From Well-being to Consumption

WP 5, Task 5.4, Deliverable 5.4

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Abbreviations and Acronyms

Abbreviation	Fully written
CD	Compensating differentials
CC	Compensating Consumption
CI	Compensating Income
CO2	Carbon dioxide
EDGAR	Emissions Database for Global Atmospheric Research
GDP	Gross Domestic Product
GHG	Green House Gas
LSA	Life satisfaction approach
N2O	Nitrous Oxide
NH3	Ammonia
NMVOC	Non Methane Volatile Organic Compounds
NOX	Nitrogen Oxides
OC	Carbon Monoxide
PM10	Fine Particulate matter 10
PM2.5	Fine Particulate Matter 2.5
QoG	Quality of Governance
SO2	Sulfur Dioxide
SWB	Subjective Well-being
WA	Well-being Approach

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Part 1: The costs of social and environmental degradation in affluent economies

1 Introduction

Economic growth is commonly regarded as a measure of progress, despite it being intended to simply measure the productive capacity of a country. Over the course of the twentieth century, it accompanied improvements in health, education, and living standards. However, environmental and social degradation coupled with the lack of long-run improvements in well-being, showed the limits of growth as a measure of progress (Easterlin and O'Connor, 2022; Jensen et al., 2024; Mikucka et al., 2017; Costanza et al., 2009; Fleurbaey, 2009).

Social comparisons and hedonic adaptation are two main mechanisms proposed to explain why economic growth and changes of subjective well-being are decoupled in the long run (Easterlin, 1974; Clark et al., 2008; Clark, 2016). The main idea is that individual well-being depends on previous achievements and on what others, the so-called reference group, have: if the expectations based on previous achievements are not met, subjective well-being does not grow even in presence of economic growth. Similarly, if individual income grows as much as or less than the one of others, subjective well-being will also decrease despite economic growth. The effects of social comparisons and adaptation for subjective well-being compound with those of defensive consumption, a third mechanism explaining why subjective well-being can stagnate in growing economies (Sarracino and O'Connor, 2023).

As Daly (1998; 1999) notes, growth becomes *uneconomic* when the environmental and social costs it generates exceed its benefits, so that further GDP expansion ultimately reduces net welfare rather than increasing it. These costs, however, are typically invisible to market prices and standard accounts of output. As environmental degradation and social fragmentation erode subjective well-being, individuals turn to private goods and services to defend themselves against this erosion - a phenomenon known as defensive expenditure (Hirsch, 1976) or defensive consumption (Bartolini and Bonatti, 2008). This response creates a feedback loop in which defensive consumption stimulates economic activity and resource use, perpetuating a cycle of growth that feeds on the very social and environmental disruption it helps produce (Antoci and Bartolini, 2004; Bartolini and Bonatti, 2008).

By pushing individuals to consume private goods and services to defend against the depletion of common goods, defensive consumption becomes an engine of economic growth. The depletion of natural and social capital opens the way to new business opportunities to address and buffer their impacts. Air filters and bottled water protect people from pollution; private security and insurance services shield from criminality; home entertainment offers companionship to the lonely; in these examples collective issues become fertile ground for new businesses and stimulate new economic activity which, however, offers an individual patch, without solving the collective problem. What is more, individuals need to work harder to afford the new defensive consumption. As degradation progresses, defensive consumption needs expand, setting people on a defensive treadmill where the protection they gain from their defensive consumption is lost as the erosion of common goods progresses. The economy thrives by offering market solutions to losses that are collectively endured, and thanks to the increased working efforts to afford the new expenditures. This is how defensive consumption explains why, in many affluent societies, declining ecological sustainability, rising stress and mental disorders, eroding social relations, increased loneliness, and flat well-being trends follow economic growth (Dixson-Decleve et al., 2022; Macchia, 2022; Sarracino and Mikucka, 2017).

The theoretical foundations of defensive growth are well established (Bartolini and Bonatti, 2003; Bartolini and Bonatti, 2008), and various studies provided evidence supporting its hypothesis and expectations. However, we still lack estimates of how much consumption and economic output is dedicated to defending well-being against social and environmental degradation. The information typically available in national accounts and social surveys is usually insufficient to distinguish defensive expenditures other forms of consumption.

We address this gap by leveraging the relationship between subjective well-being, aggregate consumption, and measurable societal "bads". Given the difficulty of observing actual consumption behaviour, we adopt a valuation approach based on compensating differentials. Specifically, we estimate the monetary value, in terms of consumption, that would be required to maintain well-being constant in face of increases in social or environmental degradation – what we will refer to in the following as compensating consumption. These estimates capture the shadow cost, akin to the economic concept of marginal rate of substitution, between consumption and public bads. These do not reflect behavioural expenditures, but rather the amount of consumption needed to sustain subjective well-being unchanged in response to increases in social or environmental disruption. As such, these estimates indicate the value of consumption that individuals would have to adopt to protect their subjective well-being in presence of social and environmental degradation, that is the value of defensive consumption. We emphasize that this is a theoretical amount, not the actual money individuals spend for defensive purposes. In a second step, we compare compensating consumption valuations with the compensating income amounts we obtain using the same method, but switching aggregate consumption with aggregate income.

Our empirical strategy is based on a panel of high-income countries observed between 2009 to 2019. We combine subjective well-being data from the Gallup World Poll with macroeconomic indicators of consumption and a selection of social and environmental variables. These include income inequality, mistrust, distress, lack of prosocial behaviour, PM2.5 air pollution and temperature changes from greenhouse gas emissions. These variables are selected not only for their data availability in time, but because they also represent plausible externalities of economic activity with demonstrable effects on well-being.

We contribute to the literature in various ways. First, we contribute to the valuation literature (which we discuss in section 5) by estimating shadow prices for both social and environmental degradation, thus providing an estimate of the value of defensive consumption. This is very different from what has been done in previous literature using compensating differentials. Here, we recognize that the erosion of social and natural resources creates new business opportunities that contribute to "uneconomic" growth. However, such growth is undesirable as it does not benefit well-being, it creates new common degradation, and it establishes a self-reinforcing vicious cycle of growth, degradation and new growth. Our contribution is to provide a first estimate of the value of defensive consumption on total consumption. This is a first step towards the more ambitious goal of establishing how much is the share of the economy dedicated to defensive consumption. If we could get rid of defensive consumption, economic activity – and therefore growth – would be smaller, but it would be compatible with social and environmental sustainability, and with individuals' well-being.

The second value added of our work is that we apply the method of compensating differentials to the Gallup World Poll, an internationally harmonised yet underused dataset for well-being analysis. Third, we estimate compensating differentials with respect to consumption, as well as income, and discuss the implications of the different results we obtain.

Our work further adds to the literature on the limits of GDP as a measure of progress. Trying to establish whether a significant portion of economic activity is defensive would allow us to tell good, creative-led growth from the bad, defensive one, where only the former could contribute to real progress. Recognising this distinction invites us to rethink policy priorities: toward prevention rather than repair, and investing in public goods rather than inciting private coping. It also calls for a reconsideration of what economic indicators should measure: not merely the quantity of output, but the quality of life they enable and the sustainability with which it is achieved (Sarracino and Slater, 2025).

2 Data

The variables of interest for our analysis are subjective well-being (SWB), aggregate consumption per capita, and a number of social and environmental bads. We retrieved these variables from various datasets and merged them in a single, unbalanced panel dataset, covering high-income countries observed between 2009 and 2019. The choice of the period of analysis is dictated by the availability of individual level data on SWB and other socio-demographic controls which are sourced from the Gallup World Poll. We limit our analysis to 2019 to exclude the Covid-19 period during which the relationship between our variables of interest could have been affected in unpredictable ways.

Our dependent variable is the individual level Cantril ladder of life satisfaction, which asks "Please imagine a ladder with steps numbered from zero at the bottom to 10 at the top. The top of the ladder represents the best possible life for you and the bottom of the ladder represents the worst possible life for you. On which step of the ladder would you say you personally feel you stand at this time?".

Aggregate consumption per capita is sourced from the Penn World Table and it measures real consumption at constant 2017 national prices (in million 2017 USD). Data on social and environmental degradation, which we also refer to as “bads”, are derived from multiple datasets and are aggregated as follows:

- *Distress*, an index which we construct as the first principal component of three variables: the country-year share of people who feel pain, worry and stress. These are sourced from the Gallup World Poll, which asks respondents to report whether they felt any of the above feelings the day before (with a yes or no answer). We take the weighted average per country-year of the three variables, that is the share of people who answered “yes” to each of the questions, and we construct the index on the three shares.
- *Lack of pro-social behaviour* is the average of the shares of respondents in each country-year answering “no” to each of three variables sourced from the Gallup World Poll: donating money, volunteering, and helping strangers. Each component is assessed through responses to the question: “In the past month, have you done any of the following? A. Donated money to a charity; B. Volunteered your time to an organisation; C. Helped a stranger or someone you didn’t know who needed help.”
- *Mistrust* measures the share of people who state they do not think others around them can generally be trusted. The variable comes from the Survey Data Recycling (SDR) project, a harmonized dataset of a number of social surveys (Slomczynski et al., 2023). Mistrust is the variable for which we have the least observation, with the series starting in 2009 and ending in 2017. The observations are unbalanced across country-years as the trust question was not asked consistently in all social surveys that compose the SDR, and when asked it is possible it was in different years, with different intervals and in different countries at the time.
- *Gini index of income inequality* is sourced from the Standardized World Income Inequality Database and it measures the Gini of disposable income per country.
- *Temperature changes from GHG emissions:* sourced by Jones and co-authors (2023) this variable measures the temperature changes derived by Green House Gas emissions from anthropogenic activities[1].
- *PM2.5* is a measure of pollution expressed as mean annual exposure (micrograms per cubic meter). Population-weighted exposure to ambient PM2.5 pollution is defined as the average level of exposure of a nation's population to concentrations of suspended particles measuring less than 2.5 microns in aerodynamic diameter, which are capable of penetrating deep into the respiratory tract and causing severe health damage. Exposure is calculated

[1] Temperature changes from GHG emissions is measured as $\Delta T = k\, x \frac{1}{C} x\, E(GHG)$. Here, k is the conversion factor translating emissions into temperature, $E(GHG)$ is the cumulative emissions of GHG by country and year and C is a constant of conversion. This measure of temperature changes only pertains anthropogenic emissions, as all the green-house gases the authors include to estimate temperature changes are derived from economic activity and exclude land use and agriculture. For more details on the measure, please refer to the paper by Jones and co-authors (2023).

by weighting mean annual concentrations of PM2.5 by population in both urban and rural areas[2]. PM2.5 is observed from 2010 onwards.

The choice of these variables as measures of social and environmental bads is dictated by, firstly, availability of data with long enough time-series as well as geographical coverage; secondly, they are all plausibly related to economic activity, and have an adverse effect on subjective well-being.

3 Methods

To compute the monetary equivalent of social and environmental bads we use the method of compensatory differentials. A widespread literature has used the Wellbeing Approach (WA), or Life Satisfaction Approach (LSA), to derive monetary values of non-marketable goods[3]. This method uses subjective well-being measures to derive marginal rates of substitution between non-market goods or bads and measures of income, which can be used to measure the compensating (or equivalent) surplus (Fujiwara, 2013; Frey at al., 2009).

We estimate the compensating surplus in terms of willingness to accept the negative change: compensating surplus is the amount of money, paid or received, that will leave the individual in his initial welfare position following a change in the good (or bad) (Fujiwara, 2013). In our case, we are interested in how much people should consume to accept the negative change, that is, an increase in social and environmental disruption, to maintain their well-being unchanged. Essentially, by measuring the marginal disutility of social and environmental bads, as well as the marginal utility of consumption, we can determine the trade-off between consumption and the bads, and assign the bads a monetary value. Hence, this approach allows to compute the costs of social and environmental degradation, by monetizing the well-being losses caused by these bads.

To implement this method, we investigate the relationship between SWB, consumption and bads using Ordinary Least Squares (linear probability) to estimate the following equation:

$$SWB_{i,c,t} = \alpha + \beta_1\left(Bads_{c,t}\right) + \beta_2\left(Log\ Consumption\ pc_{c,t}\right) + \beta_3 Controls_{i,c,t} + \beta_4 Controls_{c,t} + \lambda_t + u_{c,t} \quad (1)$$

where $SWB_{i,c,t}$ is the subjective well-being of each individual, measured with the Cantril ladder of Life satisfaction, in country c at time t, $\text{Log Consumption } pc_{c,t}$ is the natural

[2] PM2.5 data were sourced in early 2024 from the World Development Indicators via the world bank function on STATA but has since been moved to the WDI archives.

[3] As examples, the wellbeing approach as a valuation technique has been applied to air pollution (Welsch 2002, 2006), aircraft noise (van Praag and Baarsma 2005), climate (Rehdanz and Maddison 2005), terrorism (Frey et al. 2009b), corruption (Welsch 2008), conflict (Welsch, 2008b), and fear of crime (Moore and Shepherd, 2006). For a thorough review of the method's critiques and comparison to hedonic pricing or contingent valuation methods to value public goods and bads please refer to the papers by Levinson (2012), Welsch (2006) and Frey et al. (2004).

logarithm of per capita consumption, and $Bads_{c,t}$ represents a matrix of the social and environmental variables mentioned above, measured as the level of bad in each country-year. λ_t are time dummies and $u_{c,t}$ are standard errors clustered at the country-year level. We further include a set of controls to account for socio-demographic and country characteristics that might affect the relationship between the bads and subjective well-being. In particular, we include a number of individual level controls sourced from the Gallup World Poll, and a number of country level controls. Individual level controls are: age categories (15 to 25, 26 to 45, 46 to 65, and 66+), an unemployment dummy, educational attainment in categories, a dummy for female gender, household size, marital status in categories, income expressed in quintiles, and whether the responded resides in a urban or rural area. Country level controls include the country's unemployment rate and inflation rate to account for the economy and lastly, we include latitude and macro-region dummies.

We regress individuals' SWB on all social bads (Gini, mistrust, lack of pro-social behaviour and distress) in one equation, and in a separate equation we regress SWB on the environmental variables (temperature changes from greenhouse gas and PM2.5). Indeed, when assessing the effect of each variable independently, bads in the same group (social or environmental) might be picking up some of the effects of the other variables. For instance, the effect of Gini on well-being might capture part of the effect of mistrust. However, we have no reason to believe that any of the social bads would be picking up any of the environmental bads' effects on well-being, and vice versa.

To compute the compensating differential, we set $\Delta SWB = 0$, where the Δ can be thought of as the difference between SWB in the "absence" of bad and SWB under an increase in the bad[4], and obtain the following formula for the compensating differential:

$$Compensating\ Differential = \boldsymbol{e}^{\left(\frac{-\boldsymbol{\beta_1}(\boldsymbol{SD_{bad}})}{\boldsymbol{\beta_2}}+\boldsymbol{Log}(\boldsymbol{Consumption})\right)} - \overline{Consumption} \quad (2)$$

This formula represents the *monetary equivalent value* of the bads, that is, the change (the extra dollars to be spent) in consumption necessary to offset a marginal change in any of the bads, accounting for the nonlinear relationship between consumption and SWB. It represents the *compensating consumption*, or the extra consumption necessary to hold well-being constant. In what follows, we represent the change in terms of a standard deviation of each bad, and we compute the monetary equivalent for each bad from the two estimated equations (one on social and one on environmental bads) as keeping the effect of each other bad constant. In appendix A, we also report the results of the eight regressions of WSB on each bad independent of the other (table A4).

[4] Note here that for the sake of explaining the formula of the compensating differentials, we set the Δ to be difference between a situation with no bad to one with a bad. However, in our theoretical framework the bad exists and it increases with economic activity, as per the defensive growth model (Bartolini and Bonatti, 2008).

4 Results

How much should people consume to defend against social and environmental degradation? Table 1 reports the average compensatory consumption amounts over the whole period, as well as the yearly equivalents. Our estimates suggest that compensating consumption ranges between 2061$ and 3170$ for social bads, and between 2688$ and 5035$ for environmental disruption. In particular, we estimate that societies would need to consume 3170$, on average over the 9-year period, to maintain their well-being levels unchanged in face of an increase in one standard deviation in the Gini of inequality. Per year, this means that an increase in Gini is compensated with 352 extra dollars of consumption. This is the highest compensating consumption estimate for the social bads. As for the other bads, among the social disruption variables, one standard deviation increase in distress is valued at 2061$ of extra consumption (229$ per year), the lowest compensating consumption according to our results. Among the environmental variables, our estimates suggest the lowest compensating consumption is for the temperature change from GHG, around 2688$, whereas the compensating amount for PM25, over the 10-year period is 5035 dollars. These compensating consumption values are obtained using the compensating differential formula for the willingness to accept a standard deviation increase in the bad, as expressed in equation (2). These computations are based on the coefficients of consumption and bads resulting from regression 1 and reported in table 1.

Table 1: Compensating consumption value of each bad

	Compensating Consumption	CC x year	Unit Cost
Gini	3170.91	352.32	66.17
Mistrust (share)	2944.85	327.2	21.73
Distress (share)	2061.94	229.1	35.67
No pro-social behaviour (share)	2323.76	258.19	21.53
Temperature changes from GHG	2688.15	268.81	6804.6
PM2.5	5035.09	503.5	33.37

Notes: Compensating consumption is computed as per equation (2). It represents the monetary value (in dollars) of increases in the bads, estimated as the marginal rate of substitution between the bad and log consumption per capita, multiplied by the SD of the bads. The bads' unit costs in the third column are derived by dividing the compensating differential by the number of years and the standard deviation of each bad.

The signs of the coefficients indicate that all the considered bads correlate negatively with SWB in a sizeable and statistically significant way (see Table 2). For instance, a one standard deviation (SD) increase of the Gini index (around 5.32 points in our sample of high-income countries) correlates with a reduction in SWB of 0.199 points on a 0-10 point scale (-0.0377*5.3=-0.199). Similarly, one standard deviation increase in mistrust (15.05 percent) correlates to a decrease in SWB of around 0.18 points. As for the environmental bads, one SD increase in temperatures from GHG (0.039°C) reduces well-being by 0.18 points and one standard deviation increase in PM2.5 (15.08

micrograms per cubic meter) is associated to well-being reduction of 0.34 points. Table A1 in appendix A reports the descriptive statistics of the two analytical samples, as well as the list of countries included in each.

Consumption per capita attracts high and statistically significant coefficients in both regressions. Partial correlations are 1.91 and 2.15 according to the specification. Thus, a 10% increase in consumption correlates to an increase in subjective well-being of 0.18 points on a 0-10 scale (=1.91*ln(1.10)) in the social bads specification, and by 0.23 points in the second specification, column 2 of table 2, with environmental bads.

All control variables mentioned in the previous section are not shown for brevity, but can be found in table A2 in appendix A. In the first specification, shown in column 1 of table 2 in which we regress SWB on social bads, we find that the inflation rate attracts a negative albeit non-statistically significant coefficient, whereas the unemployment rate attracts a very small positive and statistically significant (at the lowest level) coefficient. All other individual level controls attract significant coefficients, with the expected signs. For instance, women are happier on average, being separated or widowed correlates to lower SWB, and unemployed respondents are less happy. In the specification from column 2, in which we regress SWB on the environmental bads, the unemployment rate shows a negative and statistically significant correlation with SWB, and all individual level controls attract similar coefficients to those in column 1.

Table 2: Regression of subjective well-being on social and environmental bads

Cantril ladder of life satisfaction				
	(1)		(2)	
Gini	-0.0377***	(0.00810)		
Mistrust (share)	-0.0124***	(0.00182)		
Distress (share)	-0.0207***	(0.00424)		
No pro-social behaviour (share)	-0.0124***	(0.00216)		
Temp change from GHG (°C)			-4.806***	(0.431)
PM25			-0.0227***	(0.00207)
Log Consumption	1.914***	(0.145)	2.151***	(0.108)
Constant	-10.68***	(1.578)	-15.90***	(1.138)
Time dummies	Yes		Yes	
Controls	Yes		Yes	
N	258923		491286	
Countries	42		47	

R^2	0.202	0.162

Note: *** < 1%; ** < 5%; * < 10%. Standard errors are in parentheses. Individual level controls include age categories, unemployment and educational attainment, gender, household size, marital status, income in quintiles, whether urban or rural resident; Macro level controls include unemployment rate, inflation rate, latitude and macro-region dummies (Europe and Central Asia, Latin America and Caribbean, Middle East and North Africa, North America, Sub-Saharan Africa. East Asia and Pacific is the baseline). Year dummies are included, the period of observation is 2009-2017 in the first sample, and 2010-2019 in the second. Standard errors clustered by country and year are shown in parentheses. The sample is smaller in column 1 as Mistrust is not observed every year. Sample 1 includes 42 countries, sample 2 includes 47 countries. Sample descriptive statistics and country composition are reported in table A1 in Appendix A.

4.1 Comparing compensating consumption and compensating income

Typically, compensating valuations are estimated using the marginal rate of substitution between the public good (or bad, as in our case) and income. Below we report the results of our previous estimation of equation (1) in which we regress SWB on the bads and on the logarithm of GDP per capita, rather than on consumption. The estimated coefficients are shown in table A3. As in table 2, estimated coefficients on both social and environmental bads are all negative and statistically significant. GDP per capita positively correlates to SWB as expected, with coefficients slightly lower than those of consumption. An increase of 10% in GDP per capita correlates to an increase in SWB of between 0.098 (=1.089*ln(1.10)) and 0.116 (=1.522*ln(1.10)) points according to the specification with the social or environmental bads respectively (see table A3 in appendix A).

Table 3 reports the estimated compensating income values. We observe compensating income is much larger than compensating consumption. In other words, the income equivalent, that is, the compensating income individuals would be willing to accept to make up for an increase in the bad is larger than the amount of money they would be willing to spend as compensating consumption. This is equivalent to saying that the consumption value of bads is lower than the income value of the bads.

This likely indicates that people have preferences over saving. Indeed, of what they value their compensating income to be, only part of it would they devote to consumption, whereas the rest is a valuation of their saving preferences. We emphasize that these are not behavioural responses, but rather valuations: it would be wrong to think about the exact difference between the compensating income and consumption as the actual savings. However, this result suggests that people have some propensity to value income more than consumption. A possible explanation is that income buys, at least in part, hope (Pleeging et al., 2021). A higher disposable income allows to address collective problems and insures against the uncertainty of the future, thus buying hope.

Table 3: Compensating income value of each bad

	Compensating Income	CI x year	Unit Value
Gini	10554.8	1172.75	220
Mistrust (share)	8056.48	895.16	59.46
Distress (share)	6121.44	680.16	105.9
No pro-social behaviour (share)	7743.94	860.43	71.77
Temperature changes from GHG	3464.75	346.47	8770.44
PM2.5	21382.33	2138.23	141.75

Notes: Compensating income is computed as per equation (2). It represents the monetary value (in dollars) of increases in the bads, estimated as the marginal rate of substitution between the bad and log GDP per capita, multiplied by the SD of the bads. The bads' unit costs in the third column are derived by dividing the compensating income by the number of years and the standard deviation of each bad.

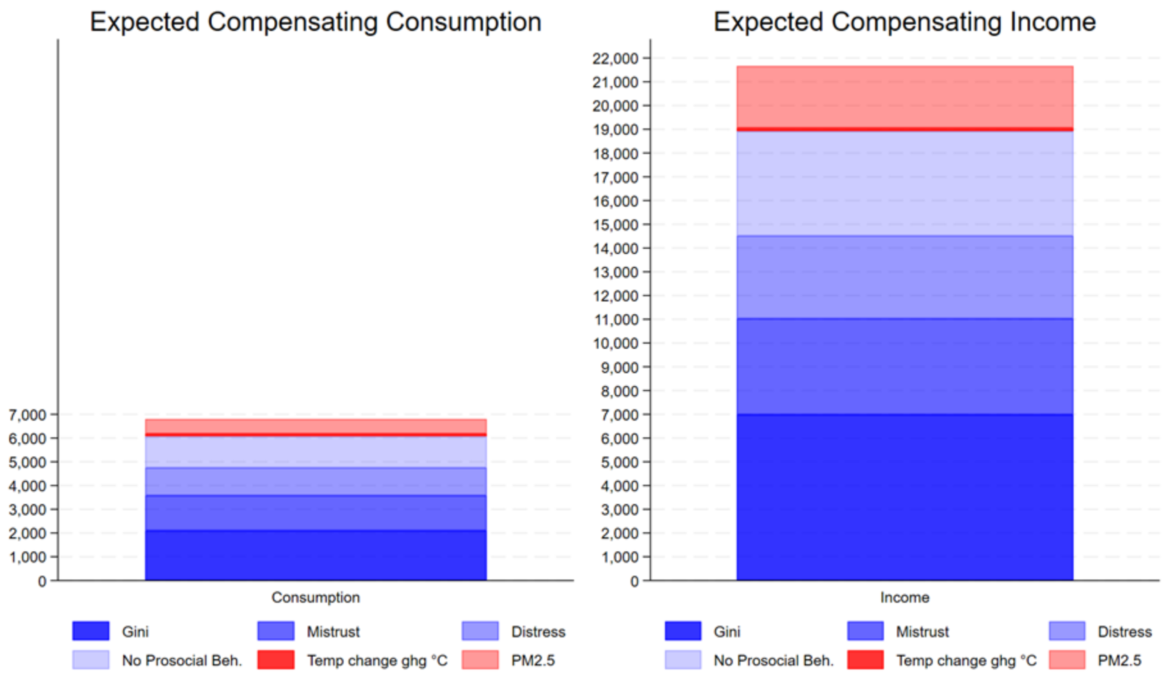
4.2 The expected defensive expenditures in affluent economies

How much are social and environmental disruption worth in affluent economies? To answer this question, we compute the unit cost for each of the bads (column 3 of Tables 1 and 3) as the compensating differential divided by the number of years in which each bad is observed (9 or 10, depending on the bad) and by the standard deviation of the bad. Multiplying each bads' unit cost by its observed value, we obtain an approximation of the expected compensating consumption, that is the cost of social and environmental disruption under the assumption that societies spend exactly what they value for each bad to maintain their well-being.

Figure 1 shows the total values of expected compensating consumption and income from social and environmental bads. The bar on the left is the sum of each of the bads' expected compensating consumption, measured as the unit costs per bad multiplied by the observed bad in our sample. We find that total expected compensating consumption is around 6500 dollars per capita. That is, if everyone spent exactly the value of each bad, and entirely defended themselves from each bad, they would spend around 5600$ on social bads, and 970$ on environmental bads, for a total of 6470 dollars per capita per year. This amounts to around 23% of observed average consumption in our sample, suggesting that a little less than one fourth of actual consumption arises from defensive needs.

Expected compensating income is much larger, reflecting the higher value that people place on increasing social and environmental disruption. Our estimates suggest that if people were to be fully compensated from the existing bads, expected compensating income would be 22000 dollars per capita, around 40% of observed GDP in our sample. Of these, 19000$ would be devoted to compensate for the well-being loss by social bads, and the remaining to compensate from increased temperature changes from anthropocentric GHG emissions and particulate matter.

Figure 1: Expected compensatory amounts in terms of consumption and income



4.3 Robustness check using an alternative measure of environmental bads

Our selection of environmental bads is constrained by data availability. To test the robustness of our results, we estimate the same specifications using an alternative composite measure of environmental pollution. We construct this variable using data from the Quality of Governance (QoG) institution[5], which sources environmental variables form The Emissions Database for Global Atmospheric Research (EDGAR) - Global Air Pollutant Emissions dataset (Povitkina et al., 2021; Crippa et al., 2020). The QoG data includes harmonized, country level data on various anthropogenic greenhouse gas emissions and air pollutants over time. We derive the composite pollution indicator as the first principal component of nine pollutants contained in the EDGAR dataset. These include SO2, PM25, PM10, OC, NOX, NMVOC, NH3, N2O, CO2[6]. The resulting indicator serves as a synthetic measure of the overall burden of anthropogenic emissions capturing variations across multiple pollutants.

We did not include this indicator in our main analysis as its components would be highly collinear with environmental bads we used (PM2.5 and temperature changes from greenhouse gases) and would introduce double counting.

Table 4 shows the results of the two estimated equations of firstly, the Cantril ladder of life satisfaction on the composite pollution indicator and consumption, and secondly of SWB on pollution and GDP. In both specifications, pollution negatively correlates with subjective well-being, whereas both consumption and GDP are both

[5] https://www.gu.se/en/quality-government/qog-data/data-downloads/environmental-indicators-dataset

[6] Cronbach alpha of the composite indicator is 0.94, suggesting a good sorting of the variables. Pollutants are: Sulfur dioxide, Fine particulate Matter (10 and 2.5), Carbon Monoxide, Nitrogen Oxides, Non-Methane Volatile Organic Compounds, Ammonia, Nitrus Oxide, Carbon Dioxide.

associated with higher SWB. Table A5 in Appendix A shows the full table, including control variables.

Our results suggest the compensatory consumption values are 286$ per capita per year, higher than both the consumption valuations of temperature changes from GHG and PM2.5. Compensatory income values instead amount to 508$, higher than that of temperature changes, but lower than income valuations for PM2.5.

Table 4: Regression of subjective well-being on a composite pollution indicator

	Cantril ladder of life satisfaction			
	(1)		(2)	
Pollution indicator	-0.000265***	(0.0000237)	-0.000163***	(0.0000219)
Log consumption	2.290***	(0.109)		
Log GDP pc			1.182***	(0.0987)
Constant	-17.68***	(1.145)	-6.795***	(1.066)
N	495491		495491	
R2	0.152		0.137	
Controls	Yes		Yes	

Note: *** < 1%; ** < 5%; * < 10%. Standard errors are in parentheses. Individual level controls include age categories, unemployment and educational attainment, gender, household size, marital status, income in quintiles, whether urban or rural resident; Macro level controls include unemployment rate, inflation rate, latitude and macro-region dummies (Europe and Central Asia, Latin America and Caribbean, Middle East and North Africa, North America, Sub-Saharan Africa. East Asia and Pacific is the baseline). Year dummies are included, the period of observation is 2009-2019. Standard errors clustered by country and year are shown in parentheses. The sample is smaller in column 1 as Mistrust is not observed every year. Sample 1 includes 42 countries, sample 2 includes 47 countries. Environmental pollution indicator the first principal component of 9 separate pollution variables sourced from the EDGAR dataset. The variables are SO2, PM25, PM10, OC, NOX, NMVOC, NH3, N2O, CO2. Alpha coefficient reliability of the indicator is 0.94.

5 Our Results in Context

The life satisfaction approach provides an alternative to traditional valuation methods such as contingent valuation and hedonic pricing, both of which have been widely used to estimate the monetary value of non-marketable goods and bads. Contingent valuation, a stated preference technique, elicits individuals' willingness to pay (WTP) for an improvement or their willingness to accept (WTA) compensation for a deterioration of a given good by directly asking them through surveys (Mitchell & Carson, 1989). While widely applied in environmental and public economics, this approach is susceptible to hypothetical bias, as respondents may overstate or understate their valuations depending on the framing of questions, strategic incentives, or the difficulty of accurately pricing intangible benefits (Hausman, 2012). Alternatively, the hedonic pricing method infers the value of non-market goods from observed market transactions, such as variations in property prices reflecting differences in environmental quality or exposure to disamenities, and it assumes that perfectly mobile individuals would relocate to better housing with better amenities (Rosen, 1974). This method, however, requires strong assumptions about market efficiency and individuals' ability to perceive and act upon differences in non-market attributes, which may not always hold.

In contrast, the life satisfaction approach overcomes these limitations by leveraging self-reported well-being measures as a proxy for utility. By regressing life satisfaction scores on income and non-market factors of interest (such as environmental quality or social conditions) we can derive implicit monetary valuations based on how changes in these factors correlate with subjective well-being (Frey et al., 2010; Welsch, 2006). This method does not require individuals to explicitly assign a monetary value to non-market goods, reducing the cognitive burden and potential biases associated with contingent valuation surveys. Moreover, it captures individuals' actual experiences rather than their hypothetical choices, making it suited for assessing public goods and externalities that lack a market.

Despite its advantages, the life satisfaction approach has limitations, as it relies on the assumption that reported well-being accurately reflects true utility and that income has a stable and comparable marginal effect across individuals and contexts (Diener et al., 1999; Frey and Stutzer, 2000; Veenhoven, 1993). Nonetheless, it provides a complement to other valuation methods and enhances our understanding of the welfare costs associated with environmental and social disruptions. The paper from Welsh and Kuhling (2009) provides a thorough discussion of the life satisfaction approach used in the literature of valuation of non-market goods, as well as a review of the literature.

Many scholars in the literature adopted the well-being approach to estimate the value of social, non-market goods and bads. Frey et al. (2009b) estimate that the compensating surplus, or the necessary income to forego terrorism, amounts to \$2,150 and \$7,641 per capita per year in France and the British Isles, respectively. Similarly, Clark and Oswald (2002) estimate the costs of widowhood at £170,000 per capita per year, while the cost of falling unemployed is significantly higher at £276,000, based on a sample of UK individuals between 1991 and 1997. Using data from the British Household Panel Survey, Powdthavee (2008) finds that an increase in social involvement (measured as frequency of meetings with friends and neighbours) has the same SWB value as an additional £85,000 per year. Moreover, Murtin et al. (2017) determine that households would be willing to forgo half of their income (approximately \$2,614 in their sample) to avoid a 1% increase in unemployment. Additionally, other findings suggest that the monetary compensation required for increased unemployment is approximately \$200 per capita per year, while inflation costs around \$70 per capita annually (Di Tella et al., 2003).

The well-being approach has been used to estimate the value of the environment as well. For instance, Welsch (2002) estimates that individuals require \$70 per year per capita to accept a 1-kiloton per capita increase in nitrogen dioxide emissions. Similarly, Di Tella and MacCulloch (2008) find that an increase of one standard deviation in sulfur dioxide (SO2) emissions correlates with a decline in happiness equivalent to a 17%

reduction in income. Several studies employ happiness measures to value air quality improvements. Welsch utilizes various cross-sectional and panel data at the country level, finding that reductions in nitrogen dioxide and lead pollution in Europe from 1990 to 1997 were valued at $750 and $1,400 per capita, respectively, in 2008 dollars (Welsch, 2006). Levinson (2012) estimates that the marginal willingness to pay for an increase in PM10 air quality is $459, which equates to spending $18 per day to achieve a one standard deviation reduction in PM10 levels.

Other studies highlight the economic burden of social and environmental stressors. Powdthavee (2008) estimates the cost of crime in South Africa at $240 per month, while Van Praag and Braasma (2005) determine that the required monthly compensation per household for airport noise in the Amsterdam region ranges between €17 and €57. Welsch (2008) calculates that the average monetary value of corruption is approximately $900 per capita per year, based on a sample of around 50 countries. Furthermore, Brown (2015) finds that the economic cost of ill-health amounts to an annual loss of $41,650 per capita in a sample of U.S. individuals between 1975 and 2010.

The yearly compensating amounts that we estimate in this paper range between 229 and 503 dollars per year for the consumption values, and between 350 and 2000 dollars for compensating income values. Overall, our estimates are line with monetary valuations of, especially, environmental variables derived in the cross-country literature. However, within-country studies report larger compensating income variations than those identified in cross-country studies.

6 Conclusion

In this paper we estimate the monetary valuation of selected social and environmental bads in affluent economies. Using a compensating differential approach, we estimate the amount of per capita consumption required to maintain well-being in the face of increased social and environmental bads. Our results suggest that individuals in high-income countries would require between $200 and $500 per year in additional consumption to offset the well-being loss associated with one standard deviation increase in these bads.

Importantly, our approach allows us to measure the monetary equivalent of the well-being loss attributable to social and environmental degradation. These figures reflect a monetary valuation and should be interpreted as shadow prices for societal bads, revealing the compensating consumption necessary to preserve subjective well-being in deteriorating conditions. Under the assumption that people defend themselves from the degradation that surrounds them, we compute the expected amount of compensatory defensive consumption. This amounts to around 6500 dollars in our sample of high-income countries observed between 2009 and 2019.

The idea of defensive consumption is not new: authors have defined defensive consumption as the amount of money people spend on private goods and services to compensate for the degradation of the common resources that surrounds them. When lack of cooperation makes it impossible for economies to solve the collective good problems, individuals resort to private solution to take care of themselves and their loved ones. Whereas this theory is extensively theoretically discussed (Bartolini and Bilancini, 2008), an estimate of the size of defensive consumption is still missing.

Our results provide an idea of the necessary amount of consumption needed for people to maintain their well-being in face of the decreasing quality of public goods such as the environment and social relations. If people consumed exactly what they value the protection from each bad to be, expected defensive consumption from the bads we observe would amount to 23% of total observed consumption in our sample. Given we only observe a selected number of bads, we argue that the total amount of defensive consumption is probably higher.

Our findings carry significant implications for how we conceptualize economic growth. If a meaningful portion of total consumption is defensive, that is, aimed at compensating for deteriorating public goods, then part of GDP is also defensive. In this light, GDP can be understood as comprising both non-defensive (creative) and defensive components. Yet only the former benefits well-being. This distinction is essential for rethinking our understanding of progress. A society growing rapidly due to increased sales of defensive goods may show high GDP figures but simultaneously be failing in terms of well-being, trust, or ecological integrity. A non-defensive growth, even if slower, may better align with the goals of sustainability and human flourishing. It would emphasize prevention and the maintenance of public goods, rather than private coping mechanisms. Recognizing the defensive dimension of consumption has important policy implications. Rather than relying on market-based private solutions to compensate for degraded environments and fraying social cohesion, public investment in prevention and public goods such as clean air, social trust and green spaces may be both more efficient and more equitable. These investments can reduce the need for defensive expenditures, freeing up resources for creative, productive, and life-enhancing uses.

Our results signal that a significant part of economic activity is potentially driven by the need to defend well-being against rising social and environmental pressures. If left unaddressed, this pattern may further stimulate a growth model that is both unsustainable and self-defeating. A new model of progress, one that tracks the quality and sustainability of life, rather than just the quantity of output, is needed.

Part 2: Social Capital Shapes the Relationship Between Well-being and Spending

1 Introduction

Is there a trade-off between achieving good lives and protecting the environment? This question is central to modern economic organization. So far, increasing the production and consumption of goods and services has been the main approach to improving lives, but it has come at a significant environmental cost. For example, the 2024 United Nations report on progress toward the Sustainable Development Goals (SDGs) showed that countries around the world made little or no progress—and in some cases even moved backward—on the three goals related to environmental quality.[7]

The scientific community has been sounding alarms about the environmental consequences of modern economic systems since the 1970s. At present, two main strategies are prevailing: green growth and degrowth. The supporters of green growth maintain that technological innovation will help separate economic growth from resource consumption and environmental impact. Degrowth proponents argue that limiting production and consumption is necessary to preserve resources for future generations. However, both approaches have limitations. A third strategy has emerged more recently: neo-humanism (Sarracino and O'Connor, 2023). This approach suggests that placing well-being at the center of public decision-making can foster both social and environmental sustainability in creativity-driven economies, with a particular focus on the role of social relationships, or social capital. For instance, when trust in others and institutions is high, people are more inclined to cooperate on shared goals, such as environmental protection, and attach less importance to social comparisons (Bartolini et al., 2023), a driver of conspicuous consumption. Moreover, happier individuals may increase consumption when their social relations are scarce (Huang & Li, 2023; Mead et al., 2011); however, as social resources grow, the need to consume diminishes. Strengthening social bonds can therefore contribute to fostering socially and environmentally sustainable societies.

To date, however, the link between well-being and consumption—especially the moderating role of social relationships—has received relatively limited attention. In this paper, we examine how SWB, specifically life satisfaction, influences household consumption expenditures. While most existing studies explore how consumption affects well-being, we focus on the reverse relationship, with particular attention to how social capital shapes this association. Specifically, we test the following two hypotheses:

1. SWB is positively associated with consumption expenditures among individuals with scarce social relationships.

[7] https://unstats.un.org/sdgs/report/2024/The-Sustainable-Development-Goals-Report-2024.pdf

2. As social capital increases, this positive relationship between SWB and consumption expenditures weakens or may even reverse.

One key concern is that unobserved individual characteristics—such as personality traits or long-standing preferences—may simultaneously influence social capital, SWB, and consumption expenditures. To address this issue, we apply fixed effects panel regressions to data from the 2006–2010 waves of the Household, Income, and Labour Dynamics in Australia (HILDA) survey. This is an individual level panel dataset that provides a rich battery of information on household spending, social relations and SWB. We consider total household consumption expenditures, as well as basic and conspicuous consumption expenditures, and three indicators of social capital: social support, low loneliness, and active group membership. We find that, in general, there is no significant association between life satisfaction and consumption expenditures. However, an increase in life satisfaction is associated with an increase in consumption expenditures for individuals with poor social lives. As social support increases and loneliness decreases, the relationship between life satisfaction and consumption expenditures turns negative. This result lends support to the view that well-being and consumption are associated when social relations are scarce; when social resources increase, higher well-being does not necessarily lead to greater consumption. In other words, there is no trade-off between thriving lives and environmental protection.

The remainder of the paper is structured as follows. Section 2 reviews the relevant literature. Section 3 describes the data and outlines the methodology used in the analysis. Section 4 presents the main results, including robustness checks and heterogeneity analyses. Section 5 concludes with a discussion of the key findings and their policy implications.

2 Literature Review

There has been extensive discussion on how material living conditions affect subjective well-being (SWB), with most research focusing on the role of income. Although country-level studies have not reached a consensus on the relationship between income and SWB (e.g., Easterlin, 1974; Easterlin, 1995; Easterlin et al., 2010; Easterlin & O'Connor, 2022; Hagerty & Veenhoven, 2003; Stevenson & Wolfers, 2008), within-country studies generally find a positive, albeit moderate, effect of income (e.g., Blanchflower & Oswald, 2004; Jebb et al., 2018; Kingdon & Knight, 2007; Luttmer, 2005). More recently, there has been a growing body of literature examining how consumption expenditures influence SWB. Studies suggest that total household spending has a positive, though moderate, impact on life satisfaction (Headey et al., 2008; Guillen-Royo, 2008; Noll & Weick, 2015). Some research also indicates that life satisfaction increases with conspicuous spending but not with spending on basic goods or services (Perez-Truglia, 2013; Zimmermann, 2014; Wu, 2020).

However, relatively little is known about the reverse relationship—how SWB influences material living conditions. Some studies have shown that individuals with higher levels of SWB tend to earn higher incomes later in life (De Neve & Oswald, 2012; Graham et al., 2004; Marks & Fleming, 1999). The evidence on how SWB influences consumption expenditures, however, is mixed. Guven (2012) found that happier individuals in the

Netherlands tend to save more and exhibit greater control over their spending. In contrast, Zhu et al. (2020) reported that higher levels of happiness are associated with increased spending, particularly on basic necessities, education, and gifts in rural China. Dominko and Verbic (2022) found that life satisfaction positively affects spending on dining out and leisure activities among older adults in England, suggesting that those more satisfied with their lives are also more engaged in social and leisure activities.

It is not surprising that existing studies report mixed findings, given the variety of potential pathways through which SWB may influence consumption expenditures. On the one hand, higher SWB may lead to reduced consumption expenditures through several mechanisms: enhanced self-control (Fredrickson, 2004), increased expectations of longevity and greater concern for future health (Diener & Chan, 2011; Steptoe, 2019), and a more risk-averse approach to financial decisions (Deaton, 2005). On the other hand, higher SWB may also increase spending through alternative channels, such as greater productivity (Oswald et al., 2015), a higher likelihood of employment (Krause, 2013), and improved earnings (De Neve & Oswald, 2012).

One factor that has received relatively less attention in the relationship between SWB and consumption expenditures is the potential confounding role of social relations or social capital. Higher SWB is linked to more cooperation, prosocial behavior, social participation, and trust (Bartolini & Sarracino, 2015; Meier & Stutzer, 2008; Lyubomisky et al., 2005). There have also been some discussions on how social capital is associated with household spending. Prior research has shown that social capital can reduce poverty—measured by household per capita expenditures or income—by enhancing access to resources and opportunities (Aker, 2007; Grootaert, 1999; Narayan & Pritchett, 1999). It can also help individuals smooth consumption by providing informal financial support during shocks (De Weerdt & Dercon, 2006) and improving access to credit (Karlan et al., 2009). Moreover, social capital facilitates the sharing of food, knowledge, and other resources within communities, potentially reducing household spending on basic goods and services (Martin et al., 2004; Nosratabadi et al., 2020). Conversely, higher levels of social participation or denser social networks may also encourage social comparisons and stimulate spending on visible or conspicuous goods and services (Charles et al., 2009; Bertrand & Morse, 2016). One study that explicitly examines the role of social capital in the relationship between SWB and material living conditions is Bartolini et al. (2023), who found that the associations of income and social comparisons with SWB weaken when social capital is higher.

3 Data and Methodology

3.1 Data

We use data from the Household, Income and Labour Dynamics in Australia (HILDA) survey, which began in 2001 and currently includes 23 waves of data.[8] The HILDA survey is funded by the Australian government and conducted by the Melbourne

[8] The interviews were mostly conducted from August to November each year.

Institute of Applied Economic and Social Research. As a nationwide panel survey, it collects a broad range of social, demographic, and socioeconomic data. Its design is heavily influenced by other household panel studies, such as the German Socio-Economic Panel (GSOEP) and the British Household Panel Survey (BHPS) (Frick et al., 2007; Watson & Wooden, 2012). An advantage of the HILDA survey is its relatively detailed household spending data, which makes this study possible. Information on household expenditures for a wide range of nondurable goods and services was first collected through the Self-Completion Questionnaire (SCQ) in Wave 5. The scope of expenditure items was expanded in Wave 6 to include consumer durables, although some items were later dropped in Wave 11. In addition, detailed information on housing and childcare expenditures is collected regularly through the Household Questionnaire. This study utilizes data from Waves 6 to 10 (2006–2010), which contain the most comprehensive set of consumption items. Excluding those without household expenditures, life satisfaction, social capital indicators, and other individual characteristics used in this study, we are left with 11,750 individuals and 45,693 observations.

3.2 Variables

3.2.1 Consumption Expenditures

Waves 6-10 of the HILDA contain 28 consumption categories, based on the existing literatures, we sort these categories into 18 broader consumption categories: vehicle purchases, clothing and footwear, furniture and household appliances, recreational devices and equipment, meals eaten out, alcohol, holidays, education, tobacco, groceries, housing, public transportation, motor vehicle repairs and maintenance, motor vehicle fuels and engine oil, phone rent and calls, and internet charges, health care (health insurance included) and child care, home utilities, and other insurance. Detailed definition of the categories can be found in Appendix B Table 1. Total consumption expenditures refer to the sum of household spending across all the consumption categories listed above. The baseline classification of conspicuous versus basic consumption follows Wu (2020), drawing heavily on prior literature on conspicuous consumption, particularly Charles et al. (2009) and Friehe and Mechtel (2014). As shown in Table 5, we classify vehicle purchases, clothing and footwear, furniture and household appliances, recreational devices and equipment, meals eaten out, alcohol, and holidays as conspicuous consumption, while all remaining items are categorized as basic. This baseline classification appears plausible based on the visibility index developed by Heffetz (2011), which measures the visibility or conspicuousness of consumption by assessing how quickly members of society notice household spending across different categories, with index values ranging from 0 to 1 and higher values indicating greater visibility. As robustness checks, we will explore different classifications for conspicuous and basic consumption. Consumption expenditure variables are deflated to constant 2006 prices using the Consumer Price Index (CPI) data from the Australian Bureau of Statistics.[9] To approximate individual-level spending, household expenditures are divided by household size to obtain per capita values. All expenditure measures are then log-

[9] To minimize the influence of outliers, we exclude observations with household expenditures or income falling in the top and bottom 0.1% of their respective distributions.

transformed[10] to account for expected nonlinear relationships and to normalize the typically skewed distribution of consumption data.

Table 5: Definitions of conspicuous vs. basic goods or services

Category	Baseline: Wu (2020)	Heffetz (2011)'s Visibility Index
Vehicle purchases	C	0.73
Clothing and footwear	C	0.71
Furniture and household appliances	C	0.68
Recreational devices and equipment	C	0.66
Meals out	C	0.62
Alcohol	C	0.6
Holidays	C	0.58
Education	B	0.56
Tobacco	B	0.76
Groceries	B	0.5
Housing	B	0.5
Public transportation	B	0.45
Motor vehicle repairs and maintenance	B	0.42
Motor vehicle fuels and engine oil	B	0.39
Phone rent and calls, and internet charges	B	0.38
Health care (health insurance included) and child care	B	0.36
Home utilities	B	0.31
Other Insurance	B	0.21

[10] We approximate the logarithmic transformation using the inverse hyperbolic sine (IHS) function to account for a small number of observations with zero conspicuous expenditures.

3.2.2 Life Satisfaction

The life satisfaction variable is based on the question, "*All things considered, how satisfied are you with your life?*" Responses are measured on an 11-point scale (0–10), with higher values indicating greater life satisfaction. To partially address the issue of reverse causality, we used lagged measures of life satisfaction from waves 5 to 9. The mean level of life satisfaction is 7.90, and the median is 8. The distribution is left-skewed. For better interpretability of coefficients and to account for the skewness, we performed within-person standardization.

3.2.3 Social Capital

We use three indicators of social capital: a social support index, a measure of low loneliness, and another measure of active membership. Our social support index is derived from the answers to the question *"The following statements have been used by many people to describe how much support they get from other people. How much do you agree or disagree with each?*

- *I don't have anyone that I can confide in.*
- *There is someone who can always cheer me up when I'm down.*
- *I seem to have a lot of friends.*
- *I have no one to lean on in times of trouble.*
- *I often need help from other people but can't get it.*
- *I enjoy the time I spend with the people who are important to me.*
- *People don't come to visit me as often as I would like.*
- *When I need someone to help me out, I can usually find someone.*
- *When somethings on my mind, just talking with the people I know can make me feel better.*
- *I often feel very lonely."*

The response scale ranges from 1 to 7, with higher values indicating stronger agreement with the statement. Principal component analysis of the ten items identified two components with eigenvalues greater than 1, although these components primarily reflected the distinction between positively and negatively worded items. After reverse-coding the negatively worded items, the ten items demonstrated relatively high internal consistency, with a Cronbach's alpha of 0.826. Therefore, for each individual, we constructed a social support index by counting the number of responses with a score greater than or equal to the sample median. The index ranges from 0 to 10, with higher values indicating greater perceived support. The measure of loneliness is based on how much one agrees or disagrees with the statement "*I often feel very lonely."* We reverse the scale so that higher values indicate stronger disagreement with the statement (i.e., higher values correspond to lower loneliness). Using the reversed scale, we create a binary variable coded as 1 if the score is greater than or equal to 6 (the median), and 0 otherwise. It is worth noting that this item appears last among the series of ten statements about perceived support in the questionnaire, and as such, responses may be influenced by answers to the preceding items. The third measure of social capital is a binary indicator of active membership, derived from responses to the question: “*Are you currently an active member of a sporting, hobby, or community-based club or association?*” The variable is coded as 1 for “*Yes*” and 0 for “*No*.” Active membership is commonly regarded as a form of civic engagement—an important supply-side component of social capital that fosters trust and cooperation within communities.

3.2.4 Control Variables

Consistent with the existing literature, a wide variety of demographic and socioeconomic variables are included in the econometric analysis, including age categories—25–34, 35–44, 45–54, 55–64, 65–74, and 75 or above, with below 25 omitted; highest level of educational—high school, vocational degree, and bachelor’s degree or above, with below high school omitted; marital status—separated, divorced, or widowed, and never married, with married or de facto omitted; labor market status—part-time employed, unemployed, and not in the labor force, with full-time employment omitted; household composition—children (age <=14) in the household and older adults (age>=65) in the household; household financial resources, as indicated by natural log of household disposable income per capita; and finally, health status, represented by a dummy on whether the respondent has any long-term health condition. In addition, we control for wave, month of interview and region dummies to account for temporal and geographic variations. Table 6 presents the summary statistics of all the variables used in the empirical analysis.

Table 6. Summary Statistics, Pooled over All Waves, HILDA 2006-2010

	Mean	SD
Total household expenditures per capita	22552.583	15734.828
Total household conspicuous expenditures per capita	6596.143	8006.403
Total household basic expenditures per capita	15956.44	10927.481
Lagged standardized life satisfaction	7.859	1.425
Social support index	6.231	2.919
Low loneliness	0.59	0.492
Active member	0.381	0.486
Total household income per capita	32887.346	23904.886
Reference group: age 15–24		
Age2534	0.15	0.357
Age3544	0.19	0.392
Age4554	0.192	0.394
Age5564	0.146	0.353
Age6574	0.099	0.298
Age75	0.07	0.256
Reference group: below high school		
High school	0.154	0.361
Vocational degree	0.291	0.454
Bachelor’s degree or above	0.223	0.417
Reference group: married or de facto		

Separated, divorced, or widowed	0.146	0.354
Never married	0.21	0.408
Reference group: full-time employed		
Part-time employed	0.211	0.408
Unemployed	0.028	0.165
Not in the labour force	0.321	0.467
Children (age<=14) in the household	0.32	0.467
Older adults (age>=65) in the household	0.209	0.406
Long-term health condition	0.283	0.45

Number of observations: 45,693
Variables not reported: year, month of interview, and region dummies

3.3 Estimation Model

Consider the following regression model with individual fixed effects.

$$E_{it} = \beta LS_{i,t-1} + \rho^k SC_{it}^k \times LS_{i,t-1} + \delta^k SC_{it}^k + \gamma' X_{it} + \alpha_i + \varepsilon_{it} \quad (1)$$

where i, t, and k index for individual, time, and social capital, respectively. E represents a measure of household expenditures per capita (total, conspicuous, or basic consumption), LS represents standardized life satisfaction, SC is an indicator of social capital, X represents a number of time-variant individual characteristics (i.e., household disposable income per capita; age; education; marital status; employment status; children (age<=14) in the household; older adults (age>=65) in the household; long-term health condition, month, year, and region dummies), α indicates individual fixed effects, and ε is an error term. Our key estimator of interest is $\hat{\beta} + \widehat{\rho^k} \times SC^k$, which denotes the effect of life satisfaction as it varies with social capital k. $\widehat{\delta^k}$ represents the direct effect of social capital k (for an individual with average life satisfaction).

4 Results

4.1 Baseline Results

We first examine the relationship between life satisfaction and household expenditures, without including any social capital variables. As shown in Table 7, household expenditures per capita are not significantly associated with lagged life satisfaction, except for conspicuous expenditures per capita, which show a positive and marginally significant coefficient. This suggests that the direct relationship between spending and life satisfaction may not be obvious.

Table 7. Consumption Expenditures and Life Satisfaction

	(1)	(2)	(3)
VARIABLES	Ln (total household expenditures per capita)	Ln (total household conspicuous expenditures per capita)	Ln (total household basic expenditures per capita)
Lagged standardized life satisfaction	0.00195	0.0101*	0.00111

	(0.00197)	(0.00555)	(0.00189)
Individual Characteristics	YES	YES	YES
Individual Fixed Effects	YES	YES	YES
Region Fixed Effects	YES	YES	YES
Wave Fixed Effects	YES	YES	YES
Observations	45,693	45,693	45,693
R-squared	0.048	0.010	0.050
Number of Individuals	11,750	11,750	11,750

Robust standard errors clustered at the individual level in parentheses
*** p<0.01, ** p<0.05, * p<0.1

What about the potential moderating role of social capital? We try to answer this question by adding the interaction between each social capital indicator and lagged life satisfaction into the regressions (and its associated main effects), and the corresponding results are shown in Table 8. To provide a bettering interpretation of the results, we show the estimates with confidence interval on the effects of lagged life satisfaction on various types of expenditures by the level of each social capital indicator in Figure 2. In Panel A.1, it shows that when social support is the lowest level (social support index = 0), the relationship between lagged life satisfaction and total household spending per capita is significantly positive. However, as social support index increases, the effect size diminishes and becomes insignificant (even with a negative sign). This implies that the positive association between household spending and life satisfaction can be fully mitigated with higher levels of social support. Similarly, if an individual is highly lonely, household spending per capita is positively associated with lagged life satisfaction (Panel A.2). However, if the loneliness level is low, the association becomes negative and statistically significant. For active membership, household spending per capita is not significantly associated with lagged life satisfaction regardless of membership status (Panel A.3).

Table 8. Consumption Expenditures and Life Satisfaction: The Moderating Role of Social Capital

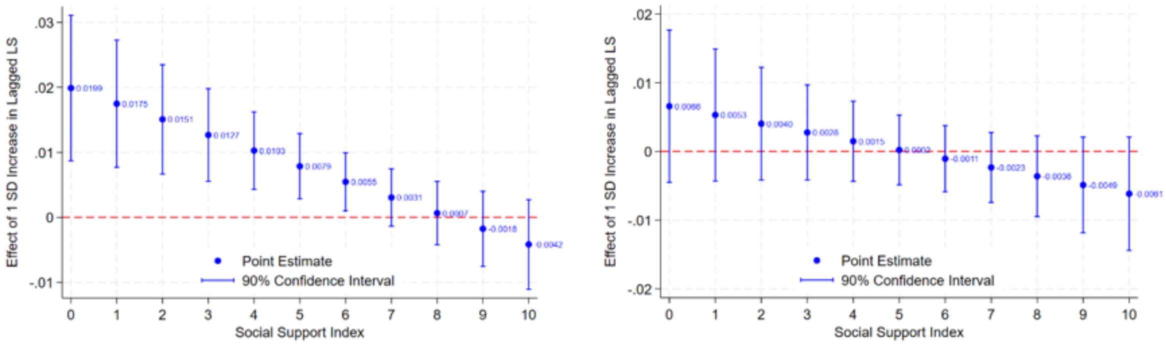
VARIABLES	Ln (total household expenditures per capita)			Ln (total household conspicuous expenditures per capita)			Ln (total household basic expenditures per capita)		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Lagged standardized life satisfaction	0.0126***	0.0115***	0.00170	0.0393***	0.0288***	0.0171**	0.0119***	0.0112***	-0.000763
	(0.00479)	(0.00328)	(0.00254)	(0.0142)	(0.00997)	(0.00755)	(0.00456)	(0.00314)	(0.00244)
Social support index	-0.000659			0.00717**			-0.00224**		
	(0.00115)			(0.00330)			(0.00110)		
Lagged standardized life satisfaction*Social support index	-0.00170**			-0.00467**			-0.00174***		
	(0.000693)			(0.00195)			(0.000661)		
Low loneliness		-0.00907*			0.00407			-0.00898*	
		(0.00536)			(0.0158)			(0.00517)	
Lagged standardized life satisfaction*Low loneliness		-0.0161***			-0.0314**			-0.0168***	
		(0.00429)			(0.0124)			(0.00412)	
Active member			0.0127**			0.0363**			0.00607
			(0.00620)			(0.0167)			(0.00594)
Lagged standardized life satisfaction*Active member			0.000538			-0.0187			0.00486

			(0.00428)			(0.0118)			(0.00407)
Observations	45,693	45,693	45,693	45,693	45,693	45,693	45,693	45,693	45,693
R-squared	0.048	0.048	0.048	0.010	0.010	0.010	0.050	0.051	0.050
Number of Individuals	11,750	11,750	11,750	11,750	11,750	11,750	11,750	11,750	11,750

Robust standard errors clustered at the individual level in parentheses

*** p<0.01, ** p<0.05, * p<0.1

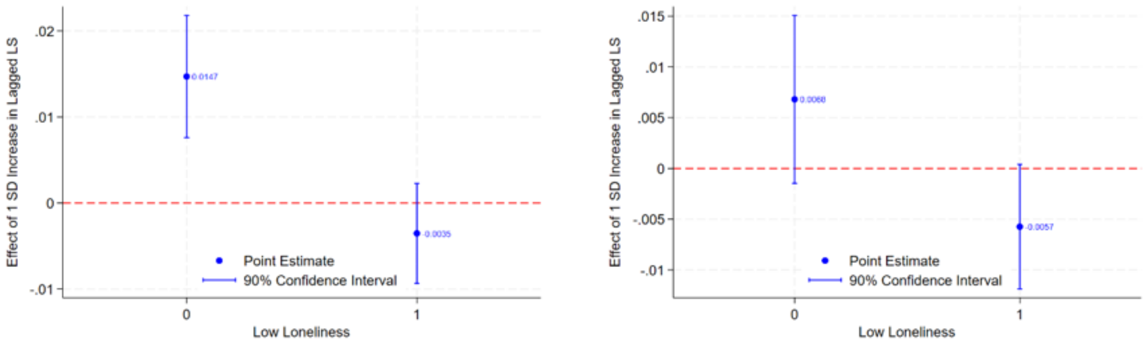
Figure 2. Heterogeneous Analysis by Gender (Outcome Variable: Total Expenditures)



Panel A.1 Female

Panel A.2 Male

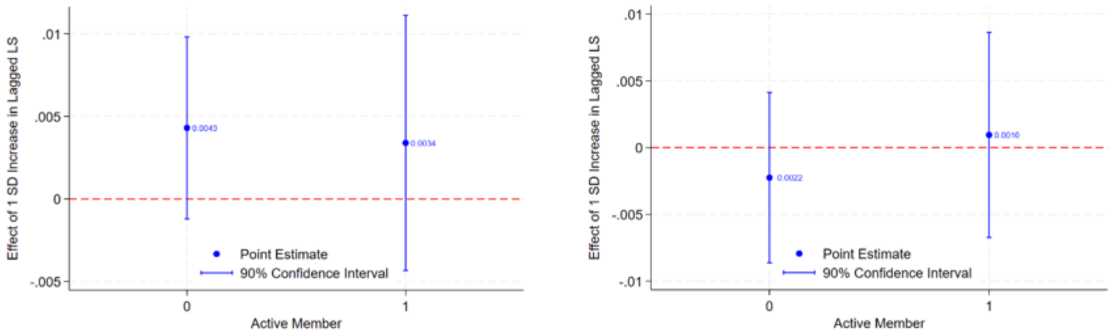
Panel A The role of social support



Panel B.1 Female

Panel B.2 Male

Panel B The role of low loneliness



Panel C.1 Female

Panel C.2 Male

Panel C The role of active membership

Notes: The figure displays the estimates of $\beta + \rho^k \times SC_{it}^k$, along with 90% confidence intervals.

The results for the social support index and low loneliness are generally consistent across models using conspicuous and basic expenditures as outcome variables. However, when the social support index is at its maximum or loneliness is low, the association between lagged life satisfaction and basic spending becomes negative and significant (Panels B.1 and B.2); in comparison, the association between lagged life satisfaction and conspicuous spending becomes negative in magnitude but remains statistically insignificant when social capital is high (Panels C.1 and C.2). Regarding active membership, we find that if an individual is not an active member of a club or association, a higher level of lagged life satisfaction is associated with a higher level of conspicuous spending, but the association is insignificant if one is an active member (Panel B.3). On the other hand, lagged life satisfaction is not associated with basic spending regardless of membership status.

We also conducted separate analyses for 18 spending categories, with the results presented in Appendix Table 2. The moderating role of social support appears significant in spending on recreational devices and equipment, education, health care (including health insurance) and childcare, utilities, and other types of insurance (such as home, contents, and motor vehicle insurance). In comparison, the moderating role of low loneliness is only significant for spending on recreational devices and equipment, housing, and utilities. The moderating effect of active membership does not appear significant for any category of spending, independently.

Besides, we also explore the direct association between social capital and spending. In Table 4, interestingly, we observe contrasting results for low loneliness and active membership: while low loneliness is associated with lower total household expenditures per capita, active membership is associated with higher expenditures. Meanwhile, the relationship between overall social support and household expenditures per capita is not statistically significant (columns (1)–(3)). A closer look at expenditure types helps explain this contrasting pattern. Higher social support and active membership are both associated with higher conspicuous spending (columns (4)–(6)). In contrast, higher social support and low loneliness are associated with lower basic spending (columns (7)–(9)). These findings suggest that the relationship between household spending and social capital varies depending on the type of consumption. In Appendix Table 3, it can also be observed that adding social capital variables has little effect on the coefficients of lagged life satisfaction, suggesting that social capital may not serve as an important mediator in the relationship between life satisfaction and spending.[11]

4.2 Robustness Checks

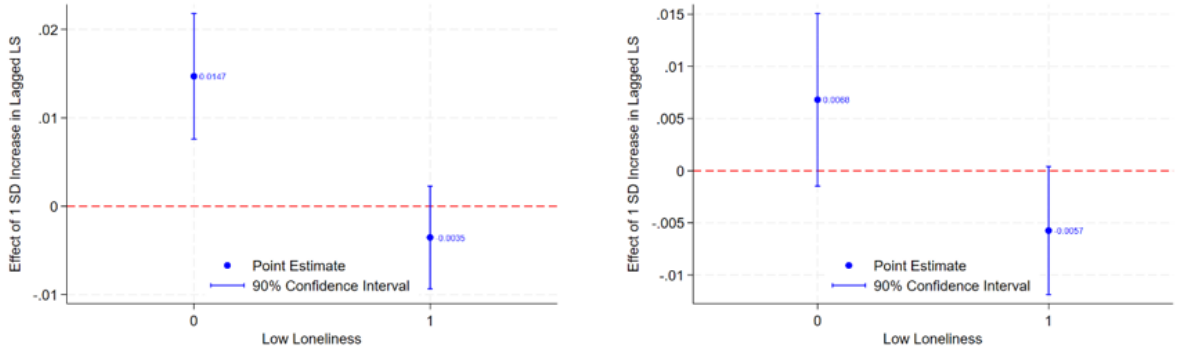
We conduct several robustness checks using conspicuous and basic spending as outcome variables, based on different categorizations of consumption. First, we considered the definition of conspicuous consumption from Friehe and Mechtel (2014), which excludes alcohol as conspicuous. In addition, there have been discussions on whether education and tobacco should be categorized as conspicuous. Spending on education may be relatively visible due to school uniforms, while spending on tobacco products is also highly visible according Heffiz's visibility index. However, tobacco may not meet the second criterion of conspicuous consumption—that the good is positional (Friehe & Mechtel, 2014; Wu, 2020). The results for conspicuous and basic expenditures based on these three alternative definitions remain robust compared to the baseline results (Appendix B Figures B1 & B2; Appendix B Table B4).

4.3 Heterogeneous Analysis

We perform heterogeneity analyses by gender and age to better understand the main results. For brevity, we present the findings for total spending in the main text and report those for conspicuous and basic spending in the Appendices. Overall, the moderating effects of social capital appear more pronounced among females than males. Specifically, among females, the positive association between lagged life satisfaction and total spending becomes statistically insignificant and even turns negative when social support is high or when individuals report low levels of loneliness (Panels A and B of Figure 3). In contrast, for males, the association between lagged life satisfaction and total spending remains statistically insignificant regardless of social support or loneliness levels. When using conspicuous spending as the outcome variable, we find that the association between lagged life satisfaction and conspicuous spending is positive and statistically significant among individuals who are not active members of clubs or associations but becomes insignificant among those who are active members (Panel C of Appendix B Figure B3). For males, however, the associations remain statistically insignificant regardless of membership status. The results for basic spending as the outcome variable are generally consistent with those observed for total spending (Appendix B Figure B4).

[11] As for the direct associations between social capital and 18 spending categories, we find that greater social support is generally linked to higher spending on furniture and household appliances, recreational devices and equipment, and holidays—all of which are relatively conspicuous forms of consumption—as well as on other types of insurance. Lower loneliness is associated with more spending on furniture and household appliances, holidays, and education, but with less spending on alcohol and tobacco. Finally, active membership is associated with greater spending on recreational devices and equipment, meals eaten out, holidays, education, motor vehicle repairs and maintenance, health care and childcare, utilities, and other insurance.

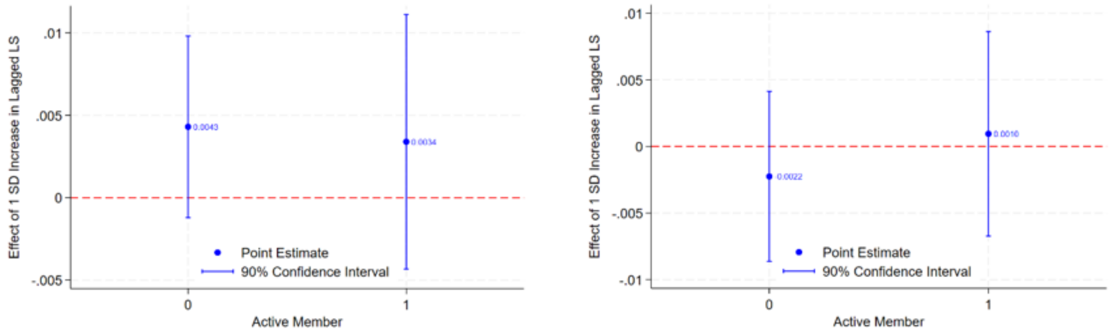
Figure 3. Heterogeneous Analysis by Gender (Outcome Variable: Total Expenditures)



Panel B.1 Female

Panel B.2 Male

Panel B The role of low loneliness



Panel C.1 Female

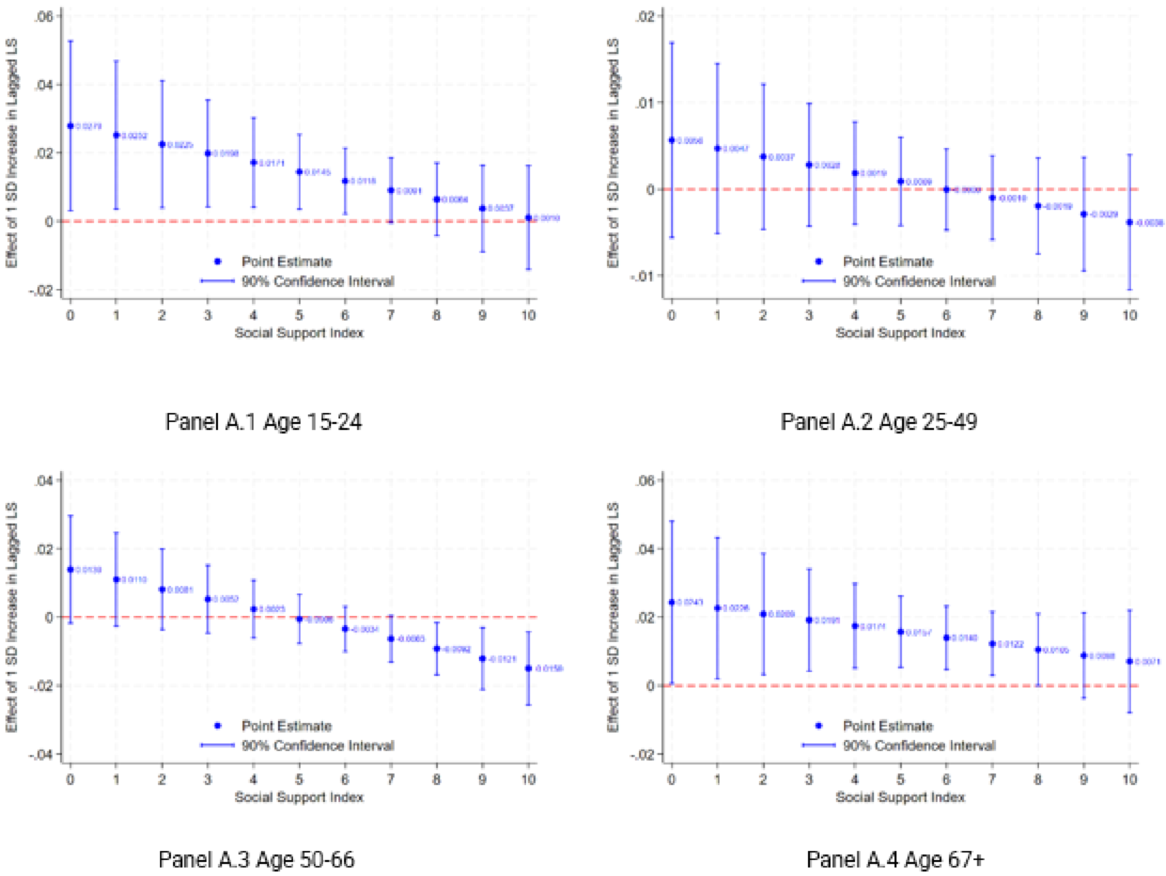
Panel C.2 Male

Panel C The role of active membership

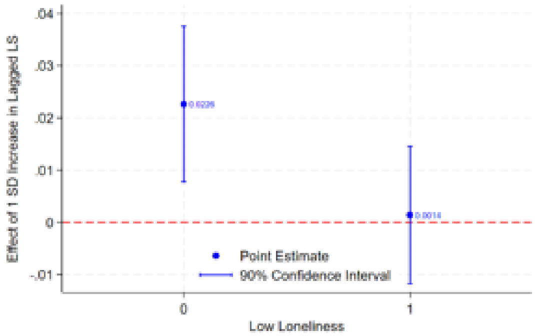
Notes: The figure displays the estimates of $\beta + \rho^k \times SC_{it}^k$, along with 90% confidence intervals.

To categorize age meaningfully, we define four age groups: 15–24 (younger individuals), 25–49 (lower middle-aged or prime-aged adults), 50–66 (upper middle-aged), and 67 and above (those who have reached retirement age). While no clear patterns emerge across age groups for the three spending outcomes, there are some interesting findings for each outcome individually. For instance, we observe, for total spending, both the youngest and the oldest groups enjoy significant moderating effects of social support and low loneliness (Panels A.1 & 4 and Panels B.1 & 4 of Figure 4). Among prime-age individuals, low loneliness also significantly moderates the positive association between lagged life satisfaction and total spending (Panel B.2). For upper middle-aged individuals, the association between lagged life satisfaction and total spending is not significant among individuals with low social support or high loneliness, but the relationships are negative and statistically significant among individuals with high social support or low loneliness (Panel A.3 & B.3). Regarding the role of active membership, we also observe the moderating effect of active membership is significant among people in the oldest age group (Panel C.1). Interestingly, in the youngest age group, the relationship between lagged life satisfaction and total spending is statistically insignificant for individuals who are not active members but, for those who are active members, it is positive and statistically significant (Panel C.4).

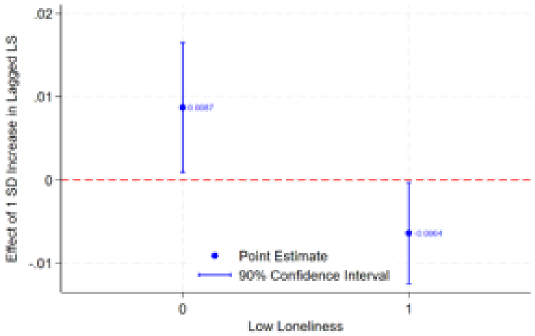
Figure 4. Heterogeneous Analysis by Age (Outcome Variable: Total Expenditures)



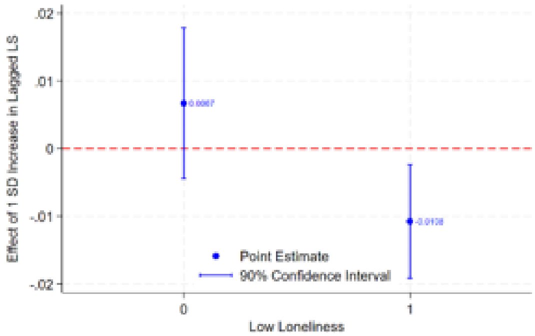
Panel A The role of social support



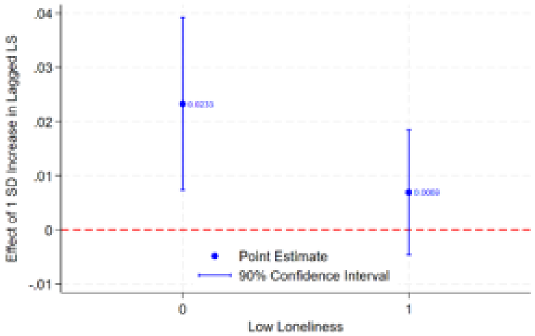
Panel B.1 Age 15-24



Panel B.2 Age 25-49

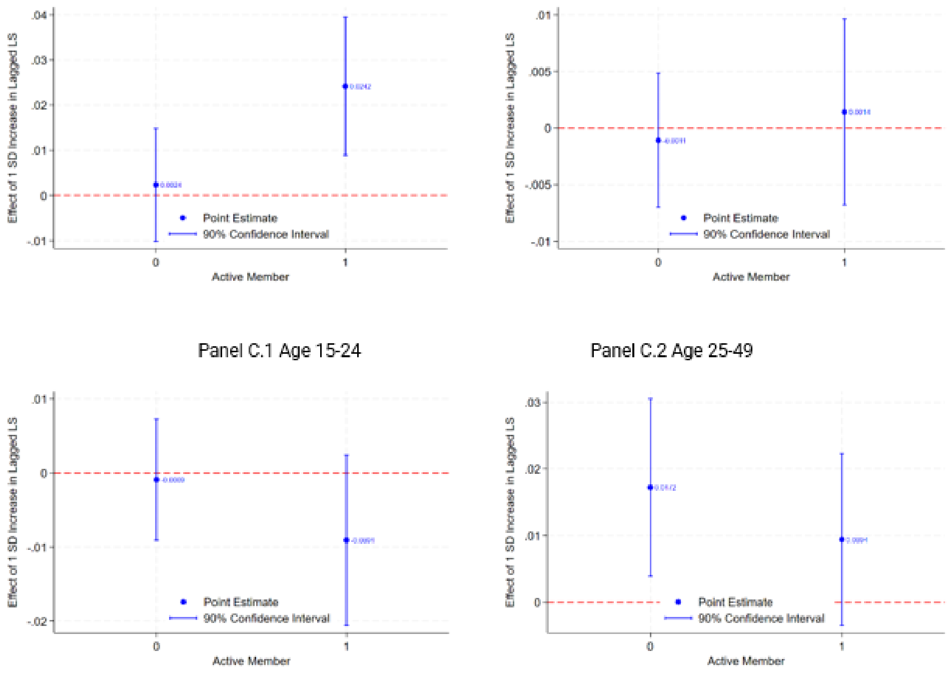


Panel B.3 Age 50-66



Panel B.4 Age 67+

Panel B The role of low loneliness



Panel C.1 Age 15-24 Panel C.2 Age 25-49

Panel C.3 Age 50-66 Panel C.4 Age 67+

Panel C The role of active membership

Notes: The figure displays the estimates of $\beta + \rho^k \times SC_{it}^k$, along with 90% confidence intervals.

For conspicuous spending, we find that the moderating effects of social support and low loneliness are statistically significant only among the oldest age group (those who have reached retirement age), while the moderating effect of active membership is significant only for individuals in the prime-age group (Appendix B Figure B5). For basic spending, the moderating effect of social support is significant for both the youngest group (15–24) and the upper middle-aged group (Panel A of Appendix B Figure B6). Low loneliness, on the other hand, significantly moderates the relationship between lagged life satisfaction and basic spending across all age groups, although the strength of the effect varies (Panel B). Interestingly, with respect to active membership, the relationship between lagged life satisfaction and basic spending is positive and statistically significant among active members in the youngest age group but remains insignificant for their non-active counterparts (Panel C.1).

5 Conclusions

This study investigated how subjective well-being (SWB), specifically life satisfaction, is associated with consumption expenditures, and, more importantly, the moderating role of social capital. Using panel data from the HILDA Survey in Australia and fixed effects regressions, we focused on both conspicuous and basic forms of spending. Our analysis reveals that the association between life satisfaction and consumption expenditures is not uniform but depends significantly on individuals' social capital. Among those with low social support or high loneliness, higher life satisfaction is associated with greater spending of different forms. However, this positive association weakens or even reverses among individuals with strong social ties or low levels of loneliness. We also document a direct relationship between social capital and consumption expenditures, although the sign varies by consumption type. In general, higher social capital is associated with more conspicuous spending but less basic spending.

These results suggest that social capital plays a buffering role in the link between well-being and consumption. Individuals embedded in supportive social networks may be less inclined to pursue material consumption as a source of satisfaction, as their emotional and psychological needs are met through social interaction. Our findings challenge the preconception that consumer spending is inherently linked to well-being. Instead, the study highlights how consumption may be driven by a scarcity of social relationships, suggesting that fostering social connections could enhance well-being without necessarily increasing consumption. This is encouraging news for the sustainability of modern societies because it indicates that promoting people's well-being and protecting the environment need not be in conflict.

These insights carry important policy implications. Strengthening social connections may help decouple well-being from consumption growth, thereby supporting more sustainable patterns of living without compromising people's well-being—a goal that has remained elusive for other approaches to environmental protection, such as degrowth. Efforts to enhance both well-being and environmental sustainability could benefit from greater investment in social infrastructure—such as community centers, inclusive public spaces, and programs that foster civic engagement and reduce loneliness. Integrating social capital considerations into sustainability and well-being policy agendas could be a promising pathway toward more inclusive and environmentally responsible growth models.

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Appendix A

Table A1: Summary statistics

	Observations	Mean	Std. Dev	Min	Max
		Sample 1			
SWB	258923	6.577592	0.7470536	4.668911	7.788252
Gini	258923	31.18621	5.323999	22.7067	48.6782
Mistrust (share)	258923	67.92355	15.05251	0	96.48013
Distress (share)	258923	31.28359	6.422346	17.4112	52.28193
Lack of pro-social behaviours	258923	60.74604	11.98736	38.62043	87.145
Consumption pc	258923	28678.23	7228.496	12887.92	46330.79
GDP pc	258923	40531.49	14618.35	15929.72	86808.66
Log consumption per capita	258923	10.22802	0.2772774	9.464046	10.74356
		Sample 2			
SWB	491286	6.596274	2.021991	0	10
Temperature changes from GHG	491286	0.015524	0.0395049	0	0.275
PM2.5	491286	18.23479	15.08453	5.257788	85.96687
Consumption pc	491286	29130.03	7225.242	13926.05	51063.34
GDP pc	491286	43048.39	17175.21	17123.71	120747.9
Log consumption per capita	491286	10.24674	0.2616331	9.541516	10.84082
		Sample 3			
SWB	495491	6.580854	2.034517	0	10
Environmental Pollution	495491	338.69	815.136	1.029414	5488.893
Consumption pc	495491	28931.29	7337.516	12887.92	51063.34
GDP pc	495491	42663.03	17155.46	15929.72	120747.9
Log consumption per capita	495491	10.23829	0.2682661	9.464046	10.84082

Sample 1: Australia, Austria, Bahrain, Belgium, Canada, Chile, China, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Latvia, Lithuania, Luxembourg, Malta, Netherlands, New Zealand, Norway, Panama, Poland, Portugal, Republic of Korea, Romania, Saudi Arabia, Singapore, Slovakia, Slovenia, Spain, Sweden, Switzerland, United Kingdom, United States, Uruguay

Sample 2: Australia, Austria, Bahrain, Belgium, Canada, Chile, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Kuwait, Latvia, Lithuania, Luxembourg, Mauritius, Netherlands, New Zealand, Norway, Oman, Panama, Poland, Portugal, Qatar, Republic of Korea, Romania, Saudi Arabia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Trinidad and Tobago, United Arab Emirates, United Kingdom, United States, Uruguay

Sample 3: Australia, Austria, Bahrain, Belgium, Canada, Chile, Croatia, Cyprus, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Kuwait, Latvia, Lithuania, Luxembourg, Malta, Mauritius, Netherlands, New Zealand, Norway, Oman, Panama, Poland, Portugal, Qatar, Republic of Korea, Romania, Saudi Arabia, Singapore, Slovakia, Slovenia, Spain, Sweden, Switzerland, Trinidad and Tobago, United Arab Emirates, United Kingdom, United States, Uruguay

Table A2: Regression of subjective well-being on bads and consumption pc

	(1)		(2)	
Gini	-0.0377***	(0.00810)		
Mistrust (share)	-0.0124***	(0.00182)		
Distress (share)	-0.0207***	(0.00424)		
Lack of pro-social beh. (share)	-0.0124***	(0.00216)		
Temperature change from GHG			-4.806***	(0.431)
PM2.5			-0.0227***	(0.00207)
Log consumption	1.914***	(0.145)	2.151***	(0.108)
Age (25-45)	-0.637***	(0.0262)	-0.567***	(0.0200)
Age (46-65)	-0.775***	(0.0336)	-0.685***	(0.0268)
Age (65+)	-0.600***	(0.0458)	-0.532***	(0.0350)
Household size	0.187***	(0.00983)	0.162***	(0.00772)
Female	0.152***	(0.0130)	0.158***	(0.0102)
Married or coupled	0.155***	(0.0193)	0.164***	(0.0154)

Separated or divorced	-0.212***	(0.0230)	-0.238***	(0.0193)
Widowed	-0.233***	(0.0293)	-0.196***	(0.0234)
Secondary education	0.290***	(0.0265)	0.372***	(0.0259)
Tertiary education	0.610***	(0.0266)	0.701***	(0.0279)
Unemployed	-0.698***	(0.0268)	-0.608***	(0.0223)
2nd quintile	0.363***	(0.0209)	0.346***	(0.0148)
3rd quintile	0.628***	(0.0240)	0.588***	(0.0173)
4th quintile	0.888***	(0.0285)	0.838***	(0.0199)
5th quintile	1.214***	(0.0351)	1.158***	(0.0246)
Small town or village	-0.104***	(0.0226)	-0.102***	(0.0203)
City	-0.0870**	(0.0266)	-0.0842**	(0.0267)
City suburbs	-0.148***	(0.0309)	-0.0735**	(0.0257)
Inflation rate	-0.0229	(0.0141)	0.000386	(0.0144)
Unemployment rate	0.0165*	(0.00772)	-0.0425***	(0.00655)
Latitude	-0.00132	(0.00211)	-0.00467**	(0.00155)
Europe and Central Asia	0.119	(0.151)	0.488***	(0.104)
Latin America and Caribbean	2.060***	(0.170)	1.172***	(0.121)
Middle East and north Africa	0.637***	(0.179)	0.669***	(0.110)
North America	0.0198	(0.177)	0.743***	(0.122)
Sub-Saharan Africa			0.136	(0.110)
Constant	-10.68***	(1.578)	-15.90***	(1.138)
N	258923		491286	
R2	0.202		0.162	

Note: East Asia and Pacific is baseline of the macro-region dummies. Year dummies are included, period of observation is 2009-2017 in the first sample, and 2010-2019 in the second. Standard errors shown in parenthesis are clustered at the country-year level. Baseline for residency is rural area or farm.

Table A4: Regression of subjective well-being on each bad independently of others

	Cantril Ladder of Life Satisfaction					
	(1)	(2)	(3)	(4)	(5)	(6)
Gini	-0.0499***					
	(0.00446)					
Mistrust (share)		-0.0166***				
		(0.00208)				
Distress (share)			-0.0269***			
			(0.00408)			
Lack of pro-social beh. (share)				-0.0260***		
				(0.00249)		
Temperature change from GHG					-5.159***	
					(0.440)	
PM2.5						-0.0236***
						(0.00214)
Log Consumption	2.276***	2.321***	2.021***	1.556***	2.333***	2.001***
	(0.0973)	(0.132)	(0.108)	(0.111)	(0.109)	(0.103)
2010	0.0172	-0.0128	0.0734	0.0267	0.0843	0
	(0.121)	(0.120)	(0.127)	(0.112)	(0.128)	(.)
2011	0.0412	0.105	0.0806	-0.0141	0.0922	0.0292
	(0.124)	(0.128)	(0.134)	(0.117)	(0.132)	(0.110)
2012	-0.0189	-0.0260	0.00979	-0.176	0.0107	-0.0805
	(0.115)	(0.124)	(0.128)	(0.115)	(0.120)	(0.108)
2013	0.00944	-0.135	0.114	-0.0328	0.0360	-0.0410
	(0.110)	(0.123)	(0.118)	(0.105)	(0.117)	(0.102)
2014	-0.0794	-0.145	0.0728	-0.168	-0.0705	-0.164
	(0.110)	(0.135)	(0.116)	(0.103)	(0.117)	(0.101)

2015	-0.114	-0.237*	0.00644	-0.168	-0.105	-0.192
	(0.107)	(0.114)	(0.115)	(0.101)	(0.116)	(0.103)
2016	-0.115	-0.255*	0.0183	-0.0906	-0.0988	-0.219*
	(0.106)	(0.112)	(0.115)	(0.0972)	(0.114)	(0.103)
2017	-0.0611	-0.119	0.0541	-0.0759	-0.0662	-0.169
	(0.104)	(0.129)	(0.110)	(0.0986)	(0.113)	(0.0968)
2018	-0.131		0.0104	0.0915	-0.134	-0.243*
	(0.106)		(0.113)	(0.0967)	(0.112)	(0.0948)
2019	-0.125		0.0350	0.0701	-0.134	-0.235*
	(0.107)		(0.115)	(0.0995)	(0.115)	(0.102)
Age (25-45)	-0.584***	-0.645***	-0.568***	-0.577***	-0.576***	-0.568***
	(0.0205)	(0.0253)	(0.0201)	(0.0201)	(0.0199)	(0.0201)
Age (46-65)	-0.709***	-0.762***	-0.657***	-0.676***	-0.668***	-0.687***
	(0.0274)	(0.0341)	(0.0274)	(0.0269)	(0.0275)	(0.0268)
Age (65+)	-0.557***	-0.585***	-0.500***	-0.513***	-0.500***	-0.543***
	(0.0355)	(0.0465)	(0.0363)	(0.0345)	(0.0356)	(0.0355)
Household size	0.159***	0.181***	0.149***	0.156***	0.145***	0.163***
	(0.00766)	(0.0104)	(0.00860)	(0.00779)	(0.00818)	(0.00807)
Female	0.162***	0.157***	0.172***	0.171***	0.171***	0.157***
	(0.00998)	(0.0130)	(0.0100)	(0.00992)	(0.0102)	(0.0102)
Married or coupled	0.180***	0.144***	0.158***	0.174***	0.160***	0.169***
	(0.0152)	(0.0209)	(0.0160)	(0.0154)	(0.0157)	(0.0156)
Separated or divorced	-0.201***	-0.219***	-0.250***	-0.213***	-0.232***	-0.237***
	(0.0190)	(0.0232)	(0.0196)	(0.0193)	(0.0193)	(0.0192)
Widowed	-0.198***	-0.241***	-0.251***	-0.208***	-0.229***	-0.198***
	(0.0227)	(0.0297)	(0.0238)	(0.0222)	(0.0240)	(0.0231)
Secondary education	0.359***	0.360***	0.359***	0.349***	0.413***	0.356***
	(0.0256)	(0.0314)	(0.0256)	(0.0257)	(0.0263)	(0.0276)
Tertiary Education	0.669***	0.671***	0.675***	0.640***	0.733***	0.682***

	(0.0257)	(0.0310)	(0.0264)	(0.0265)	(0.0279)	(0.0287)
Unemployed	-0.624***	-0.717***	-0.634***	-0.649***	-0.638***	-0.610***
	(0.0228)	(0.0291)	(0.0226)	(0.0226)	(0.0228)	(0.0222)
2nd quintile	0.341***	0.358***	0.336***	0.339***	0.333***	0.346***
	(0.0147)	(0.0207)	(0.0145)	(0.0145)	(0.0144)	(0.0149)
3rd quintile	0.588***	0.618***	0.577***	0.583***	0.569***	0.590***
	(0.0172)	(0.0240)	(0.0171)	(0.0168)	(0.0169)	(0.0175)
4th quintile	0.836***	0.874***	0.825***	0.834***	0.815***	0.840***
	(0.0198)	(0.0289)	(0.0200)	(0.0196)	(0.0196)	(0.0201)
5th quintile	1.153***	1.200***	1.144***	1.157***	1.130***	1.161***
	(0.0246)	(0.0358)	(0.0252)	(0.0243)	(0.0247)	(0.0248)
Small Town	-0.125***	-0.106***	-0.0803***	-0.0950***	-0.104***	-0.105***
	(0.0199)	(0.0238)	(0.0213)	(0.0203)	(0.0209)	(0.0205)
City	-0.0895***	-0.133***	-0.108***	-0.0727**	-0.130***	-0.0714**
	(0.0244)	(0.0286)	(0.0270)	(0.0255)	(0.0270)	(0.0267)
City Suburbs	-0.0865***	-0.134***	-0.0602*	-0.131***	-0.0846**	-0.0701**
	(0.0240)	(0.0347)	(0.0271)	(0.0272)	(0.0267)	(0.0262)
Inflation	0.000791	-0.0389*	-0.000372	0.0145	0.000867	0.000891
	(0.0147)	(0.0164)	(0.0157)	(0.0155)	(0.0163)	(0.0151)
Unemployment	-0.0218**	-0.00102	-0.0122	-0.0145*	-0.0329***	-0.0403***
	(0.00717)	(0.00787)	(0.00727)	(0.00640)	(0.00712)	(0.00683)
Latitude	-0.00299	0.00140	-0.00511**	0.00273	-0.00370*	-0.00350*
	(0.00195)	(0.00265)	(0.00190)	(0.00175)	(0.00185)	(0.00173)
Europe and Central Asia	0.196	0.213	0.525***	0.165	0.441***	0.444***
	(0.116)	(0.177)	(0.110)	(0.0959)	(0.101)	(0.115)
Latin America and Caribbean	1.839***	2.030***	1.308***	1.127***	1.327***	1.166***
	(0.141)	(0.182)	(0.130)	(0.128)	(0.137)	(0.126)
Middle East and north Africa	0.251**	0.199	0.307**	-0.208*	-0.0259	0.719***
	(0.0905)	(0.246)	(0.102)	(0.0960)	(0.101)	(0.113)
North America	0.226	-0.267	0.575***	-0.289	0.842***	0.123

	(0.145)	(0.218)	(0.173)	(0.152)	(0.126)	(0.169)
Sub-Saharan Africa	0.314*		0.116	0.00371	0.213	0.163
	(0.125)		(0.111)	(0.117)	(0.120)	(0.115)
Constant	-16.07***	-17.20***	-14.47***	-8.844***	-18.21***	-14.43***
	(1.034)	(1.448)	(1.160)	(1.236)	(1.137)	(1.096)
N	491619	260877	514656	504274	515605	491286
R2	0.165	0.191	0.152	0.159	0.152	0.158

Note: Standard errors shown in parenthesis are clustered at the country-year level.

Table A5: Robustness – subjective well-being regression on environmental pollution

	Cantril Ladder of Life Satisfaction			
	(1)		(2)	
Environmental pollution indicator	-0.000265***	(0.0000237)	-0.000163***	(0.0000219)
Log consumption	2.290***	(0.109)		
Log GDP pc			1.182***	(0.0987)
Age (25-45)	-0.587***	(0.0202)	-0.591***	(0.0199)
Age (46-65)	-0.685***	(0.0278)	-0.666***	(0.0285)
Age (65+)	-0.512***	(0.0368)	-0.477***	(0.0375)
Household size	0.143***	(0.00851)	0.128***	(0.00921)
Female	0.177***	(0.0103)	0.188***	(0.0104)
Married or coupled	0.160***	(0.0161)	0.161***	(0.0165)
Separated or divorced	-0.243***	(0.0198)	-0.241***	(0.0205)
Widowed	-0.234***	(0.0243)	-0.281***	(0.0265)
Secondary education	0.405***	(0.0279)	0.436***	(0.0299)
Tertiary education	0.727***	(0.0294)	0.730***	(0.0314)
Unemployed	-0.628***	(0.0234)	-0.636***	(0.0243)
2nd quintile	0.329***	(0.0146)	0.321***	(0.0147)

3rd quintile	0.561***	(0.0172)	0.547***	(0.0174)
4th quintile	0.810***	(0.0201)	0.794***	(0.0205)
5th quintile	1.124***	(0.0250)	1.105***	(0.0259)
Small town or village	-0.114***	(0.0211)	-0.0806***	(0.0241)
City	-0.136***	(0.0278)	-0.149***	(0.0284)
City suburbs	-0.0906**	(0.0275)	-0.0359	(0.0281)
Inflation rate	0.00527	(0.0165)	0.0104	(0.0182)
Unemployment rate	-0.0323***	(0.00775)	-0.0375***	(0.00747)
Latitude	-0.00311	(0.00179)	-0.00591**	(0.00198)
Europe and Central Asia	0.348***	(0.101)	0.627***	(0.102)
Latin America and Caribbean	1.266***	(0.135)	0.765***	(0.142)
Middle East and north Africa	-0.0726	(0.101)	-0.162	(0.115)
North America	0.812***	(0.123)	1.271***	(0.117)
Sub-Saharan Africa	0.167	(0.120)	0.152	(0.143)
Constant	-17.68***	(1.145)	-6.795***	(1.066)
N	495491		495491	
R2	0.152		0.137	

Note: *** < 1%; ** < 5%; * < 10%. Standard errors are in parentheses. Year dummies are included; the period of observation is 2009-2019.

Appendix B

Table B1. Consumption categories

Category	Definition
Vehicle purchases	Buying brand new or used motor vehicles, motorbikes, or other
Clothing and footwear	Men's, women's and children's clothing and footwear
Furniture and household appliances	Any bedroom and outdoor furniture (do not include floor coverings), household appliances, such as ovens, fridges, washing machines, and air conditioners
Recreational devices and equipment	Computers and related devices (such as printers, digital cameras, iPods, MP3 players, electronic organizers and game consoles), televisions, home entertainment systems, and other audio visual equipment (such as DVD players and video cameras)
Meals eaten out	Restaurants, take-away food, and bought lunches and snacks. Do not include alcohol
Alcohol	Alcohol consumed at home or with meals eaten out
Holidays	Holidays and holiday travel costs (include short & long holidays)
Education	Education fees paid to schools, universities, and other education providers (include private tuition fees)
Tobacco	Cigarettes and other tobacco products
Groceries	Food, cleaning products, pet food, and personal care products, excluding alcohol or tobacco
Housing	Rent, mortgage and repairs, and renovations and maintenance to your home
Public transportation	Public transport and taxis
Motor vehicle repairs and maintenance	Motor vehicle repairs and maintenance (include regular servicing)
Motor vehicle fuels and engine oil	Motor vehicle fuel (petrol, diesel, LPG) and engine oil
Phone rent and calls, and internet charges	Telephone rent and calls (include rent and charges on mobile phones), and internet charges
Health care (health insurance included) and child care	Health care spending includes fees paid to doctors, dentists, opticians, physiotherapists, chiropractors and any other health practitioner, medicines, prescriptions and pharmaceuticals (include alternative medicines.), and private health insurance; child care spending includes child care costs for children while parents work, during school holidays, and non-employment related childcare, for school-aged and not yet at school children. Assumes 12 weeks school holidays a year for school aged children
Home utilities	Electricity bills, gas bills, and other heating fuel (such as firewood and heating oil)
Other Insurance	Home and contents, and motor vehicle insurance

Table B2. 18 Specific Categories of Consumption Expenditures and Life Satisfaction: The Role of Social Capital

Panel A The Role of Social Support

		Lagged standardized		Social support		Lagged standardized life satisfaction*Social support index		Observations	R-squared	Number of individuals
(1)	Ln (expenditures on vehicle purchases per capita)	0.004	(0.047)	0.003	(0.011)	-0.001	(0.007)	45,693	0.005	11,750
(2)	Ln (expenditures on clothing and footwear per capita)	-0.004	(0.022)	0.006	(0.005)	0.002	(0.003)	45,693	0.005	11,750
(3)	Ln (expenditures on furniture and household appliances per capita)	-0.004	(0.042)	0.029***	(0.010)	0.001	(0.006)	45,693	0.009	11,750
(4)	Ln (expenditures on recreational devices and equipment per capita)	0.090**	(0.036)	0.018**	(0.009)	-0.015***	(0.005)	45,693	0.006	11,750
(5)	Ln (expenditures on meals out per capita)	-0.002	(0.028)	0.003	(0.006)	0.001	(0.004)	45,693	0.007	11,750
(6)	Ln (expenditures on alcohol per capita)	-0.001	(0.026)	-0.007	(0.006)	0.001	(0.004)	45,693	0.008	11,750
(7)	Ln (expenditures on holidays per capita)	0.077**	(0.033)	0.025***	(0.008)	-0.005	(0.005)	45,693	0.007	11,750
(8)	Ln (expenditures on education per capita)	0.049*	(0.026)	0.005	(0.006)	-0.007*	(0.004)	45,693	0.022	11,750
(9)	Ln (expenditures on tobacco per capita)	-0.009	(0.025)	-0.007	(0.006)	0.001	(0.003)	45,693	0.005	11,750
(10)	Ln (expenditures on groceries per capita)	0.003	(0.010)	-0.000	(0.002)	0.000	(0.001)	45,693	0.007	11,750
(11)	Ln (expenditures on housing per capita)	0.019	(0.025)	-0.006	(0.006)	-0.002	(0.004)	45,693	0.007	11,750
(12)	Ln (expenditures on public transportation per capita)	-0.017	(0.028)	-0.005	(0.006)	0.001	(0.004)	45,693	0.014	11,750
(13)	Ln (expenditures on motor vehicle repairs and maintenance per capita)	0.033	(0.023)	0.004	(0.005)	-0.001	(0.003)	45,693	0.006	11,750
(14)	Ln (expenditures on motor vehicle fuels and engine oil per capita)	0.008	(0.018)	0.005	(0.004)	0.000	(0.003)	45,693	0.009	11,750
(15)	Ln (expenditures on phone rent and calls, and internet charges per capita)	-0.003	(0.014)	-0.003	(0.003)	0.000	(0.002)	45,693	0.007	11,750
(16)	Ln (expenditures on health care (health insurance included) and childcare per	0.038**	(0.018)	-0.005	(0.004)	-0.005*	(0.002)	45,693	0.011	11,750
(17)	Ln (expenditures on home utilities per capita)	0.056***	(0.015)	-0.002	(0.004)	-0.007***	(0.002)	45,693	0.008	11,750
(18)	Ln (expenditures on other insurance per capita)	0.040**	(0.020)	0.010**	(0.005)	-0.005*	(0.003)	45,693	0.008	11,750

Panel B The Role of Low Loneliness

		Lagged standardized		Low loneliness		Lagged standardized life satisfaction*Low loneliness		Observations	R-squared	Number of individuals
(1)	Ln (expenditures on vehicle purchases per capita)	0.021	(0.031)	-0.056	(0.053)	-0.037	(0.042)	45,693	0.005	11,750
(2)	Ln (expenditures on clothing and footwear per capita)	-0.005	(0.015)	-0.003	(0.024)	0.023	(0.019)	45,693	0.005	11,750
(3)	Ln (expenditures on furniture and household appliances per capita)	-0.016	(0.028)	0.097**	(0.047)	0.033	(0.037)	45,693	0.009	11,750
(4)	Ln (expenditures on recreational devices and equipment per capita)	0.045*	(0.024)	0.057	(0.040)	-0.076**	(0.032)	45,693	0.006	11,750
(5)	Ln (expenditures on meals out per capita)	-0.012	(0.018)	0.024	(0.030)	0.024	(0.023)	45,693	0.007	11,750
(6)	Ln (expenditures on alcohol per capita)	-0.020	(0.018)	-0.050*	(0.029)	0.042*	(0.022)	45,693	0.008	11,750
(7)	Ln (expenditures on holidays per capita)	0.065***	(0.023)	0.096***	(0.037)	-0.028	(0.029)	45,693	0.007	11,750
(8)	Ln (expenditures on education per capita)	0.025	(0.018)	0.057**	(0.029)	-0.035	(0.023)	45,693	0.022	11,750
(9)	Ln (expenditures on tobacco per capita)	-0.017	(0.017)	-0.061**	(0.025)	0.025	(0.021)	45,693	0.006	11,750
(10)	Ln (expenditures on groceries per capita)	0.009	(0.007)	0.011	(0.011)	-0.006	(0.008)	45,693	0.007	11,750
(11)	Ln (expenditures on housing per capita)	0.042**	(0.017)	0.008	(0.028)	-0.057**	(0.023)	45,693	0.007	11,750
(12)	Ln (expenditures on public transportation per capita)	-0.026	(0.018)	-0.037	(0.029)	0.029	(0.024)	45,693	0.014	11,750
(13)	Ln (expenditures on motor vehicle repairs and maintenance per capita)	0.037**	(0.016)	0.026	(0.025)	-0.017	(0.020)	45,693	0.006	11,750
(14)	Ln (expenditures on motor vehicle fuels and engine oil per capita)	0.019	(0.012)	0.012	(0.020)	-0.017	(0.016)	45,693	0.009	11,750
(15)	Ln (expenditures on phone rent and calls, and internet charges per capita)	-0.005	(0.009)	-0.025	(0.016)	0.005	(0.012)	45,693	0.007	11,750
(16)	Ln (expenditures on health care (health insurance included) and childcare per	0.006	(0.012)	-0.027	(0.018)	0.003	(0.015)	45,693	0.011	11,750
(17)	Ln (expenditures on home utilities per capita)	0.037***	(0.009)	-0.008	(0.016)	-0.041***	(0.012)	45,693	0.008	11,750
(18)	Ln (expenditures on other insurance per capita)	0.017	(0.014)	0.031	(0.021)	-0.013	(0.017)	45,693	0.008	11,750

Panel C The Role of Active Membership

		Lagged standardized		Active member		Lagged standardized life satisfaction*Active member		Observations	R-squared	Number of individuals
(1)	Ln (expenditures on vehicle purchases per capita)	0.006	(0.026)	0.074	(0.063)	-0.021	(0.043)	45,693	0.005	11,750

(2)	Ln (expenditures on clothing and footwear per capita)	0.018	(0.012)	0.113***	(0.027)	-0.025	(0.018)	45,693	0.005	11,750
(3)	Ln (expenditures on furniture and household appliances per capita)	-0.009	(0.022)	0.016	(0.052)	0.032	(0.038)	45,693	0.009	11,750
(4)	Ln (expenditures on recreational devices and equipment per capita)	-0.012	(0.019)	0.120***	(0.045)	0.029	(0.032)	45,693	0.006	11,750
(5)	Ln (expenditures on meals out per capita)	-0.008	(0.014)	0.083***	(0.032)	0.024	(0.023)	45,693	0.007	11,750
(6)	Ln (expenditures on alcohol per capita)	0.012	(0.014)	0.010	(0.032)	-0.018	(0.021)	45,693	0.008	11,750
(7)	Ln (expenditures on holidays per capita)	0.043**	(0.018)	0.135***	(0.042)	0.011	(0.028)	45,693	0.007	11,750
(8)	Ln (expenditures on education per capita)	0.007	(0.014)	0.060*	(0.036)	-0.007	(0.023)	45,693	0.022	11,750
(9)	Ln (expenditures on tobacco per capita)	-0.007	(0.013)	-0.023	(0.029)	0.012	(0.019)	45,693	0.005	11,750
(10)	Ln (expenditures on groceries per capita)	0.003	(0.005)	0.005	(0.012)	0.006	(0.009)	45,693	0.007	11,750
(11)	Ln (expenditures on housing per capita)	-0.001	(0.013)	-0.032	(0.032)	0.025	(0.023)	45,693	0.007	11,750
(12)	Ln (expenditures on public transportation per capita)	-0.022	(0.014)	-0.002	(0.034)	0.036	(0.023)	45,693	0.014	11,750
(13)	Ln (expenditures on motor vehicle repairs and maintenance per capita)	0.034***	(0.012)	FALSE	(0.029)	-0.021	(0.019)	45,693	0.006	11,750
(14)	Ln (expenditures on motor vehicle fuels and engine oil per capita)	0.007	(0.010)	0.025	(0.023)	0.006	(0.015)	45,693	0.009	11,750
(15)	Ln (expenditures on phone rent and calls, and internet charges per capita)	-0.011	(0.008)	0.017	(0.017)	0.023**	(0.011)	45,693	0.007	11,750
(16)	Ln (expenditures on health care (health insurance included) and childcare per	0.008	(0.009)	0.042**	(0.020)	-0.001	(0.014)	45,693	0.011	11,750
(17)	Ln (expenditures on home utilities per capita)	0.014*	(0.007)	0.046**	(0.018)	-0.003	(0.012)	45,693	0.008	11,750
(18)	Ln (expenditures on other insurance per capita)	0.010	(0.010)	0.048**	(0.024)	-0.002	(0.016)	45,693	0.008	11,750

Robust standard errors clustered at the individual level in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table B3. Consumption Expenditures, Life Satisfaction, and Social Capital

VARIABLES	Ln (total household expenditures per capita)			Ln (total household conspicuous expenditures per capita)			Ln (total household basic expenditures per capita)		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Lagged standardized life satisfaction	0.00194	0.00195	0.00190	0.0101*	0.0101*	0.00993*	0.00110	0.00111	0.00109
	(0.00197)	(0.00197)	(0.00197)	(0.00555)	(0.00555)	(0.00554)	(0.00189)	(0.00189)	(0.00189)
Social support index	-0.000690			0.00708**			-0.00227**		
	(0.00115)			(0.00330)			(0.00110)		
Low loneliness		-0.00907*			0.00406			-0.00899*	
		(0.00536)			(0.0158)			(0.00517)	
Active member			0.0127**			0.0361**			0.00614
			(0.00620)			(0.0167)			(0.00594)
Individual Characteristics	YES	YES	YES	YES	YES	YES	YES	YES	YES
Individual Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES
Region Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES
Wave Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	45,693	45,693	45,693	45,693	45,693	45,693	45,693	45,693	45,693
R-squared	0.048	0.048	0.048	0.010	0.010	0.010	0.050	0.050	0.050
Number of Individuals	11,750	11,750	11,750	11,750	11,750	11,750	11,750	11,750	11,750

Robust standard errors clustered at the individual level in parentheses

*** p<0.01, ** p<0.05, * p<0.1

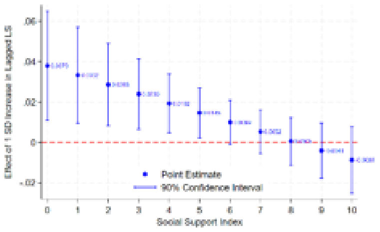
Table B4. Robustness Checks: Different Categorizations of Consumption Expenditures

	Friehe & Mechtel (2014)						Education as Conspicuous						Tobacco as Conspicuous					
VARIABLES	Ln (total household conspicuous expenditures per capita)			Ln (total household basic expenditures per capita)			Ln (total household conspicuous expenditures per capita)			Ln (total household basic expenditures per capita)			Ln (total household conspicuous expenditures per capita)			Ln (total household basic expenditures per capita)		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Lagged standardized life satisfaction	0.0222**	0.0284**	0.0174*	0.00580**	0.0106***	-0.0007	0.0235***	0.0307***	0.0171**	0.00586**	0.0106***	-0.0009	0.0230***	0.0223**	0.0161**	0.00580**	0.0116***	-0.000593
	(0.0108)	(0.0117)	(0.00902)	(0.00286)	(0.00309)	(0.00240)	(0.00900)	(0.00967)	(0.00728)	(0.00293)	(0.00316)	(0.00246)	(0.00886)	(0.00940)	(0.00708)	(0.00292)	(0.00316)	(0.00246)
Social support index	0.0284			-0.00332			0.00787			-0.0032			0.012			-0.00438		
	(0.0189)			(0.00537)			(0.0152)			(0.00548)			(0.0147)			(0.00552)		
Lagged standardized life satisfaction*Social support index	-0.0252*			-0.00877**			-0.0235**			-0.00947**			-0.0274**			-0.00837**		
	(0.0139)			(0.00393)			(0.0116)			(0.00403)			(0.0114)			(0.00402)		
Low loneliness		0.0271			-0.00967*			0.00506			-0.00846			-0.00337			-0.0083	
		(0.0181)			(0.00509)			(0.0153)			(0.00520)			(0.0146)			(0.00521)	
Lagged standardized life satisfaction*Low loneliness		-0.0331**			-0.0160***			-0.0333***			-0.0165***			-0.0235**			-0.0172***	
		(0.0145)			(0.00405)			(0.0119)			(0.00414)			(0.0117)			(0.00415)	
Active member			0.0545***			0.0064			0.0333**			0.00529			0.0341**			0.00686
			(0.0188)			(0.00585)			(0.0162)			(0.00597)			(0.0155)			(0.00601)
Lagged standardized life satisfaction*Active member			-0.0234*			0.00463			-0.0168			0.00425			-0.0208*			0.0049
			(0.0139)			(0.00400)			(0.0113)			(0.00411)			(0.0112)			(0.00410)
Observations	45,693	45,693	45,693	45,693	45,693	45,693	45,693	45,693	45,693	45,693	45,693	45,693	45,693	45,693	45,693	45,693	45,693	45,693
R-squared	0.008	0.008	0.008	0.054	0.054	0.053	0.009	0.009	0.009	0.05	0.05	0.05	0.011	0.011	0.011	0.049	0.05	0.049
Number of Individuals	11,750	11,750	11,750	11,750	11,750	11,750	11,750	11,750	11,750	11,750	11,750	11,750	11,750	11,750	11,750	11,750	11,750	11,750

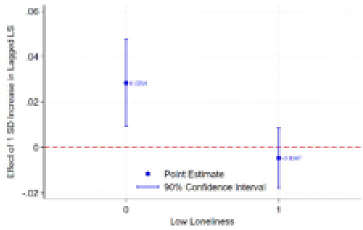
Robust standard errors clustered at the individual level in parentheses

*** p<0.01, ** p<0.05, * p<0.1

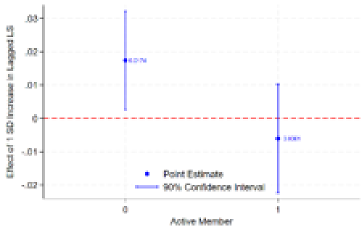
Figure B1. Robustness Checks (Outcome Variable: Conspicuous Expenditures)



Panel A.1

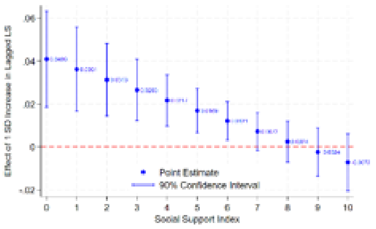


Panel A.2

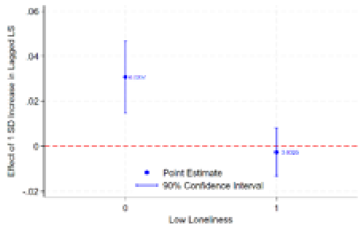


Panel A.3

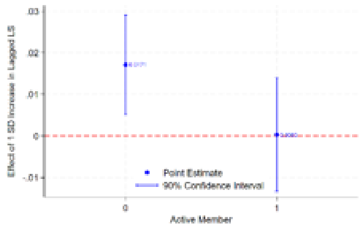
Panel A Definition by Friehe & Mechtel (2014)



Panel B.1

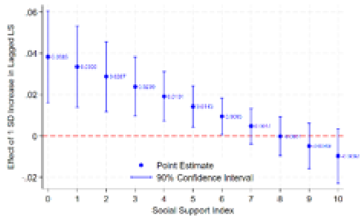


Panel B.2

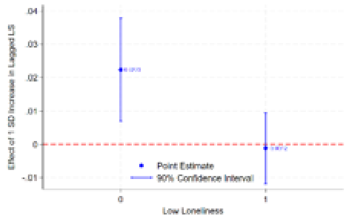


Panel B.3

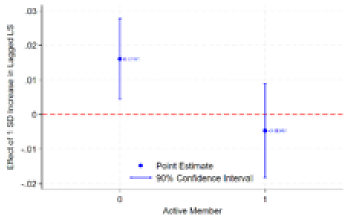
Panel B Education as conspicuous consumption



Panel C.1



Panel C.2

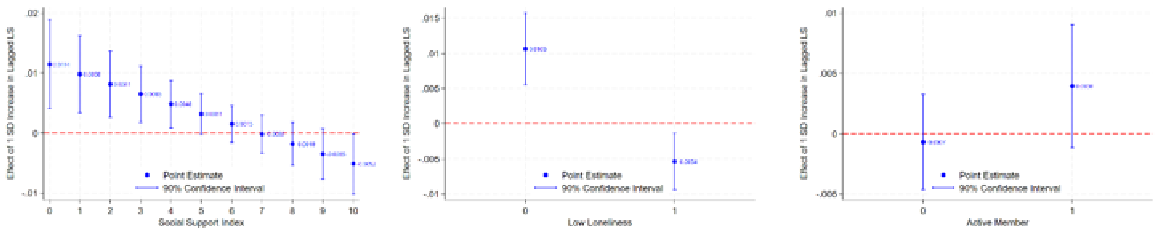


Panel C.3

Panel C Tobacco as conspicuous consumption

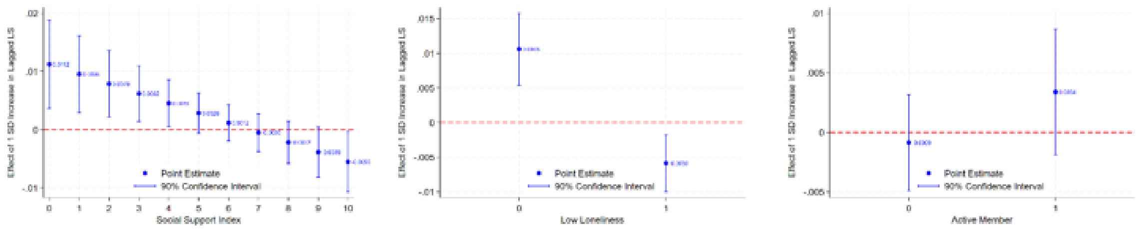
Notes: The figure displays the estimates of $\beta + \rho^k \times SC_{it}^k$, along with 90% confidence intervals.

Figure B2. Robustness Checks (Outcome Variable: Basic Expenditures)



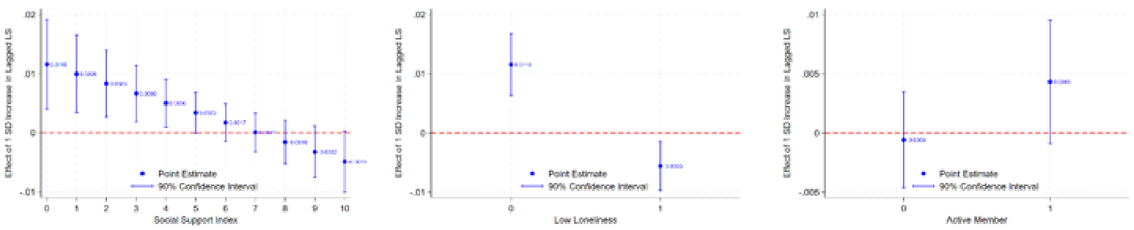
Panel A.1 Panel A.2 Panel A.3

Panel A Definition by Friehe & Mechtel (2014)



Panel B.1 Panel B.2 Panel B.3

Panel B Education as conspicuous consumption

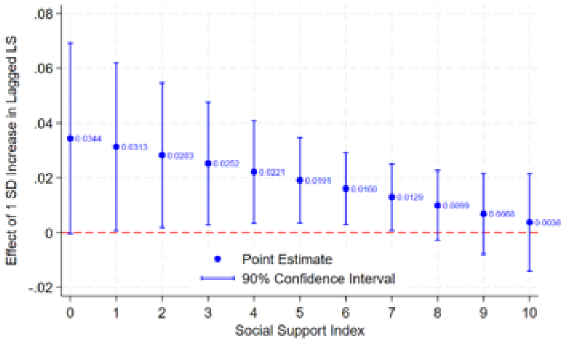


Panel C.1 Panel C.2 Panel C.3

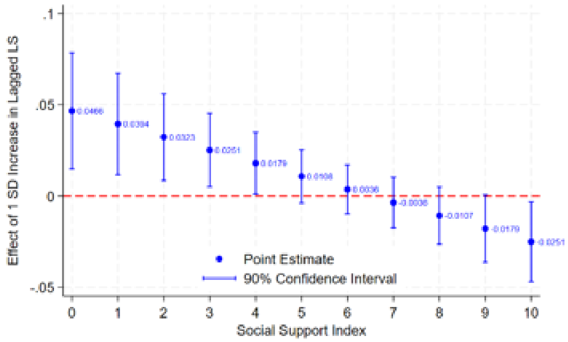
Panel C Tobacco as conspicuous consumption

Notes: The figure displays the estimates of $\beta+\rho^k\times SC\_it^k$, along with 90% confidence intervals.

Figure B3. Heterogeneous Analysis by Gender (Outcome Variable: Conspicuous Expenditures)

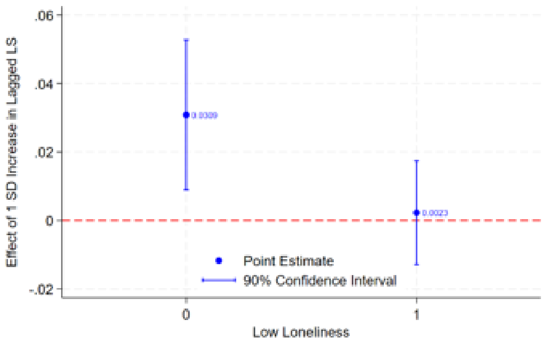


Panel A.1 Female

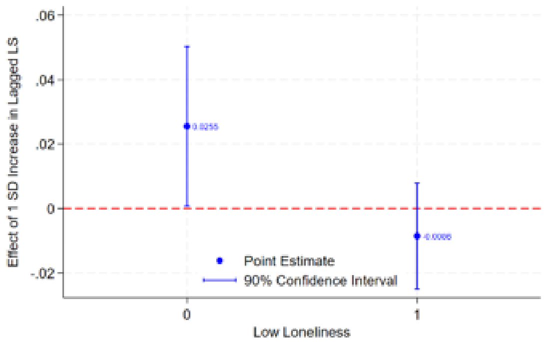


Panel A.2 Male

Panel A The role of social support

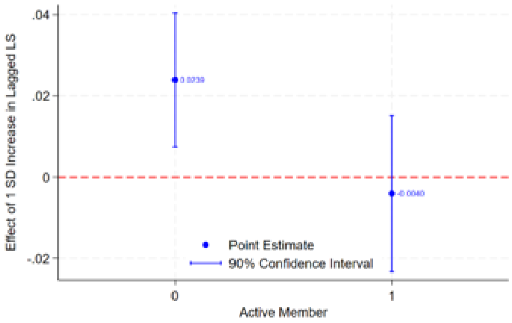


Panel B.1 Female

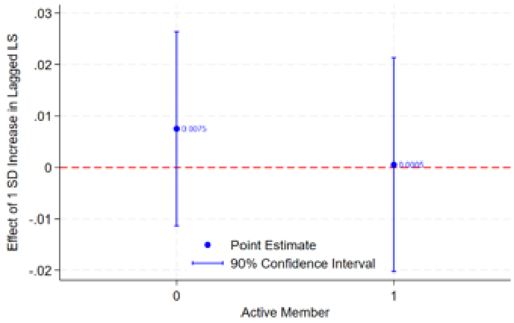


Panel B.2 Male

Panel B The role of low loneliness



Panel C.1 Female

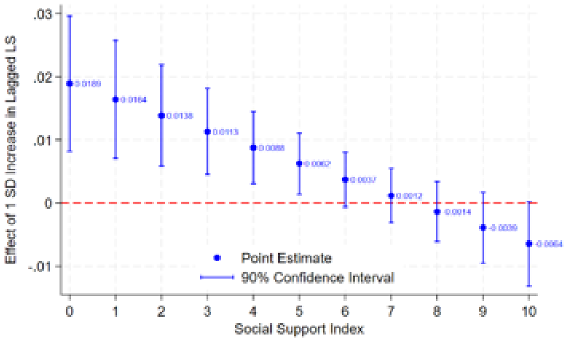


Panel C.2 Male

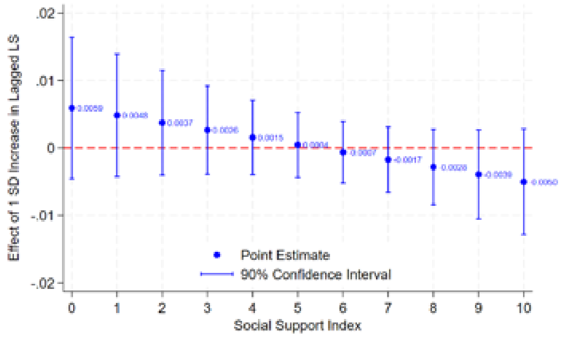
Panel C The role of active membership

Notes: The figure displays the estimates of $\beta + \rho^k \times SC_{it}^k$, along with 90% confidence intervals.

Figure B4. Heterogeneous Analysis by Gender (Outcome Variable: Basic Expenditures)

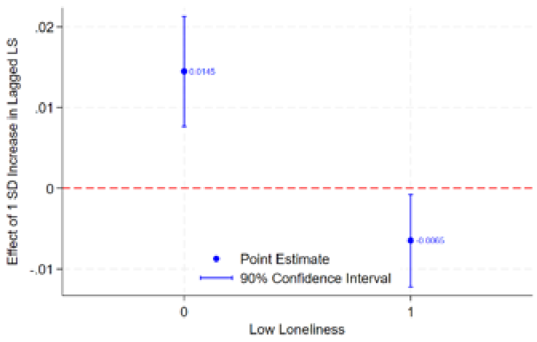


Panel A.1 Female

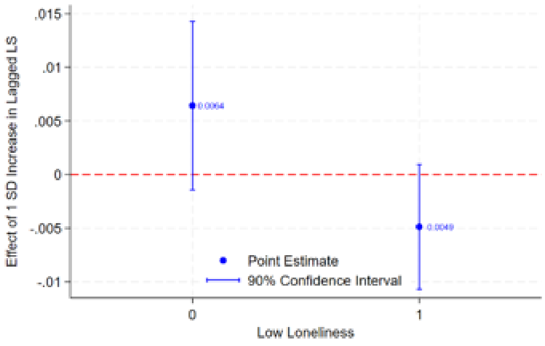


Panel A.2 Male

Panel A The role of social support

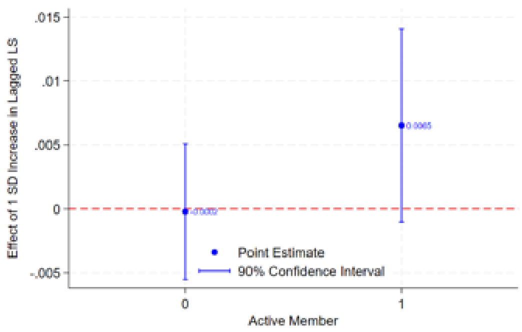


Panel B.1 Female

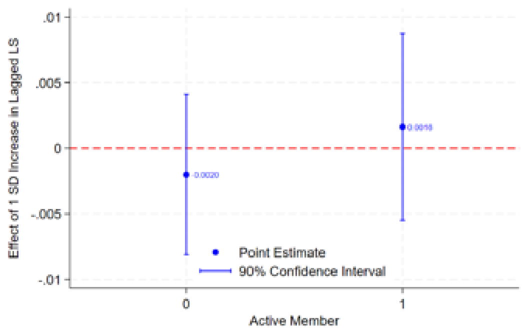


Panel B.2 Male

Panel B The role of low loneliness



Panel C.1 Female

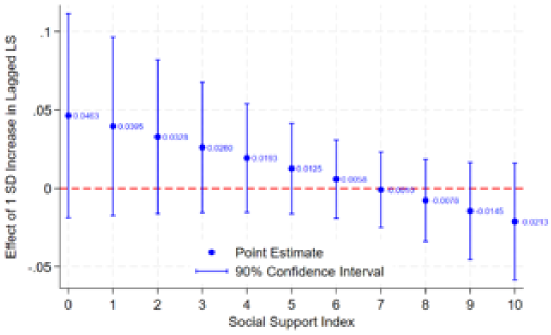


Panel C.2 Male

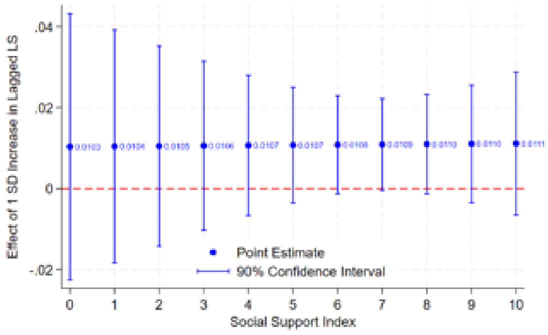
Panel C The role of active membership

Notes: The figure displays the estimates of $\beta + \rho^k \times SC_{it}^k$, along with 90% confidence intervals.

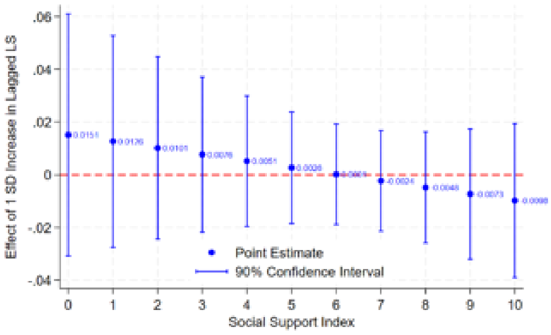
Figure B5. Heterogeneous Analysis by Age (Outcome Variable: Conspicuous Expenditures)



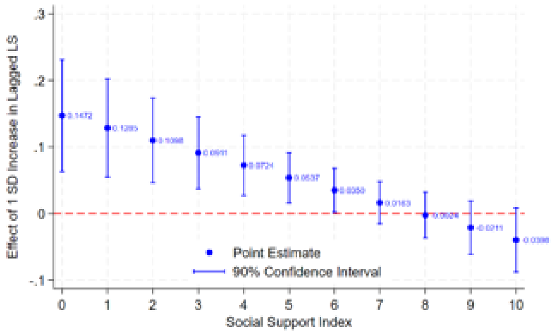
Panel A.1 Age 15-24



Panel A.2 Age 25-49

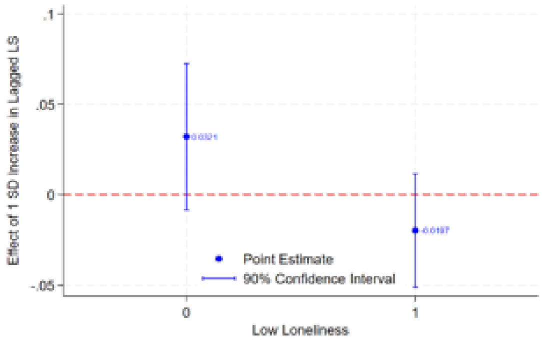


Panel A.3 Age 50-66

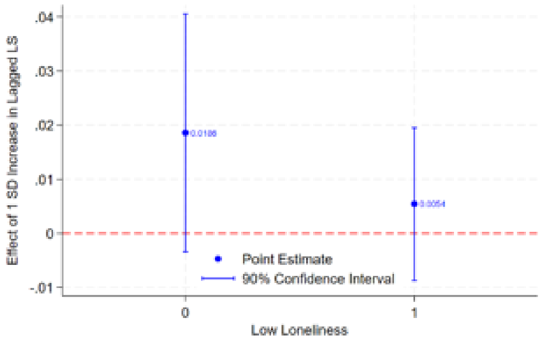


Panel A.4 Age 67+

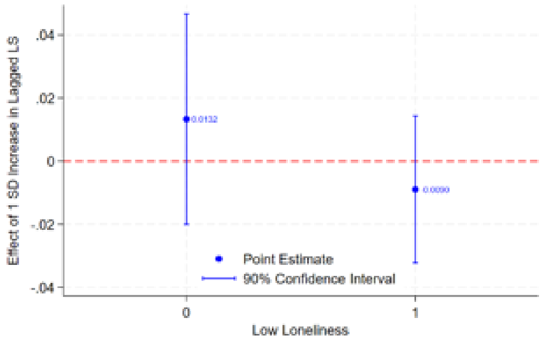
Panel A The role of social support



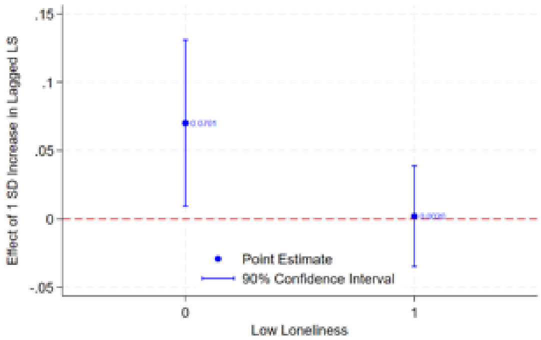
Panel B.1 Age 15-24



Panel B.2 Age 25-49

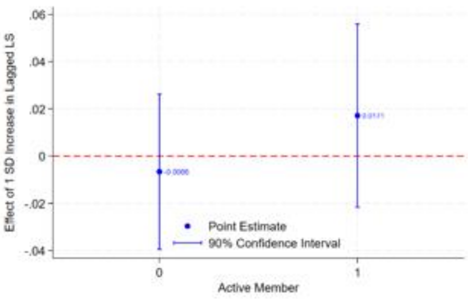


Panel B.3 Age 50-66

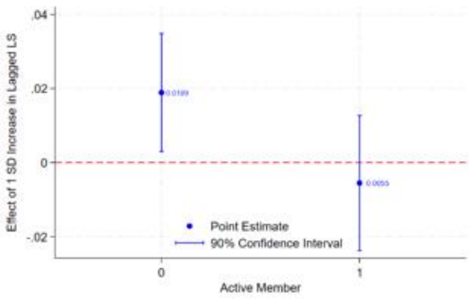


Panel B.4 Age 67+

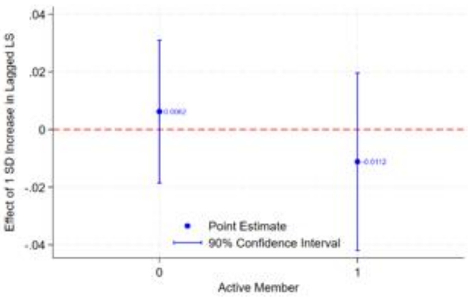
Panel B The role of low loneliness



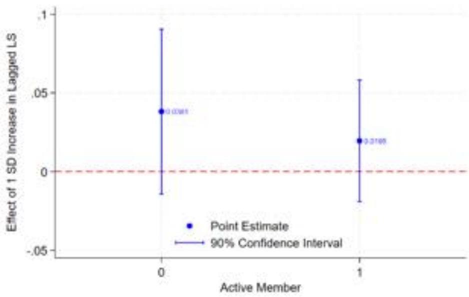
Panel C.1 Age 15-24



Panel C.2 Age 25-49



Panel C.3 Age 50-66

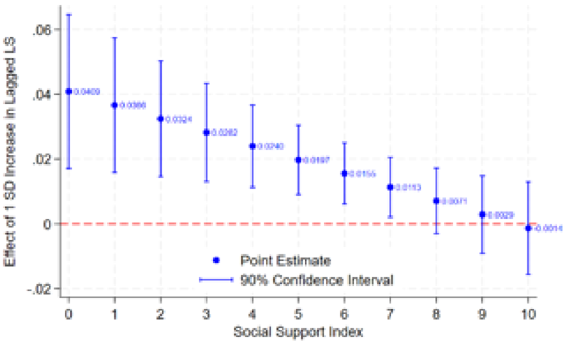


Panel C.4 Age 67+

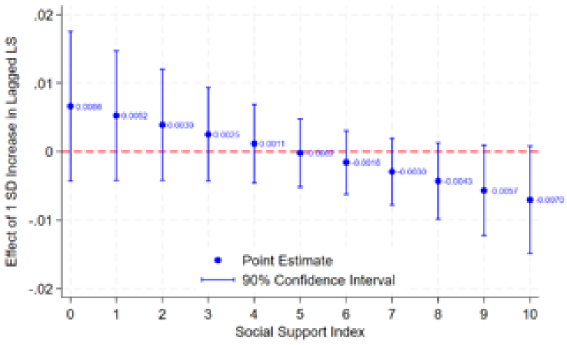
Panel C The role of active membership

Notes: The figure displays the estimates of $\beta + \rho^k \times SC_{it}^k$, along with 90% confidence intervals.

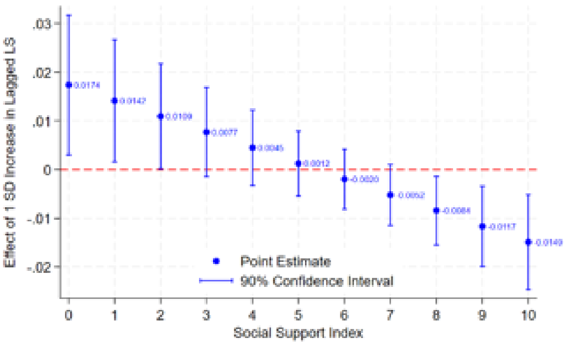
Figure B6. Heterogeneous Analysis by Age (Outcome Variable: Basic Expenditures)



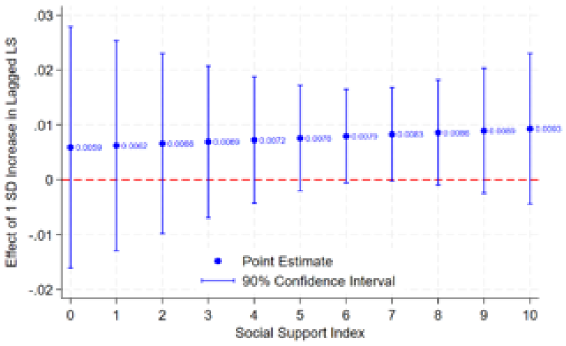
Panel A.1 Age 15-24



Panel A.2 Age 25-49

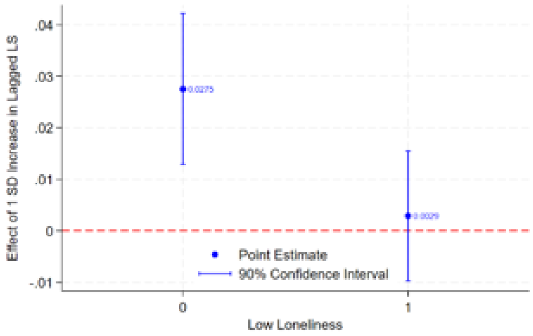


Panel A.3 Age 50-66

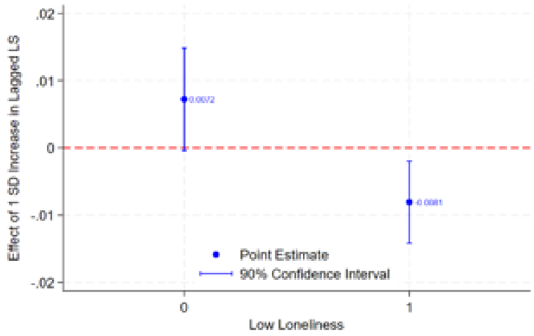


Panel A.4 Age 67+

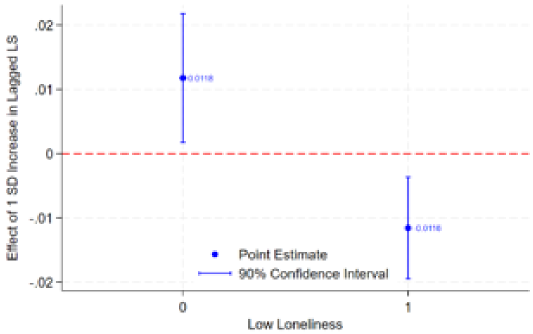
Panel A The role of social support



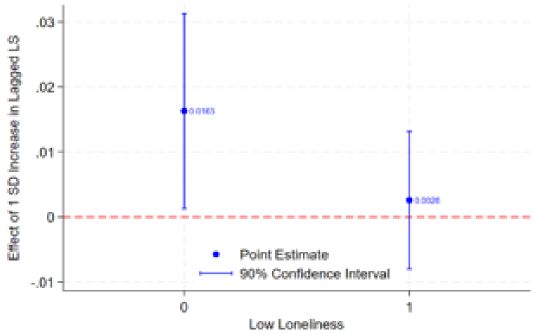
Panel B.1 Age 15-24



Panel B.2 Age 25-49

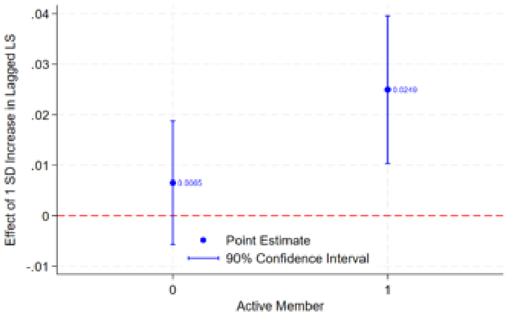


Panel B.3 Age 50-66

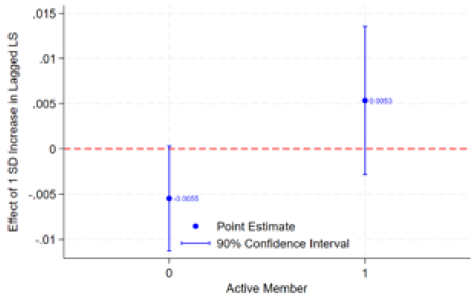


Panel B.4 Age 67+

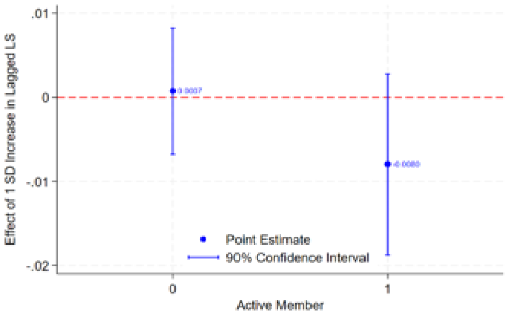
Panel B The role of low loneliness



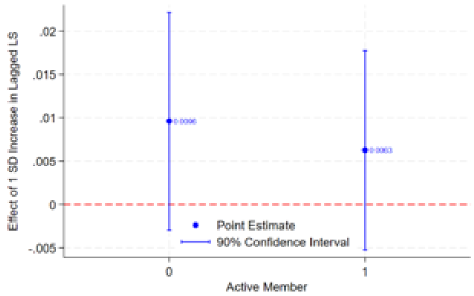
Panel C.1 Age 15-24



Panel C.2 Age 25-49



Panel C.3 Age 50-66



Panel C.4 Age 67+

Panel C The role of active membership

Notes: The figure displays the estimates of $\beta + \rho^k \times SC_{it}^k$, along with 90% confidence intervals.