignificant.

<sup>17</sup> In fact, the conclusions on the correlation between absolute income and SWB are divided. A set of studies which employed panel data suggested a significant and positive correlation between household total income and SWB. Their results also showed that once individual fixed effects are controlled for, the coefficient of household income on SWB drops significantly (e.g., Ferrer-i-Carbonell and Frijters 2004; Boyce and Wood 2011). Some studies have found positive but weak or even negative relationship between income and SWB (Diener et al. 1993; Argyle 1999; Distant 2013; Tibesigwa et al. 2016). See Ferrer-i-Carbonell and Frijters (2004) for more discussion.

**Table 5.** Asymmetric Impacts of Self-Perceived Relative Income on Life Satisfaction

Variables	In Comparison to...					
	(1) Friends	(2) Colleagues	(3) Neighbors	(4) Friends	(5) Colleagues	(6) Neighbors
	Pooled OLS			Fixed Effects		
Log (total household income)	0.063*** (0.014)	0.080*** (0.022)	0.070*** (0.014)	0.007 (0.013)	0.009 (0.019)	0.010 (0.013)
Log (total household saving)	0.034*** (0.005)	0.048*** (0.008)	0.040*** (0.005)	0.015*** (0.005)	0.025*** (0.008)	0.016*** (0.005)
<i>Self-perceived positions of income comparison</i>						
Better than friends	0.077*** (0.024)			0.065*** (0.023)		
Worse than friends	-0.519*** (0.028)			-0.142*** (0.026)		
Better than colleagues	0.099*** (0.031)			-0.017 (0.031)		
Worse than colleagues	-0.428*** (0.047)			-0.146*** (0.046)		
Better than neighbors	0.136*** (0.022)			0.067*** (0.022)		
Worse than neighbors	-0.449*** (0.030)			-0.143*** (0.027)		
Wave fixed effects	Y	Y	Y	Y	Y	Y
N	23,908	8869	23,605	23,908	8869	23,605
Adjusted R-squared	0.174	0.113	0.173	0.612	0.604	0.613

Notes: The dependent variable is the cardinal life satisfaction ranging from 1 to 7, where higher value stands for higher life satisfaction. The omitted category of self-perceived relative income is the “about the same” group. Respondents who answered “I don’t know” or “Not applicable” to the self-perceived relative income questions are dropped. A full set of covariates, as those in Table 4, is controlled for but not reported. Standard errors are clustered at the individual level and reported in parentheses.

\*\*\* $p < 0.01$ .

\*\* $p < 0.05$ .

\* $p < 0.1$ .

*Is Income Comparison Symmetric?*

One interesting question is, do people respond to favorable and unfavorable self-perceived relative income status differently? To answer this question, I reestimate Equations 1 and 2 by dividing the positions in income comparisons into two separate categories to indicate that an individual has a better or worse position than the reference group in income comparisons. Hence, people who perceive having about the same income as the reference groups are the omitted category.<sup>18</sup> The coefficients of self-perceived relative income positions are reported in Table 5.

Results suggest that a favorable relative income position perceived by an individual leads to higher life satisfaction of that individual while the unfavorable position has a negative impact on an individual’s life satisfaction. Yet, the impacts of income comparisons are not symmetric. The results show that the unfavorable relative income position has a stronger impact on life satisfaction. The asymmetric effect of income comparisons on life satisfaction is in line with some previous research

<sup>18</sup> In the analyses in Table 5 and onward, I exclude respondents who answered “I don’t know” or “Not applicable” to the self-perceived relative income questions. Including these individuals does not alter the results.

(e.g., Senik 2009; Goerke and Pannenberg 2015).<sup>19</sup> A possible explanation is that people tend to react more to negative than positive information which has been largely proven in the literature on personality and psychology (e.g., Ito et al. 1998; Ohman, Lundqvist, and Esteves 2001).

### *How Does Self-Perceived Relative Income Respond to Finance-Related Changes?*

While the results show a strong impact of self-perceived relative income on life satisfaction, it is also important to understand what may have caused people's perception of their relative income position to change. It is especially interesting to investigate the connections between self-perceived relative income and changes in financial situations of the respondents. I estimate Equation 3 by regressing the cardinal self-perceived relative income on a set of financial variables, employment status, and household size as discussed in section 3.<sup>20</sup> A full set of covariates from Equation 1, wave fixed effects, and individual fixed effects are controlled for in all three regressions. Results are reported in Table 6.<sup>21</sup>

The dependent variables are self-perceived relative income against friends, colleagues, and neighbors in columns 1–3, respectively. The values of the dependent variables range from i) “much worse” to v) “much better.” Therefore, a higher value stands for a better position in income comparisons.

The results suggest that a higher total net income and total savings lead to a more favorable self-perceived relative income position in comparison with the reference groups. For instance, in column 1 of Table 6, the coefficient of total net income is around 0.1. It suggests that a 10% increase in total net income leads to a 0.01 ( $0.1 \times \ln(1.1)$ ) increase in self-perceived relative income on a 5-point scale.<sup>22</sup> Total housing wealth and total investment also have a positive impact on self-perceived relative income, but the impact is smaller than that of total net income and savings. Employment status is positively and significantly correlated with self-perceived relative income. The results suggest that being employed in the preceding month to the survey interview increases an individual's perceived relative income by around 0.06–0.07 points on a 5-point scale. The results suggest no correlation between household size and self-perceived relative income. Total mortgage debt is negatively correlated with self-perceived relative income, but the coefficients are rather small. Financial debt has no impact on self-perceived relative income.

The results generally agree with the findings in Stutzer and Frey (2004), although the results are not directly comparable because the measures of the dependent variables are different in this article and those in Stutzer and Frey (2004). Employing panel data from SOEP, they suggested that higher household income being employed and having a larger household size lead to higher income aspiration, where income aspiration is measured by a specific amount of income that people feel sufficient. Household size is found to be positive but insignificantly correlated with self-perceived relative income as shown in Table 6. The main reason behind this is that the change in household size over time in the sample is rather small with a mean close to zero and SD close to 0.4.

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<sup>19</sup> Using survey data on a group of University of California employees, a recent study by Card et al. (2012) found that employees whose salaries are below the median for their occupation have lower job satisfaction and a higher propensity of looking for a new job while employees with above-median salaries are unaffected. Another study by Fliessbach et al. (2007) on human brain activity and reward-related comparisons found that human brain reacts more strongly to positive results in reward-related comparisons.

<sup>20</sup> Financial variables are in logarithm and the unit is a thousand pound.

<sup>21</sup> Only the coefficients of self-perceived relative income are reported in Table 6 and onward.

<sup>22</sup> The correlation between the financial variables and self-perceived relative income are larger when Equation 3 is estimated using pooled OLS. For instance, a 10% increase in total net income leads to a 0.04-point increase in self-perceived relative income.

**Table 6.** Financial Determinants of Self-Perceived Relative Income

Variables	In Comparison to...		
	(1) Friends	(2) Colleagues	(3) Neighbors
Log (total net income)	0.095** (0.038)	0.078 (0.059)	0.119*** (0.035)
Log (total savings)	0.032*** (0.005)	0.038*** (0.011)	0.044*** (0.006)
Log (total investment)	0.008* (0.004)	0.013 (0.009)	0.018*** (0.004)
Log (total housing wealth)	0.016 (0.010)	0.053*** (0.020)	0.030** (0.012)
Log (total financial debt)	-0.002 (0.008)	-0.005 (0.014)	-0.010 (0.009)
Log (total mortgage debt)	-0.012** (0.005)	-0.009 (0.009)	-0.012** (0.006)
Employed last month	0.073*** (0.019)	0.071 (0.077)	0.057*** (0.020)
Household size	0.053 (0.044)	0.038 (0.071)	0.057 (0.046)
Individual fixed effects	Y	Y	Y
Wave fixed effects	Y	Y	Y
Mean and Std. Dev. of the dependent variable	2.97 (0.78)	3.30 (0.93)	3.11 (0.83)
<i>N</i>	23,904	8869	23,604

Notes: The dependent variables are self-perceived relative income, ranging from i) "much worse" to v) "much better" where a higher value indicates a higher level of relative income in income comparisons against the reference groups. A full set of covariates, as those in Table 4, is controlled for but not reported. Standard errors are clustered at the individual level and reported in parentheses.

\*\*\* $p < 0.01$ .

\*\* $p < 0.05$ .

\* $p < 0.1$ .

The results also indicate that people's perceived relative income positions are more affected by their disposable income such as net income and savings which affect their daily experiences than the value of housing and other forms of assets to which they tend to adapt after acquiring them.

## 5. Robustness Check

### *Testing the Validity of the Fixed Effects Strategy*

As discussed in section 3, I implement two methods to test the validity of the fixed effects strategy which aims to largely capture unobservables which may affect both SWB and self-perceived relative income.

First, I introduce lead terms of the main explanatory variable into Equation 2 and reestimate the equation. If the identification strategy is valid, the association between contemporaneous SWB and self-perceived relative income in the next time period should be insignificant, conditional on the contemporaneous perceived relative income. The results are presented in Table 7. The results clearly show that all the leading terms of self-perceived relative income have insignificant and small coefficients, while the results for the contemporaneous self-perceived relative income are consistent with the baseline results.

The second test is a placebo test where I employ self-reported health status as the outcomes in Equation 2. I expect to find insignificant association between self-reported health status and self-perceived

**Table 7.** Self-Perceived Relative Income and Life Satisfaction Robustness Check: Including Leads of Self-Perceived Relative Income

Variables	In Comparison to...		
	(1) Friends	(2) Colleagues	(3) Neighbors
<i>Self-perceived positions of income comparison</i>			
A bit better off	-0.092 (0.077)	0.040 (0.093)	-0.049 (0.057)
About the same	-0.142* (0.079)	-0.045 (0.096)	-0.093 (0.061)
A bit worse off	-0.254*** (0.086)	-0.208* (0.120)	-0.203*** (0.070)
Much worse off	-0.529*** (0.121)	-0.337* (0.202)	-0.354*** (0.114)
A bit better off (1 wave lead)	-0.048 (0.078)	0.067 (0.083)	-0.060 (0.059)
About the same (1 wave lead)	-0.042 (0.079)	-0.003 (0.085)	-0.050 (0.062)
A bit worse off (1 wave lead)	-0.090 (0.086)	0.022 (0.115)	-0.044 (0.073)
Much worse off (1 wave lead)	-0.036 (0.122)	0.104 (0.163)	-0.059 (0.114)
Individual fixed effects	Y	Y	Y
Wave fixed effects	Y	Y	Y
<i>N</i>	14,501	4529	14,157

Notes: Dependent variable is life satisfaction. A full set of time-variant covariates are controlled for but not reported. Standard errors are clustered at the individual level and reported in parentheses.

\*\*\* $p < 0.01$ .

\*\* $p < 0.05$ .

\* $p < 0.1$ .

relative income should the identification strategy be valid. Table 8 contains the results. The results show an insignificant link between self-reported health and self-perceived relative income as expected.

Therefore, results from both tests support for the validity of the fixed effects strategy I implement in the setting of the current study.

### Gender-Specific Estimations

Some previous studies find completely different patterns between genders. For instance, Mayraz, Wagner, and Schupp (2009) find no correlation between self-perceived relative income and SWB for women, but a strong one for men. I reestimate the fixed effects models estimated in Table 5 using subsamples for males and females separately to test for possible heterogeneity between genders. The results are presented in columns 1–3 and 4–6 in Supporting Information Table S3 for males and females, respectively.

The asymmetric impacts of relative income on life satisfaction are confirmed for both males and females. The estimates show little evidence of heterogeneity by gender.<sup>23</sup>

<sup>23</sup> The coefficients obtained in the male and female subsamples are generally the same. The only pair of coefficients which are statistically different from each other are the coefficients of Better than Neighbors where the  $p$ -value of  $F$ -test for equivalence is slightly lower than 0.05.



**Table 8.** Placebo Test: Self-Perceived Relative Income and Self-Reported Health

Variables	In Comparison to...		
	(1) Friends	(2) Colleagues	(3) Neighbors
<i>Self-perceived positions of income comparison</i>			
A bit better off	0.045 (0.036)	-0.034 (0.038)	-0.008 (0.028)
About the same	0.058 (0.036)	-0.012 (0.040)	0.040 (0.030)
A bit worse off	0.047 (0.040)	0.010 (0.047)	0.047 (0.035)
Much worse off	0.067 (0.051)	0.008 (0.074)	0.052 (0.046)
Individual fixed effects	Y	Y	Y
Wave fixed effects	Y	Y	Y
<i>N</i>	23,904	8869	23,604

Notes: The dependent variable is the self-reported health status. A full set of covariates, including life satisfaction, age, and its square, are controlled for but not reported. Standard errors are clustered at the individual level and reported in parentheses.

\*\*\* $p < 0.01$ .

\*\* $p < 0.05$ .

\* $p < 0.1$ .

### *Fixed Effects Ordered Logit Regressions*

As is described in section 3, the original answers to the survey question on life satisfaction are ordinal, ranging from 1 to 7, indicating the lowest to the highest degree of life satisfaction. As a robustness check, I employ the fixed effects ordered logit model derived by Baetschmann, Staub, and Winkelmann (2015).<sup>24</sup> The results are reported in Supporting Information Table S4.

In general, the effect of an unfavorable relative income position is again larger than that of a favorable one.<sup>25</sup> This asymmetric effect of relative income on life satisfaction is consistent with our previous findings using linear models.

## **6. Conclusions**

This article is the first to control for individual fixed effects while investigating the impact of self-perceived relative income and life satisfaction. Taking advantage of the panel structure of the ELSA data, the study alleviates the endogeneity caused by omitted variables, especially by unobservable personality traits. The results show that self-perceived relative income compared to friends, colleagues, and neighbors is significantly and positively related to life satisfaction. Specifically, higher relative income perceived against various reference groups increases one's propensity

<sup>24</sup> Baetschmann et al. (2015) show that the fixed effects ordered logit estimator introduced by Ferrer-i-Carbonell and Frijters (2004) is generally inconsistent.

<sup>25</sup> It is not possible to calculate marginal effects without making further assumptions for the individual effects using this estimating method. But the statistical significance, the signs, and the relative sizes of marginal effects can be derived from the regression coefficients. The signs of the marginal effects are identical to the signs of the coefficients of the variables of interest (the self-perceived relative income). One can also calculate the relative sizes of the marginal effects by comparing the relative sizes of the coefficients because the relative sizes of marginal effects are equal to the relative sizes of the coefficients.

of being satisfied with his/her life, and vice versa. In addition, the impact of self-perceived relative income on life satisfaction is asymmetric. SWB declines strongly if self-perceived income of an individual is lower than the comparison group, but the increase in SWB is smaller in absolute value when that individual's self-perceived income is higher than the comparison group.

Results from fixed effects regressions are generally consistent with those found in pooled OLS estimations, but the coefficients obtained from fixed effects models are always smaller. Fixed effects ordered logit models and gender-specific analysis both confirm the main findings in the pooled OLS and fixed effects regressions. Absolute income is only significantly and positively related to life satisfaction in the pooled OLS estimations, but never significantly different from zero when individual fixed effects are controlled for. In addition, the coefficients of absolute income are much smaller than those of relative income. These results suggest that higher absolute income does not lead to higher life satisfaction, and that relative income is more important in determining people's SWB. Household savings, however, have a statistically significant and positive impact on life satisfaction according to the results. This is plausible because wealth plays an important role in income comparisons, and this is especially true for elderly people. Nonetheless, the impact of household savings is still much smaller than that of relative income. At last, I find that among employment status, household size and all of the financial-related variables studied in the analyses, employment status, and disposable income, including net income and savings, are the most important determinants of self-perceived income. Having higher income and savings as well as being employed lead to a more favorable self-perceived position in income comparisons against friends, colleagues, and neighbors. Results suggest that people are more likely to judge their relative income according to their disposable income which affects their daily experiences instead of the value of housing and other forms of assets to which they tend to adapt after acquiring them.

The results of this study support the hypothesis that income comparisons against external reference groups, such as friends, neighbors, and colleagues, are relevant and important in determining people's life satisfaction, and that lower relative income has a significant negative impact on life satisfaction. This finding implies that policies that alleviate income inequality, especially those designed for supporting the population who feel disadvantaged in improving their financial situation or even general social status, should be helpful in raising the overall well-being.

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## **Supporting Information**

Additional Supporting Information may be found in the online version of this article.