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FACULTÉ DES HAUTES ÉTUDES COMMERCIALES

DÉPARTEMENT D'ÉCONOMIE

ESSAYS ON SUBJECTIVE WELL-BEING, HEALTH AND CONSUMPTION

THÈSE DE DOCTORAT

présentée à la

Faculté des Hautes Études Commerciales
de l'Université de Lausanne

pour l'obtention du grade de
Docteur ès Sciences Économiques,
mention « Économie politique »

par

Silas AMO-AGYEI

Directeur de thèse
Prof. Jürgen Maurer

Jury

Prof. Rafael Lalive, président
Prof. Pascal St-Amour, expert interne
Prof. Arie Kapteyn, expert externe
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I M P R I M A T U R

Sans se prononcer sur les opinions de l'auteur, la Faculté des Hautes Etudes Commerciales de l'Université de Lausanne autorise l'impression de la thèse de Monsieur Silas AMO-AGYEI, titulaire d'un bachelor en économie et mathématiques de l'Université du Ghana, titulaire d'un master en économie politique de l'Université de Lausanne, en vue de l'obtention du grade de docteur ès Sciences économiques, mention « économie politique ».

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ESSAYS ON SUBJECTIVE WELL-BEING, HEALTH AND CONSUMPTION

Lausanne, le 13 septembre 2022

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FACULTY OF BUSINESS AND ECONOMICS

Dissertation

ESSAYS ON SUBJECTIVE WELL-BEING, HEALTH AND CONSUMPTION

by

Silas Amo-Agyei

Submitted to the University of Lausanne in fulfillment

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PREFACE

The three chapters of my thesis provide coherent studies on distinct dimensions of individual subjective well-being (SWB) and how they relate to important economic outcomes, such as consumption and health. As a portrayal of human well-being, SWB complements standard aggregate well-being measures, such as GDP, and reflects a wider range of experiences, including those unrelated to market exchange. Owing to recent state-of-the-art surveying techniques, these distinct SWB dimensions can be reliably and quantitatively measured.

Using SWB as a proxy for utility, chapter one provides evidence for health-state dependence of the utility function and shows that the marginal utility of consumption increases as health deteriorates, highlighting the capacity of consumption to provide a buffer against the negative impact of health shocks on well-being. Chapter two studies the association of pain with SWB and shows both evaluative and experienced (emotional) well-being dimensions to be markedly lower for people living with pain than they are for those without pain. Further, pain-related differences in time use between people with pain and those without pain are shown as providing only a small compensating effect. Finally, chapter three documents the direct relationship between evaluative and experienced (emotional) well-being dimensions and highlights the importance of the multidimensional nature of SWB.

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List of Acronyms and Abbreviations

ADL	Ability to perform activities of daily living
BUC	Blow-up and Cluster
CPI	Consumer price indices
CRE	Correlated random effects
CRRA	Constant relative risk aversion
DIF	Differential item functioning
DRM	Day Reconstruction Method
FE	Fixed effects
GDP	Gross Domestic Product
HIC	High-income country
IASP	International Association of the Study of Pain
ICD	International Classification of Diseases
LMIC	Low- and middle-income country
LPM	Linear probability model
OECD	Organisation for Economic Co-operation and Development
OLS	Ordinary least squares
OOP	Out-of-pocket spending
RLMS	Russia Longitudinal Monitoring Survey
SAGE	Study on Global Ageing and Adult Health
SAH	Self-assessed health
SWB	Subjective well-being
WHO	World Health Organization
WHODAS	World Health Organization Disability Assessment Schedule
WHOQoL8	WHO Quality of Life Index
WHS	World Health Survey

INTRODUCTION

"The ultimate purpose of economics, of course, is to understand and promote the enhancement of well-being".[1] This sentiment, expressed in 2012 by the then Chairman of the US Federal Reserve, is directly in line with that of Adam Smith and the other founding fathers of economics. In economic theory, the well-being of people and societies is embedded in the notion of 'utility'. The concept of utility is an underlying principle of modern economics, whether explicitly (e.g. consumer theory) or implicitly (e.g. development economics). Although foundational, utility has typically not been measured or quantified in economics and economists have generally desisted from defining utility in more tangible terms. However, there is a growing body of literature linking utility to subjective well-being (SWB) [e.g., Benjamin et al., 2012, 2014; Frey & Stutzer, 2002], and widespread interest in measuring and understanding SWB [OECD, 2013; Stiglitz et al., 2009]. SWB measures are now reliably and quantitatively measured in several national surveys using state-of-the-art surveying techniques. The use of SWB as a measure of human well-being or as a proxy for utility is particularly important because it does not only complement standard aggregate well-being measures such as GDP, but also it reflects a wider range of experiences, including individuals' environment and those unrelated to market exchange [Diener & Seligman, 2004; Kahneman & Krueger, 2006].

SWB is a multifaceted construct that comprises concepts of both evaluative and emotional (experienced) well-being [National Research Council, 2013; OECD, 2013]. Evaluative well-being consist of individuals' cognitive global evaluation of their lives when they pause and reflect whereas experienced well-being comprises individuals' feelings (affective experiences) during day-to-day moments of life [Killingsworth, 2021]. Evaluative well-being mirrors key economic concepts such as utility stock or the value function over one's life which is conceptually equivalent to the indirect utility function whereas experienced well-being reflects the concept of flow utility over a day, instantaneous utility function or the felicity function.

There are several broad branches of interest in the study of SWB in economics. First, one broad branch explores the potential of SWB as an indicator of aggregate social progress to complement limited measures such as GDP [e.g., Benjamin et al., 2014; Fleurbaey, 2009]. The second branch of literature uses SWB information to test economic theories, shed light on important empirical

[1] Speech by Ben S. Bernanke, former Chairman of the US Federal Reserve, to the 32nd General Conference of the International Association for Research in Income and Wealth, Cambridge, Massachusetts, 6 August 2012. Quote taken from Layard et al. [2014].

puzzles, and value public and nonmarket goods [e.g., Frey & Stutzer, 2014; Fujiwara, 2013; Kassenboehmer & Haisken-DeNew, 2009; Levinson, 2012; Luttmer, 2005; Oswald & Powdthavee, 2008; Stutzer, 2004; Van Praag & Baarsma, 2004]. Third, there is a branch of SWB literature working on identifying and overcoming measurement challenges which are peculiar to self-reported data, such as survey methods, adaptive preferences, and reporting bias [e.g., Burchardt, 2005]. Fourth and lastly, another branch of literature focuses on understanding the determinants of SWB [Clark et al., 2018], in particular measuring the relationship between SWB and income [Frey & Stutzer, 2000; Kahneman & Deaton, 2010; Kapteyn et al., 2015; Killingsworth, 2021], unemployment [Frey & Stutzer, 2000; Knabe et al., 2010], health [Flores et al., 2015; Miret et al., 2017], age [Kieny et al., 2020; Stone et al., 2010], and gender [Kieny et al., 2021], among others. The thesis presented here relates to and contributes to the three latter branches of the study of SWB in economics.

The thesis comprises three self-contained chapters in the area of SWB. Using SWB to proxy for utility, chapter one contributes to the body of literature that uses SWB to test economic theories by providing evidence for health-state dependence of the utility function using broad-based measures of household consumption from a panel data. Chapter two shifts focus to study the association of pain experience with SWB and time use among older people in low-and middle-income countries (LMICs) making use of anchoring vignettes to account for common reporting behavior between self-reported pain and SWB. Finally, chapter three provides evidence of the direct relationship between distinct dimensions of SWB.

It is standard practice in applied work to assume that the utility function of consumption is health-state independent. Moreover, most of the limited previous literature that provide evidence for health-state dependence of utility do so by using income measures as a proxy for consumption due to lack of broad-based consumption measures in many survey data. However, the use of actual consumption to estimate how the marginal utility of consumption varies with health is more appealing than income because consumption is typically found to be more closely linked with well-being than income [Brown & Gathergood, 2020; Meyer & Sullivan, 2003]. Chapter one of this thesis uses a long panel data from the Russia Longitudinal Monitoring Survey (RLMS) to estimate the effect of health status on the marginal utility of consumption by directly using broad-based measures of consumption. More so, by using direct measures of consumption, the chapter estimates health-state dependence by using different consumption categories such as consumption of food, services, among others. To do this, the chapter estimates how an observed within-individual utility change associated with a health shock varies across individuals of different consumption levels. The findings reject the null of health-state independence of utility and show that the marginal utility

of consumption increases as health deteriorates. This finding implies that nonmedical consumption provides a buffer against the negative impact of a health shock on well-being.

Chapter two contributes to the literature on the determinants of SWB by providing a comprehensive assessment of the association of pain experience with various dimensions of SWB and time use among older people in LMICs. Pain is common and affects a large number of people, with significant impact on many aspects of life, including being a leading global cause of disability [Vos et al., 2016]. It is also often viewed as a sensitive barometer of population health and well-being [Zajacova et al., 2021]. The limited available evidence largely considers the relationship between pain and the evaluative well-being dimension of SWB, in spite of the higher appeal for use of the experienced well-being dimension in assessing the impact of health on overall well-being [Dolan & Kahneman, 2007]. Moreover, most studies are based on data from high-income countries (HICs) with notable exceptions. Meanwhile, adult populations in LMICs are disproportionately exposed to risk factors for developing pain such as physically demanding work combined with frequent under-nutrition, and often have limited access to effective pain treatments or management options compared to their counterparts in HICs [James et al., 2018; Payne et al., 2017; Sharma et al., 2019]. Using the first wave of the WHO Study on Global Ageing and Adult Health (SAGE) from five LMICs, this chapter explores the use of anchoring vignettes as a form of a control function to account for common reporting behavior between self-reported pain and SWB. SAGE contains extensive data on individual demographic and socioeconomic characteristics, time use, and several measures of SWB including activity-specific affective experiences from an abbreviated version of Kahneman et al. [2004]'s Day Reconstruction Method (DRM). Using multivariable linear regression models, the findings of this chapter shows that both evaluative and experienced well-being dimensions of SWB are markedly lower for people living with pain compared to those without pain, and that differences in experienced utility by pain status are exclusively due to worse activity-specific affective experiences among people with pain. The chapter further shows that pain-related differences in time use in favour of those in pain provide only small compensating effect, implying that the time use advantage does not provide enough buffer against the negative association of pain with experienced utility.

The last chapter of the thesis takes a closer look at SWB and explores the relationship between experienced and evaluative well-being dimensions. The SWB literature shows that both SWB dimensions are complementary, yet they capture different underlying phenomena and have different determinants, antecedents and consequences that go well beyond people's income and material conditions [Stiglitz et al., 2009]. Individuals' choices tend to maximize their evaluative well-being

[Benjamin et al., 2012] and both SWB dimensions often show different relationships with important demographic and socioeconomic characteristics, such as age [Kieny et al., 2020; Stone et al., 2010], gender [Kieny et al., 2021], health [Miret et al., 2017], income [Kahneman & Deaton, 2010; Kapteyn et al., 2015; Killingsworth, 2021] and unemployment [Knabe et al., 2010]. Using the same SAGE data of chapter 2, chapter 3 applies the abbreviated version of Kahneman et al. [2004]'s DRM to assess the extent to which people's subjective assessment of their emotional affects during the course of a day (experienced well-being) is directly related to their self-reported general life satisfaction and quality of life (evaluative well-being). To identify a direct partial association, the chapter accounts for common objective determinants of both SWB dimensions and adjusts for common self-rating behavior between the two by using anchoring vignettes for health-state description in a multivariable linear regression framework. The results show that evaluative well-being is moderately associated with measures of experienced well-being. The results further show that age appears to have a dampening effect on the association of evaluative well-being with experienced well-being but income does not appear to have such dampening effect.

The thesis' contributions have important implications for economic policy towards advancing population well-being. The first chapter's results have implications for economic decisions such as optimal life-cycle savings and insurance design—notably long-term care and disability insurance. For example, the results imply that not only is full health insurance desirable, but also it is desirable to promote resource transfers from good-health to poor-health states such that more can be consumed in poor health where the marginal utility of consumption is higher. The findings in the second chapter calls for policy interventions and welfare support for older people in LMICs who experience pain in their everyday lives. Chapter two's results imply that prevention of pain and improving treatment of widespread pain can be an important step towards improving old-age population health and well-being in developing countries. Finally, the results in the third chapter imply that given the low extent of direct relationship found between experienced and evaluative SWB dimensions, there should be caution in using both SWB dimensions interchangeably as a proxy for utility in applied work. The size of the direct association between the two SWB dimensions reinforces the literature that they are complementary, yet distinct aspects of human well-being, and both should be measured in SWB surveys and used complementarily.

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CHAPTER 1

The Effect of Health State on the Marginal Utility of Consumption: Evidence based on Household Consumption Expenditure

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This study applies broad-based measures of household consumption expenditure and a utility proxy to estimate the effect of health state on the marginal utility of consumption using the Russia Longitudinal Monitoring Survey's panel data. To do so, I estimate how an observed within-individual utility change associated with a health shock varies across individuals of different consumption levels. I reject the null of health-state independence of utility and show that the marginal utility of consumption increases as health deteriorates, implying that nonmedical consumption tends to buffer the negative effects of a health shock on well-being. The baseline results show that moving from a good health state to a poor health state raises the marginal utility of consumption by 2.5 to 4.0 percentage points depending on the measure of health.

Keywords: *consumption; health; utility; marginal utility of consumption; well-being.*
JEL Classification: *D12, I10, I31.*

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1.1 INTRODUCTION

What is the worth of consumption to a sick person? In other words, how does people's health status affect the shape of their utility function? Assumptions about how health status affects the utility function (hereafter called *health-state dependence of utility*) have implications for economic outcomes such as health insurance decisions [Arrow, 1974; Viscusi & Evans, 1990; Zeckhauser, 1970, 1973], optimal life-cycle savings [Finkelstein et al., 2013], and long-term care [Ameriks et al., 2020].[1] For example, if the marginal utility of consumption is independent of health for any given consumption, then full insurance is optimal.[2] If on the other hand, poor health lowers (raises) the marginal utility of consumption, then less (more) than full insurance is desirable [Viscusi & Evans, 1990]. Thus, the relative magnitudes of the marginal utilities of consumption in good and poor health states are key empirical parameters.

Unequivocally, for any given level of consumption, an individual's overall utility is greater when in good health than in poor health. However, theoretically, poor health might decrease, increase, or not alter the marginal utility of consumption. Certain consumption goods are more enjoyable in good health and might decrease the marginal utility of consumption when ill. Examples of such goods likely to be more enjoyable in good health include traveling, skiing or hiking. Yet, other goods can be more enjoyable in poor health and might increase the marginal utility of consumption when ill. Examples of such consumption goods include market services for physically demanding housework such as assistance with self-care. Whether the marginal utility of consumption decreases (defined as *negative health-state dependence*), increases (*positive health-state dependence*), or remains constant (*health-state independence*) with deteriorating health depends on the relative importance of both types of consumption goods.[3]

Despite the important policy implications of health-state dependence of utility, it is standard practice in applied work to assume health-state independence. Empirical evidence on how the marginal utility of consumption varies with health is limited. Most of the limited literature that attempt this question show evidence of negative health-state dependence [Blundell et al., 2020; J. R. Brown et al., 2016; Finkelstein et al., 2013; Sloan et al., 1998; Viscusi, 2019; Viscusi & Evans, 1990], whereas few others find evidence of positive health-state dependence [e.g., Edwards, 2008; Gyrd-Hansen, 2017; Kools & Knoef, 2019; Lillard & Weiss, 1997].

[1] For this paper and following the definition by [Finkelstein et al., 2009], health-state dependence of utility is defined as the effect of health on the marginal utility of consumption.

[2] Optimal insurance coverage, when there is actuarially fair insurance, would equate the marginal utility of consumption in each health state.

[3] This paper follows the terminology in Finkelstein et al. [2009, 2013]. For clarity, the discussion of health-state dependence is restricted to the utility from nonmedical and nondurable consumption expenditure at the individual level.

Significantly, the previous evidence is based on using income measures as a proxy for consumption mainly due to lack of broad-based consumption measures in survey data, with the exception of Blundell et al. [2020]. However, the use of actual consumption to estimate how the marginal utility of consumption varies with health is more appealing than income because consumption is typically found to be more closely linked with well-being. In particular, changes in individuals' subjective well-being (SWB) are associated with changes in their consumption and not their income [G. D. A. Brown & Gathergood, 2020], and consumption is more closely associated with independent measures of poor health than income is [Jencks et al., 2004; B. D. Meyer & Sullivan, 2003].

The contribution of this paper is twofold. First, I use long panel data to estimate the effect of health status on the marginal utility of consumption by directly using measures of consumption rather than inferring state dependence from estimates of how the marginal utility of income varies with health status. More so, using direct measures of consumption allows me to estimate the state dependence by using different consumption categories, such as consumption of food, services, among others. Use of different consumption categories here is important because households typically adjust their consumption basket after a health shock due to changing resources and also due to changing utility from consuming certain goods following the health shock [Blundell et al., 2020]. Second, I use different health measures based on diagnosed chronic illnesses and self-assessed health (SAH) to evaluate whether the health-state dependence of utility varies with different health measures. Thus, this study fills an important gap in the literature, especially related to using consumption, and relates to two important strands of previous studies: those that attempt to identify the effects of health on the utility function and those that analyze whether economic resources buffer a decline in well-being following a health shock [e.g., Freedman et al., 2019; B. Meyer & Mok, 2016].

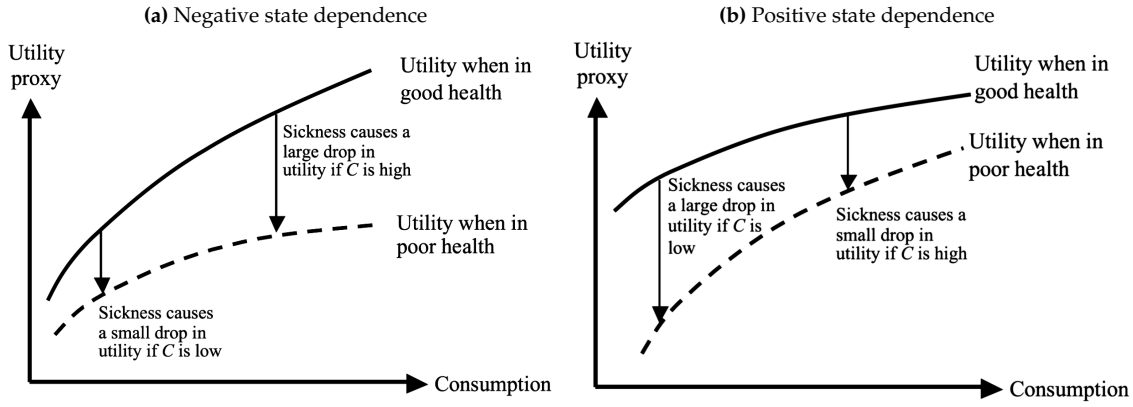
There are two broad classes of approaches to estimate the health-state dependence of the utility function.[4] One broad class of approaches is based on individuals' revealed demand for moving resources across different health states. If the marginal utility of consumption depends on health, then forward-looking agents allocate resources across health states ex ante to enable more to be consumed when marginal utility is highest. For example, health insurance demand with its associated state-dependent payoff streams. The second broad class of approaches is to estimate how observed within-individual utility change associated with a health shock varies across individuals with different consumption, which is the approach I adopt. I use an approach similar to Finkelstein

[4] See Finkelstein et al. [2009] for a detailed discussion of the two broad classes of approaches.

et al. [2013] to examine how the difference in the observed individual utility over time between good and poor health states varies with consumption.

The approach is illustrated in Figure 1.1. Whether the difference in the observed utility of being in good versus poor health increases (Figure 1.1(a)) or decreases (Figure 1.1(b)) with consumption infers that the marginal utility of consumption decreases (negative health-state dependence) or increases (positive health-state dependence), respectively, as health deteriorates. The magnitude of the change in the difference in utility across health states by consumption allows quantification of the magnitude of any health-state dependence of the utility function.

Figure 1.1: Illustration of health-state dependent utility functions



Source: Finkelstein et al. [2013]

Implementing this approach requires observing, for the same individual and for a long period, a measure of utility, health status, and broad-based consumption measures; notably, such data that cover the total adult population is difficult to find. To the best of my knowledge, the data that best fit these criteria as well as cover the total adult population is from Phase II of the Russia Longitudinal Monitoring Survey (RLMS), which is based on a representative sample of the Russian Federation and produces 24-wave long panel data that covers the period from 1994 to 2019 (as of the time of this writing) and both adult and child populations. The RLMS allows for the construction of broad-based consumption measures, making it best suited to answer the research question at hand. The data allow for an analysis of five *big-ticket* consumption categories of nondurable and nonmedical consumption: (i) food including own-farm food products; (ii) fuel including for cooking; (iii) nonmedical services including public transport, tailoring, hairdressing, etc.; (iv) other nondurables including utilities, rent, stationary, etc.; and (v) tourism and leisure. I estimate the effect of health on the marginal utility of aggregate consumption and then of the various consumption categories evaluated at per adult equivalent in the household.

The results reject the null of no health-state dependence of utility and provide evidence in favor of positive health-state dependence. Thus, I find statistically significant evidence that the marginal utility of consumption increases as health deteriorates, which implies that consumption tends to mitigate the negative effects of a health shock on well-being. The baseline estimates show that moving from a good health state to a poor health state increases the marginal utility of consumption by 2.5 to 4.0 percentage points depending on how health is measured. This increase is equivalent to a 1.59-percentage point increase in the marginal utility of consumption for a one-standard-deviation increase in the number of diagnosed chronic illnesses (relative to the marginal utility when the individual has no chronic illness) and a 1.81-percentage point increase in the marginal utility of consumption for a one-standard-deviation increase in a subjective health evaluation toward *very bad* health (relative to the marginal utility when the individual evaluates herself as having *very good* health). The results are robust across alternative specifications and to alternative health measure. To compute the alternative health measure, I follow Blundell et al. [2020, 2017] and Jürges [2007] and use predicted values of a SAH, regressed over a set of objective health measures (dummies for having certain health conditions, as diagnosed by a doctor).

The findings align with the limited evidence on positive health-state dependence of the utility function and on economic resources capacity to buffer declines in well-being following a health shock. I sharpen this body of evidence by looking deep into consumption to identify the health-state dependence parameters associated with the various components of consumption. The results show that positive health-state dependence of utility is strongest for the most essential components of consumption such as food.

The remainder of the paper is organized as follows. The next section outlines the empirical strategy underlying the analysis. Section 1.3 describes the data and presents summary statistics, followed by the main results of the empirical analysis in Section 1.4. Section 1.5 provides additional results and robustness checks while the final section highlights the conclusions.

1.2 Method

Finkelstein et al. [2009] distinguish two broad classes of empirical approaches to estimating the health-state dependence of the utility function. One broad class exploits individuals' revealed preferences for moving resources across health states. If health-state dependence of utility is nonzero, then forward-looking individuals allocate resources across health states ex ante such that more can be consumed when the marginal utility is highest. This class of approaches can be implemented

by (i) exploring health insurance demand, which by construction offers state-dependent payoff streams;[5] (ii) exploring demand for risky assets across individuals with varying probabilities of uninsured health shocks [e.g., Edwards, 2008]; or (iii) comparing consumption profiles across individuals with different health trajectories based on assumptions about bequest motives [e.g., Lillard & Weiss, 1997].

The other broad class of approaches is based on observed individual utility changes. By comparing within-individual utility changes associated with a health shock across individuals with different consumption or resources, the change in the marginal utility of consumption resulting from the health shock can be identified. One way to implement this comparison is to inquire from individuals the amount of money they require to compensate them for a hypothetical exposure to specific health risks and examine how these self-reported compensating differentials vary with consumption or proxies thereof, such as permanent income [e.g., Evans & Viscusi, 1991; Kools & Knoef, 2019; Sloan et al., 1998; Viscusi & Evans, 1990]. Another way is to use utility proxies, such as SWB. Then, one can estimate in a panel how the utility proxy changes in response to health shocks and how this change varies across individuals with different consumption or resources [e.g., Finkelstein et al., 2013].

The method used in this study contributes to and improves on existing studies that use the last class of approaches. The contribution lies in the fact that the data I use allows for consumption to be directly observed. Studies that use permanent income as a proxy for consumption [e.g., Finkelstein et al., 2013] require a strong assumption of rational, forward-looking behavior for this approximation to be valid—an assumption not needed in this study. Furthermore, using consumption of different types of goods allows for the disaggregation of the consumption effect into the effect from the consumption of necessary goods and that from other types of goods.

Given that I observe consumption, health status, and a proxy for utility, estimating the health-state dependence of the utility function based on the observed utility class of approaches can be directly implemented. That is, if poor health causes a more significant decline in utility for individuals with higher consumption relative to individuals with lower consumption, then the utility curve for good health must be steeper than that for poor health, which means that the marginal utility of consumption declines with poor health (negative health-state dependence). Conversely, if the drop in utility for individuals in poor health is smaller at higher consumption levels than at lower consumption levels, then the utility curve in poor health must be steeper than that in good health,

[5] No study as of this writing has implemented this approach due to risk aversion issues and, more importantly, market imperfections in offering health insurance contracts, particularly contracts that offer more than full insurance payoffs.

implying that the marginal utility of consumption increases in poor health (positive health-state dependence). This phenomenon can be observed by regressing the utility proxy on consumption, health status, and the interaction of consumption and health status while controlling for other individual characteristics, which results in the coefficient of the interaction term providing an estimate of the health-state dependence of utility.

The next two subsections discuss the empirical model and outline the underlying assumptions for the identification strategy.

1.2.1 Econometric Specifications

To estimate the effect of health status on the marginal utility of consumption, I estimate the regression:[6]

$$U_{it} = \beta_1 \delta(H_{it}) + \beta_2 \log C_{it} + \beta_3 [\delta(H_{it}) \times \log C_{it}] + X'_{it}\Gamma_1 + \alpha_i + \lambda_t + \epsilon_{it} \tag{1.1}$$

U is the individual utility proxy (SWB), where i refers to the individual and t to the year of the survey; $\delta(H_{it}) \in [0, 1]$, as described in Section 1.3, refers to poor health status that is increasing in deteriorating health (with 0 representing "good health" state and 1 representing the worst observed health state ("poor health")); $\log C_{it}$ is the logarithm of nonmedical and nondurable consumption of individual i in period t; X_{it} is a vector of observed individual time-variant characteristics including age, education, marital status, household size, place of residence, labor market status, and occupational skill; and ϵ_{it} is the error term. Individual and year fixed effects are captured by α_i and λ_t, respectively.

The baseline analysis estimates the effect of health status on the marginal utility of consumption by running a fixed-effect linear regression of equation (1.1)—that is, a fixed-effect linear probability model (LPM (FE)). However, I explore nonlinear models in Section 1.5 for robustness checks. I estimate the coefficients β_1, β_2, β_3 and the vector Γ_1, with β_3 as the main coefficient of interest that provides evidence of the direction and magnitude of health-state dependence of the utility function. If $\beta_3 = 0$, then utility is health-state independent. However, if $\beta_3 < 0 (> 0)$, then utility is health-state dependent, and the marginal utility of consumption declines (rises) with deteriorating health.

[6] For simplicity, I present the linear form, but I use nonlinear estimations in Section 1.5 for robustness checks.

1.2.2 Identifying assumptions and threats to identification

This paper identifies the health-state dependence of the utility function from the effect of a health shock on within-individual utility, where SWB functions as a proxy for the utility from consumption. Four identifying assumptions are required to interpret β_3 as a test of the health-state dependence of utility and as the magnitude of such state dependence. First, the ordinal SWB measure, which I use as a proxy for true utility from consumption, is assumed to be comparable across individuals and through time. If this assumption breaks down, the inference made from the analyses might be inaccurate.

Second, in addition to health status ($\delta(H_{it})$), consumption (C_{it}), and the other observed covariates (X_{it}), other unobserved determinants of utility might vary with health status by consumption. If these potential unobserved determinants are not accounted for, they might render inaccurate the inference made from the estimation. Examples of such unobserved determinants include unobserved individual heterogeneity, such as person-specific characteristics such as optimism/pessimism, or factors such as family background that are correlated with utility, health status, and consumption. Another example includes time trend factors, such as conflict or economic crisis. The period under review (1994 to 2019) is characterized by at least three financial crises (1998, 2008, and 2014) and other economic hardships, in particular the difficult economic conditions in post-Soviet Union Russia.[7] The individual and time fixed effects, α_i and λ_t, in the model control for these unobserved individual- and time-specific factors that correlate with utility, health status, and consumption.

Third, the consumption and health variables are not severely affected by endogeneity concerns. In the estimation equation (1.1), I attempt to estimate a "utility production function", for which consumption and health are the inputs. As in any production function, the inputs need to be considered potentially endogenous because they are choices that people make to maximize their utility. Hence, both utility and consumption might respond to any time-varying unobservable shock, causing consumption to be endogenous (a similar argument can be made for health, although possibly to a lesser extent). I attempt to circumvent this problem by using household consumption per adult equivalent, rather than each individual's consumption, and by looking at within-individuals over time, that is, by controlling for individual unobserved heterogeneity and making reasonable assumptions about measurement errors in the utility variable to help with the identification.

Fourth and finally, observed nonmedical and nondurable consumption expenditure does not

[7] See, for example, https://www.britannica.com/place/Russia/Post-Soviet-Russia.

include unidentified out-of-pocket (OOP) medical spending in a way that might cause the inference from the estimation to be misleading. In the data, an individual's OOP as a fraction of nonmedical and nondurable consumption is approximately 6.42% per year on average, which is low and might be attributed to the fact that the Russian Federation has minimum compulsory health insurance that minimizes OOP [Twigg, 1999].

1.3 Data and variables of interest

I use data from Phase II of the Russia Longitudinal Monitoring Survey (RLMS), which is the only known data that simultaneously observe the health, SWB, and broad-based consumption expenditure of the general population. The data represent a series of nationally representative surveys designed to monitor the effects of Russian reforms on the health and economic welfare of households and individuals in the Russian Federation. The survey is based on repeated sampling of dwellings—all household members are interviewed each year (if they can be contacted within three visits), and the dwelling (rather than the household) is followed in subsequent years. For completeness and to minimize attrition, previously surveyed families who no longer live at the sampling addresses (referred to as *movers*) are also followed. Data were collected 28 times between 1992 and 2019. Of these, 24 waves represent the RLMS Phase II spanning 1994 to 2019 with the exception of 1997 and 1999, when the survey was not administered.[8]

The RLMS comprises 38 primary sampling units representative of the Russian Federation. On average, 5,764 households with 15,495 persons and 12,465 adult individuals (aged 16 or older) are interviewed per survey round, where a household is defined as all individuals living together and sharing income and expenses. The response rate in the first round of Phase II of the RLMS was very high, exceeding 87.6% of households and more than 97% of the individuals listed on household rosters [Kozyreva et al., 2016]. Furthermore, attrition is generally low compared with similar panel surveys in other countries, partly due to lower mobility and infrequent changes of addresses in the Russian Federation [Gorodnichenko et al., 2010]. Appendix 1.A provides details of the sample selection and variable definitions.

The RLMS is unique and originally designed to serve multiple purposes. In addition to its comparatively large size and long panel dimension, the RLMS contains many standard measures found in other longitudinal datasets, such as the Panel Study of Income Dynamics, Health and Retirement Study, and Family Life Surveys. Unlike these other surveys, the RLMS combines topics

[8]The data prior to 1994 are not comparable with that from 1994 onwards so were dropped (https://www.hse.ru/en/rlms/).

usually studied separately. For example, income surveys are often separated from expenditure surveys, and time allocation surveys are isolated from health and retirement surveys. In contrast, the RLMS's multiple purposes combine numerous topics into one integrated study and provide detailed measurements of income, extensive consumption expenditures, transfers, employment and unemployment, education history, migration, housing, health risk factors, anthropometry, diet, medical services, social attitudes, food prices, community amenities, children activities, and other outcomes of the overall national population. The multi-purpose survey design allows researchers to answer important cross-disciplinary questions by integrating socioeconomic and bio-medical perspectives, making it a well-suited data source for the research question. For more details on the RLMS and its scope and depth, see, for example, Kozyreva et al. [2016]; Kozyreva & Peter [2015].

1.3.1 Utility proxy

The outcome variable of the estimation in this study is utility, which is proxied for by a measure of SWB. A growing body of literature links utility to SWB, in particular measures of one's own happiness or life satisfaction [e.g., Benjamin et al., 2012, 2014; Frey & Stutzer, 2002]. For example, individuals' SWB predictions are a powerful predictor of their choices (decision utility), with SWB and choice coinciding 83% of the time [Benjamin et al., 2012]. The literature also stresses the importance of the use of SWB because it does not only complement standard aggregate well-being measures such as GDP, but also it reflects a wider range of experiences, including those unrelated to market exchange [Diener & Seligman, 2004; Kahneman & Krueger, 2006].

The SWB measure I use in this paper represents individuals' responses to the general life satisfaction question: *"To what extent are you satisfied with your life in general at the present time?"*, which is asked in the same manner and placed approximately at the same position in the survey questionnaires for all 24 waves used in the analysis. Responses range from one to five as illustrated below.[9]

Not at all satisfied ⟵ 1 2 3 4 5 ⟶ *Fully satisfied*

Histograms of the responses to the general life satisfaction question across the 24 survey waves are presented in Figure 1.2. The figure shows that the proportion of individuals with the worst well-being (i.e., those who reported "*Not at all satisfied*" (category 1)) is relatively high in the years following the dissolution of the Soviet Union (an average of 28% of respondents between 1994

[9] I have reversed the original scores such that a higher score represents superior well-being.

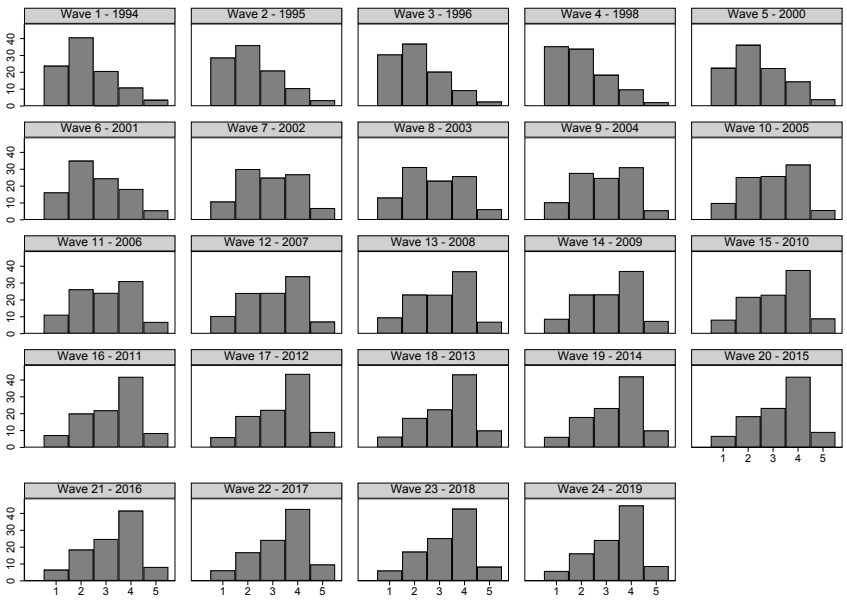
and 2000) compared with the corresponding proportion in subsequent years (an average of 8% of respondents between 2001 and 2019). This phenomenon reflects the economic conditions in the Russian Federation over time: the years following the dissolution of the Soviet Union (1992–1999) were marked by difficult economic conditions and conflicts, coupled with the 1998 Russian financial crisis. However, a turning point occurred in the 2000s, as reflected in the population's overall well-being. Because year fixed effects are included in the model, the unobserved year trend should be filtered out such that the estimated changes in utility are changes resulting from variations in health status, consumption, and the other observed individual characteristics accounted for in the model.

The baseline estimation uses a binary utility proxy for ease of interpretation. Thus, I recode the SWB measure as a binary variable as follows

$$\widetilde{u} = \begin{cases} 1 & \text{if general life satisfaction } \geq \text{ the median value in the sample } (= 3) \\ 0, & \text{otherwise.} \end{cases}$$

However, Section 1.5 relaxes this assumption to explore the full ordered responses of the utility proxy.

Figure 1.2: Histogram of the utility proxy—general life satisfaction



Notes: The figure summarizes individuals' responses to the SWB question: *"To what extent are you satisfied with your life in general at the present time?"* Responses range from 1 (*not at all satisfied*) to 5 (*fully satisfied*). The original scores were reversed such that a higher score represents superior well-being. The sample consists of all 305,870 person-year observations in Phase II of the RLMS for which responses to the SWB question are recorded.

1.3.2 Health status

Different health measures available in the RLMS are used to obtain a one-dimensional measure of overall health status—specifically, diagnosed chronic illness, SAH, and an index based on the combination of the two define an individual's health status to explore the effects of health on the marginal utility of consumption.

- *Diagnosed chronic diseases*: A disease or condition enters this health measure if and only if an individual reports that it was diagnosed by a doctor. Following standard practice in the literature [see, e.g., Finkelstein et al., 2013; Smith, 1999], the following set of eight chronic health conditions are selected: Cancer; Diabetes; Heart disease (myocardial infarction); Hepatitis (A, B, or C), Botkin's disease or jaundice; Hypertension (high arterial blood pressure); Liver, kidney, or lung disease; Stroke; and Tuberculosis. I define this health measure as the total number of diseases out of the eight that an individual has in a given survey round with a higher value depicting deteriorating health. This measure is available for all persons across all survey waves. Except for cancer, each chronic disease is coded as an absorbing state in that, once an individual responds that she has been diagnosed with a chronic disease, she remains in this health state as long as she stays in the survey.[10]

- *Self-assessed health (SAH)*: Subjective health evaluation is the response to the question: "*How would you evaluate your health?*." It has five possible ordered responses ranging from 1 (*very good health*) to 5 (*very bad health*), with higher values depicting deteriorating health. This health measure is also available for all persons across all survey waves.

- *Predicted health index*: Aside using diagnosed chronic diseases and SAH, I construct an alternative health measure, which I use for robustness check. The construction of this alternative health measure follows a similar strategy to that used by Blundell et al. [2020, 2017] and Jürges [2007]: that is, I instrument SAH by objective health measures. This means that the alternative health index only captures fluctuations in SAH that are driven by underlying fluctuations in objective measures of health. Thus, this approach of defining health eliminates the changes in SAH that are not caused by any objective change and does not consider changes in objective measures that do not translate into changes in SAH. Specifically, the health index constructed for each person is the predicted value from a linear regression of the SAH of that person on objective health measures, which are dummies for the set of eight diagnosed chronic illnesses

[10] Coding cancer as an absorbing state does not significantly change the estimates presented in the paper.

previously mentioned. The regression also includes age and its square, year dummies, education dummies, and initial health status. Similarly to the SAH and chronic diseases measures, higher values of the predicted health measure depict deteriorating health. Table 1.A2 in Appendix 1.A.5 presents estimates of how the diagnosed chronic diseases predict SAH, with cancer, stroke, heart disease, hypertension, diabetes, and liver, kidney or lung disease being the strongest predictors of SAH.

For comparable health-state dependence estimates across the three health measures previously outlined, each measure is transformed into a poor health function, $\delta(H_{it}) \in [0, 1]$, based on the following formula inspired by Gertler & Gruber [2002] and Stewart et al. [1990]:

$$\delta(H_{it}) = \left(\frac{Score_{it} - Min\ Score}{Max\ Score - Min\ Score} \right) \tag{1.2}$$

$Score_{it}$ represents the total number of diagnosed chronic diseases (in the case of the chronic diseases health measure), subjective health evaluation (in the case of SAH), and predicted health status (in the case of the predicted health index) of individual i in period t. *Min Score* represents the minimum health score (best health status) in the sample for each of the three health measures. Finally, *Max Score* represents the maximum health score (worst health status) in the sample for each of the three health measures. At the extreme ends, $\delta(H_{it}) = 0$ implies a completely healthy ("good health") state, whereas $\delta(H_{it}) = 1$ implies a completely sick ("poor health") state.

1.3.3 Consumption estimates

Broad-based nonmedical and nondurable household consumption expenditure values are estimated from five big-ticket consumption items: (i) food including own-farm food products; (ii) fuel including for cooking; (iii) nonmedical services including public transport, tailoring, hairdressing, etc.; (iv) other nondurables including utilities, rent, stationary, etc.; and (v) tourism and leisure. The consumption estimates used in the analysis are annual values per adult equivalent[11], converted to 2010 prices using yearly consumer price indices (CPI) drawn from the World Bank. Adult equivalence scale, rather than household size, is used to capture differences in need by age and economies of scale in consumption within the household. Appendix 1.A provides details of how consumption per adult equivalent is constructed. I use aggregate consumption in the baseline analysis, and then subsequently use disaggregated consumption expenditure categories to identify which consump-

[11] The adult equivalence scale is computed using the OECD's scale of $1 + 0.7 \times (N_A - 1) + (0.5) \times N_C$, where N_A is the number of adults in the household in a given survey round and N_C is the number of children.

tion category drives the results.

1.3.4 Summary statistics

Table 1.1 presents descriptive statistics for the baseline sample. The sample is restricted to individuals aged 16 years or older and observed at least twice between 1994 and 2019. The sample consists of 58% women. The average respondent is approximately 45 years old. Sixty-three percent of person-years are married, and approximately three individuals live in a typical household. The average person has approximately 16 years of education. Fifty-six percent of individuals in the sample are active workers in the labor market. A respondent participated in about 12 of the 24 survey rounds, on average. Permanent real household income is measured by the average of the total annual income across all waves combining wage income with other sources of income for household members active in the labor market. The per capita values of income and consumption are similarly estimated by dividing by the adult equivalence scale in each household.[12,13] Appendix 1.A provides full description of the data and selected variables.

The average permanent annual household income per adult equivalent in the Russian Federation in 2010 prices is ₽150,007 (US$4,936). Annual nonmedical and nondurable consumption per adult equivalent is ₽111,971 (US$3,684), representing about 75% of permanent income. Food-related consumption expenditures alone accounts for about 55% of total nonmedical and nondurable consumption. The income and consumption values are similar to estimates in previous studies about the Russian Federation [see, e.g., von Hinke & Leckie, 2017]. As expected, consumption is less volatile than income as depicted by their respective standard deviations relative to their means. The average annual OOP per capita is about ₽7,191 (US$237), which translates to 6.42% of annual nonmedical and nondurable consumption per adult equivalent. Table 1.A1 in the Appendix 1.A shows details of disaggregated consumption by consumption-ticket item.

The baseline health measures include the number of diagnosed chronic diseases reported by each respondent, his or her SAH, and the corresponding constructed indices. The average individual in the sample has one diagnosed chronic illness (with a within-person standard deviation of 0.63) and reports that his or her health status is close to *average health*, (with a score of 2.82 out of a maximum of 5). Prevalence across the diseases vary significantly in the sample (estimates not

[12] All income and consumption expenditures (in Rubles) before 1998 are divided by 1,000 to account for the 1998 Ruble redenomination exercise. On January 1, 1998, preceding the financial crisis, the Russian Ruble was redenominated with the new code *RUB* (₽) and was exchanged at the rate of 1 *RUB* = 1,000 *RUR*.

[13] All values (in Rubles) are in constant 2010 prices (deflated using yearly CPI from the World Bank). Income and consumption estimates include own-farm produce sold and/or consumed. Approximately 47% of all households consume at least one food crop item from their own farms, and 15% consume at least one animal product from their farms.

reported): Hypertension (48%); Liver, kidney and lung disease (29.9%); Diabetes (9.4%); Hepatitis (A, B, or C), Botkin's disease or jaundice (9.1%); Heart disease (4.4%); Stroke (3.6%); Tuberculosis (1.5%); and Cancer (1.4%).

The utility proxy is individuals' general life satisfaction based on the question *"To what extent are you satisfied with your life in general at the present time?"*. Responses range from 1 (*not at all satisfied*) to 5 (*fully satisfied*), which is further collapsed into a binary response, with a value of 1 if the respondent has at least the median level of life satisfaction in the adult sample and 0 otherwise. On average, 64% of the sample has life satisfaction greater than or equal to the sample median.

Although the main estimates of the health-state dependence of the utility function are based on regression specifications outlined in Section 1.2, the key empirical finding is illustrated in Figure 1.3, which is the empirical analog of Figure 1.1. I take individuals with varying health transitions across the survey waves and group them by consumption deciles. Within each consumption decile, I group individuals according to their health status: "good health" (having less than the median number of chronic diseases of one, that is, having no chronic disease (chart (a)) or having SAH lower than the median value of three (chart (b))) and "poor health" (having one or more chronic diseases (chart (a)) or having at least the median SAH of three (chart (b))). The figure plots the percentage of individuals with general life satisfaction higher than or equal to the sample median by health status and for each consumption decile. By construction, the mean general life satisfaction of those in "good health" and those in "poor health" is calculated using the same set of individuals within each consumption decile; therefore, changes in mean general life satisfaction by consumption decile are based on within-individual comparisons.

Figure 1.3 illustrates the following. First, general life satisfaction in both "good health" and "poor health" states appears to have the standard concavity property of a true utility function, making it a suitable proxy for true utility. That is, life satisfaction in both health states increases at a diminishing rate with respect to consumption. Second, in each consumption decile, the mean life satisfaction of individuals in "good health" is higher than that of individuals in "poor health." Third and finally, the mean life satisfaction drops less after a deterioration in health for individuals with higher consumption than those with lower consumption. In other words, utility seems to have a positive health-state dependence. That is, the gradient of general life satisfaction with respect to the log of consumption appears higher with deteriorating health, implying that the marginal utility of consumption increases with poor health. This phenomenon is true in both charts. The regression results that follow provide a formal test for the health-state dependence of utility, as depicted by this figure, and provide estimates of the magnitude of such state dependence.

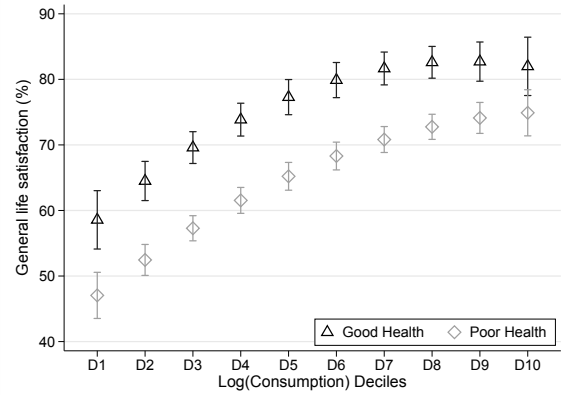
Table 1.1: Descriptive statistics

	Baseline sample: Age $\geq$ 16 and observed at least twice from 1994-2019								
	Obs.	Mean	Std. dev.	Std. dev. (within-indiv.)	Min	5th percentile	Median	95th percentile	Max
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Demographics									
No. of waves	281,217	12.19	6.69	0	2	3	11	24	24
Female	281,217	0.58	0.49	0	0	0	1	1	1
Married	281,217	0.63	0.48	0.23	0	0	1	1	1
Age (years)	281,217	45.10	18.16	4.53	16	19	43	77	103
Education (years)	281,217	15.69	4.76	1.66	0	7	16	21	23
Household size	281,217	3.35	1.65	0.79	1	1	3	6	16
No. of adults	281,217	2.68	1.26	0.66	1	1	2	5	12
No. of kids	281,217	0.66	0.9	0.52	0	0	0	2	11
Working	281,217	0.56	0.5	0.30	0	0	1	1	1
Permanent income									
Permanent income per capita (₽)	281,217	150,007	189,159	0	0	43,684	120,648	314,835	9,010,239
US$ equivalent (2010)	281,217	4,936	6,224	0	0	1,437	3,970	10,359	296,473
Consumption									
Total consumption per capita (₽)	281,217	111,971	72,816	49,312	106	29,603	94,975	256,997	485,125
US$ equivalent (2010)	281,217	3,684	2,396	1,623	3	974	3,125	8,456	15,963
5 big-ticket consumption categories									
Food (including drinks)	281,217	61,771	39,160	29,280	0	18,564	53,145	132,868	473,920
Fuel (including for cooking)	281,217	5,398	12,131	9,395	0	0	0	24,896	387,588
Services	281,217	8,602	14,482	12,006	0	0	5,266	26,329	418,921
Other nondurables	281,217	33,850	39,194	28,037	0	995	22,094	108,734	447,129
Tourism and leisure	281,217	2,350	14,668	13,112	0	0	0	7,623	379,304
Out-of-pocket medical expenditure (OOP)									
Medical expenditure (₽)	281,217	7,191	31,887	28,355	0	0	1,789	26,711	4,215,837
Poor Health Measures									
No. of chronic diseases	281,217	1.07	1.15	0.63	0	0	1	3	7
Chronic disease index	281,217	0.15	0.16	0.09	0	0	0.14	0.43	1
Self-assessed health (SAH)	281,217	2.82	0.74	0.45	1	2	3	4	5
SAH index	281,217	0.45	0.19	0.11	0	0.25	0.50	0.75	1
Predicted SAH index	281,217	0.33	0.15	0.02	0	0.13	0.32	0.60	1
Utility Proxy									
General life satisfaction (full category)	281,217	3.01	1.15	0.84	1	1	3	5	5
General life satisfaction (binary)	281,217	0.64	0.48	0.38	0	0	1	1	1

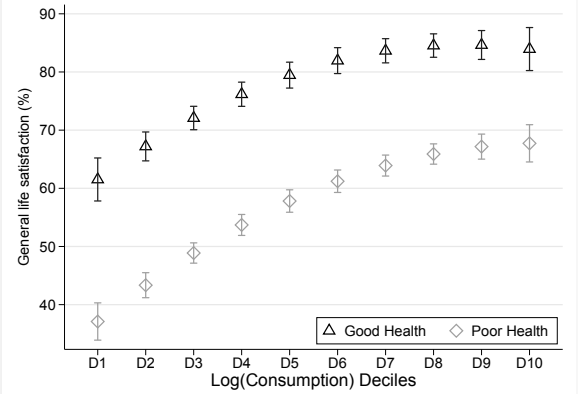
Notes: The data come from Phase II of the RLMS spanning 24 waves and collected from 1994 to 2019. No. of waves is the total number of survey rounds in which a respondent was interviewed. Household size comprises all members in the household. SAH is a subjective health evaluation based on the question: *"How would you evaluate your health?"*. Responses range from 1 (*very good health*) to 5 (*very bad health*). No. of chronic diseases is the total number of physician-diagnosed diseases that a respondent has out of the following set of eight chronic diseases: Cancer; Diabetes; Heart disease (myocardial infarction); Hepatitis (A, B, or C), Botkin's disease or jaundice; Hypertension (high arterial blood pressure); Liver, kidney, or lung disease; Stroke; and Tuberculosis. Except for cancer, each chronic disease is coded as an absorbing state. General life satisfaction represents individuals' responses to the question *"To what extent are you satisfied with your life in general at the present time?"*. Responses range from 1 (*not at all satisfied*) to 5 (*fully satisfied*). The responses are further collapsed into a binary response, with value 1 if the respondent has at least the median level of well-being in the sample and 0 otherwise. Income and consumption estimates are annual values per adult equivalent. Household income per capita includes income from a household's own farms. Permanent income is constructed by taking the average across all waves of total household income per adult equivalent for each individual. Consumption estimates comprise nonmedical and nondurable expenditures, including consumption of own-farm produce. All estimates prior to 1998 are divided by 1,000 to account for the 1998 Ruble redenomination. Income and expenditures (in Rubles, ₽) are in constant 2010 prices (deflated using yearly CPI from the World Bank). The top percentile of the consumption distribution is excluded from the analysis, given the potential sensitivity of the coefficient of the log of consumption to such outliers. However, including these individuals does not substantively affect the reported results. Appendix 1.A provides detailed descriptions of the variables and the disaggregation of consumption.

Figure 1.3: Impact of health on utility by consumption decile

(a) Based on diagnosed chronic diseases



(b) Based on self-assessed health (SAH)



Notes: The figure shows the impact of health on the utility function—proxied by general life satisfaction—by deciles of log of consumption. Within each consumption decile, I compare the fraction of individuals whose general life satisfaction are higher than or equal to the sample median across the two different health states. Health is measured by the number of diagnosed chronic diseases that an individual suffers from (chart (a)) and SAH (chart (b)). Good health is defined as having less than the median number of chronic diseases of one, that is, having no chronic disease (chart (a)) or having SAH lower than the median value of three (chart (b)), whereas poor health is defined as having one or more chronic diseases(chart (a)) or having at least the median SAH of three (chart (b)). The sample consists of 23,879 unique individuals and 142,204 person-year observations in chart (a) and 30,681 unique individuals and 237,419 person-year observations in chart (b) who have varying health status transitions across the survey waves. General life satisfaction is a proxy for utility, which takes the value 1 if the respondent has at least the sample median level of life satisfaction and 0 otherwise. Error bars denote 95% confidence intervals.

1.4 Main results

Table 1.2 presents the baseline estimation results using the sample in Table 1.1 and based on equation (1.1), which assumes that the mapping function $f(.)$ is linear; that is, equal intervals on the reported SWB scale reflect equal intervals of true utility. As expected, utility is increasing in the log of consumption and decreasing in poor health. For example, the coefficient of "poor health" in Column (1) implies that moving from a good health state (with no chronic health condition, i.e., $\delta(H_{it}) = 0$) to a poor health state (i.e., $\delta(H_{it}) = 1$) is associated with a 27-percentage point decline in the probability that an individual's general life satisfaction is at least at the median of the population (down from a mean of 64%). The coefficient of the log of consumption implies that doubling consumption is associated with a 4-percentage point increase in utility off of a mean of 64%. Utility is also increasing in age, household size, being married, and actively working in the labor market.

The coefficient of the interaction of poor health and the log of consumption is key and provides evidence of the direction as well as magnitude of the health-state dependence of the utility function. This dependence is positive for both specifications and is significant at conventional levels. The positive sign indicates that the marginal utility of consumption increases as health deteriorates

(i.e., positive health-state dependence). In other words, the marginal utility of consumption in poor health is higher than that in good health, implying that the null of the health-state independence of utility is rejected. Regarding magnitude, I find that moving from a good health state to a poor health state raises the marginal utility of consumption by 2.5 to 4.0 percentage points relative to the marginal utility when the individual is in good health. An interpretation of this magnitude in terms of a change in the standard deviation of health status shows that a one-standard-deviation increase in the number of chronic diseases is associated with a 1.59-percentage point increase in the marginal utility of consumption relative to the marginal utility when the individual has no chronic illness. Similarly, a one-standard-deviation increase in subjective health evaluation toward *very bad* health is equivalent to a 1.81-percentage point increase in the marginal utility of consumption relative to the marginal utility when the individual evaluates themselves as having *very good* health. These results imply that consumption tends to mitigate the negative effect of poor health on well-being.

An important concern is that nonlinearity of the effect of consumption on utility might exist, as economic theory predicts. To examine this point, I add to the baseline specification reported in Table 1.2 quadratic and cubic terms of consumption and their interaction with health status. This specification with higher orders of consumption corresponds to the estimates reported in Table 1.3. The inclusion of higher order terms of consumption does not affect the conclusions on the presence of health-state dependence in the utility function but provide some evidence that the consumption effect on utility might be nonlinear. I reject at conventional levels that the consumption-health interaction terms are jointly equal to zero with F-test statistics of 3.25 and 20.76 in Columns (1) and (2), respectively.

Figure 1.4 reinforces the illustration in Figure 1.3, which shows that the gradient of utility with respect to the log of consumption is increasing in deteriorating health. Unlike Figure 1.3, which simply plots general life satisfaction by health status and consumption deciles, Figure 1.4 plots predicted general life satisfaction in good and poor health states against the log of consumption using the baseline model in equation (1.1) and the regression coefficients in Tables 1.2 and 1.3. The overall means of the vector of observed individual characteristics ($\overline{X}_{..}$), predicted individual fixed effects ($\overline{\widehat{\alpha}}_{.}$), and time fixed effects ($\overline{\widehat{\lambda}}_{.}$) are used in the prediction of general life satisfaction in each health state. The figure depicts a pattern that is consistent with the finding of positive health-state dependence of utility, where the drop in the utility of individuals in poor health is smaller at higher levels of consumption than at lower consumption levels, in particular in the region starting from the first to the 99th percentiles of consumption, implying that the utility curve in poor health is steeper than the utility curve in good health. The top panel in Figure 1.4 depicts the case of linearity of

the consumption effect on utility according to the baseline results in Table 1.2, whereas the bottom panel shows the case of nonlinearity of the consumption effect on utility according to the estimates in Table 1.3.

Another important concern with the baseline estimates in Table 1.2 is that the sample selection criteria of all adult individuals aged 16 years or older who are either active workers or nonworkers might bias the estimates of the effect of health on the marginal utility of consumption because poor health might affect consumption through changes in labor income resulting from deteriorating health. Similarly, active working individuals are those most likely to be in good health and, hence, are those for whom the marginal utility of consumption declines less with poor health. This potential sample selection issue is much less of a concern when observing household consumption expenditure, which is less volatile to changes in labor income following a health shock [Gorbachev, 2011; Stephens, 2001]. To crosscheck this issue, in Table 1.4, I report results for which I restrict the baseline sample to household members who do not work and, thus, receive no labor income, reducing the sample size to just 44% of the baseline sample in Table 1.1. The estimates in Table 1.4 are reassuring. The estimate of the increase in the marginal utility of consumption associated with moving from a good to a poor health state remains positive and stable when the baseline sample is restricted to nonworking household members only. The marginal utility of consumption increases by 2.94 percentage points for the chronic diseases measure and by 2.60 percentage points for the SAH measure.

Aside from providing evidence in favor of the positive health-state dependence of utility, and given that nonmedical consumption buffers the negative effects of poor health on well-being, I take a further look at disaggregated consumption expenditure categories to identify the part of consumption that drives the results. The results reveal that consumption of necessary goods such as food and fuel including for cooking drives the results. The disaggregated results are reported in Table 1.5.

Table 1.2: Baseline regression results: Health-state dependent utility

Sample: Age $\geq$ 16 and observed at least twice from 1994-2019 Outcome variable: General life satisfaction (utility proxy) Model: LPM (FE)		
	(1)	(2)
Health measure:	CHRONIC	SAH
Poor Health	-0.2763***	-0.4724***
	(0.052)	(0.036)
Log(consumption)	0.0398***	0.0242***
	(0.003)	(0.004)
Poor health $\times$ Log(consumption)	0.0254**	0.0399***
	(0.011)	(0.008)
Age	0.0040***	0.0031***
	(0.001)	(0.001)
Age^2	0.0001***	0.0001***
	(0.000)	(0.000)
Married	0.0691***	0.0700***
	(0.004)	(0.004)
Household size	0.0071***	0.0065***
	(0.001)	(0.001)
Working	0.0926***	0.0892***
	(0.003)	(0.003)
N	281,217	281,217
No. of individuals	35,847	35,847
R^2	0.4180	0.4224
Other covariates	YES	YES
Individual FE	YES	YES
Wave year FE	YES	YES
Regional dummies	YES	YES

Notes: Robust standard errors in parentheses are clustered at the individual level. *** p<0.01, ** p<0.05, and * p<0.1. The table reports coefficients from the baseline model (1.1) using OLS. The outcome variable is general life satisfaction, which is coded as 1 if the respondent has general life satisfaction higher than or equal to the sample median and 0 otherwise. The mean of the outcome variable in the baseline sample is 0.64. Poor health in Column (1) is a composite measure that comprises the total number of reported diagnosed chronic illnesses out of the following: Cancer; Diabetes; Heart disease (myocardial infarction); Hepatitis (A, B, or C), Botkin's disease or jaundice; Hypertension (high arterial blood pressure); Liver, kidney, or lung disease; Stroke; and Tuberculosis. Poor health in Column (2) is a measure based on self-assessed health (SAH), which ranges from 1 (*very good health*) to 5 (*very bad health*). Both health measures are transformed into a disease index, $\delta(H_{it}) \in [0, 1]$, which is increasing in poor health. Log(consumption) is the log of nonmedical and nondurable household consumption expenditure per adult equivalent. In addition to the covariates shown in the table, the estimation includes individual and wave fixed effects and controls for education, place of residence, and occupation.

Table 1.3: Health-state dependent utility: Nonlinearity of consumption effect

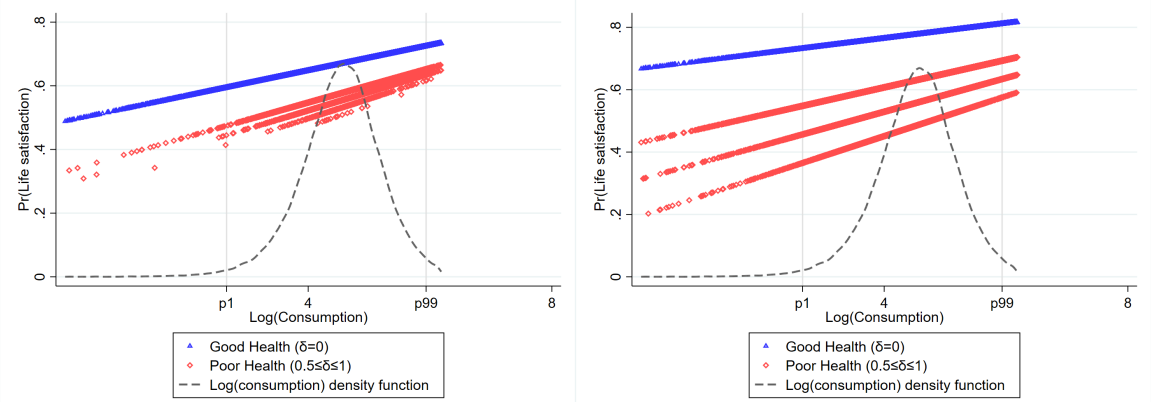
Sample: Age $\geq$ 16 and observed at least twice from 1994-2019 Outcome variable: General life satisfaction (utility proxy) Model: LPM (FE)		
	(1)	(2)
Health measure:	CHRONIC	SAH
Poor health	-0.2327	-0.0618
	(0.255)	(0.124)
Log(Consumption)	-0.0298	0.0240
	(0.029)	(0.056)
Log(consumption)^2	0.0277***	0.0255*
	(0.008)	(0.015)
Log(consumption)^3	-0.0029***	-0.0038***
	(0.001)	(0.001)
Poor health $\times$ Log(Consumption)	0.0194	-0.1112
	(0.188)	(0.099)
Poor health $\times$ Log(Consumption)^2	-0.0062	0.0006
	(0.047)	(0.027)
Poor health $\times$ Log(Consumption)^3	0.0011	0.0026
	(0.004)	(0.002)
Age	0.0039***	0.0029***
	(0.001)	(0.001)
Age^2	0.0001***	0.0001***
	(0.000)	(0.000)
Married	0.0691***	0.0701***
	(0.004)	(0.004)
Household size	0.0068***	0.0062***
	(0.001)	(0.001)
Working	0.0927***	0.0892***
	(0.003)	(0.003)
N	281,217	281,217
No. of individuals	35,847	35,847
R^2	0.4182	0.4226
Other covariates	YES	YES
Individual FE	YES	YES
Wave FE	YES	YES
Regional dummies	YES	YES
F-statistic that all consumption-health interaction terms are jointly equal to zero	3.25	20.76
P-value of F-test	0.0207	0.0000

Notes: Robust standard errors in parentheses are clustered at the individual level. *** p<0.01, ** p<0.05, and * p<0.1. The table replicates the baseline specification in Table 1.2 by adding quadratic and cubic terms of the log of consumption and their interaction with health status. The outcome variable is general life satisfaction, which is coded as 1 if the respondent has general life satisfaction higher than or equal to the sample median and 0 otherwise. The mean of the outcome variable in the baseline sample is 0.64. Poor health in Column (1) is a composite measure that comprises the total number of reported diagnosed chronic illnesses out of the following: Cancer; Diabetes; Heart disease (myocardial infarction); Hepatitis (A, B, or C), Botkin's disease or jaundice; Hypertension (high arterial blood pressure); Liver, kidney, or lung disease; Stroke; and Tuberculosis. Poor health in Column (2) is a measure based on self-assessed health (SAH), which ranges from 1 (*very good health*) to 5 (*very bad health*). Both health measures are transformed into a disease index, $\delta(H_{it}) \in [0, 1]$, which is increasing in poor health. Log(consumption) is the log of nonmedical and nondurable household consumption expenditure per adult equivalent. In addition to the covariates shown in the table, the estimation includes individual and wave fixed effects and controls for education, place of residence, and occupation.

Figure 1.4: Graphical presentation of the effects of health on the marginal utility of consumption

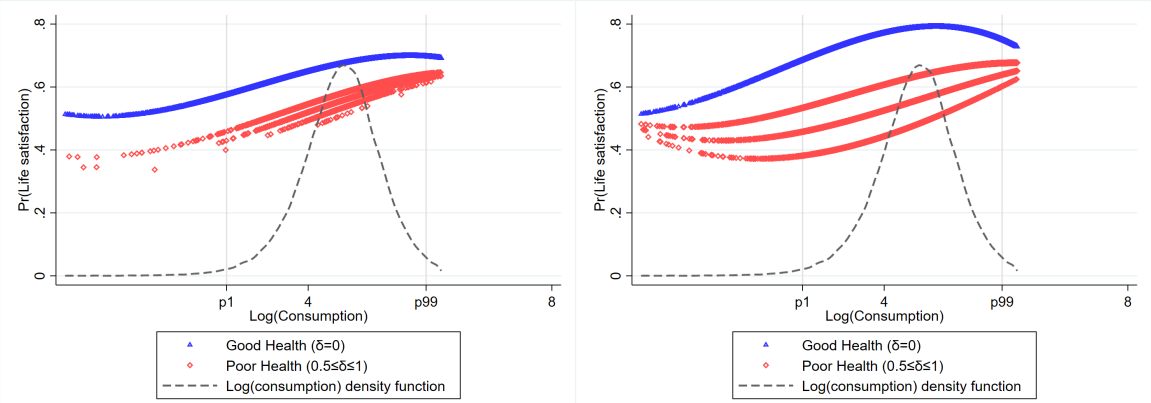
Panel A: Linearity of consumption effect on utility (Table 1.2)

(a) Chronic diseases measure **(b)** SAH measure



Panel B: Nonlinearity of consumption effect on utility (Table 1.3)

(c) Chronic diseases measure **(d)** SAH measure



Notes: The figure shows a scatter plot of predicted general life satisfaction in good and poor health states using the baseline model in equation (1.1) against the log of consumption. Panel A plots the model in Table 1.2 (showing the linear consumption effect), whereas Panel B plots the model in Table 1.3 where second and third orders of log of consumption are included. The overall means of the vector of observed individual characteristics ($\overline{X}_{..}$), the predicted individual fixed effects ($\overline{\widehat{\alpha}}_{.}$), and time fixed effects ($\overline{\widehat{\lambda}}_{.}$) are used in the prediction of general life satisfaction in each health state. $p1$ and $p99$ in the x-axis are the first and 99th percentiles of the log of consumption, respectively. Health in plots (a) and (c) is a composite measure that represents the total number of reported diagnosed chronic illnesses out of the following: Cancer; Diabetes; Heart disease (myocardial infarction); Hepatitis (A, B, or C), Botkin's disease or jaundice; Hypertension (high arterial blood pressure); Liver, kidney, or lung disease; Stroke; and Tuberculosis. Health in plots (b) and (d) is a measure based on SAH that ranges from 1 (*very good health*) to 5 (*very bad health*). Both health measures are transformed into a disease index, $\delta(H_{it}) \in [0, 1]$, which is increasing in poor health. Good health implies that $\delta(H_{it}) = 0$ and poor health here is defined to include cases where $0.5 \leq \delta(H_{it}) \leq 1$. Consumption refers to nonmedical and nondurable household consumption expenditure per adult equivalent.

Table 1.4: Health-state dependent utility among nonworkers

Sample: Age $\geq$ 16, not working and observed at least twice from 1994-2019 Outcome variable: General life satisfaction (utility proxy) Model: LPM (FE)		
	(1)	(2)
Health measure:	CHRONIC	SAH
Poor health	-0.2812***	-0.4468***
	(0.067)	(0.047)
Log(consumption)	0.0318***	0.0221***
	(0.004)	(0.006)
Poor health $\times$ Log(consumption)	0.0294**	0.0260**
	(0.015)	(0.011)
Age	0.0022	0.0012
	(0.001)	(0.001)
Age^2	0.0001***	0.0001***
	(0.000)	(0.000)
Married	0.0683***	0.0677***
	(0.008)	(0.008)
Household size	0.0127***	0.0120***
	(0.002)	(0.002)
N	119,504	119,504
No. of individuals	20,401	20,401
R^2	0.4576	0.4632
Other covariates	YES	YES
Individual FE	YES	YES
Wave year FE	YES	YES
Regional dummies	YES	YES

Notes: Robust standard errors in parentheses are clustered at the individual level. *** p<0.01, ** p<0.05, and * p<0.1. The table reports coefficients from the baseline model (1.1) using OLS for a restricted sample of nonworking household members. The outcome variable is general life satisfaction, which is coded as 1 if the respondent has general life satisfaction higher than or equal to the sample median and 0 otherwise. In the baseline sample, the mean of the outcome variable is 0.64. Poor health in Column (1) is a composite measure that comprises the total number of reported diagnosed chronic illnesses out of the following: Cancer; Diabetes; Heart disease (myocardial infarction); Hepatitis (A, B, or C), Botkin's disease or jaundice; Hypertension (high arterial blood pressure); Liver, kidney, or lung disease; Stroke; and Tuberculosis. Poor health in Column (2) is a measure based on self-assessed health (SAH), which ranges from 1 (*very good health*) to 5 (*very bad health*). Both health measures are transformed into a disease index, $\delta(H_{it}) \in [0, 1]$, which is increasing in poor health. Log(consumption) is the log of nonmedical and nondurable household consumption expenditures per adult equivalent. In addition to the covariates shown in the table, the estimation includes individual and wave fixed effects and controls for education, place of residence, and occupation.

Table 1.5: Health-state dependent utility: Consumption categories

Sample: Age $\geq$ 16 and observed at least twice from 1994-2019 Outcome variable: General life satisfaction (utility proxy) Model: LPM (FE)				
	(1)	(2)	(3)	(4)
Health measure:	CHRONIC		SAH	
	Without OOP	With OOP	Without OOP	With OOP
Poor health	-0.2511***	-0.2730***	-0.3689***	-0.3792***
	(0.045)	(0.046)	(0.032)	(0.032)
Log(food)	0.0256***	0.0256***	0.0096**	0.0095**
	(0.002)	(0.002)	(0.004)	(0.004)
Log(fuel)	0.0037***	0.0037***	-0.0010	-0.0011
	(0.001)	(0.001)	(0.001)	(0.001)
Log(services)	0.0036***	0.0036***	0.0069***	0.0066***
	(0.001)	(0.001)	(0.001)	(0.001)
Log(other nondurables)	0.0043***	0.0042***	0.0093***	0.0085***
	(0.001)	(0.001)	(0.002)	(0.002)
Log(tourism and leisure)	0.0003	0.0003	-0.0037***	-0.0037***
	(0.001)	(0.001)	(0.001)	(0.001)
Log(medical expenditure)		-0.0005		0.0017**
		(0.000)		(0.001)
Poor health $\times$ Log(food)	0.0201*	0.0239**	0.0388***	0.0397***
	(0.010)	(0.010)	(0.008)	(0.008)
Poor health $\times$ Log(fuel)	0.0061**	0.0062**	0.0126***	0.0127***
	(0.003)	(0.003)	(0.002)	(0.002)
Poor health $\times$ Log(services)	0.0042	0.0055	-0.0055**	-0.0045*
	(0.004)	(0.004)	(0.003)	(0.003)
Poor health $\times$ Log(other nondurables)	0.0084	0.0117**	-0.0090***	-0.0071**
	(0.005)	(0.005)	(0.003)	(0.003)
Poor health $\times$ Log(tourism and leisure)	0.0037	0.0038	0.0108***	0.0110***
	(0.003)	(0.003)	(0.002)	(0.002)
Poor health $\times$ Log(medical expenditure)		-0.0105***		-0.0060***
		(0.002)		(0.002)
N	281,217	281,217	281,217	281,217
No. of individuals	35,847	35,847	35,847	35,847
R^2	0.4183	0.4185	0.4228	0.4229
Other covariates	YES	YES	YES	YES
Individual FE	YES	YES	YES	YES
Wave year FE	YES	YES	YES	YES
Regional dummies	YES	YES	YES	YES
F-statistic that all consumption-health interaction terms are equal	0.73	9.54	18.62	21.31
P-value of F-test	0.5685	0.0000	0.0000	0.0000
F-statistic that all consumption-health interaction terms are jointly equal to zero	4.24	8.19	19.81	18.69
P-value of F-test	0.0008	0.0000	0.0000	0.0000

Robust standard errors in parentheses are clustered at the individual level. *** p<0.01, ** p<0.05, * p<0.1. Table reports results from a single regression, which estimates a modified version of the baseline model in equation (1.1) in which various consumption expenditure categories are separately interacted with the health measure in a single regression. Columns (1) and (3) exclude out-of-pocket medical spending (OOP) whereas columns (2) and (4) include OOP. The outcome variable is a dummy with value 1 if respondent answered *fully satisfied*, *rather satisfied* or *both yes and no* to the question: *"To what extent are you satisfied with your life in general at the present time?"* and 0 if the respondent answered *less than satisfied* or *not at all satisfied*. The mean of the outcome variable is 0.63 in the baseline sample (individuals with age $\geq$ 16 and observed at least twice). The estimation includes individual and wave fixed effects and controls for age and its square, marital status, household size, working status, education, place of residence, and occupation. See notes under Table 1.2 for additional details.

1.5 Robustness checks and additional analyses

To address potential robustness concerns over the findings previously discussed, I performed a large set of additional sensitivity analyses on the baseline results presented in Table 1.2. In the following subsections, I present discussions on these additional analyses. The results associated with this section are reported in Tables 1.B1-1.B8 of Appendix 1.B.

1.5.1 Health-state dependence of utility and poor health intensity

The effect of health on the marginal utility of consumption might vary with different intensities of sickness. For example, the effect might be different for individuals who transition from a no chronic illness state to one chronic illness state over the life course compared with individuals who transition to several chronic illnesses state. Tables 1.B1 and 1.B2 in Appendix 1.B report results from specifications based on varying intensities of poor health. Table 1.B1 shows the results from the estimation using chronic illness as the health measure, whereas Table 1.B2 reports the results from using SAH. Column (1) in each table repeats the baseline results from Table 1.2.

In Table 1.B1, the specification in Column (2) uses the following dummies for different intensities of poor health: the respondent has one chronic illness, has two or three chronic illnesses, and has four or more chronic illness. The reference group for this column is "individuals without any chronic illness." Column (3) reports results for individuals with up to two chronic illnesses, and Column (4) reports results for individuals with at least three chronic illnesses. Similarly, in Table 1.B2, the specification in Column (2) uses the following dummies for different intensities of poor health: *good* health, *average* health, *bad* health, and *very bad* health. The reference group is individuals with *very good* health. Separate regressions were run for individuals with *very good* to *average* health (Column (3)) and individuals with *bad* or *very bad* health (Column (4)). The results from the specifications in the two tables are consistent with the baseline findings of positive health-state dependence of utility. However, positive state dependence appears much stronger at more intense poor health. In other words, the consumption buffer for a decline in well-being following a health shock appears stronger at more intense poor health.

1.5.2 Health-state dependence of utility at different consumption quintiles

How health status affects the marginal utility of consumption might also depend on where an individual is located in the consumption distribution. Table 1.B3 in Appendix 1.B examines this question by exploring different segments of the consumption distribution. The table presents es-

timates from a specification in which quintiles of the log of consumption are interacted with poor health and for which individuals in the first consumption quintile are the reference group. The results from the table are consistent with the baseline finding of positive health-state dependence of utility and show that the effect is stronger at higher consumption quintiles.

1.5.3 Effect of the onset of individual chronic diseases on marginal utility of consumption

The approach used in the baseline specification yields estimates of the average effect of deteriorating health on the marginal utility of consumption in the representative sample of adults in the Russian Federation. These estimates, as reported in the previous sections, are the relevant parameters for economic decisions. However, the marginal utility of consumption might not change in the same way with the onset of each chronic disease. Therefore, I examine separately the effect of each chronic disease on the marginal utility of consumption. Undoubtedly, the estimated effect of the onset of a particular measured chronic disease also captures the effects of unmeasured health conditions that are correlated with that disease. In this sense, I run a single regression in which I simultaneously estimate the effect of each of the measured chronic diseases.

Table 1.B4 in Appendix 1.B presents estimates from a single regression equation in which each of the eight reference chronic diseases is interacted with the log of nonmedical household consumption per adult equivalent. All eight consumption-health-state interaction terms are included in this regression, along with dummies for each of the eight reference diseases. The first eight columns of Table 1.B4 provide the estimates of the coefficients of the interaction terms (i.e., estimates of health-state dependence) and the disease dummy for each of the eight diseases. The coefficient of consumption and the nonweighted and prevalence-weighted sum of the estimates of the first eight columns are presented in the ninth and tenth columns.

Not surprisingly, the precision of estimates for specific diseases is often considerably worse than that of the estimates for an aggregate measure of disease. Indeed, I estimate statistically significant state dependence only for cancer and hypertension. Nonetheless, with the exception of diabetes, hepatitis, stroke, and tuberculosis, the point estimates of the coefficients of the interaction terms are all positive. Moreover, I cannot reject at conventional significance levels that all eight interaction terms are equal (p-value = 0.1428). In addition, I show at conventional levels that the consumption-health interaction terms are jointly significantly different from zero, with a p-value of 0.0183.

In the final two columns, I show that the nonweighted and the prevalence-weighted sum of the eight interaction terms from this specification is statistically significant with magnitudes of 6.84 and

0.51 percentage points, respectively. This result is consistent with the baseline finding of positive health-state dependence of the utility function.

1.5.4 Health-state dependent utility by gender

Does health-state dependence of utility vary by demographic characteristics—in particular, by gender? Table 1.B5 in Appendix 1.B presents estimates of health-state dependence of utility separately for men and women. The first two columns show the results for the case of the chronic illnesses measure, and the remaining two columns present the results for the case of SAH.

As the results illustrate, the estimates of the health-state dependence parameter lose precision when the sample is grouped by gender—in particular, in the case of the chronic illnesses measure. However, in all of the specifications, I find no significant difference in the health-state dependence of utility between men and women, implying that health-state dependence of utility does not vary with gender. In fact, the p-values for the null of equality of the health-state dependence coefficients of men and women in Columns (1) and (2), and Columns (3) and (4), are 0.340 and 0.220, respectively.

1.5.5 Alternative measure of health

Previous literature express skepticism over the use of subjective health evaluations (i.e., SAH) as a health measure given their potential drawbacks in accurately reflecting individuals' objective health status, such as the noncomparability of responses across individuals [see, e.g., Bound et al., 1999]. Limitations might also exist when using the number of diagnosed chronic illnesses as a measure of individuals' health because the number of diseases an individual suffers might not accurately reflect the severity of a respondent's sickness or the deterioration in the quality of their lives. To examine the quality of the health measures used in the baseline model, I create an alternative health measure on the basis of both the subjective health evaluations and the number of diagnosed chronic diseases that an individual reports, using a strategy similar to that used by Blundell et al. [2020, 2017] and Jürges [2007]. Section 1.3.2 describes how this alternative health index is constructed.

Column (3) of Table 1.B6 in Appendix 1.B presents the estimate of health-state dependence of utility based on the constructed health index. Here, bootstrapped standard errors are reported in parenthesis since predicted health measures are used. The first and second columns repeat the baseline results in Table 1.2. The results from the table, which are based on the predicted health in-

dex, reaffirm the baseline findings of positive health-state dependence of utility, with a magnitude similar to the estimates from the baseline results.

1.5.6 Alternative specifications: Nonlinear regressions and fixed-effects ordered models

In this section, examine the sensitivity of the quantitative estimates to alternative specifications. I also relax the utility proxy from a binary response to explore the full nonbinary categories of the outcome variable in fixed-effects ordered models framework.

1.5.6.1 Bias-corrected probit and logit binary response models with two-way fixed effects

As a first step, I present results from fixed-effects probit and logit models. I use the R package *bife* developed by Stammann et al. [2016].[14] The package estimates fixed effects binary choice models with potentially many individual fixed effects and computes average partial effects. Incidental parameters (IP) bias [Neyman & Scott, 1948], as introduced by many incidental parameters as a result of dummies for individual fixed effects, is reduced with an asymptotic bias-correction proposed by Fernández-Val [2009].

Table 1.B7 in Appendix 1.B summarizes the results from the bias-corrected probit and logit binary response models with two-way fixed effects using both chronic illnesses and SAH measures. The fixed effects probit and logit models drop all observations of cross-sectional units with non-varying responses, that is, individuals who never change their response to the general life satisfaction question across the survey waves. This deletion can be done because those observations do not contribute to the identification of the structural parameters due to perfect classification. This drop of observations mechanically changes the magnitude and/or significance of the estimates. Hence, to assess the sensitivity of the results to the specification of the mapping of the true latent utility to the utility proxy, the estimates from the probit and logit specifications should be compared with Columns (1) and (3), where I report the linear specification on the sample used for the fixed-effect probit and logit regressions. The estimates from the nonlinear models have the same direction as that from the linear model, even where precision is lacking, implying that the assumption of linearity in expression (1.1) is not unreasonable.

[14] See details here https://cran.r-project.org/web/packages/bife/index.html.

1.5.6.2 Nonlinearity and the full categories of the utility proxy

As a next step, I relax the utility proxy from a binary response to explore the full nonbinary categories of the outcome variable. In this section, I assess a range of alternative estimators for fixed and random effects ordered models in the context of estimating the effect of poor health status on the marginal utility of consumption. The following estimators are compared: (i) fixed effects OLS, (ii) correlated random effects ordered model (CRE), (iii) the DvS two-step FE estimator [Das & van Soest, 1999], and (iv) the Blow-up and Cluster (BUC) FE estimator [Baetschmann et al., 2015].

Table 1.B8 in Appendix 1.B presents results from these alternative specifications using both chronic illnesses and SAH measures. Similar to the nonlinear binary models in Table 1.B7, the ordered models drop all observations of cross-sectional units with non-varying responses. Because the ordered models are nonlinear (except in Columns (1) and (5)), the estimated coefficients do not reflect the marginal effects of the predictors on the ordered outcome variable (utility proxy). One way to interpret the coefficients in Table 1.B8 is that the sign of the coefficients indicates the direction in which an increase in the predictors influences the cumulative distribution of the ordered outcome variable. If the coefficient is positive, an increase in the predictor leads to an unambiguous decrease in the probability of the lowest category of the ordered outcome variable and an increase in the probability of the highest category of the outcome variable. The table shows that the results from the various specifications are generally consistent with the baseline findings of the positive health-state dependence of utility, although precision for the estimate of the interaction term between health status and consumption for three of the eight specifications is lacking.

1.6 Conclusions

I use valid measures of ill health and broad-based measures of household consumption to estimate the health-state dependence of the utility function. The approach is based on observed individual utility changes, for which I estimate how within-person health shocks affect general life satisfaction (utility proxy), comparing this effect across individuals with different nonmedical and nondurable consumption levels. I implement this approach using 24 waves of the RLMS.

Across a wide range of alternative specifications and different health measures, I find robust evidence in favor of positive health-state dependence of utility—a deterioration in health is associated with a statistically significant increase in the marginal utility of consumption. The baseline estimates show that moving from a good health state to a sick state raises the marginal utility of consumption by 2.5 to 4.0 percentage points. This increase is equivalent to a 1.59-percentage

point increase in the marginal utility of consumption for a one-standard-deviation increase in the number of diagnosed chronic illnesses (relative to the marginal utility when the individual has no chronic illness), and a 1.81-percentage point increase in the marginal utility of consumption for a one-standard-deviation decline in subjective health evaluation (relative to the marginal utility when the individual has a *very good* health). These results imply that nonmedical and nondurable consumption mitigates the negative effect of poor health on well-being. Using disaggregated consumption categories further reveals that the consumption of necessary goods such as food and fuel including for cooking drives the results.

From a policy standpoint, the findings in this study have implications for important economic behaviors or decisions, such as optimal life-cycle savings, transfer policies, and insurance design—notably long-term care and disability insurance. For example, the estimates of health-state dependence of utility presented in this study imply that not only is full health insurance desirable, but also inter-state resource transfers, that is, the transfer of resources from a good health to a poor health state, is desirable such that more can be consumed in the state where the marginal utility of consumption is higher (i.e., in the poor health state). Furthermore, because older people are more likely to be in poorer health state than younger ones, increasing savings toward the end of the life cycle is also desirable to guarantee higher consumption, particularly consumption of essential goods when in old age.

However, this study has noteworthy limitation that future research could address. The results show that the consumption of necessary goods drive the impact of health shocks on the marginal utility of consumption. One question that comes to mind is, what if people change what they consume (not just how much) following a health shock? How should we think of such shifts when trying to measure health-state-dependent utility parameters? Future research could provide evidence on how people's pre-shock preferences for consumption goods affect how health shocks shift the marginal utility of consumption.

SUPPORTING INFORMATION

Appendix 1.A: Detailed data description and variable definitions.

Appendix 1.B: Results of robustness checks and additional analyses.

APPENDICES

1.A DETAILED DATA DESCRIPTION AND VARIABLE DEFINITIONS

1.A.1 Russia Longitudinal Monitoring Survey (RLMS)

The Russia Longitudinal Monitoring Survey (RLMS) of Higher School of Economics is a series of nationally representative surveys designed to monitor the effects of Russian reforms on the health and economic welfare of households and individuals in the Russian Federation.[15] These effects are measured by a variety of means: detailed monitoring of individuals' health status and dietary intake, measurement of broad-based household-level expenditures and service utilization, and collection of relevant community-level data, including region-specific prices and community infrastructure data. The RLMS is conducted by the National Research University "Higher School of Economics" and OOO "Demoscope" together with Carolina Population Center, University of North Carolina at Chapel Hill, and the Institute of Sociology of the Federal Center of Theoretical and Applied Sociology of the Russian Academy of Sciences.

Data have been collected 28 times between 1992 and 2019. Phase I of the survey—rounds (I–IV)—spanned July 1992 and January 1994 but was discontinued because the sampling was flawed as it was based on a sample of enterprises and organizations within each state ministry and did not allow the longitudinal potential of repeated waves to be exploited. The Phase II survey (rounds 5-28), called RLMS began in 1994 and has been repeated annually since then, with the exception of 1997 and 1999 when the survey was not administered. I use rounds 5-28 of the RLMS (Phase II) which spans 24 survey waves collected between 1994 and 2019.

The sample in Phase II was designed to overcome the shortcomings of the probability sample used in the Phase I. The initial target sample size was set at 4,000 households. A multistage probability sample of households was employed to get a nationally representative sample for the Russian Federation. Based on a *split-panel* sample design [Kish, 1987], it is both a nationally representative cross-sectional survey that represents the conditions of Russian households and individuals at each point of time and a panel survey that allows researchers to trace the same individuals throughout the economic transition. The sample has been subsequently replenished to account for new construction and attrition while preserving the longitudinal integrity of the survey. The survey strategy is predicated on the principle of *repeated sampling of dwellings*, in which all household members are interviewed each year (if they can be contacted within three visits), and then the dwelling itself

[15] RLMS web sites: `https://rlms-hse.cpc.unc.edu`; `https://www.hse.ru/org/hse/rlms`.

(rather than the household) is followed. For completeness and to minimize attrition, previously surveyed families who no longer live at the sampling addresses are also followed. Overall, there are 5,764 households with 15,495 persons and 12,465 adult individuals on average per round of data collection, where the household is defined as all individuals living together and sharing income and expenses including unmarried children, 18 years of age or younger, who are temporarily residing outside the domicile at the time of the survey. In order to minimize measurement error, the interviewer conducts direct individual interviews with as many household members aged 14 and older as possible (as opposed to interviewing one individual and using proxy responses for the rest), acquiring data about their individual activities and health. Data for children aged 13 and younger are obtained from adults in the household.

1.A.2 Baseline sample selection

The following criteria is used to select the baseline sample:

1. All adults 16 years old or older.
2. I exclude the top percentile of the consumption distribution from the analysis, given the potential sensitivity of the coefficient of consumption to such outliers. In practice, including these individuals does not have any substantive effect on the results.
3. Finally, I require that the individual appear in the baseline sample for more than one wave, and only use person-years where the key variables have non-missing values.

1.A.3 Attrition

The response rate in the first round of the Phase II of the the RLMS in 1994 was very high, exceeding 87.6% for households and more than 97% of the individuals listed on the household rosters [Kozyreva et al., 2016]. The response rates following the first round varied across Primary Sampling Units (PSUs), depending on the proportion of households in rural areas. Obviously, in Moscow and St Petersburg, respondents and household response rates are substantially lower than in the Russian Federation as a whole. However, since this situation was expected and has been adjusted in oversampling procedures, the actual proportion of completed household interviews compares well to the proportion of the population in each stratum [Kozyreva et al., 2016]. For wave-to-wave attrition, there were only about 29% of households and 19% of individuals from the 1994 round who continued to participate until 2014 with 12.8% of initial 1994 participants passing

away over time [Kozyreva et al., 2016]. When people die or refuse to participate in subsequent rounds of the survey, they exit the sample, and I keep pre-exit observations in the sample. Most of the attrition comes through death and movement out of initial sampled dwelling address. Given that, newer households who move to sampled dwelling addresses are added to the panel and new additional households are included, the sample size stays relatively stable across the waves. Compared to similar panel surveys in other countries, attrition in the RLMS is generally low partly due to lower mobility and infrequent change of addresses in the Russian Federation [Gorodnichenko et al., 2010]. I treat wave-to-wave attrition in the sample as random in the analysis.

1.A.4 Key variables definitions

To account for the monetary reform of January 1, 1998 in Russia which led to the redenomination of the Russian ruble by 1000, I divide all monetary values reported by households prior to 1998, including consumption expenditure and income by 1000 to enable comparability with values from later years. Also, I transform all nominal monetary values to constant 2010 prices using yearly consumer price indices (CPI) from the World Bank. All reported expenditure and income values are therefore *real* values with 2010 as the base year.

1.A.4.1 Household consumption

The RLMS allows to construct broad-based measures of total household consumption expenditures which can be further disaggregated into durable and non-durable consumption. The survey has three main consumption expenditure categories: expenditure on durable goods, medical services, and non-durable goods including food. The durable goods part has four *big-ticket* consumption items whiles the non-durable goods consumption category has five *big-ticket* items.

- *Durable goods*: The four *big-ticket* durable consumption items comprise: (i) clothing and shoes; (ii) cultural goods such as TV, mobile phones, jewelry, household appliances, among others; (iii) automobiles, motorcycles, bikes and sport equipment including their accessories; and (iv) purchase of house, apartment and building maintenance. Given that the actual consumption (and hence utility) from purchases of durable goods span more than a calender year, I exclude durable goods from the household consumption estimates used for the analysis.

- *Medical expenditure*: The survey allows to compute total out-of-pocket (OOP) health expenditure as a share of non-medical consumption at both the individual and household levels. The

measure includes all health expenditures for ambulance services, hospitalization, clinic treatment, dental services and prescribed medication. A rough estimate indicates that the proportion of individual's share of out-of-pocket (OOP) spending as a percent of non-medical and non-durable consumption is 6.42% on average per year. The consumption estimates used in the estimation of the effect of health on the marginal utility of consumption excludes medical expenditure.

- *Non-durable goods*: This expenditure category comprises all non-medical and non-durable expenditure items by the household during the year of the survey. It consists of five *big-ticket* expenditure items:

    1. *Food*: Food consumption in the RLMS consists of about 90 food items sub-categorized into seven groups: (i) expenditure on grain, cereals, bread, pasta and tuber; (ii) expenditure on meat, fish, oil and canned food; (iii) expenditure on milk, dairy and sugar; (iv) expenditure on fruits, vegetables and spices; (v) expenditure on drinks (tea, coffee, alcohol and non-alcohol) and tobacco; (vi) expenditure on food and drinks taken outside home; and (vii) other non-categorized food items. Each household is asked to report their expenditure on each of the food items for the past seven days prior to the survey round. To complement the recall of food expenditure for the past seven days, an additional question about the amount spent on food in general in the last 30 days prior to the survey round is asked. I use the maximum of the annualized 'past seven days' or 'last 30 days' food expenditure in the analysis. However, using the minimum of the two does not change the results presented in the main article. Total household food consumption includes own-farm food items and animal husbandry consumed.[16] For the purpose of this paper, own-farm food items are priced using average local market prices in the community in the year of the survey round extracted from the community level dataset from the RLMS.

    2. *Fuel*: Fuel consumption consists of fuel for running vehicles, motors, generators; and fuel for cooking including bottled gas.

    3. *Services*: This consists of expenditure on public transport, tailoring, laundry, hairdressing, postal services, and other non-medical services.

    4. *Other non-durable expenditures*: All other non-categorized expenditure items such as rent

[16] About 47% of all households consume at least one crop item from their own farms and 15% consume at least one animal product from their own farms.

payment, bills, utilities, stationery, among others are captured under this sub-category.

5. *Tourism and leisure*: This includes expenditures on vacation and tourism including parties outside.

In the analysis, I define total annual consumption within the household as the sum of all non-medical and non-durable annual spending by members of the household, excluding the consumption of durables and medical services. In order to capture differences in need by age and economies of scale in consumption within the household, I estimate consumption per adult equivalent using the OECD's adult equivalence scale of $1 + 0.7 \times (N_A - 1) + (0.5) \times N_C$, where N_A is the number of adults in the household in a given survey round and N_C is the number of children.

1.A.4.2 Household income

I construct total annual household income as the sum of household income from wages and salaries, capital income (business income, dividend and interest income, and other asset income), pensions, transfers or subsidies, and other sources using responses from the household level survey. I include income from household own farms and animal husbandry subtracting farming expenditures. To obtain real annual household income per capita, I divide the estimated annual household income by adult equivalence scale using the OECD's scale of $1 + 0.7 \times (N_A - 1) + (0.5) \times N_C$ in order to capture differences in contributions of adults and children in the household. Finally, I take the average of household income per adult equivalent across all survey waves for each individual to obtain permanent household annual income per capita.

Table 1.A1 presents estimates of disaggregated consumption per adult equivalent and permanent household income per capita, which complements Table 1.1 in the main article. Expenditures on durable goods and medical services are excluded from the analysis. For clarity, the discussion of health-state dependence of utility is restricted to the utility from non-medical and non-durable consumption expenditure.

Table 1.A1: Annual income and consumption per adult equivalent (2010 prices)

Baseline sample: Age $\geq$ 16 and observed at least two times			
	Obs.	Aggregate	Disaggregate
	(1)	(2)	(3)
Income			
Permanent household income per capita (₽)	281,217	150,007	
US$ (2010)	281,217	4,936	
Consumption			
Total consumption per capita (₽)	281,217	111,971	
US$ (2010)	281,217	3,684	
Expenditures on food			
Total	281,217	61,771	
Grain, seeds, cereals, bread, pasta & tuber	281,217		6,431
Meat, fish, oil & canned food	281,217		17,782
Milk, dairy & sugar	281,217		12,159
Fruits, vegetables & spices	281,217		6,905
Drinks & tobacco	281,217		6,165
Food & drinks eaten outside	281,217		6,098
Other food items	281,217		6,230
Expenditure on non-food			
Total	281,217	50,200	
Fuel	281,217		5,398
Services	281,217		8,602
Other nondurables	281,217		33,850
Tourism & leisure	281,217		2,350

Notes: Table shows household level annual income and consumption averaged across the 24 survey waves and across individuals. Income and consumption estimates are annual values per adult equivalent. Consumption comprises non-medical and non-durable expenditures only, and excludes the top percentile of the consumption distribution. Permanent income is constructed by taking the average across all waves of total household income per adult equivalent for each individual. All estimates prior to 1998 are divided by 1000 to account for the 1998 Ruble redenomination. Income and expenditures (in Rubles, ₽) are in constant 2010 prices (deflated using yearly consumer price indices (CPI) from the World Bank). Column (1) shows the total number of person-years in the baseline sample (individuals with 16 years or older and observed at least in two survey rounds); Column (2) shows income and consumption aggregates whiles Column (3) shows disaggregated consumption estimates.

1.A.5 How strongly do diagnosed chronic diseases predict SAH?

Table 1.A2: Predictive power of diagnosed chronic diseases on SAH

Baseline sample: Age $\geq$ 16 and observed at least twice from 1994-2019 Outcome variable: Self-assessed health (SAH) Model: OLS	
	(1)
Cancer	0.3750***
	(0.016)
Diabetes	0.1239***
	(0.004)
Heart disease	0.1618***
	(0.006)
Hepatitis A—B—C^a	-0.0074*
	(0.004)
Hypertension	0.1284***
	(0.003)
Liver—Kidney—Lung disease	0.1326***
	(0.003)
Stroke	0.2169***
	(0.007)
Tuberculosis	0.0532***
	(0.010)
Age	0.0068***
	(0.000)
Age^2	0.0000***
	(0.000)
Education (reference: 0-6 grades)	
Unfinished secondary	-0.0909***
	(0.007)
Secondary (or vocational)	-0.1322***
	(0.007)
Higher education	-0.1632***
	(0.013)
N	281,217
R^2	0.4534
Other covariates	NO
Initial health status	YES
Wave year dummies	YES

Notes: Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. SAH is self-assessed health ordered responses ranging from 1 (very good health) to 5 (very bad health). Diagnosed diseases are binary. [a] Hepatitis includes Botkin's disease and jaundice.

1.B RESULTS OF ROBUSTNESS CHECKS AND ADDITIONAL ANALYSES

Table 1.B1: Health-state dependent utility and poor health intensity - chronic illnesses

Sample: Age $\geq$ 16 and observed at least twice from 1994-2019 Outcome variable: General life satisfaction (utility proxy) Model: LPM (FE)				
	(1)	(2)	(3)	(4)
Health measure:	CHRONIC			
	Baseline	Poor Health Intensity	Chronic 0-2	Chronic 3+
Poor health	-0.2763***		-0.0820***	-0.4423***
	(0.052)		(0.022)	(0.162)
1 Chronic Disease		-0.0090		
		(0.018)		
2-3 Chronic Diseases		-0.0800***		
		(0.020)		
4+ Chronic Diseases		-0.2038***		
		(0.047)		
Log(Consumption)	0.0398***	0.0405***	0.0392***	0.0367***
	(0.003)	(0.003)	(0.003)	(0.008)
Poor health $\times$ Log(Cons.)	0.0254**		0.0087*	0.0713**
	(0.011)		(0.005)	(0.035)
1 Chronic $\times$ Log(Cons.)		-0.0003		
		(0.004)		
2-3 Chronic $\times$ Log(Cons.)		0.0086**		
		(0.004)		
4+ Chronic $\times$Log(Cons.)		0.0243**		
		(0.010)		
N	281,217	281,217	247,106	34,111
No. of individuals	35,847	35,847	34,885	5,822
R^2	0.4180	0.4180	0.4334	0.4436
Other covariates	YES	YES	YES	YES
Individual FE	YES	YES	YES	YES
Wave year FE	YES	YES	YES	YES
Regional dummies	YES	YES	YES	YES
F-statistic that all the consumption-health interaction terms are jointly equal to zero		3.15		
P-value of F-test		0.0238		

Notes: Robust standard errors in parentheses are clustered at the individual level. *** p<0.01, ** p<0.05, * p<0.1. Table reports coefficients from specifications based on varying intensities of the number of chronic health illnesses individuals suffer. The outcome variable is general life satisfaction which is coded as 1 if the respondent has general life satisfaction level higher than or equal to the sample median and 0 otherwise. The mean of the outcome variable is 0.64 in the baseline sample. Column (1) repeats the baseline results from column (1) of Table 1.2. Column (2) estimates the model using the following dummies for different intensities of poor health: the respondent has no chronic illness, has one chronic illness, has two or three chronic illnesses, and has four or more chronic illnesses. The reference group under this column is individuals without any chronic illness. Column (3) runs the regression for individuals with up to two chronic illnesses while Column (4) runs the regression for individuals with at least three chronic illnesses. In addition to the covariates shown in the table, the estimation includes individual fixed effects, wave fixed effects, and controls for age and its square, education, place of residence, occupation, household size, a dummy for whether the individual is married, and a dummy for whether the individual is working in the year of the survey round.

Table 1.B2: Health-state dependent utility and poor health intensity - SAH

Sample: Age $\geq$ 16 and observed at least twice from 1994-2019 Outcome variable: General life satisfaction (utility proxy) Model: LPM (FE)				
	(1)	(2)	(3)	(4)
Health measure:	SAH			
	Baseline	Poor Health Intensity	SAH 1,2,3	SAH 4,5
Poor health	-0.4724***		-0.2365***	-0.1556***
	(0.036)		(0.027)	(0.039)
2 - *Good* health		-0.2716***		
		(0.039)		
3 - *Average* health		-0.3675***		
		(0.039)		
4 - *Poor* health		-0.4324***		
		(0.043)		
5 - *Very poor* health		-0.6326***		
		(0.053)		
Log(Consumption)	0.0242***	-0.0161*	0.0172***	0.0412***
	(0.004)	(0.008)	(0.005)	(0.006)
Bad health $\times$ Log(Cons.)	0.0399***		0.0307***	0.0064
	(0.008)		(0.006)	(0.009)
2 - *Good* health $\times$ Log(Cons.)		0.0541***		
		(0.008)		
3 - *Average* health $\times$ Log(Cons.)		0.0637***		
		(0.009)		
4 - *Poor* health $\times$Log(Cons.)		0.0556***		
		(0.009)		
5 - *Very poor* health $\times$Log(Cons.)		0.0677***		
		(0.012)		
N	281,217	281,217	240,664	40,553
No. of individuals	35,847	35,847	34,265	10,947
R^2	0.4224	0.4233	0.4155	0.5129
Other covariates	YES	YES	YES	YES
Individual FE	YES	YES	YES	YES
Wave year FE	YES	YES	YES	YES
Regional dummies	YES	YES	YES	YES
F-statistic that all the consumption-health interaction terms are jointly equal to zero		14.85		
P-value of F-test		0.0000		

Notes: Robust standard errors in parentheses are clustered at the individual level. *** p<0.01, ** p<0.05, * p<0.1. Table reports coefficients from specifications based on varying intensities of poor health based on subjective health evaluation. The outcome variable is general life satisfaction which is coded as 1 if the respondent has general life satisfaction level higher than or equal to the sample median and 0 otherwise. The mean of the outcome variable is 0.64 in the baseline sample. Column (1) repeats the baseline results from column (2) of Table 1.2. Column (2) estimates the model using the following dummies for different intensities of poor health: the respondent has *very good* health, *good* health, *average* health, *bad* health and *very bad* health. The reference group under this column is individuals with *very good* health. Column (3) runs the regression for individuals with *very good* to *average* health while Column (4) run the regression for those with *bad* and *very bad* health. In addition to the covariates shown in the table, the estimation includes individual fixed effects, wave fixed effects, and controls for age and its square, education, place of residence, occupation, household size, a dummy for whether the individual is married, and a dummy for whether the individual is working in the year of the survey round.

Table 1.B3: Health-state dependent utility: Consumption quintiles

Sample: Age $\geq$ 16 and observed at least twice from 1994-2019 Outcome variable: General life satisfaction (utility proxy) Model: LPM (FE)		
	(1)	(2)
Health measure:	CHRONIC	SAH
Poor health	-0.1748***	-0.3317***
	(0.020)	(0.012)
Log(consumption) Q2	0.0343***	0.0305***
	(0.004)	(0.007)
Log(consumption) Q3	0.0463***	0.0330***
	(0.004)	(0.008)
Log(consumption) Q4	0.0545***	0.0297***
	(0.005)	(0.008)
Log(consumption) Q5	0.0619***	0.0223***
	(0.005)	(0.008)
Poor health $\times$ Log(consumption) Q2	-0.0087	0.0049
	(0.018)	(0.014)
Poor health $\times$ Log(consumption) Q3	0.0120	0.0320**
	(0.019)	(0.015)
Poor health $\times$ Log(consumption) Q4	0.0136	0.0562***
	(0.020)	(0.015)
Poor health $\times$ Log(consumption) Q5	0.0506**	0.1022***
	(0.022)	(0.016)
N	281,217	281,217
No. of individuals	35,847	35,847
R^2	0.4178	0.4222
Other covariates	YES	YES
Individual FE	YES	YES
Wave year FE	YES	YES
Regional dummies	YES	YES
F-statistic that all the consumption-health interaction terms are jointly equal to zero	2.39	12.25
P-value of F-test	0.0489	0.0000

Notes: Robust standard errors in parentheses are clustered at the individual level. *** p<0.01, ** p<0.05, * p<0.1. Table reports coefficients from specifications based on varying degrees of consumption. The outcome variable is general life satisfaction which is coded as 1 if the respondent has general life satisfaction level higher than or equal to the sample median and 0 otherwise. The mean of the outcome variable is 0.64 in the baseline sample. Poor health in Column (1) is a composite measure which comprises the total number of reported diagnosed chronic illnesses out of the following: Cancer; Diabetes; Heart disease (myocardial infarction); Hepatitis (A, B or C), Botkin's disease or jaundice; Hypertension (high arterial blood pressure); Liver, kidney or lungs disease; Stroke; and Tuberculosis. Poor health in Column (2) is a measure based on self-assessed health (SAH), which ranges from 1 (*very good health*) to 5 (*very bad health*). Both health measures are transformed into a disease index, $\delta(H_{it}) \in [0, 1]$, which is increasing in poor health. Log(consumption) is the log of non-medical and non-durable household consumption expenditure per adult equivalent. $Q2 - Q5$ are second to fifth quintiles of log(consumption). Individuals in the first quintile of log(consumption), $Q1$ are the reference group. In addition to the covariates shown in the table, the estimation includes individual fixed effects, wave fixed effects, and controls for age and its square, education, place of residence, occupation, household size, a dummy for whether the individual is married, and a dummy for whether the individual is working in the year of the survey round.

Table 1.B4: Marginal utility of consumption with respect to each chronic disease

Sample: Age $\geq$ 16 and observed at least twice from 1994-2019 Outcome variable: General life satisfaction (utility proxy) Model: LPM (FE) - Single regression										
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Health condition:	Cancer	Diabetes	Heart	Hepatitis	Hypertension	LKL	Stroke	TB	Non-weighted linear combination of (1)-(8)	Prevalence-weighted linear combination of (1)-(8)
Poor Health	-0.3636***	0.0185	-0.0871**	-0.0041	-0.0406**	-0.0558***	-0.0526	0.0121		
	(0.113)	(0.033)	(0.042)	(0.032)	(0.018)	(0.020)	(0.049)	(0.063)		
Log(Cons.)									0.0388***	0.0388***
									(0.003)	(0.003)
Poor Health $\times$ Log(Cons.)	0.0624***	-0.0079	0.0108	-0.0000	0.0065*	0.0067	-0.0042	-0.0059	0.0684**	0.0051***
	(0.023)	(0.007)	(0.009)	(0.007)	(0.004)	(0.004)	(0.011)	(0.014)	(0.030)	(0.003)
N									281,217	281,217
No. of individuals									35,847	35,847
R^2									0.4183	0.4183
Other covariates									YES	YES
Individual FE									YES	YES
Wave year FE									YES	YES
Regional dummies									YES	YES
F-statistic that all the eight consumption-health interaction terms are equal									1.56	1.56
P-value of F-test, F(7, 35846)									0.1734	0.1734
F-statistic that all the consumption-health interaction terms are jointly equal to zero									2.30	2.30
P-value of F-test F(8, 35846)									0.0183	0.0183

Notes: Robust standard errors in parentheses are clustered at the individual level. *** p<0.01, ** p<0.05, * p<0.1. Table reports results from a single regression, which estimates a modified version of the baseline model in equation (1.1) in which eight disease dummies (Poor Health), indicating whether the respondent has the particular disease listed in the headings of Columns (1)-(8), are separately interacted with log of consumption in a single regression. The outcome variable is general life satisfaction which is coded as 1 if the respondent has general life satisfaction level higher than or equal to the sample median and 0 otherwise. The mean of the outcome variable is 0.64 in the baseline sample. Poor health in this specification is a dummy variable which takes value 1 if the individual has the reference chronic conditions in Columns (1)-(8) and 0 otherwise. The chronic conditions include Cancer; Diabetes; Heart disease (myocardial infarction); Hepatitis (A, B or C), Botkin's disease or jaundice; Hypertension (high arterial blood pressure); Liver, kidney or lungs disease (LKL); Stroke; and Tuberculosis (TB). Log(consumption) is the log of non-medical and non-durable household consumption expenditure per adult equivalent in the household. The estimation includes individual fixed effects, wave fixed effects, and controls for age and its square, education, place of residence, occupation, household size, a dummy for whether the individual is married, and a dummy for whether the individual is working in the year of the survey round. The non-weighted linear combination of the interaction terms (Column (9)) gives a combined estimate of state-dependent utility which is not weighted by the prevalence of each chronic disease. The prevalence-weighted linear combination of the interaction terms (Column (10)) gives an estimate of state-dependent utility that takes into account the prevalence of each chronic disease in the sample.

Table 1.B5: Health-state dependent utility by gender

Sample: Age $\geq$ 16 and observed at least twice from 1994-2019 Outcome variable: General life satisfaction (utility proxy) Model: LPM (FE)				
	(1)	(2)	(3)	(4)
Health measure:	CHRONIC		SAH	
Gender:	Men	Women	Men	Women
Poor health	-0.2486***	-0.2304***	-0.4317***	-0.4613***
	(0.089)	(0.065)	(0.056)	(0.047)
Log(consumption)	0.0335***	0.0454***	0.0209***	0.0299***
	(0.004)	(0.003)	(0.006)	(0.006)
Poor health $\times$ Log(onsumption)	0.0125	0.0210	0.0332***	0.0363***
	(0.019)	(0.014)	(0.012)	(0.010)
Age	0.0001	0.0066***	-0.0003	0.0052***
	(0.001)	(0.001)	(0.001)	(0.001)
Age^2	0.0002***	0.0001***	0.0002***	0.0001***
	(0.000)	(0.000)	(0.000)	(0.000)
Married	0.0612***	0.0735***	0.0612***	0.0740***
	(0.008)	(0.005)	(0.008)	(0.005)
Household size	0.0091***	0.0055***	0.0089***	0.0047***
	(0.002)	(0.002)	(0.002)	(0.002)
Working	0.1367***	0.0614***	0.1321***	0.0591***
	(0.005)	(0.004)	(0.005)	(0.004)
N	118,536	162,681	118,536	162,681
No. of individuals	15,994	19,853	15,994	19,853
R^2	0.4117	0.4216	0.4159	0.4259
Difference between the health-state dependence coefficients for men and women	-0.009		-0.003	
P-value for the null of equality of the health-state dependence coefficients for men and women	0.340		0.220	
Other covariates	YES	YES	YES	YES
Individual FE	YES	YES	YES	YES
Wave year FE	YES	YES	YES	YES
Regional dummies	YES	YES	YES	YES

Notes: Robust standard errors in parentheses are clustered at the individual level. *** p<0.01, ** p<0.05, * p<0.1. Table replicates the baseline model in Table 1.2 by running separate regressions for men and women. The outcome variable is general life satisfaction which is coded as 1 if the respondent has general life satisfaction level higher than or equal to the sample median and 0 otherwise. The mean of the outcome variable is 0.64 in the baseline sample. Poor health in Columns (1) and (2) is a composite measure which comprises the total number of reported diagnosed chronic illnesses out of the following: Cancer; Diabetes; Heart disease (myocardial infarction); Hepatitis (A, B or C), Botkin's disease or jaundice; Hypertension (high arterial blood pressure); Liver, kidney or lungs disease; Stroke; and Tuberculosis. Poor health in Columns (3) and (4) is a measure based on self-assessed health (SAH), which ranges from 1 (*very good health*) to 5 (*very bad health*). Both health measures are transformed into a disease index, $\delta(H_{it}) \in [0, 1]$, which is increasing in poor health. Log(consumption) is the log of non-medical and non-durable household consumption expenditure per adult equivalent. In addition to the covariates shown in the table, the estimation includes individual fixed effects, wave fixed effects, and controls for education, place of residence and occupation. P-values for the null of equality of the health-state dependence coefficients for men and women are bootstrapped with 50 replications.

Table 1.B6: Health-state dependent utility using an alternative measure of health

Sample: Age $\geq$ 16 and observed at least twice from 1994-2019 Outcome variable: General life satisfaction (utility proxy) Model: LPM (FE)			
	(1)	(2)	(3)
	Baseline		Alternative measure (Predicted health)
	CHRONIC	SAH	
Poor health	-0.2763***	-0.4724***	-0.8603***
	(0.052)	(0.036)	(0.073)
Log(consumption)	0.0398***	0.0242***	0.0268***
	(0.003)	(0.004)	(0.004)
Poor health $\times$ Log(consumption)	0.0254**	0.0399***	0.0485***
	(0.011)	(0.008)	(0.012)
Age	0.0040***	0.0031***	0.0029***
	(0.001)	(0.001)	(0.001)
Age^2	0.0001***	0.0001***	0.0001***
	(0.000)	(0.000)	(0.000)
Married	0.0691***	0.0700***	0.0692***
	(0.004)	(0.004)	(0.004)
Household size	0.0071***	0.0065***	0.0070***
	(0.001)	(0.001)	(0.001)
Working	0.0926***	0.0892***	0.0926***
	(0.003)	(0.003)	(0.003)
N	281,217	281,217	281,217
No. of individuals	35,847	35,847	35,847
R^2	0.4180	0.4224	0.4182
Other covariates	YES	YES	YES
Individual FE	YES	YES	YES
Wave year FE	YES	YES	YES
Regional dummies	YES	YES	YES

Notes: Bootstrapped standard errors (with 100 replications) in parentheses in Column (3) are clustered at the individual level. *** p<0.01, ** p<0.05, * p<0.1. Table replicates the baseline model in Table 1.2 by replacing the health measure with an alternative measure of health based on predicted values of a SAH, regressed over a set of objective health measures, using a strategy similar to that used by Blundell et al. [2020, 2017] and Jürges [2007]. The outcome variable is general life satisfaction which is coded as 1 if the respondent has general life satisfaction level higher than or equal to the sample median and 0 otherwise. The mean of the outcome variable is 0.64 in the baseline sample. Poor health in Column (3) is predicted alternative measure of health transformed into a disease index, $\delta(H_{it}) \in [0, 1]$, which is increasing in poor health. Log(consumption) is the log of non-medical and non-durable household consumption expenditure per adult equivalent. In addition to the covariates shown in the table, the estimation includes individual fixed effects, wave fixed effects, and controls for education, place of residence and occupation.

Table 1.B7: Bias corrected non-linear binary choice models - Average partial effects (APEs)

Sample: Age $\geq$ 16 and observed at least twice from 1994-2019 Outcome variable: General life satisfaction (utility proxy) Model: Bias corrected non-linear binary choice models with two-way FE						
	(1)	(2)	(3)	(4)	(5)	(6)
Health measure:	CHRONIC			SAH		
	OLS (FE) (w/o indiv. with all 0s & 1s in utility)	FE Probit (IP Bias-corrected)	FE Logit (IP Bias-corrected)	OLS (FE) (w/o indiv. with all 0s & 1s in utility)	FE Probit (IP Bias-corrected)	FE Logit (IP Bias-corrected)
Poor health	-0.2444***	-0.1696***	-0.1646***	-0.4759***	-0.3679***	-0.3595***
	(0.060)	(0.052)	(0.052)	(0.045)	(0.041)	(0.041)
Log(consumption)	0.0501***	0.0391***	0.0396***	0.0390***	0.0301***	0.0313***
	(0.003)	(0.003)	(0.003)	(0.005)	(0.005)	(0.005)
Poor health $\times$ Log(consumption)	0.0140	0.0058	0.0039	0.0260***	0.0196**	0.0177*
	(0.013)	(0.011)	(0.011)	(0.010)	(0.009)	(0.009)
Age	0.0040***	0.0025	0.0038	0.0028***	-0.0006	-0.0006
	(0.001)	(0.008)	(0.008)	(0.001)	(0.008)	(0.008)
Age^2	0.0001***	0.0001***	0.0001***	0.0001***	0.0001***	0.0001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Married	0.0826***	0.0660***	0.0674***	0.0834***	0.0666***	0.0680***
	(0.005)	(0.004)	(0.004)	(0.005)	(0.004)	(0.004)
Household size	0.0085***	0.0069***	0.0070***	0.0078***	0.0065***	0.0066***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Working	0.1130***	0.0885***	0.0897***	0.1083***	0.0846***	0.0857***
	(0.004)	(0.003)	(0.003)	(0.004)	(0.003)	(0.003)
N	213,262	213,262	213,262	213,262	213,262	213,262
No. of individuals	21,866	21,866	21,866	21,866	21,866	21,866
R^2	0.2771	-	-	0.2837	-	-
Other covariates	YES	YES	YES	YES	YES	YES
Individual FE	YES	YES	YES	YES	YES	YES
Wave year FE	YES	YES	YES	YES	YES	YES
Regional dummies	YES	YES	YES	YES	YES	YES

Notes: Standard errors in parentheses (those in Columns (1) and (4) are robust and clustered at the individual level). *** p<0.01, ** p<0.05, * p<0.1. Table reports coefficients from alternative models to investigate the sensitivity of the quantitative estimates to potential misspecification of $f(.)$ under binary response models. The outcome variable is general life satisfaction which is coded as 1 if the respondent has general life satisfaction level higher than or equal to the sample median and 0 otherwise. The mean of the outcome variable is 0.64 in the baseline sample. Poor health in Columns (1)-(3) is a composite measure which comprises the total number of reported diagnosed chronic illnesses out of the following: Cancer; Diabetes; Heart disease (myocardial infarction); Hepatitis (A, B or C), Botkin's disease or jaundice; Hypertension (high arterial blood pressure); Liver, kidney or lungs disease; Stroke; and Tuberculosis. Poor health in Columns (4)-(6) is a measure based on self-assessed health (SAH), which ranges from 1 (*very good health*) to 5 (*very bad health*). Both health measures are transformed into a disease index, $\delta(H_{it}) \in [0, 1]$, which is increasing in poor health. Log(consumption) is the log of non-medical and non-durable household consumption expenditure per adult equivalent. In addition to the covariates shown in the table, the estimation includes individual fixed effects, wave fixed effects, and controls for education, place of residence and occupation. Column (1) reports the results from the baseline specification with the same sample as used in Columns (2)-(3) for the case of the chronic illnesses measure. Column (4) reports the results from the baseline specification with same sample as used in Columns (5)-(6) for the case of the self-assessed health measure. Columns (2) and (5) report APEs from a fixed effects probit specification. Columns (3) and (6) report APEs from a fixed effects logit specification. Bias resulting from the incidental parameters (IP) problem [Neyman & Scott, 1948] is reduced with an asymptotic bias-correction proposed by Fernández-Val [2009]. The nonlinear models drop all observations of cross-sectional units (individuals) with non-varying response.

Table 1.B8: Non-linear ordered choice models

Sample: Age $\geq$ 16 and observed at least twice from 1994-2019 Outcome variable: General life satisfaction (utility proxy) Model: Non-linear ordered choice models								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Health measure:	CHRONIC				SAH			
	OLS	CRE	DvS	BUC	OLS	CRE	DvS	BUC
Poor health	-0.5902***	-0.9594***	-1.0936***	-1.0116***	-1.1200***	-2.5649***	-2.7210***	-2.5375***
	(0.119)	(0..219)	(0.262)	(0.264)	(0.086)	(0.171)	(0.197)	(0.202)
Log(cons.)	0.1253***	0.2993***	0.2816***	0.2866***	0.1039***	02381***	0.2013***	0.2301***
	(0.006)	(0.011)	(0.013)	(0.014)	(0.010)	(0.019)	(0.023)	(0.023)
Poor health $\times$ Log(cons.)	0.0440*	0.0345	0.0393	0.0306	0.0551***	0.1373***	0.1792***	0.1299***
	(0.025)	(0.047)	(0.056)	(0.056)	(0.019)	(0.038)	(0.043)	(0.044)
Age	0.0024	-0.0997***	-0.0940***	-0.1026***	-0.0003	-0.0864***	-0.1096***	-0.1234***
	(0.002)	(0.003)	(0.034)	(0.056)	(0.002)	(0.003)	(0.034)	(0.034)
Age^2	0.0004***	0.0009***	0.0008***	0.0008***	0.0004***	0.0009***	0.0009***	0.0009***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Married	0.2029***	0.4405***	0.4398***	0.4426***	0.2054***	0.4503***	0.4527***	0.4527***
	(0.010)	(0.017)	(0.023)	(0.023)	(0.010)	(0.017)	(0.023)	(0.023)
Household size	0.0200***	0.0465***	0.0415***	0.0441***	0.0184***	0.0427***	0.0386***	0.0411***
	(0.003)	(0.005)	(0.006)	(0.006)	(0.003)	(0.005)	(0.006)	(0.006)
Working	0.2294***	0.4931***	0.4602***	0.4725***	0.2186***	0.4726***	0.4417***	0.4538***
	(0.008)	(0.013)	(0.017)	(0.017)	(0.008)	(0.013)	(0.016)	(0.017)
Female		-0.0512***				0.0555***		
		(0.017)				(0.017)		
N	281,217	281,217	267,447	652,869	281,217	281,217	267,447	652,869
No. of individuals	35,847	35,847	35,319	35,319	35,847	35,847	35,319	35,319
R^2	0.5017	-	-	-	0.5086	-	-	-
Other covariates	YES	YES	YES	YES	YES	YES	YES	YES
Individual FE	YES	NO	YES	YES	YES	NO	YES	YES
Wave year FE	YES	YES	YES	YES	YES	YES	YES	YES
Regional dummies	YES	YES	YES	YES	YES	YES	YES	YES

Notes: Standard errors in parentheses (those in Columns (1), (4), (5) and (8) are robust and clustered at the individual level). *** p<0.01, ** p<0.05, * p<0.1. Table reports coefficients from alternative models to investigate the sensitivity of the quantitative estimates to potential misspecification of $f(.)$ under ordered response models. The outcome variable is general life satisfaction which is coded as 1 if the respondent has general life satisfaction level higher than or equal to the sample median and 0 otherwise. The mean of the outcome variable is 0.64 in the baseline sample. Poor health in Columns (1)-(3) is a composite measure which comprises the total number of reported diagnosed chronic illnesses out of the following: Cancer; Diabetes; Heart disease (myocardial infarction); Hepatitis (A, B or C), Botkin's disease or jaundice; Hypertension (high arterial blood pressure); Liver, kidney or lungs disease; Stroke; and Tuberculosis. Poor health in Columns (4)-(6) is a measure based on self-assessed health (SAH), which ranges from 1 (*very good health*) to 5 (*very bad health*). Both health measures are transformed into a disease index, $\delta(H_{it}) \in [0, 1]$, which is increasing in poor health. Log(consumption) is the log of non-medical and non-durable household consumption expenditure per adult equivalent. In addition to the covariates shown in the table, the estimation includes individual fixed effects, wave fixed effects, and controls for education, place of residence and occupation. Columns (1) and (5) report results under an OLS specification which treats the categorical response variable as a continuous variable. The other columns report results using different specifications and estimation methods. Columns (2) and (6) report the results from a correlated random effects ordered probit model (CRE). Columns (3) and (7) implement the Das and van Soest (DvS) two-step estimator [Das & van Soest, 1999]. Finally, Columns (4) and (8) implement the Blow-up and Cluster (BUC) estimator [Baetschmann et al., 2015]. The nonlinear models drop all observations of cross-sectional units (individuals) with non-varying response.

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CHAPTER 2

Pain and Subjective Well-Being Among Older People: A Comprehensive Assessment Based on the WHO Study on Global Ageing and Adult Health

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This paper studies the association of pain with subjective well-being (SWB) and time use among older people in five low- and middle-income countries using the WHO Study on Global Ageing and Adult Health. We use anchoring vignettes as control functions to correct for common self-rating behavior between self-reported pain and SWB. Using data on individual time use and several measures of SWB including activity-specific affective experiences from an abbreviated version of the Day Reconstruction Method, we find that both evaluative and experienced well-being are markedly lower for people living with pain compared to those without pain. Moreover, differences in experienced utility by pain status are exclusively due to worse activity-specific affective experiences among people with pain, which are partially mediated through changes in functional limitations. Furthermore, pain-related differences in time use in favour of those living with pain provide only small compensating effects.

Keywords: *pain; subjective well-being; experienced utility; time use; low- and middle-income countries.*
JEL Classification: *D12, I31, J14, J14.*

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2.1 INTRODUCTION

Pain is a sensitive barometer of population health and well-being [Zajacova et al., 2021]. It is common and affects a large number of people across their lifespan, with significant impact on all aspects of life. It directly undermines quality of life and, instrumentally, can harm the ability to lead a good life [Benjamin et al., 2014; Eccleston, 2019]. It is associated with economic and social disadvantage [Case & Deaton, 2020; Case et al., 2020], reduced productivity [Dueñas et al., 2016], loss of work [Blanchflower & Bryson, 2021; Kapteyn et al., 2008; Krueger, 2021; Piper et al., 2021], and poor mental and general health outcomes both in the short run [Kapteyn et al., 2008; Kohler et al., 2022] and in the long run [Blanchflower & Bryson, 2021; Kapteyn et al., 2008; Kelleher et al., 2021; Noel et al., 2016; Torrance et al., 2010], with far-reaching consequences on families and national social and healthcare systems [Dueñas et al., 2016]. The increasing prevalence of pain around the world constitutes one of the most costly health burdens worldwide and a leading global cause of disability [Vos et al., 2016]. It frequently presents as a response to an originating disease or injury; however, it is not merely an accompanying symptom, but rather a separate condition in its own right, with its own medical definition and taxonomy [Mills et al., 2019]. In 2019, the World Health Organization (WHO) released the 11th International Classification of Diseases (ICD-11), which for the first time classifies pain as a disease in and of itself [World Health Organization, 2019]. In spite of its prevalence and impact, pain is often neglected [Raffaeli & Arnaudo, 2017] and undertreated [N. B. King & Fraser, 2013].

Subjective well-being (SWB), on the other hand, is a multifaceted construct that comprises concepts of both evaluative and emotional or experienced well-being [National Research Council, 2013; OECD, 2013]. Both SWB concepts are in line with utility concepts in economic theory, in that evaluative well-being reflects utility stock over life or the value function which is conceptually equivalent to the indirect utility function [1] whereas experienced well-being reflects the concept of flow utility over a day, instantaneous utility function or the felicity function.[2]

Evaluative well-being consist of individuals' cognitive global evaluation of their lives when they pause and reflect whereas experienced well-being comprises individuals' feelings (affective experiences) during day-to-day moments of life such as joy or worry [Killingsworth, 2021]. According to Kahneman & Riis [2005], while evaluative well-being focuses on cognitive judgments

[1] The value function or indirect utility function gives the individual's maximal attainable utility when faced with a vector of goods prices or choice and a budget constraint.

[2] The felicity function characterizes the utility of a given individual's consumption at any given point in time. It is therefore not the same as a utility function specifying a complete preference ordering over all consumption goods or over consumption levels at all times.

about life and is thus heavily influenced by introspective evaluation, memory, cultural disposition and self-conceptualization; experienced well-being characterizes individuals' continuous flows of pleasure and pain, i.e., sequences of momentary positive or negative affective experiences over the life course and thus, is less influenced by introspection, memory or cultural disposition due to its reliance on momentary affective experiences.

Both concepts of SWB can be reliably and quantitatively measured using state-of-the-art surveying techniques [Benjamin et al., 2014; Krueger & Schkade, 2008; National Research Council, 2013; OECD, 2013]. Evaluative well-being is usually assessed by reporting how satisfied or happy people are with their lives in general whereas experienced well-being can be directly measured from data on time use and individuals' affective experiences during activities of daily living using methods such as experienced sampling [Csikszentmihalyi & Hunter, 2003; Larson & Csikszentmihalyi, 1983] or Day Reconstruction Method (DRM) [Kahneman et al., 2004a].

Evaluative and experienced well-being capture distinct, yet complementary aspects of well-being with different determinants, antecedents and consequences that go well beyond people's income and material conditions [Stiglitz et al., 2009]. Although there is a substantial association between them [Amo-Agyei & Maurer, 2022], evaluative and experienced well-being often show different relationships with important demographic and socioeconomic characteristics, such as age [Kieny et al., 2020; Stone et al., 2010], gender [Kieny et al., 2021], health [Miret et al., 2017], income [Kahneman & Deaton, 2010; Kapteyn et al., 2015; Killingsworth, 2021] and unemployment [Knabe et al., 2010], and individuals' choices tend to maximize their evaluative well-being [Benjamin et al., 2012].

While prevalence and correlates of pain as well as its burden and socio-demographic distribution have been extensively studied, evidence about its association with SWB is limited. The limited available evidence on the relationship between pain and SWB mainly consider measures of evaluative well-being, such as general life satisfaction. Moreover, these few evidence are typically based on data from high-income countries (HICs) [see, e.g., Ellingsen-Dalskau et al., 2021; McNamee & Mendolia, 2014; Rush et al., 2019; Sturgeon et al., 2017] while evidence from low- and middle-income countries (LMICs) remains scarce. Meanwhile, adult and older populations in LMICs are disproportionately exposed to risk factors for developing pain such as physically demanding work combined with frequent under-nutrition, and often have limited access to effective pain treatments or management options compared to their counterparts in HICs [James et al., 2018; Payne et al., 2017; Sharma et al., 2019]. Few studies in the context of LMICs include Kohler et al. [2022] and Stubbs et al. [2016]. Stubbs et al. [2016] study the epidemiology of back pain and its relationship

with mental well-being using data from the World Health Survey (WHS) from 43 LMICs and show that back pain is associated with elevated mental health comorbidity in LMICs. Based on data on older adults in rural Malawi, Kohler et al. [2022], show that pain is widespread and is a strong predictor of mental health and general life satisfaction in the rural mature population.

In spite of its higher appeal for valuing non-market goods, such as health and for assessing the impact of poor health on overall well-being [Dolan & Kahneman, 2007][3], the relationship between experienced well-being and pain has not been well studied. The only study on the association of pain with experienced well-being measures that we know of is the work by Steptoe et al. [2015]. Using the Gallup World Poll, Steptoe et al. analyse the pattern of well-being across ages and the association between well-being and survival at older ages. They find that older people with illnesses that are usually associated with pain such as arthritis, coronary heart disease, and chronic lung disease show both increased levels of depressed mood and impaired hedonic well-being (feelings of happiness, sadness, anger, stress, and pain). However, their measures of experienced well-being—depression and hedonic well-being—are non-diary-based and do not account for the duration of the associated activities of daily living.

Our study complements the limited empirical evidence on the relationship between pain and SWB by providing a comprehensive assessment of the association of pain with both evaluative and experienced well-being among older people in five LMICs, namely China, Ghana, India, Russia and South Africa. Our data come from the first wave of the WHO Study on Global Ageing and Adult Health (SAGE), 2007–2010, which is a cross-national survey focusing on nationally representative samples of mature populations in six LMICs. In addition to using measures of evaluative well-being and overall emotion scores, we use detailed data on time use and activity-specific affective experiences from an abbreviated version of Kahneman et al. [2004a]'s DRM to construct measures of duration-weighted overall experienced utility and activity-specific experienced utilities.

This paper has two overarching purposes. First, we assess the association of pain with the two broad dimensions of SWB previously discussed as well as its association with time use. Specifically, we assess the extent to which pain relates to older people's general life satisfaction and WHO quality of life index (both reflecting cognitive evaluative well-being), as well as their emotion scores and experienced utility (both reflecting experienced well-being) and time allocation between five

[3] Dolan & Kahneman [2007] argue that methods based on people's preference or desire for an outcome, such as health (i.e. decision utility or evaluative well-being) are likely to underrate people's actual affective experiences, i.e. their hedonic experience of that outcome, in this case health due to the influence of self-conceptualization, memory and contextual factors, which may lead to a systematic underestimation of the power of hedonic adaptation. In their view, the relationship between health and well-being should rather be assessed based on direct measures of experienced utility using experienced sampling or DRM.

activity groups: work, housework, travel, leisure, and self-care. Second, we explore the relative importance of differences in activity-specific affective experiences (so-called "saddening effects") and differences in time use (so-called "time composition effects") between people with and without high levels of pain for group differences in experienced utility using a simple counterfactual thought experiment similar to Flores et al. [2015]. The results highlights the extent to which older adults in pain are disadvantaged in terms of well-being, in spite of the presence of some coping strategies among these adults such as increasing leisure time. Our results thus have important policy implications. It is important to investigate and understand the underlying causes and consequences of pain while at the same time providing interventions that could reduce the impact of pain on individuals' well-being.

Our analyses produce two main results. First, we find that in all the five countries studied, both evaluative and experienced well-being are markedly lower for people living with pain compared to those without pain. By focusing on experienced well-being, we find that the observed differences in experienced utility are exclusively due to worse activity-specific affective experiences of people with pain during their activities of daily living. In contrast, differences in time use between people with pain and those without pain provide only small compensating effects, which operates through the fact that people living with pain tend to spend less of their time on work-related activities, which respondents perceive as relatively less pleasant, and more time on leisure activities, which are generally associated with higher affective ratings of respondents. Second, we observe that much of the association between pain and SWB appears to be mediated through changes in functional limitations, which is consistent with findings in previous studies that variation in disability is explained by within person variation in pain [see, e.g., Kapteyn et al., 2008].

Our paper contributes to a long line of research on the interplay of ill-health and well-being. Our approach has the appealing feature that it accommodates both evaluative and experienced well-being measures from the same study population that are often studied separately. Specifically, we include diary-based and duration weighted measures of experienced well-being in addition to standard measures of emotional and evaluative well-being in our SWB mix. Another contribution of this paper lies in the way we addresses the potentially serious concern associated with the regression of a subjective dependent outcome (SWB) on a subjective independent variable (pain) due to their possibly correlated measurement errors. In particular, the concern that different groups within and across countries may have systematically different ways of using response categories of subjective variables [Grol-Prokopczyk et al., 2011]. To circumvent this problem, we use *anchoring vignettes* for health-state description as a form of control functions based on Cameron & Trivedi

[2005, p. 37] and Wooldridge [2015] to correct for individual reporting heterogeneity and to appropriately control for unobserved common self-rating style between SWB and pain.

We organize the rest of the paper as follows. Section 2.2 describes the data and briefly presents pain and well-being indicators. Section 2.3 discusses the estimation methods and Section 2.4 presents the main results. Section 2.5 concludes.

2.2 Data and variables of interest

We use data from the first wave of the WHO Study on Global ageing and Adult Health (SAGE), collected between 2007-2010 [Kowal et al., 2012].[4] SAGE is a multi-disciplinary and multi-country study on ageing in six LMICs namely, China, Ghana, India, Mexico, the Russian Federation, and South Africa. The study focuses mainly on individuals with age 50 years or older but also includes small comparison samples of adults with age 18-49 years. We use the SAGE data from China, Ghana, India, the Russian Federation, and South Africa from WHO's public use files.[5] We use individual- and household-level data from the main sample of respondents with age 50 years or older, excluding the smaller comparison samples of younger adults.

SAGE has several features that make it unique. Reflecting its design as a multi-purpose survey, SAGE contains extensive individual- and household-level data on several life domains, such as demographic and socioeconomic characteristics, family and social relationships, and health and healthcare use. It also contains extensive information on people's SWB, covering aspects of both evaluative and experienced well-being. In terms of evaluative well-being, SAGE contains a range of measures comprising general life satisfaction as well as domain-specific satisfaction such as satisfaction with oneself, health, personal relationships, and conditions of living place, among others. In terms of experienced well-being, SAGE collects data on 14 positive and negative emotions over the previous day of the survey interview as well as an abbreviated version of the Day Reconstruction Method (DRM) [Kahneman et al., 2004a], which combines data on time use with measurements of affective experiences through time. In addition, the SAGE data facilitates conducting parallel analyses on countries in different regions of the world at varying stages of development and across different cultural contexts at the same time based on fully harmonized data. Such analyses allow to determine whether estimates are robust across multiple settings and, therefore, whether they rep-

[4] WHO's SAGE is designed as a longitudinal study collecting data on adults aged 50 years and older, plus a smaller comparison sample of adults aged 18-49 years, from nationally representative samples in six countries: China, Ghana, India, Mexico, Russian Federation, and South Africa. As of the time of this writing this, only data from wave 1 (collected between 2007 and 2010) were publicly available.

[5] We exclude the Mexican sample (2,070 observations) from our analysis, as about 50% of this sample has incomplete interviews with missing information on our main outcomes of interest from the well-being module.

resent a general pattern or some country-specific idiosyncratic associations perhaps, due to specific cultural contexts, location or institutional framework.

To measure experienced well-being, SAGE randomly allocates individuals to four sets of assessments of emotional well-being referring to the morning, afternoon, evening or entire day preceding the day of the survey interview. The randomly selected full day sample (7,649 observations) does not report a detailed time diary along with activity-specific affects as required for the measurement of experienced utility and is therefore dropped from the sample. We assume that non-responses occur at random and therefore drop observations with missing information on any variable we used in the regression analysis. Following this sample selection procedure, our final sample in the analysis comprises 21,783 respondents from all five countries, with country-specific sample sizes ranging from 2,032 in South Africa to 9,267 in China.

2.2.1 Measurement of SWB

Within the construct of SWB, at least two broad approaches—in terms of the level of cognitive processing necessary—capture distinct aspects: evaluative well-being and experienced well-being. We use these two broad dimensions of well-being as our main outcomes of interest in assessing the association of pain with SWB.

2.2.1.1 Evaluative well-being

Evaluative well-being refers to peoples' cognitive assessment of the quality or goodness of various aspects of their lives, their overall life satisfaction, or sometimes how happy they are generally with their lives. This dimension of SWB demands substantial thinking, including aggregation over time and comparison with self-selected standards (e.g., my life compared with what, when, or whom?) [Steptoe et al., 2015] and is thus influenced by introspective evaluation, memory, cultural disposition and self-conceptualization [Kahneman & Riis, 2005]. From the viewpoint of economic theory, evaluative well-being reflects the concept of utility stock or the value function, which is conceptually equivalent to the indirect utility function—the individual's maximal attainable utility when faced with a vector of goods prices or choice and a budget constraint.

In this paper, we distinguish two different measures of evaluative well-being. The first is general life satisfaction, which is measured on a five-point Likert scale. It is based on individuals' responses to the question "*Taking all things together, how satisfied are you with your life as a whole these days?*", with responses ranging from 0 (very dissatisfied) to 4 (very satisfied).[6]

[6]We have transformed and reversed the original scores of all well-being measures so that a higher score represents

The second is a composite measure of quality of life—the WHO Quality of Life Index (also referred to as EUROHIS-QOL 8 index [Power, 2003]), which we will refer to as 'WHOQoL8' hereafter. We construct WHOQoL8 by summing the scores of individuals' cognitive evaluation of their satisfaction in eight different life domains,[7] each measured on a five-point scale ranging from 0 (very dissatisfied) to 4 (very satisfied). Our constructed WHOQoL8 score therefore ranges from 0 to 32 with higher values depicting higher overall quality of life. To complement our composite measure of quality of life, we include in our analysis the eight separate domains of quality of life.

The respondents on average have high levels of both general life satisfaction and WHOQoL8. Average general life satisfaction across our studied sample is 2.7 out of a maximum of 4 and WHOQoL8 has a sample mean of 20.2 out of a maximum score of 32 (Table 2.1, Panel A). By looking at the separate WHOQoL8 domains, the respondents' quality of life measures range from 2.1 (for ability to meet personal needs) and 2.8 (satisfaction with personal relationships) on average out of a maximum score of 4 (Table 2.2, Panel A).

2.2.1.2 Experienced well-being and time use

Experienced well-being, on the other hand comprises individuals' feelings (affective experiences) during day-to-day moments of life [Killingsworth, 2021]. Contrary to evaluative well-being, experienced well-being does not necessarily demand any high level of cognitive processing and thus, is less influenced by introspection, memory or cultural disposition due to its reliance on momentary affective experiences [Kahneman & Riis, 2005]. In relation with economic theory, experienced well-being reflects the concept of flow utility, instantaneous utility function or the felicity function, which characterizes the utility of a given individual's consumption at any given point in time.

We measure experienced well-being by using two strategies. First, we construct an emotion score based on people's binary responses to questions about whether they experienced a total of 11 non-pain emotions overall for much of the day preceding the survey interview.[8] To make the emotion score increasing in well-being, we reversed the original binary codes of the negative emotions such that an emotion takes value 1 if a respondent reports the presence of a positive emotion or the absence of a negative emotion and 0 otherwise. The emotion score thus ranges from 0 (least net affects) to 11 (greatest net affects) with a mean of 8.9 across our studied sample (Table 2.1, Panel A).

better well-being.

[7] (i) Overall quality of life; (ii) Health; (iii) Energy for everyday life; (iv) Ability to perform activities of daily living (ADL); (v) Themselves/their self-esteem; (vi) Personal relationships; (vii) Ability to meet personal needs; and (viii) Conditions of living place.

[8] Three positive emotions comprising *smiled or laughed a lot, enjoyed what one did much of the day* and *felt calm or relaxed much of the day*; and eight negative non-pain emotions consisting of *worried, rushed, irritated or angry, depressed, tense or stressed, lonely, bored*, and *sleepy*.

We also report a summary of the 11 separate domains of the emotion score (Table 2.2, Panel B). For positive emotions, 75% of respondents report feeling calm or relaxed much of the day, 74% report they enjoyed their activities much of the day, and only 43% report they smiled or laughed during the day. The incidence of negative emotions was rather low with feeling rushed, worried, stressed and sleepiness being among the most reported.

The second measure of experienced well-being, experienced utility, is duration-weighted affective experiences during everyday activities of the day preceding the interview. We use detailed data on time use and activity-specific affective experiences provided by the abbreviated DRM module of the SAGE data. Time use and corresponding affective experiences during the previous day were assessed for up to 10 successive activities from an exhaustive list of 22 possible non-sleep activities. Measurement of time and affective experiences started at the time after waking up (morning group), at mid-day (afternoon group) or at 6 p.m. (evening group), depending on the respondent's randomly assigned group. Combining the data from all respondents, we are able to estimate time use and affective experiences of different population groups throughout the entire day. The abbreviated DRM adopted by SAGE has been shown to lead to measures of experienced well-being similar to full DRM instruments [Miret et al., 2012].

For each non-sleep activity reported in the SAGE's time diary, respondents rate the presence or absence, as well as the intensity of two positive affects (*felt calm or relaxed* and *enjoyed* when doing the activity) and five negative affects (*felt worried, rushed, irritated or angry, depressed* and *tense or stressed* when doing the activity) on a three-point scale ranging from 0 (not at all) to 2 (very much). Using all the detailed list of the 22 possible non-sleep activities results in a relatively high frequency of non-participation for certain infrequent activities such as religious activities, intimate relations or care provision. To make the data more easily presentable, we follow previous studies [Flores et al., 2015; Kieny et al., 2020, 2021] and regroup the 22 activities into five naturally-related broader categories corresponding to work, housework, traveling/commuting, leisure, and self-care to avoid very small participation rates in certain detailed activity groups.[9]

Based on the broader grouping of activities, we follow the general approach of Kahneman et al. [2004b] and Knabe et al. [2010]—which has been previously used in Flores et al. [2015] and Kieny et

[9]Similar to previous studies, our work classification comprises working and subsistence farming activities. Housework includes preparing food, doing housework, watching children, shopping and providing care to someone. Traveling by bicycle, public transportation and walking somewhere are classified as traveling and commuting. We define leisure as resting (including tea or coffee break), chatting with someone, playing (including cards and games), reading, watching TV or listening to radio, exercising or leisure walking, and other leisure activities. Finally, self-care groups grooming or bathing (oneself), eating, religious activities, and intimate relations/sex. Resulting individual-level participation rates for our broader five activity groups across all country samples range from 14.9% for traveling in China to 90.5% for leisure in India.

al. [2020, 2021]—and compute experienced utility as duration-weighted net affect, i.e., the sum of the stream of positive and negative affects associated with activities performed during the part of the day covered by the abbreviated DRM. We define individual i's net affect during activity group a (called 'activity-specific net affect') as

$$u_{ia} = \sum_{s} \left(\sum_{l} h_{is} PA_{is}^{l} - \sum_{k} h_{is} NA_{is}^{k} \right) \quad \forall a = 1, \ldots, 5 \tag{2.1}$$

where PA_{is}^{l} represents the affect rating of the lth positive emotion reported by individual i for a single spell s of possible multiple mentions of activity group a, and NA_{is}^{k} represents the affect rating of the kth negative emotion. The time weight h_{is} is thereby defined as

$$h_{is} = \frac{t_{is}}{T_{ia}} \tag{2.2}$$

where t_{is} refers to the duration of a single spell s of possible multiple mentions of activity group a and T_{ia} refers to the overall time individual i spent on activity group a.

We further define experienced utility of individual i as aggregated net affect, that is, as the duration-weighted sum of net affects by activity group:

$$U_i = \sum_{a} \tau_{ia} u_{ia} \tag{2.3}$$

where τ_{ia}=T_{ia}/T_i is the fraction of non-sleep time individual i spent on activity group a relative to their total time covered by the 10 successive activities reported in their randomly assigned set of the abbreviated DRM (morning, afternoon or evening set). Non-sleep time is unevenly distributed across morning, afternoon and evening sets of the abbreviated DRM. Thus, to ensure comparability of results across DRM groups with different starting times, we use time shares rather than absolute activity group durations as weighting factors. Experienced utility ranges from 0 (least duration-weighted net affect) to 14 (greatest duration-weighted net affect) with a mean of 12.1 across the studied populations (Table 2.1, Panel A). The mean of the various group-activity-specific net affects ranges from 11.4 (for work) to 12.5 (for self-care) (Table 2.1, Panel B). To complement our experienced utility measure which is based on the duration-weighted aggregated net affects, we also report separate estimates for duration-weighted positive and negative affects in Table 2.2.

Table 2.1 Panel C reports the associated time shares of the group activities. Respondents on average spend 16% of their non-sleep time on work, 20% on housework, 5% on travel or commuting,

44% on leisure activities, and 14% on self-care.

Table 2.1: Summary of SWB and time use

	Obs.	Mean	Std. dev.	Min	5th percentile	Median	95th percentile	Max
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: Overall SWB								
General life satisfaction	21,783	2.65	0.74	0	1	3	4	4
WHOQoL8	21,783	20.20	4.81	0	12	21	28	32
Emotion score	21,783	8.88	2.21	0	4	10	11	11
Experienced utility	21,783	12.08	1.94	0	8.30	12.31	14	14
Panel B: Activity-specific net affect								
Work	6,267	11.44	2.36	0	7	12	14	14
Housework	12,169	11.81	2.18	0	7.67	12	14	14
Travel	4,981	11.75	2.37	0	7	12	14	14
Leisure	18,159	12.40	1.91	0	8.50	13	14	14
Self-care	16,701	12.45	1.83	0	9	13	14	14
Panel C: Time use								
Work	21,783	0.16	0.29	0	0	0	0.82	1
Housework	21,783	0.20	0.26	0	0	0.11	0.75	1
Travel	21,783	0.05	0.13	0	0	0	0.33	1
Leisure	21,783	0.44	0.32	0	0	0.43	0.96	1
Self-care	21,783	0.14	0.15	0	0	0.10	0.43	1

Notes: The entries are pooled averages across the five countries studied using population weights.

Table 2.2: Summary of detailed (separate) SWB domains

	Obs.	Mean	Std. dev.	Min	5th percentile	Median	95th percentile	Max
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: Separate WHOQoL8 domains								
Satisfied with overall quality of life	21,722	2.24	0.72	0	1	2	3	4
Satisfied with health	21,779	2.41	0.92	0	1	3	4	4
Has enough energy for everyday life	21,768	2.55	1.03	0	1	3	4	4
Satisfied with ADL	21,771	2.6	0.82	0	1	3	4	4
Satisfied with ownself	21,772	2.7	0.78	0	1	3	4	4
Satisfied with personal relationships	21,769	2.84	0.69	0	2	3	4	4
Ability to meet personal needs	21,713	2.1	1.08	0	0	2	4	4
Satisfied with conditions of living place	21,757	2.73	0.82	0	1	3	4	4
Panel B: Separate emotion score domains								
Calm/relaxed	21,773	0.75	0.43	0	0	1	1	1
Enjoyed	21,772	0.74	0.44	0	0	1	1	1
Smiled/laughed	21,760	0.43	0.49	0	0	0	1	1
Not worried	21,773	0.86	0.35	0	0	1	1	1
Not rushed	21,771	0.85	0.36	0	0	1	1	1
Not irritated/angry	21,772	0.89	0.31	0	0	1	1	1
Not depressed	21,771	0.91	0.28	0	0	1	1	1
Not tense/stressed	21,762	0.87	0.34	0	0	1	1	1
Not lonely	21,776	0.89	0.31	0	0	1	1	1
Not bored	21,772	0.88	0.33	0	0	1	1	1
Not sleepy	21,777	0.82	0.39	0	0	1	1	1
Panel C: Experienced utility								
Positive affects	21,783	2.73	1.10	0	0.7	2.78	4	4
Negative affects (reversed)	21,783	9.35	1.24	0	6.7	10	10	10

Notes: The entries are pooled averages across the five countries studied using population weights.

2.2.2 Measurement of pain

Objectively measuring pain is not an easy task as no device exist that can test the presence or severity of pain. Its "gold standard" measurement is a person's own assessment, unlike for many other health measures for which medical records are considered the gold standard. One useful definition of pain is that it is "whatever the experiencing person says it is, existing whenever he or she says it does" Boddice [2017, p. 45]. The International Association of the Study of Pain (IASP) formulation, which is effectively the official definition in biomedicine, describes pain as "an unpleasant sensory and emotional experience associated with, or resembling that associated with, actual or potential tissue damage" [Raja et al., 2020]. Various definitions, however, share the emphasis on the subjective components of pain over the role of underlying physical damage [Zajacova et al., 2021].

To assess pain profiles of older adult populations across our studied sample, we measure self-

reported pain based on individual's responses to three consecutive pain-related questions in the SAGE data:

Overall in the last 30 days,...

(a) *...how much of bodily aches or pains did you have?*

(b) *...how much bodily discomfort did you have?*

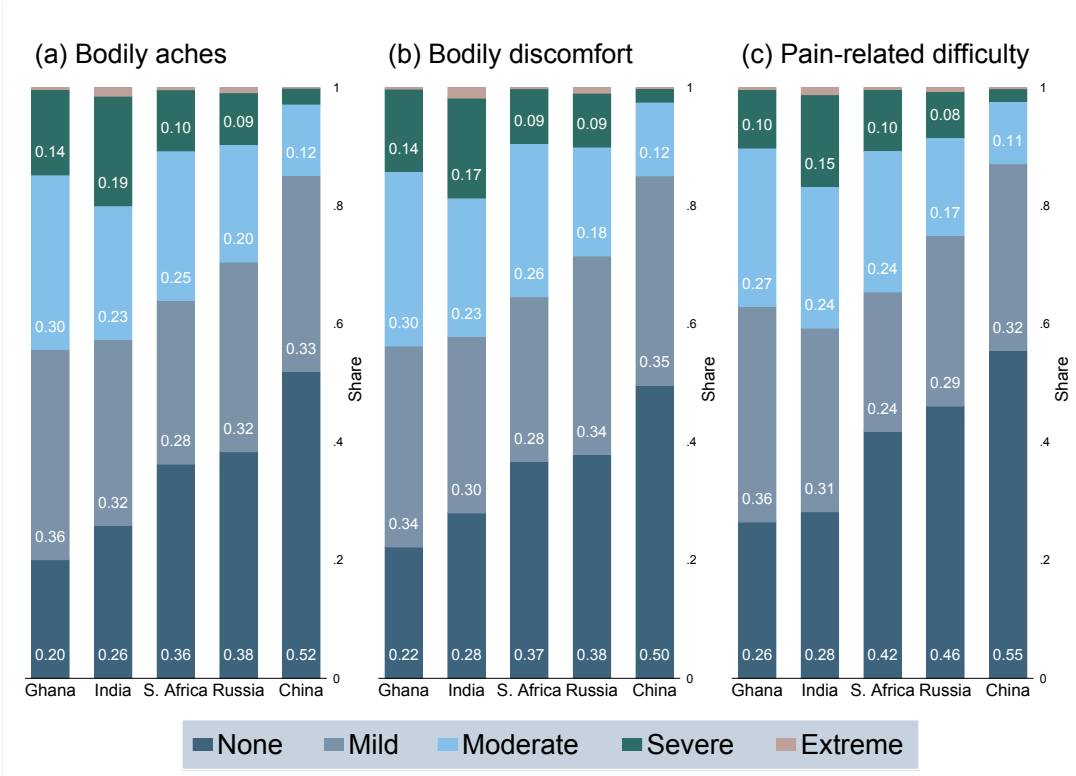
(c) *...how much difficulty did you have in your daily life because of your pain?*

Each of these three questions has five response categories: "none", "mild", "moderate", "severe", and "extreme", which we code to range from 0 (none) to 4 (extreme). Responses to the questions on pain therefore indicate the presence or absence of pain, as well as the severity of pain (conditional on having pain). Figure 2.1 plots the distribution of the three domains of pain in the studied population. The figure plots the fraction reporting each response category to the pain questions. We observe that, pain is widespread in the mature population across the five studied LMICs. In Ghana, 80% of respondents report having at least mild bodily aches or pains in the last 30 days, 78% report having at least mild bodily discomfort, and 74% report having at least mild pain-related challenges in doing activities of daily living. In India, the fraction of mature adults reporting at least mild bodily aches, discomfort, and pain-related difficulties in the last 30 days are 74%, 72%, and 72%, respectively. The corresponding fractions in South Africa (Russia) are 64% (62%), 63% (62%), and 58% (54%), respectively. It is only in China that at least 50% of the mature population do not report any form of pain or pain-related difficulties in doing activities of daily living. Indeed, the three domains of our pain measure are highly correlated with correlation between any pain-domain pair across the countries ranging from 0.81 to 0.93 (see Table 2.A1 in Appendix 2.A).

In our baseline analysis, we combine responses to the three pain-related questions to construct a single composite measure of pain, which ranges from 0 (no pain) to 12 (extreme pain). To obtain a binary measure of pain as typically done in practice to disaggregate the group differences in experienced utility into "saddening" and "time composition" effects, we classify people in the top 20% of each country's distribution of the composite pain measure based on the three domains of pain as "having pain" and compare them with the bottom 80% of the distribution in each country. The choice of the 20% cutoff point is mainly motivated by the distribution of the three pain domains in each studied country, in that the fraction of people reporting "severe" or "extreme" in any of the three domains of pain is on average 20.2% except in China where it is much lower. To check the robustness of our findings with regard to the choice of cutoff point, we re-estimate all of our models with less restrictive cutoff points (30% and 40%) for obtaining binary pain indicators. Rather than

using binary indicators for pain, we also use standardized values of the composite pain measure, and of the three separate pain domains to explore the robustness of our findings of association of pain with SWB.

Figure 2.1: Pain distribution among the older adult population



Notes: Sample weights applied. Observations: Ghana(3031), India (4839), South Africa(2032), Russia(2614), and China(9267).

2.2.3 Explanatory variables

To isolate the partial association of pain with the various dimensions of SWB and time use, we use an extensive set of control variables to account for factors that may be correlated with both pain and SWB. These factors include demographic and socioeconomic characteristics as well as other observed life circumstances that are commonly predictive of SWB among mature adults such as age, gender, marital or partnership status, household composition, minority status, place of residence, education, household income as well as indicators of social cohesion and whether a respondent was a victim of violent crime in the last 12 months.[10] We segment age into 10-year groups (50-59

[10]Our analyses use the same sets of control variables in all five countries except for ethnicity, which is not considered in China where the ethnic group "Han" represents 99% of the sample). Social cohesion indicators include trust in others, perceived safety of living environment, and community involvement such as attending public meetings, meeting with community leaders, attending religious services, among others.

years, 60-69 years, 70-79 years, and 80+ years). Income is measured by indicators of household permanent income based on an index for assets or wealth. In addition, we control for the presence of objective long-term health conditions, i.e. diagnosed chronic illnesses or injuries from road traffic accident. In the first set of specifications, we control only for the demographic and socioeconomic characteristics as well as the presence of objective health conditions described above. In the second set of specifications, we also control for functional limitations which we construct based on measures of individual's physical limitations to perform activities of daily living using 20 different items comprising bathing, eating, and mobility, among others.

Table 2.3 reports the socio-demographic distribution of the 21,783 respondents in our selected sample. The table contains the complete list of covariates included in our regression models. A typical respondent across the five countries is about 62 years old, with country-specific age averages ranging from 61.4 in India and South Africa to 64.2 in Ghana. About 52% of the sample are women and 75% are married or cohabiting. Fifty-six percent live in rural areas and about 10% are ethnic minorities with notable variations across countries—for example, while only 1% of older adults in China belong to minority ethnic groups, the corresponding share in Ghana is more than 51.6%. There are about 3 persons (including adults and children) in a typical household across the studied sample.

In terms of socioeconomic status, on average, about 42% of the respondents have less than primary education with only about 8% having college or university education. Of course there are wide variations across countries. For example, while about 64% of respondents from Ghana have less than primary education, only 2% of those from Russia have less than primary education. Around 43% of the sample are actively employed while only about 2% were victims of a violent crime in the past 12 months preceding the survey interview. Pointing to the social cohesion indicators, older adults in our sample on average have a good level of trust in others (scoring 8.6 out of a maximum score of 15), generally feel safe in their communities (scoring 7.1 out of 10) but tend to be moderately involved in their communities (scoring 16.5 out of 44). We also observe a notable degree of functional limitations in the mature adult population, with an average score of 34.6 out of 108. The prevalence of objective chronic health illnesses is lowest in depression (3%) and highest in hypertension and cataracts (28% each).

Table 2.3: Respondent socio-demographics

	Obs.	Mean	Std. dev.	Min	5th percentile	Median	95th percentile	Max
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Demographics								
Age (years)	21,783	62.34	9.31	50	51	60	80	114
50-59	21,783	0.47	0.50	0	0	0	1	1
60-69	21,783	0.30	0.46	0	0	0	1	1
70-79	21,783	0.18	0.38	0	0	0	1	1
80+	21,783	0.05	0.23	0	0	0	1	1
Female	21,783	0.52	0.50	0	0	1	1	1
Married/cohabiting	21,783	0.75	0.43	0	0	1	1	1
Rural	21,783	0.56	0.50	0	0	1	1	1
Ethnic minority	21,783	0.10	0.30	0	0	0	1	1
No. of adults	21,783	2.58	2.17	1	1	2	7	19
No. of kids	21,783	0.89	1.64	0	0	0	4	20
Household size	21,783	3.47	3.23	1	1	2	10	28
Socioeconomic status								
Education: Less than primary	21,783	0.42	0.49	0	0	0	1	1
Primary	21,783	0.16	0.36	0	0	0	1	1
Secondary	21,783	0.16	0.36	0	0	0	1	1
High school	21,783	0.19	0.39	0	0	0	1	1
$\geq$ College/university	21,783	0.08	0.26	0	0	0	1	1
Permanent income: Q1 (poorest 25%)	21,783	0.24	0.43	0	0	0	1	1
Q2 (second poorest 25%)	21,783	0.24	0.43	0	0	0	1	1
Q3 (second richest 25%)	21,783	0.25	0.43	0	0	0	1	1
Q4 (richest 25%)	21,783	0.26	0.44	0	0	0	1	1
Working	21,783	0.43	0.49	0	0	0	1	1
Violent crime victim	21,783	0.02	0.14	0	0	0	0	1
Social cohesion indicators								
Community involvement	21,783	16.52	4.74	9	10	16	25	44
Trust in others	21,783	8.62	2.39	3	4	9	12	15
Safety	21,783	7.14	2.00	2	3	8	10	10
Disability								
Functional limitations	21,783	34.61	14.26	5	22	29	64	108
Other objective long-term health conditions								
Arthritis	21,783	0.27	0.45	0	0	0	1	1
Stroke	21,783	0.04	0.20	0	0	0	0	1
Angina	21,783	0.16	0.36	0	0	0	1	1
Diabetes	21,783	0.07	0.25	0	0	0	1	1
Chronic lung disease	21,783	0.09	0.28	0	0	0	1	1
Asthma	21,783	0.09	0.28	0	0	0	1	1
Depression	21,783	0.03	0.17	0	0	0	0	1
Hypertension	21,783	0.28	0.45	0	0	0	1	1
Cataracts	21,783	0.28	0.45	0	0	0	1	1
Poor oral health	21,783	0.25	0.43	0	0	0	1	1
Injuries from traffic accident	21,783	0.08	0.27	0	0	0	1	1

Notes: The entries are pooled averages across the five countries studied using population weights. Sample is restricted to individuals with age 50 years or older. Income quartiles are country-specific and derived from an asset/wealth index. Community involvement represents individuals' participation in activities of their communities. Trust is a score based on questions about individuals' perceived trust in neighbors, colleagues and strangers. Safety is a score based on information about perceived safety at home and in the neighborhood.

2.3 ESTIMATION

Our main objective is to analyze the direct association of pain with the various dimensions of SWB. In addition, we take a deeper look into experienced utility and assess the relative importance of differences in activity-specific affective experiences (so-called "saddening" effects) and differences in time use (so-called "time composition" effects) between people with and without pain for corresponding group differences in experienced utility. We thus conduct separate analyses of the association of pain with experienced utility, activity-specific affective experiences and time use, which we later combine within the framework of a simple counterfactual thought experiment similar to Flores et al. [2015]. We do the estimation separately for each of the five countries to avoid potential issues of unobserved country-specific heterogeneity due to say, response category differential item functioning (DIF) across countries [G. King et al., 2004].[11] To the extent that we do not attempt to make explicit cross-country comparisons, the multi-country setting of SAGE has the important advantage of allowing us to check the consistency of our findings across varying cultural settings and levels of economic development. We thus interpret potential similarities in our findings across countries as evidence for robustness and consistency of our findings.

Before analyzing the association of pain with SWB and time use, we analyze the socio-demographic patterns and potential sources (or originating health conditions) of pain by estimating ordinary least squares (OLS) regression of the form:

$$\tilde{\text{Pain}}_i = \beta_0 + X_i'\Gamma_1 + H_i'\Pi_1 + \epsilon_i \tag{2.4}$$

where $\tilde{\text{Pain}}_i$ is standardized values of the composite pain measure as well as the separate pain domains, X_i is a vector of the socio-demographic characteristics reported in Table 2.3, and H_i is a vector of long-term health conditions and injuries reported in the same table.

Next, to tackle our main objective of analyzing the overall association of pain with SWB, we build upon previous literature [Carroll et al., 2009; Groot & Maassen van den Brink, 2004, 2006; McNamee & Mendolia, 2014] and assume an underlying indirect SWB function (SWB^*).[12] We assume that each dimension of SWB is a function of pain status P, underlying long-term objective health conditions other than pain H, and other observed individual characteristics X that include

[11] For example, countries may differ in their use of response categories, that is, in where along the general life satisfaction spectrum they locate thresholds between "very dissatisfied" and "dissatisfied", "neutral" and "satisfied", and so on. Several studies show evidence of differential use of response categories of subjective reporting across countries [see, e.g., Banks et al., 2007; Jürges, 2007; Zimmer et al., 2000].

[12] SWB^* represents each of the four dimensions of SWB—general life satisfaction, WHOQoL8, emotion score, and experienced utility.

permanent income:

$$SWB^* = SWB(P, H, X) \tag{2.5}$$

A major challenge for the indirect well-being function expressed in (2.5) is that of establishing causal effect of pain on SWB, given that people with pain may have unobserved characteristics that also affect their SWB and other outcomes. Furthermore, people with pain may be systematically different from those without pain, and reporting of pain might be affected by people's overall perceptions of their own lives and therefore by their own SWB. If these conditions hold, then linear regression analysis using OLS methods would generate results that may be best viewed as upper bound estimates of the effects. We cannot, in the SAGE data, perfectly address the problem of selection on unobservables. There is simply no quasi-experimental variation across our sample to exploit. Further, detecting an instrumental variable that is correlated with pain but uncorrelated with the error term in the SWB equation seems impossible.

Another challenge is that whenever the left-hand side variable of a regression equation is based on subjective reporting (SWB^*) and the main independent variable on the right-hand side is also subjective (P), analyses based on such regression equation may yield misleading results because possible measurement errors in the outcome variable SWB^* may be correlated with self-reported pain P. That is, there is a possibility that people who are more "well-being optimistic" may also be more "health-optimistic", implying that respondents may apply common rating styles for their SWB and pain reportings.[13]

We minimise the bias of the OLS estimates by doing the following. First, to correct for potential common self-rating behavior between SWB and pain, we use *anchoring vignettes* for health-state description as a form of control functions based on Cameron & Trivedi [2005, p. 37] and Wooldridge [2015]. Second, we refrain from interpreting our estimated coefficients as causal effects, but rather as association of pain with SWB.

Anchoring vignettes have been proposed as most promising for adjusting for response category DIF and establishing comparable response scales across groups [Murray et al., 2002]. Anchoring vignettes are brief texts depicting hypothetical individuals who manifest the trait of interest (e.g., health state) to a lesser or greater degree. Typically respondents rate several vignettes, representing varying levels of difficulties in different areas of the trait of interest. These ratings reveal what

[13]There is ample evidence of systematic differences in self-rating behavior, in particular differential use of subjective response categories between countries [Banks et al., 2007; Jürges, 2007; Zimmer et al., 2000] and within-country groups such as socioeconomic strata [Dowd & Zajacova, 2007], ethnicity [Menec et al., 2007; Shetterly et al., 1996], age [Groot, 2000], and gender [Barsky et al., 2001; Case & Paxson, 2005].

different groups mean by response categories such as "satisfied". Anchoring vignettes, in short, reveal response category DIF. In other words, vignettes can be used to estimate where on the latent spectrum groups locate the thresholds between response categories. These threshold differences can then be adjusted for statistically, allowing for valid inter-group comparisons of self-ratings, unbiased by DIF.[14] The primary measurement assumptions of the anchoring vignette method are response consistency and vignette equivalence [G. King et al., 2004].

The SAGE data contains four separate sets of vignettes for health state description with each set corresponding to only one of the four random allocations—morning, afternoon, evening, and entire day groups—for assessment of time use and affective experiences. Given that we base our analysis only on the morning, afternoon and evening allocations, we use only the three corresponding sets of vignettes in the analysis. Each individual questionnaire includes only one set of 10 vignettes, with the morning group answering *mobility and affect* vignettes, afternoon group answering *pain and personal relationships* vignettes, and the evening group answering *vision, sleep and energy* vignettes. Respondents rate each character in the vignettes on the same scale as their own self-rating, and think of the character as someone of the same age and background as them. To further encourage response consistency, vignette characters' sex and name were matched to respondents' sex and country-specific common names; and the question following each vignette exactly replicated the pain question's wording (for example, *[. . .] overall in the last 30 days, how much difficult did [character] have. . .*).

We therefore define each indirect SWB dimension as a linear function of pain P, objective health conditions other than pain H, and other individual characteristics X while using the vignettes responses as control functions to adjust for response category DIF (or common rating style between pain and SWB):

$$\tilde{SWB}_i^* = \beta_0 + \beta_1 \text{Pain}_i + H_i'\Lambda_1 + X_i'\Gamma_1 + V_i'\rho_1 + \eta_i \tag{2.6}$$

$$\tilde{u}_{ia}^* = \beta_0^u + \beta_{1a}^u \text{Pain}_i + H_i'\Lambda_{1a}^u + X_i'\Gamma_{1a}^u + V_i'\rho_{1a}^u + \eta_{ia}^u \tag{2.7}$$

where $\tilde{SWB_i}^*$ represents each of the four dimension of SWB (standardized at country level), $\tilde{u}_{ia}^*$ is each activity-specific net affects (standardized at country level using the mean and standard deviation of overall experienced utility), Pain_i is our binary measure of pain, H_i' is a vector of long-term objective health conditions other than pain, X_i' is a vector of socio-demographic characteristics, V_i' is a vector of the vignettes for health-state description, and η_i is an idiosyncratic individual error

[14] For detailed information about vignettes, see G. King et al. [2004]; G. King & Wand [2007]; Murray et al. [2002].

term, which is assumed to be normally distributed.[15] We estimate equations (2.6) and (2.7) by OLS using country-specific sample weights.[16] To facilitate comparability of effect sizes and ease of interpretation, all continuous measures are standardized to mean zero and standard deviation equal to 1 using country-specific mean and standard deviation such that estimated differences ought to be interpreted in country-specific standard deviation units of the respective outcome.

We proceed to analyze the two components of experienced utility: time use (τ_{ia}) and activity-specific net affects ($\tilde{u}_{ia}$) separately to study the mechanisms linking pain and experienced utility. To estimate the partial association of pain with time use, we use weighted multivariate fractional logit models that include the same set of controls in X_i' and H_i' as before. These models restrict estimated time shares to fall within the unit interval (i.e. $\tau_{ia} \in [0, 1]$) and impose that all time shares add up to one ($\sum_{a=1}^{5} \tau_{ia} = 1$). Following Mullahy [2015] and Flores et al. [2015], our models use a multinomial logit functional form:

$$\xi[\tau_a|X_i] = \frac{\exp\left(\alpha_a^\tau + \beta_a^\tau \text{Pain}_i + H_i'\Lambda_{1a}^\tau + X_i'\Gamma_{1a}^\tau\right)}{1 + \sum_{m=1}^{4} \exp\left(\alpha_m^\tau + \beta_m^\tau \text{Pain}_i + H_i'\Lambda_{1m}^\tau + X_i'\Gamma_{1m}^\tau\right)}, \quad \forall a = 1, \ldots, 4 \tag{2.8}$$

$$\xi[\tau_5|X_i] = \frac{1}{1 + \sum_{m=1}^{4} \exp\left(\alpha_m^\tau + \beta_m^\tau \text{Pain}_i + H_i'\Lambda_{1m}^\tau + X_i'\Gamma_{1m}^\tau\right)} \tag{2.9}$$

where the assumption $\alpha_5^\tau = \beta_5^\tau = \Lambda_5^\tau = \Gamma_5^\tau = 0$ is imposed to ensure identification [Cameron & Trivedi, 2005]. We estimate the models' parameters by using a quasi-maximum likelihood approach and compute standard errors using a bootstrap procedure with 250 repetitions to avoid problems of underdispersion.

To isolate the relative contributions of differences in time use and differences in activity-specific affective experiences for the overall differences in experienced utility between people with pain and those without pain, we combine the results from the above analyses (equations (2.7), (2.8) and (2.9)) within the framework of a simple counterfactual thought experiment following Flores et al. [2015]. Specifically, we estimate the contribution of differences in activity-specific affective experiences between people with pain and those without pain, the saddening effect Δ_U^{Affect}, as

$$\Delta_U^{Affect} = \sum_a \overline{\tau}_a \times \delta_a^{\tilde{u}} \tag{2.10}$$

[15] To explore the robustness of our findings, we also use standardized values of the continuous measures of pain (see Appendix 2.B for estimates of additional results and robustness checks).

[16] All regression estimates reported in this chapter use country-specific sample weights. The weighted estimates are closely comparable to the unweighted ones (not reported).

where $\overline{\tau}_a$ is the average proportion of time spent on activity group a in the overall sample from each country, and $\delta_a^{\tilde{u}}$ is the country-specific average partial effect of pain on the affect rating of activity group a, that is, $\delta_a^{\tilde{u}} = \partial \tilde{u}_a / \partial$Pain (equation (2.7)). The saddening effect in equation (2.10) describes differences in overall experienced utility by pain status, which are due to corresponding differences in activity-specific net affects alone, while fixing the allocation of time for all persons irrespective of their pain status at the country-specific overall population averages of time use ($\overline{\tau}_a$).

Similarly, to isolate the importance of time use for group differences in experienced utility between persons with pain and those without pain, we estimate time composition effects, Δ_U^{Time} as

$$\Delta_U^{Time} = \sum_a \overline{\tilde{u}}_a \times \delta_a^{\tau} \tag{2.11}$$

where $\overline{\tilde{u}}_a$ is the average net affect during activity group a in the overall country-specific samples, and δ_a^{τ} denotes the average partial association of pain on the proportion of time spent on activity group a, that is, $\delta_a^{\tau} = \partial \tau_a / \partial$Pain (equations (2.8) and (2.9)). The time composition effect thus fixes the activity-specific net affects for all persons irrespective of their pain status at the country-specific overall population averages of the activity-specific net affects ($\overline{\tilde{u}}_a$), and then isolates the impact of pain-related differences in time use on overall experienced utility.

While this counterfactual thought experiment is similar to standard econometric decomposition techniques such as Oaxaca-Blinder decompositions [Blinder, 1973; Oaxaca, 1973], it does not allow to exactly decompose the estimated group differences in experienced utility between persons with pain and those without pain due to the general dependence between time use and activity-specific net affects. Our counterfactual analyses are nonetheless useful, as they help to gauge the relative quantitative importance of the saddening and time composition effects within the framework of a straight-forward thought experiment.

2.4 Results

2.4.1 Association of individual characteristics with pain

Table 2.4 reports estimates of the association of individual characteristics with pain based on equation (2.4). Each column shows partial associations from OLS regression models using standardized values of our composite pain measure. Panel A presents the socio-demographic patterns of pain by country. Consistent with previous studies, our results show substantial socio-demographic gradient in the experience of pain among older people across the studied sample. There are important

gender differences in the experience of pain, with women reporting between 0.11 and 0.14 standard deviations more pain than men in China, Ghana, India, and Russia; whereas men report 0.11 standard deviations more pain than women in South Africa. Rural dwellers report more pain than their urban counterparts at least in China, Ghana, and India. Turning to labour market status, actively working individuals report less pain than those out of work. Experience of pain appears to rise linearly with age in all the countries except in South Africa. Pain prevalence is also lower among people with more economic resources or higher education, in particular among those with college or university education.

Turning to the associations of long-term health conditions with pain (Table 2.4 Panel B), the results show that living with arthritis, angina, and depression are consistently associated with more pain experience across all five countries. Hypertension, cataracts, poor oral health, and injuries from traffic accident are associated with more pain in at least four of the five countries. Stroke is associated with more pain experience only in China, Ghana and India. Diabetes and chronic lung disease are positively associated with pain only in India and Russia, whereas asthma is positively associated with pain only in China. Tables 2.B2-2.B4 in Appendix 2.B report results from ordered probit regression models using the three separate domains of our composite pain measure—bodily aches or pains, bodily discomfort, and pain-related difficulty in daily life. The ordered probit regression results are generally consistent with our baseline findings in Table 2.4.

Table 2.4: Association of individual characteristics with pain

Outcome: Pain—a composite measure of bodily aches, discomfort and pain-related difficulty (standardized) Model: OLS	China	Ghana	India	Russia	South Africa
Panel A: Socio-demographic characteristics					
Female	0.1095***	0.1373***	0.1365***	0.1149*	-0.1098*
	(0.027)	(0.045)	(0.046)	(0.062)	(0.065)
Married/cohabiting	0.0667**	0.0401	-0.1732**	0.0738	-0.1331**
	(0.033)	(0.049)	(0.079)	(0.060)	(0.065)
Rural	0.3603***	0.1473**	0.2042***	0.0422	0.0776
	(0.062)	(0.064)	(0.051)	(0.068)	(0.084)
Ethnic minority		-0.0554	0.0521	-0.0055	-0.1476**
		(0.050)	(0.059)	(0.066)	(0.071)
Household size (standardized)	-0.0099	0.0421**	0.0289	-0.1089***	0.0705**
	(0.013)	(0.021)	(0.019)	(0.021)	(0.033)
Working	-0.1164***	-0.2819***	-0.1725***	-0.1071	-0.2602***
	(0.033)	(0.049)	(0.039)	(0.069)	(0.072)
Violent crime victim	0.0597	-0.0634	-0.0008	-0.1932	0.0948
	(0.096)	(0.126)	(0.109)	(0.197)	(0.106)
Age group (reference is 50-59 yo)					
Age 60-69	-0.0246	0.1514***	0.0965**	0.1215*	-0.0248
	(0.028)	(0.045)	(0.045)	(0.064)	(0.073)
Age 70-79	0.0872**	0.2780***	0.1385**	0.2704***	0.1214
	(0.036)	(0.052)	(0.056)	(0.080)	(0.083)
Age 80+	0.1596**	0.3540***	0.3521***	0.4641***	0.1613
	(0.066)	(0.075)	(0.103)	(0.141)	(0.137)
Education level (reference is less than or completed primary)					
Secondary	-0.0662*	-0.0074	-0.0612	-0.0463	-0.0991
	(0.036)	(0.105)	(0.069)	(0.138)	(0.084)
High School	-0.0732**	-0.1383**	-0.0647	-0.2463*	-0.2627**
	(0.037)	(0.062)	(0.079)	(0.129)	(0.112)
College/university	-0.1529***	-0.1453	-0.3626***	-0.2935**	-0.2004**
	(0.043)	(0.096)	(0.069)	(0.135)	(0.095)
Permanent income quartiles (reference is bottom 25%)					
Q2: second poorest 25%	-0.0510	0.0236	-0.0942**	0.0114	-0.0412
	(0.050)	(0.053)	(0.047)	(0.092)	(0.098)
Q3: second richest 25%	-0.1128*	-0.0714	-0.0508	-0.1425	-0.1052
	(0.058)	(0.059)	(0.059)	(0.095)	(0.097)
Q4: richest 25%	-0.2884***	-0.1650**	-0.1897***	-0.0596	-0.1504
	(0.057)	(0.069)	(0.057)	(0.085)	(0.102)
Panel B: Objective chronic health conditions					
Arthritis	0.5982***	0.4591***	0.4113***	0.5501***	0.7381***
	(0.030)	(0.050)	(0.041)	(0.060)	(0.081)
Stroke	0.3939***	0.4839***	0.3328***	0.1115	0.0783
	(0.062)	(0.099)	(0.108)	(0.094)	(0.168)
Angina	0.3002***	0.2512***	0.3151***	0.1955***	0.2824**
	(0.054)	(0.067)	(0.051)	(0.056)	(0.132)
Diabetes	0.0790	0.0022	0.1416**	0.2480***	0.1355
	(0.052)	(0.107)	(0.068)	(0.068)	(0.089)
Chronic lung disease	-0.3331	-0.0110	0.2648**	0.7956***	0.1377
	(0.235)	(0.311)	(0.110)	(0.203)	(0.241)
Asthma	0.4922**	0.0429	0.1100	-0.4276**	0.0806
	(0.229)	(0.194)	(0.114)	(0.182)	(0.227)
Depression	0.4689**	0.2092*	0.2630***	0.4043**	0.2559*
	(0.192)	(0.112)	(0.072)	(0.163)	(0.153)
Hypertension	0.0685**	0.1389**	0.1446**	0.0340	0.2741***
	(0.029)	(0.069)	(0.068)	(0.045)	(0.083)

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	China	Ghana	India	Russia	South Africa
Panel B: Objective chronic health conditions					
Cataracts	0.1666***	0.3074***	0.1895***	0.3458***	0.0984
	(0.038)	(0.045)	(0.041)	(0.067)	(0.109)
Poor oral health	0.1929***	0.2004***	0.1582***	0.1739***	0.0748
	(0.031)	(0.061)	(0.045)	(0.065)	(0.094)
Injuries from traffic accident	0.2578***	0.1920**	0.3391***	0.3244***	0.2043
	(0.059)	(0.087)	(0.049)	(0.107)	(0.149)
N	9,267	3,031	4,839	2,614	2,032
R^2	0.207	0.223	0.266	0.418	0.286

Notes: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Sample weights are applied. The entries in each column are country-specific average partial association of socio-demographic characteristics and objective chronic health conditions with our baseline pain measure using OLS regression models. Estimates in each column are produced from a single regression using equation (2.4). Pain is a standardized composite measure combining responses to three pain-related questions (bodily aches or pains, bodily discomfort, and pain-related difficulty in daily life). Sample includes older adults with age 50 or older. Results from ordered probit regression models using the three separate domains of our pain pain measure are reported in Tables 2.B2-2.B4 in Appendix 2.B. Ethnic minority is not considered in China where the ethnic group "Han" represents 99% of the sample.

2.4.2 Pain, SWB and time use

Our main results for the association of pain with SWB and time use based on equations (2.6)-(2.9) are reported in Table 2.5. We present population weighted estimates of the partial association of pain experience with various dimensions of overall SWB (Panel A), activity-specific net affects (Panel B), and time use (Panel C) using the whole sample of older adults aged 50 or older across the five countries studied.[17] The regressions in the table control for a large set of socio-demographic characteristics and objective long-term health conditions other than pain as well as use anchoring vignettes to adjust for common self-rating style between pain and SWB (Panels A and B). The estimates in Panels A and B also include the F-statistic that all the vignette terms are jointly equal to zero (in square brackets).

Panel A of Table 2.5 shows that pain has a large, negative and significant association with both evaluative (general life satisfaction and WHOQoL8 index) and experienced (emotion score and experienced utility) well-being dimensions of older adults in all the countries in our sample. The results show that people with pain experience (those in the top 20% of the distribution of our composite pain measure) in the last 30 days prior to the survey report between 0.374 (India) and 0.485 (Russia) standard deviations lower general life satisfaction, between 0.487 (India) and 0.637 (South Africa) standard deviations lower WHO quality of life scores, and between 0.338 (South Africa) and 0.522 (India) standard deviations lower emotion scores. Turning to the well-being dimension of our main focus, experienced utility, our results show that people with pain report significantly

[17] The reported population weighted estimates are closely comparable to the unweighted ones (not reported).

lower levels of overall pleasure in doing activities of daily living. Specifically, pain is associated with between 0.096 (South Africa) and 0.218 (India) standard deviations lower experienced utility among older people in our sample.

Further looking at the association of pain with experienced utility based on its two components—activity-specific net affects (Panel B) and time use (Panel C), Panel B of Table 2.5 shows estimates of the partial associations of pain with each activity-specific net affects for each country. These estimates are based on the country- and activity-specific regressions of net affects on pain and all other observed individual characteristics as well as anchoring vignettes of equation (2.7). Regardless of the specific activity or country considered, our estimates of partial association of pain with activity-specific net affects are all negative. Holding other individual characteristics fixed, people with pain report on average worse affective experiences across all activity groups in all the countries. These negative partial associations of pain with activity-specific net affects are generally significant at conventional levels. The partial associations of pain with travel in China; work, housework, and travel in Ghana; work and travel in India; and housework and leisure in South Africa are the only exceptions. In most countries, the estimated partial associations of pain with activity-specific net affects are also fairly large, often above 0.10 standard deviations of the country-specific distributions of experienced utility.

The estimates in square brackets in Panels A and B are the F-statistics obtained from performing Wald tests on whether the coefficients of the control functions (the health-state vignettes) are simultaneously zero. The tests produce large F-statistic in each regression implying that the vignettes are jointly significant and useful to account for common self-rating style between SWB and pain.

To complement the results in Panels A and B of Table 2.5, we report in Table 2.6 the results for the eight separate domains of WHOQoL8 (Panel A), the 11 separate domains of emotion score (Panel B), and the positive and negative components of the experienced utility measure (Panel C). Using the detailed domains of well-being yield similar results for adjusted differences in SWB as reported in Table 2.5.

Panel C of Table 2.5 reports corresponding estimates for the partial associations of pain with time shares spent in different activities based on country-specific multivariate fractional logit models for time use (equations (2.8) and (2.9)). Since the time shares pertain to mutually exclusive and exhaustive sets of non-sleep activities, all country-specific average partial associations naturally sum to zero. Controlling for demographic and socioeconomic characteristics including objective health status, people with pain spend significantly less time on work. The partial association of

pain with time share for work ranges from -2.2 percentage points in China to -8 percentage points in South Africa. The partial association of pain with time shares for housework and travel are also negative, implying that people with pain experience tend to spend less time on housework or travel although the coefficient for housework is only significantly in China, Ghana, and South Africa, and that for travel significant only in Russia. Compensating for the negative partial associations of pain with time spent on work, housework and travel, we find positive and statistically significant partial associations of pain experience with time spent on leisure activities in all the countries. Our estimates show that people in the top 20% of the distribution of our pain measure spend on average between 3.7 (China) and 9.2 (South Africa) percentage points more time shares on leisure activities than those in the bottom 80% of the pain distribution. Similarly, we also find mostly positive partial association of pain with time spent on self-care but this association is only statistically significant only in India and South Africa.

Table 2.7 reports the results from our counterfactual thought experiment aimed at showing the relative importance of differences in activity-specific net affects keeping time allocation fixed for all persons (saddening effects) and differences in time use keeping activity-specific net affects fixed for all persons (time composition effects) for the previously reported overall differences in experienced utility by pain status. The first row of Panel A, repeats the partial association of pain with overall experienced utility reported in Table 2.5. The second row of Panel A presents estimates of the total saddening effect. The total saddening effect captures the implied differences in experienced utility between persons living with pain and those without pain if the two groups only differ in their activity-specific net affects, fixing time use at the overall average time shares observed in each country. Finally, the third row of Panel A shows estimates of the total time composition effect. The time composition effect isolates the implied differences in experienced utility between persons living with pain and those without pain if the two groups only differ in their time use, fixing activity-specific net affects at their overall averages within each country.

Our estimate of total saddening effect in each country is negative and statistically significant at conventional levels, ranging from -0.099 standard deviations in Ghana to -0.208 standard deviations in India. In all the countries, the total saddening effects are comparable in magnitude to the overall partial association of pain with experienced utility. The observed differences in activity-specific net affects alone thus imply a gap in experienced utility between persons with and those without pain similar to the one observed in Table 2.5. On the contrary, the estimated total time composition effect—operating through differences in time use by pain status—suggests only small compensating effect. Thus, isolating the pure contribution of differences in time use to the overall

differences in experienced utility between people with pain and those without pain yields small positive, but statistically significant time composition effect, ranging from 0.018 standard deviations in South Africa to 0.060 standard deviations in Russia. While the time composition effects generally provide a small advantage in the experienced utility of persons living with pain relative to those without pain, the corresponding effect sizes are relatively small. These effect sizes amount to only 10-30% of the total saddening effects that work against persons living with pain. This finding implies that though people living with pain spend significantly more time on leisure activities, this time use advantage does not provide enough buffer against the negative association of their pain with their experienced utility.

Panels B and C of Table 2.7 provide disaggregated estimates of the relative importance of pain-related differences in activity-specific net affects and time use for each of the five activity groups. Reflecting the general pattern of the estimated partial associations of pain with activity-specific net affects, Panel B shows that all the activity groups contribute to the negative total saddening effect. Panel C in turn provides a similarly detailed disaggregation of the time composition effects, which are mostly positive and statistically significant with notable exceptions.

Tables 2.B5-2.B8 in Appendix 2.B provide robustness checks for our benchmark results by re-estimating the models in Tables 2.5 and 2.7 for our alternative cutoff points for defining pain status of 30% and 40%, respectively. Using these broader cutoffs for defining pain status produce similar estimates for adjusted differences in overall evaluative and experienced well-being, activity-specific net affects, and time use between people with pain and those without pain (Tables 2.B5 and 2.B6). Reflecting the comparable estimates of the partial association of pain with the two components of experienced utility, our counterfactual exercise aimed at isolating saddening and time composition effects also yields similar results as our benchmark results (Tables 2.B7 and 2.B8).

As additional robustness checks, we also use standardized values of our composite pain measure as well as of the separate pain domains to explore the robustness of our findings of association of pain with SWB instead of using cutoff points to define pain status. The specification with standardized pain measures, corresponding to the estimates reported in Tables 2.B9-2.B12 in Appendix 2.B, also produce similar results as our benchmark analyses.

An important concern is that in responding to the anchoring vignettes questions, respondents who suffer from pain may not be able rate the characters in the vignettes on the same scale as their own self-rating and may not think of the characters as people of the same life experience as them if the vignettes are not about pain experience. To examine this, in Tables 2.B13 -2.B18 in Appendix 2.B, we restrict the analysis to the afternoon group of the abbreviated version of DRM that respond

only to pain and personal relationships vignettes. This restriction reduces the sample size to just 32.8% of our baseline sample (from 21,783 to 7,136 observations). The results in Tables 2.B13 -2.B18 are reassuring: the specifications with the restricted sample generally produce results of similar pattern as our benchmark results, even conditional on responding to pain-related vignettes only.

Table 2.5: Partial association of pain (composite measure with all 3 pain domains—top 20%) with well-being and time use

	China	Ghana	India	Russia	South Africa
Panel A: Aggregate well-being dimensions					
General life satisfaction	-0.394***	-0.451***	-0.374***	-0.485***	-0.403***
	[413.0]	[33.4]	[4.7]	[8.7]	[41.0]
WHOQoL8 index	-0.563***	-0.568***	-0.487***	-0.611***	-0.637***
	[335.9]	[20.7]	[6.5]	[6.7]	[43.5]
Emotion score	-0.490***	-0.343***	-0.522***	-0.374***	-0.338***
	[162.8]	[18.0]	[5.4]	[12.2]	[35.1]
Experienced utility	-0.204***	-0.109**	-0.218***	-0.189***	-0.096**
	[229.2]	[44.1]	[11.4]	[11.0]	[7.4]
Panel B: Activity-specific net affects					
Work	-0.248***	-0.139	-0.080	-0.123*	-0.067**
	[69.3]	[313.2]	[3.2]	[4604.2]	[>3100]
Housework	-0.298***	-0.105	-0.239***	-0.264**	-0.116
	[212.2]	[11.9]	[10.3]	[663.6]	[2678.8]
Travel	-0.101	-0.060	-0.149	-0.812**	-0.392**
	[43.0]	[21.7]	[3.2]	[177.9]	[66984.8]
Leisure	-0.145***	-0.121***	-0.241***	-0.139***	-0.093
	[164.1]	[20.3]	[11.3]	[39.5]	[26.8]
Self-care	-0.181***	-0.002***	-0.211***	-0.143***	-0.151***
	[81.4]	[25.1]	[10.6]	[123.7]	[32.0]
Panel C: Time use					
Work	-0.022***	-0.038**	-0.056***	-0.078***	-0.080***
Housework	-0.015**	-0.004*	-0.010	-0.002	-0.034**
Travel	0.000	-0.003	-0.005	-0.005*	0.004
Leisure	0.037***	0.047***	0.040**	0.075***	0.092***
Self-care	0.000	-0.002	0.030***	0.009	0.018**
N	9,267	3,031	4,839	2,614	2,032
Socio-demographic controls	YES	YES	YES	YES	YES
Chronic ill-health controls	YES	YES	YES	YES	YES
Health-state vignettes	YES	YES	YES	YES	YES

Notes: *** p<0.01, ** p<0.05, * p<0.1. Standard errors are computed using 250 bootstrap replications. Sample weights applied. *F*-statistic that all vignette terms are jointly equal to zero are in square brackets in Panels A and B. The entries in each column are country-specific average partial effects of pain (composite measure with all 3 pain domains—top 20%) on Aggregate dimensions of SWB (Panel A), activity-specific net affects (Panel B), and time use (Panel C). Average partial effects are estimated based on a linear regression (equation (2.6) in Panel A and equation (2.7) Panel B) or multivariate fractional estimators (equations (2.8) and (2.9) in Panel C). All well-being and net affects measures are standardized to mean zero and standard deviation equal to 1 using country-specific mean and standard deviation. All regressions control for a large set of socio-demographic characteristics including age dummies, gender, marital status, area of residence, ethnic minority status (except in China), household size, violent crime victim status, education, permanent income, social cohesion indicators, and long-term health conditions (angina, arthritis, asthma, cataracts, chronic lung disease, depression, diabetes, hypertension, injuries from traffic accident, poor oral health, and stroke). In addition, each regression in Panels A and B adjusts for anchoring vignettes for health-state description. The regression models for activity-specific net affects (Panel B) use lower number of observations than reported in the table. Sample includes older adults with age 50 or older.

Table 2.6: Partial association of pain (composite measure with all 3 pain domains—top 20%) with the separate domains of WHOQoL8, emotion score and experienced utility

	China	Ghana	India	Russia	South Africa
Panel A: Separate WHOQoL8 domains					
Satisfied with overall quality of life	-0.363***	-0.331***	-0.276***	-0.308***	-0.521***
	[89.6]	[25.3]	[15.0]	[7.3]	[32.2]
Satisfied with health	-0.628***	-0.618***	-0.593***	-0.654***	-0.688***
	[369.8]	[42.0]	[6.7]	[6.5]	[109.3]
Has enough energy for everyday life	-0.430***	-0.490***	-0.347***	-0.439***	-0.573***
	[142.9]	[17.5]	[8.7]	[24.2]	[60.6]
Satisfied with ADL	-0.440***	-0.516***	-0.490***	-0.685***	-0.672***
	[415.3]	[18.5]	[9.8]	[24.2]	[64.4]
Satisfied with ownself	-0.410***	-0.486***	-0.467***	-0.545***	-0.468***
	[752.0]	[45.6]	[13.6]	[10.6]	[25.5]
Satisfied with personal relationships	-0.232***	-0.353***	-0.276***	-0.257***	-0.403***
	[632.8]	[22.7]	[12.8]	[10.2]	[45.8]
Ability to meet personal needs	-0.357***	-0.150*	-0.159***	-0.288***	-0.230***
	[128.5]	[27.5]	[18.9]	[18.0]	[18.1]
Satisfied with conditions of living place	-0.264***	-0.388***	-0.126***	-0.188***	-0.153***
	[66.3]	[27.7]	[6.0]	[6.5]	[39.5]
Panel B: Separate emotion score domains					
Calm/relaxed	-0.063***	-0.044***	-0.105***	-0.004*	-0.030
	[190.6]	[13.4]	[8.5]	[23.9]	[24.5]
Enjoyed	-0.058***	-0.065***	-0.124***	-0.018	-0.031
	[70.3]	[17.4]	[9.1]	[26.3]	[19.0]
Smiled/laughed	-0.073***	-0.008	-0.062**	0.028	-0.075***
	[241.1]	[51.6]	[7.1]	[4.8]	[19.8]
Not worried	-0.075***	-0.067***	-0.127***	-0.090***	-0.057***
	[212.6]	[1.7]	[7.1]	[6.3]	[14.7]
Not rushed	-0.035***	-0.009	-0.043***	-0.066***	-0.007
	[100.2]	[209.0]	[15.5]	[7.1]	[28.8]
Not irritated/angry	-0.062***	-0.009*	-0.094***	-0.004	-0.007
	[1.8]	[1.5]	[21.0]	[12.8]	[48.2]
Not depressed	-0.048***	-0.047***	-0.094***	-0.075***	-0.048***
	[1.1]	[1.1]	[32.4]	[20.2]	[1.0]
Not tense/stressed	-0.030***	-0.055***	-0.091***	-0.063***	-0.030**
	[59.6]	[22.6]	[7.8]	[13.2]	[22.0]
Not lonely	-0.044***	0.007	-0.086***	-0.075***	-0.029*
	[665.4]	[59.8]	[11.7]	[7.3]	[16.2]
Not bored	-0.061***	-0.050***	-0.098***	-0.067***	-0.034*
	[686.6]	[22.2]	[8.6]	[7.3]	[19.37]
Not sleepy	-0.083***	-0.063**	-0.099***	-0.101***	-0.043
	[157.3]	[2.6]	[13.2]	[18.1]	[65.97]

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	China	Ghana	India	Russia	South Africa
Panel C: Experienced utility					
Positive affects	-0.131***	-0.067*	-0.093**	-0.028	-0.178***
	[207.9]	[42.3]	[12.4]	[39.0]	[21.1]
Negative affects (reversed)	-0.219***	-0.118**	-0.244***	-0.261***	-0.033
	[404.3]	[62.9]	[8.3]	[39.5]	[2.8]
Socio-demographic controls	YES	YES	YES	YES	YES
Chronic ill-health controls	YES	YES	YES	YES	YES
Health-state vignettes	YES	YES	YES	YES	YES

Notes: *** p<0.01, ** p<0.05, * p<0.1. Standard errors are computed using 250 bootstrap replications. Sample weights applied. *F*-statistic that all vignette terms are jointly equal to zero are in square brackets. The entries in each column are country-specific average partial effects of pain (composite measure with all 3 pain domains—top 20%) on the separate domains of WHOQoL8 (Panel A), emotion score (Panel B), and experienced utility (Panel C). Average partial effects are estimated based on a linear regression (equation (2.6). SWB measures in Panels A and C are standardized to mean zero and standard deviation equal to 1 using country-specific mean and standard deviation, whiles those in Panel B are binary responses. All regressions control for a large set of socio-demographic characteristics including age dummies, gender, marital status, area of residence, ethnic minority status (except in China), household size, violent crime victim status, education, permanent income, social cohesion indicators, and long-term health conditions (angina, arthritis, asthma, cataracts, chronic lung disease, depression, diabetes, hypertension, injuries from traffic accident, poor oral health, and stroke). In addition, each regression adjusts for anchoring vignettes for health-state description.

Table 2.7: Partial saddening and time composition effects of pain (composite measure with all 3 pain domains—top 20%) on experienced utility

	China	Ghana	India	Russia	South Africa
Panel A: Difference in experienced utility and its components					
Difference	-0.204***	-0.109**	-0.218***	-0.189***	-0.096**
Saddening effect	-0.195***	-0.099***	-0.208***	-0.203***	-0.122***
Time composition effect	0.021*	0.020***	0.031***	0.060***	0.018*
Additive decomposition of experienced utility components across activity groups					
Panel B: Saddening effect					
Work	-0.041***	-0.028	-0.010	-0.025*	-0.007**
Housework	-0.059***	-0.013	-0.047***	-0.070**	-0.023
Travel	-0.003	-0.004	-0.010	-0.041**	-0.021**
Leisure	-0.072***	-0.054***	-0.103***	-0.054***	-0.040
Self-care	-0.020***	0.000**	-0.038***	-0.014***	-0.031***
Panel C: Time composition effect					
Work	0.012***	0.010***	0.017***	0.031***	-0.002**
Housework	0.003**	0.000	0.001	0.000	-0.003**
Travel	0.000	0.001	0.000	0.001**	0.000
Leisure	0.006***	0.010***	0.007**	0.024***	0.019***
Self-care	0.000	0.000	0.006***	0.004	0.004**
N	9,267	3,031	4,839	2,614	2,032
Socio-demographic controls	YES	YES	YES	YES	YES
Chronic ill-health controls	YES	YES	YES	YES	YES
Health-state vignettes	YES	YES	YES	YES	YES

Notes: *** p<0.01, ** p<0.05, * p<0.1. Standard errors are computed using 250 bootstrap replications. Sample weights applied. The entries in each column are country-specific average partial saddening and time composition effects of pain (composite measure with all 3 pain domains—top 20%) on experienced utility. Experienced utility and net affects measures are standardized to mean zero and standard deviation equal to 1 using country-specific mean and standard deviation. Each component of the saddening effect is computed using equation (2.10) and each component of the time composition effect is computed using equation (2.11). The first row of Panel A (Total difference) repeats the pain coefficients for experienced utility in Table 2.5.

2.4.3 Functional limitations as a mediating mechanism between pain and experienced utility

We test whether functional limitations serve as a mediating mechanism that connects SWB with pain status. We reason that pain is associated with SWB partly because it threatens functional limitations and functional limitations in turn affect people's well-being. People with pain experience tend to report high levels of functional limitations. Specifically, across our study sample, a one-standard deviation increase in our composite pain measure is associated with 0.45 (China) to 0.54 (South Africa) standard deviations increase in our functional limitations measure holding constant observed socio-demographic characteristics, objective ill-health conditions other than pain and responses to the anchoring vignettes (Table 2.8).

To test for functional limitations as a mediating mechanism, we allow for a direct effect of func-

tional limitations on the various dimensions of SWB. We posit that pain can have an indirect effect on SWB through functional limitations. Thus, we include functional limitations as an additional covariate in equations (2.6)-(2.9) while keeping pain and other objective health conditions in the same regressions. An argument for this is that SWB may respond to pain and functional limitations in different ways.

Estimation results for this test are presented in Tables 2.9 and 2.11. We define pain status using the top 20% of the distribution of our composite pain measure as the cutoff point, similar to our benchmark estimations in Tables 2.5 and 2.7. The results in Tables 2.9 and 2.11 show that, even conditional on functional limitations, pain remains significantly and substantially negatively associated with general life satisfaction, WHOQoL8, and emotion score across all the countries in our study. However, the partial associations of pain with experienced utility and activity-specific net affects appear to be mediated through changes in functional limitations. Specifically, pain loses its predictive power in predicting experienced utility in three of the five countries (Ghana, India and South Africa), in terms of the overall effect (Table 2.9) and where it is significant (China and Russia), the effect size is attenuated. In terms of the saddening effect, although pain retains its predictive in all countries but India, the effect size is diminished by the introduction of functional limitations (Table 2.11). Replicating analysis for Panel A of Table 2.9 by using the detailed domains of WHOQoL8, emotion scores, and the positive and negative components of the experienced utility measure yield same conclusions (Table 2.10). These results indicate that although pain is substantially associated with other dimensions of SWB, its association with affective experiences largely work through functional limitations. Specifications with broader definitions of pain status (using 30% and 40% cutoff points, respectively) show similar results (see Tables 2.B19- 2.B22 in Appendix 2.B).

Table 2.8: Partial association of pain (standardized composite measure with all 3 pain domains) with standardized functional limitations

	China	Ghana	India	Russia	South Africa
Pain (standardized)	0.4541***	0.4636***	0.4887***	0.4932***	0.5449***
	(0.021)	(0.020)	(0.017)	(0.029)	(0.024)
F-statistic that all vignette terms are jointly equal to zero	[241.3]	[7.2]	[12.9]	[13.6]	[104.5]
Socio-demographic controls	YES	YES	YES	YES	YES
Chronic ill-health controls	YES	YES	YES	YES	YES
Health-state vignettes	YES	YES	YES	YES	YES
N	9,267	3,031	4,839	2,614	2,032
R^2	0.483	0.625	0.598	0.734	0.722

Notes: *** p<0.01, ** p<0.05, * p<0.1. Sample weights applied. F-statistic that all vignette terms are jointly equal to zero are in square brackets. The entries in each column are country-specific average partial effects of pain (standardized composite measure with all 3 pain domains) on standardized functional limitations. All regressions control for a large set of socio-demographic characteristics including age dummies, gender, marital status, area of residence, ethnic minority status (except in China), household size, violent crime victim status, education, permanent income, social cohesion indicators, and long-term health conditions (angina, arthritis, asthma, cataracts, chronic lung disease, depression, diabetes, hypertension, injuries from traffic accident, poor oral health, and stroke). In addition, each regression adjusts for anchoring vignettes for health-state description. Sample includes older adults with age 50 or older.

Table 2.9: Partial association of pain (composite measure with all 3 pain domains—top 20%) with well-being and time use—adjusted for functional limitations

	China	Ghana	India	Russia	South Africa
Panel A: Aggregate well-being dimensions					
General life satisfaction	-0.196***	-0.214***	-0.095**	-0.247***	-0.103***
	[203.5]	[32.8]	[5.7]	[10.6]	[33.3]
WHOQoL8 index	-0.288***	-0.271***	-0.106***	-0.293***	-0.258***
	[189.5]	[19.8]	[7.8]	[8.2]	[46.9]
Emotion score	-0.349***	-0.297***	-0.264***	-0.167**	-0.236***
	[97.4]	[17.6]	[5.9]	[11.1]	[22.9]
Experienced utility	-0.148***	-0.052	-0.030	-0.052***	-0.006
	[115.2]	[44.5]	[12.2]	[10.3]	[5.7]
Panel B: Activity-specific net affects					
Work	-0.212***	-0.044	0.101	0.103	-0.124**
	[67.6]	[9618.8]	[2.9]	[179.6]	[>11000]
Housework	-0.212***	-0.083	-0.043	-0.087	-0.035
	[75.1]	[11.5]	[10.6]	[314.7]	[694.7]
Travel	-0.126	-0.005	0.004**	-0.475	-0.250*
	[59.1]	[18.8]	[3.3]	[16254.1]	[9866.1]
Leisure	-0.060	-0.052*	-0.060	0.059	-0.007
	[117.6]	[18.4]	[11.8]	[35.9]	[24.8]
Self-care	-0.128***	0.025	0.021	0.013**	-0.074**
	[63.3]	[23.3]	[14.3]	[1455.2]	[30.9]
Panel C: Time use					
Work	0.004***	-0.032***	-0.021	-0.031	-0.069***
Housework	0.002	0.005	0.003	0.017	-0.011
Travel	-0.001*	0.003**	0.000	0.006	0.016**
Leisure	0.000*	0.028**	0.009	0.012	0.062**
Self-care	-0.005***	-0.003	0.010***	-0.004	0.002
N	9,267	3,031	4,839	2,614	2,032
Socio-demographic controls	YES	YES	YES	YES	YES
Chronic ill-health controls	YES	YES	YES	YES	YES
Health-state vignettes	YES	YES	YES	YES	YES
Functional limitations adjusted	YES	YES	YES	YES	YES

Notes: *** p<0.01, ** p<0.05, * p<0.1. Standard errors are computed using 250 bootstrap replications. Sample weights applied. *F*-statistic that all vignette terms are jointly equal to zero are in square brackets in Panels A and B. The entries in each column are country-specific average partial effects of pain (composite measure with all 3 pain domains—top 20%) on Aggregate dimensions of SWB (Panel A), activity-specific net affects (Panel B), and time use (Panel C) adjusting for functional limitations. Average partial effects are estimated based on a linear regression (equation (2.6) in Panel A and equation (2.7) Panel B) or multivariate fractional estimators (equations (2.8) and (2.9) in Panel C). All well-being and net affects measures are standardized to mean zero and standard deviation equal to 1 using country-specific mean and standard deviation. All regressions control for a large set of socio-demographic characteristics including age dummies, gender, marital status, area of residence, ethnic minority status (except in China), household size, violent crime victim status, education, permanent income, social cohesion indicators, and long-term health conditions (angina, arthritis, asthma, cataracts, chronic lung disease, depression, diabetes, hypertension, injuries from traffic accident, poor oral health, and stroke). In addition, each regression in Panels A and B adjusts for anchoring vignettes for health-state description. The regression models for activity-specific net affects (Panel B) use lower number of observations than reported in the table. Sample includes older adults with age 50 or older.

Table 2.10: Partial association of pain (composite measure with all 3 pain domains—top 20%) with the separate domains of WHOQoL8, emotion score and experienced utility—adjusted for functional limitations

	China	Ghana	India	Russia	South Africa
Panel A: Separate WHOQoL8 domains					
Satisfied with overall quality of life	-0.215***	-0.071**	-0.089*	-0.148***	-0.229**
	[90.4]	[27.1]	[15.4]	[7.2]	[33.1]
Satisfied with health	-0.398***	-0.336***	-0.234***	-0.340***	-0.364***
	[197.6]	[40.4]	[7.2]	[8.6]	[72.3]
Has enough energy for everyday life	-0.137**	-0.212***	-0.017	-0.111	-0.166*
	[142.5]	[18.4]	[6.6]	[27.2]	[57.6]
Satisfied with ADL	-0.138*	-0.222***	-0.133***	-0.221***	-0.224***
	[153.0]	[19.7]	[11.1]	[27.3]	[66.6]
Satisfied with ownself	-0.174***	-0.212***	-0.156**	-0.287***	-0.186***
	[295.7]	[48.1]	[14.5]	[8.6]	[25.2]
Satisfied with personal relationships	-0.059	-0.136**	-0.065	-0.024	-0.179*
	[260.2]	[24.0]	[13.3]	[10.2]	[23.5]
Ability to meet personal needs	-0.179***	-0.098	0.016*	-0.252***	-0.101
	[80.6]	[25.8]	[18.5]	[17.0]	[17.3]
Satisfied with conditions of living place	-0.185***	-0.229***	0.017	-0.127	0.002
	[56.3]	[25.4]	[5.8]	[6.1]	[47.9]
Panel B: Separate emotion score domains					
Calm/relaxed	-0.048***	-0.037***	-0.056	0.006*	-0.018
	[153.5]	[11.1]	[8.7]	[23.5]	[14.0]
Enjoyed	-0.029*	-0.068***	-0.084***	0.022	-0.022
	[47.5]	[16.9]	[9.3]	[25.5]	[13.5]
Smiled/laughed	-0.048***	-0.001*	-0.006	0.080**	-0.072***
	[231.1]	[51.0]	[6.6]	[4.8]	[16.1]
Not worried	-0.049***	-0.055***	-0.054	-0.058***	-0.038***
	[75.5]	[1.7]	[7.8]	[7.2]	[15.0]
Not rushed	-0.033***	-0.017**	-0.034**	-0.063***	0.001
	[54.8]	[177.0]	[15.2]	[7.0]	[26.5]
Not irritated/angry	-0.039***	-0.002*	-0.041**	-0.006**	0.014
	[1.8]	[1.5]	[22.4]	[12.4]	[41.6]
Not depressed	-0.031**	-0.026**	-0.025	-0.038***	-0.025
	[1.2]	[1.1]	[24.1]	[21.7]	[1.0]
Not tense/stressed	-0.021***	-0.050***	-0.045*	-0.033***	0.007
	[57.0]	[18.7]	[7.9]	[10.9]	[21.3]
Not lonely	-0.022**	0.002	-0.028	-0.033***	-0.017
	[484.0]	[59.9]	[11.8]	[5.1]	[17.2]
Not bored	-0.035***	-0.029***	-0.034	-0.014*	-0.009
	[443.8]	[20.4]	[7.6]	[6.0]	[18.6]
Not sleepy	-0.060***	-0.069**	-0.048	-0.050***	-0.001
	[89.6]	[2.6]	[13.2]	[18.3]	[119.6]

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	China	Ghana	India	Russia	South Africa
Panel C: Experienced utility					
Positive net affects	-0.112***	-0.007	0.021	0.069	-0.054
	[167.4]	[42.1]	[12.6]	[43.44]	[19.5]
Negative net affects (reversed)	-0.133*	-0.075	-0.058	-0.128***	0.023
	[426.6]	[59.2]	[8.7]	[6.2]	[2.7]
Socio-demographic controls	YES	YES	YES	YES	YES
Chronic ill-health controls	YES	YES	YES	YES	YES
Health-state vignettes	YES	YES	YES	YES	YES

Notes: *** p<0.01, ** p<0.05, * p<0.1. Standard errors are computed using 250 bootstrap replications. Sample weights applied. F-statistic that all vignette terms are jointly equal to zero are in square brackets. The entries in each column are country-specific average partial effects of pain (composite measure with all 3 pain domains—top 20%) on the separate domains of WHOQoL8 (Panel A), emotion score (Panel B), and experienced utility (Panel C) adjusting for functional limitations. Average partial effects are estimated based on a linear regression (equation (2.6). SWB measures in Panels A and C are standardized to mean zero and standard deviation equal to 1 using country-specific mean and standard deviation, whiles those in Panel B are binary responses. All regressions control for a large set of socio-demographic characteristics including age dummies, gender, marital status, area of residence, ethnic minority status (except in China), household size, violent crime victim status, education, permanent income, social cohesion indicators, and long-term health conditions (angina, arthritis, asthma, cataracts, chronic lung disease, depression, diabetes, hypertension, injuries from traffic accident, poor oral health, and stroke). In addition, each regression adjusts for anchoring vignettes for health-state description.

Table 2.11: Partial saddening and time composition effects of pain (composite measure with all 3 pain domains—top 20%) on experienced utility—adjusted for functional limitations

	China	Ghana	India	Russia	South Africa
Panel A: Difference in experienced utility and its components					
Difference	-0.148***	-0.052	-0.030	-0.052***	-0.006
Saddening effect	-0.125***	-0.039*	-0.017	-0.002*	-0.052**
Time composition effect	-0.003***	0.013**	0.010	0.011	0.011
Additive decomposition of experienced utility components across activity groups					
Panel B: Saddening effect					
Work	-0.035***	-0.009	0.013	0.021	-0.013**
Housework	-0.042***	-0.010	-0.009	-0.023	-0.007
Travel	-0.004	0.000	0.000**	-0.024	-0.014*
Leisure	-0.030	-0.023*	-0.026	0.023	-0.003
Self-care	-0.014***	0.004	0.004	0.001**	-0.015*
Panel C: Time composition effect					
Work	-0.002***	0.009***	0.007	0.012	-0.001***
Housework	0.000	0.000	0.000	-0.002	-0.001
Travel	0.000**	-0.001**	0.000	-0.002	0.001
Leisure	0.000*	0.006**	0.002	0.004	0.013*
Self-care	0.000***	-0.001	0.002***	-0.002	0.000
N	9,267	3,031	4,839	2,614	2,032
Socio-demographic controls	YES	YES	YES	YES	YES
Chronic ill-health controls	YES	YES	YES	YES	YES
Health-state vignettes	YES	YES	YES	YES	YES
Functional limitations adjusted	YES	YES	YES	YES	YES

Notes: *** p<0.01, ** p<0.05, * p<0.1. Standard errors are computed using 250 bootstrap replications. Sample weights applied. The entries in each column are country-specific average partial saddening and time composition effects of pain (composite measure with all 3 pain domains—top 20%) on experienced utility adjusting for functional limitations. Experienced utility and net affects measures are standardized to mean zero and standard deviation equal to 1 using country-specific mean and standard deviation. Each component of the saddening effect is computed using equation (2.10) and each component of the time composition effect is computed using equation (2.11). The first row of Panel A (Total difference) repeats the pain coefficients for experienced utility in Table 2.5.

2.5 Conclusions

Our study analyses the relationship between pain and the two broad dimensions of SWB—evaluative well-being (general life satisfaction and WHOQoL8 index) and experienced well-being (emotion score and experienced utility)—among older people in five LMICs, using the WHO Study on Global Ageing and Adult Health. We have used anchoring vignettes for health-state description as control functions to account for common self-rating behavior between self-reported pain and SWB. To the best of our knowledge, this is the first paper to study the association of old-age pain experience with multiple dimensions of SWB in broad population data from the developing world while

accounting for common self-rating behavior through the use of anchoring vignettes.

Beyond documenting adjusted differences in the various dimensions of overall SWB between people with pain and those without pain, our paper takes a closer focus on experienced utility and provides a detailed analysis of the underlying differences in activity-specific affective experiences and differences in time use between these two population groups that yield the overall association of pain status with experienced utility. Exploiting the definition of experienced utility as duration-weighted net affect, we *decompose* the partial association of pain with experienced utility into saddening and time composition effects to highlight the main sources of differences in experienced utility between individuals with pain and those without pain.

Our results show that pain does not only affect people's cognitive evaluative well-being but also it affects people's affective experiences during their daily activities of life and their overall emotional or experienced well-being. Our estimates shows that both evaluative and experienced well-being are markedly lower for people living with pain compared to those without pain. By focusing on the dimension of experienced well-being, the observed differences in experienced utility are exclusively due to worse affective experiences for all daily-life activities among people with pain compared to those without pain. By contrast, differences in time use between the two population groups in favour of those living with pain provide relatively small compensating effects which operates through the fact that people with pain allocate a larger share of their time to relatively "more pleasant" leisure activities away from "less pleasant" work-related activities. However, the observed differences in time use—in favour of people with pain—does not provide enough buffer against the overall negative association of pain with experienced utility.

Our estimates further reveal that while pain remains significantly and substantially negatively associated with both measures of evaluative well-being (general life satisfaction and WHOQoL8 index) and emotion score, the association of pain with overall experienced utility as well as with activity-specific net affects becomes weak after controlling for functional limitations. Our results thus imply that pain have a significant and substantial association with observed patterns of reported life satisfaction, WHOQoL8 index, and emotion score, but that this association is partially mediated through functional limitations.

While our cross-sectional study does not allow us to examine the dynamics of reported well-being resulting from dynamics of people's pain experience, the observed well-being gap between people with pain and those without pain nonetheless suggests that adaptation to pain is likely to be only partial or occurring rather gradually over time. This evidence is closely related to findings for the relationship between the dynamics of pain, work disability, and employment which shows

that pain is often persistent through time [Kapteyn et al., 2008].

Our analysis is cross-sectional and focuses on the basic description of the relationship between pain experience, reported well-being, and time use during the day. Although we use anchoring vignettes to correct for common self-rating behavior between self-reported pain and SWB, our results may still be affected by issues of endogeneity and selection. Consequently, we do not interpret our reported estimates as causal effects, but rather partial associations. In spite of this study limitation, our descriptive approach is a valuable exploration of stylized facts regarding the relationship between old-age pain status, reported well-being, and time use in the developing world.

Our study has important implications for health policy in LMICs. The results shows the extent to which older adults in pain are disadvantaged in terms of well-being, despite the presence of coping strategies such as increasing leisure time. The high prevalence of pain among older people in the sampled countries in our study calls for policy interventions and welfare support, and prioritizing pain among older people in national health policies. It is important to investigate and understand the underlying causes and consequences of pain while at the same time providing interventions and support that could reduce the role of pain on individuals' well-being. This is particularly important in the LMICs context because older people in LMICs are disproportionately exposed to risk factors for developing pain and often have limited access to effective pain treatments or management options [see, e.g., James et al., 2018; Payne et al., 2017; Sharma et al., 2019]. Our descriptive findings imply that prevention of pain and improving treatment of widespread pain can be an important step towards improving old-age population health and well-being in developing countries. To better address pain and reduce its burden, chronic pain should be treated as a disease in and of itself and access to effective pain treatments in non-clinical settings must be enhanced, including the provision of an integrated interdisciplinary pain service as well as interventions such as physiotherapy and cognitive behavioural therapy.

APPENDICES

2.A ADDITIONAL SUMMARY STATISTICS

Table 2.A1: Correlation between responses to pain questions

	China			Ghana			India			Russia			South Africa		
	Aches	Discomfort	Difficulty	Aches	Discomfort	Difficulty	Aches	Discomfort	Difficulty	Aches	Discomfort	Difficulty	Aches	Discomfort	Difficulty
Aches	1			1			1			1			1		
Discomfort	0.89	1		0.86	1		0.86	1		0.90	1		0.93	1	
Difficulty	0.85	0.88	1	0.81	0.82	1	0.82	0.85	1	0.85	0.86	1	0.87	0.88	1

Notes: Sample weights are applied. Observations: Ghana(3031), India (4839), South Africa(2032), Russia(2614), and China(9267).

2.B ADDITIONAL RESULTS

Table 2.B2: Association of individual characteristics with bodily aches or pains

Model: Ordered probit					
	China	Ghana	India	Russia	South Africa
Panel A: Socio-demographic characteristics					
Female	0.1525***	0.1882***	0.2068***	0.1432	-0.0886
	(0.037)	(0.054)	(0.059)	(0.094)	(0.088)
Married/cohabiting	0.0852**	0.0743	-0.1501*	0.0698	-0.1370
	(0.041)	(0.061)	(0.080)	(0.087)	(0.087)
Rural	0.3856***	0.1617**	0.2225***	0.1567	0.0694
	(0.075)	(0.073)	(0.056)	(0.118)	(0.100)
Ethnic minority		-0.0489	-0.0111	-0.1359	-0.1390
		(0.058)	(0.070)	(0.111)	(0.096)
Household size (standardized)	-0.0036	0.0522**	0.0400	-0.1964***	0.0763*
	(0.018)	(0.024)	(0.026)	(0.062)	(0.041)
Working	-0.0927**	-0.2764***	-0.1898***	-0.1525	-0.3902***
	(0.042)	(0.057)	(0.050)	(0.110)	(0.093)
Violent crime victim	0.0735	0.0503	-0.0100	-0.3419	0.1429
	(0.121)	(0.143)	(0.135)	(0.373)	(0.140)
Age group (reference is 50-59 yo)					
Age 60-69	-0.0343	0.1908***	0.1135**	0.1740	-0.0198
	(0.040)	(0.059)	(0.055)	(0.107)	(0.096)
Age 70-79	0.1024**	0.3369***	0.2148***	0.3196***	0.1262
	(0.048)	(0.064)	(0.066)	(0.116)	(0.107)
Age 80+	0.0917	0.3993***	0.3241***	0.4460**	0.1656
	(0.078)	(0.091)	(0.122)	(0.182)	(0.148)
Education level (reference is less than or completed primary)					
Secondary	-0.0496	-0.1111	-0.1112	-0.0342	-0.1368
	(0.048)	(0.127)	(0.091)	(0.168)	(0.111)
High School	-0.1216**	-0.1644**	-0.0298	-0.3016*	-0.3181*
	(0.059)	(0.080)	(0.100)	(0.157)	(0.173)
College/university	-0.3436***	-0.1398	-0.6004***	-0.3916**	-0.2012
	(0.079)	(0.121)	(0.114)	(0.185)	(0.156)
Permanent income quartiles (reference is bottom 25%)					
Q2: second poorest 25%	-0.0447	0.0348	-0.1436***	0.0701	-0.0555
	(0.054)	(0.059)	(0.055)	(0.131)	(0.113)
Q3: second richest 25%	-0.1297*	-0.0792	-0.0644	-0.1378	-0.1187
	(0.068)	(0.068)	(0.068)	(0.139)	(0.117)
Q4: richest 25%	-0.3637***	-0.1657**	-0.2233***	0.0462	-0.2164
	(0.076)	(0.084)	(0.075)	(0.131)	(0.132)
Panel B: Objective chronic health conditions					
Arthritis	0.7042***	0.5142***	0.4850***	0.7578***	0.9017***
	(0.033)	(0.057)	(0.049)	(0.068)	(0.101)
Stroke	0.3194***	0.5375***	0.3349***	0.1248	0.0108
	(0.067)	(0.127)	(0.122)	(0.128)	(0.198)
Angina	0.3178***	0.2690***	0.3863***	0.3198***	0.4307***
	(0.057)	(0.075)	(0.063)	(0.076)	(0.165)
Diabetes	0.0904	0.0484	0.3089***	0.2526*	0.1305
	(0.064)	(0.129)	(0.095)	(0.132)	(0.103)
Chronic lung disease	-0.3592*	0.1441	0.2906**	1.0023***	0.2601
	(0.217)	(0.406)	(0.144)	(0.308)	(0.330)
Asthma	0.5017**	-0.0154	0.1121	-0.6341**	-0.0837
	(0.211)	(0.268)	(0.141)	(0.274)	(0.315)
Depression	0.3085*	0.1336	0.2591***	0.4565**	0.2685
	(0.182)	(0.128)	(0.094)	(0.206)	(0.192)

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	China	Ghana	India	Russia	South Africa
Panel B: Objective chronic health conditions					
Hypertension	0.0843**	0.1836**	0.2128**	0.0661	0.3288***
	(0.032)	(0.080)	(0.087)	(0.069)	(0.096)
Cataracts	0.2116***	0.3070***	0.2334***	0.4579***	0.1000
	(0.045)	(0.053)	(0.044)	(0.091)	(0.139)
Poor oral health	0.2161***	0.3069***	0.1469***	0.2032**	0.0715
	(0.035)	(0.075)	(0.051)	(0.090)	(0.118)
Injuries from traffic accident	0.2864***	0.2241**	0.3881***	0.4228***	0.2741
	(0.068)	(0.099)	(0.066)	(0.161)	(0.171)
N	9,267	3,031	4,839	2,614	2,032

Notes: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Sample weights are applied. The entries in each column are country-specific partial association of socio-demographic characteristics and objective chronic health conditions with bodily aches or pains using ordered probit regression models. Ethnic minority is not considered in China where the ethnic group "Han" represents 99% of the sample. Sample includes older adults with age 50 or older.

Table 2.B3: Association of individual characteristics with bodily discomfort

Model: Ordered probit					
	China	Ghana	India	Russia	South Africa
Panel A: Socio-demographic characteristics					
Female	0.1500***	0.1248**	0.1525**	0.1132	-0.1336
	(0.035)	(0.054)	(0.061)	(0.082)	(0.085)
Married/cohabiting	0.0952**	0.0099	-0.2179**	-0.0165	-0.1520*
	(0.040)	(0.060)	(0.105)	(0.088)	(0.084)
Rural	0.4470***	0.1745**	0.2678***	0.0605	0.0539
	(0.078)	(0.077)	(0.083)	(0.108)	(0.103)
Ethnic minority		-0.1060*	0.0982	-0.0420	-0.2072**
		(0.062)	(0.080)	(0.100)	(0.096)
Household size (standardized)	-0.0111	0.0507**	0.0339	-0.1885***	0.0741*
	(0.017)	(0.024)	(0.023)	(0.044)	(0.041)
Working	-0.1203***	-0.3182***	-0.1937***	-0.0906	-0.3579***
	(0.042)	(0.060)	(0.054)	(0.105)	(0.102)
Violent crime victim	0.0483	-0.1208	-0.0939	-0.4218	0.0572
	(0.136)	(0.146)	(0.130)	(0.375)	(0.133)
Age group (reference is 50-59 yo)					
Age 60-69	-0.0122	0.1693***	0.1104**	0.1804*	-0.0676
	(0.038)	(0.054)	(0.054)	(0.098)	(0.092)
Age 70-79	0.1222**	0.2909***	0.0962	0.3274***	0.1237
	(0.048)	(0.063)	(0.078)	(0.116)	(0.111)
Age 80+	0.2090***	0.3624***	0.4430***	0.5970***	0.1737
	(0.070)	(0.092)	(0.120)	(0.174)	(0.164)
Education level (reference is less than or completed primary)					
Secondary	-0.0785	-0.0028	-0.0498	-0.0144	-0.1118
	(0.049)	(0.128)	(0.085)	(0.145)	(0.116)
High School	-0.1227**	-0.1767**	-0.1570	-0.3256**	-0.3393*
	(0.053)	(0.075)	(0.122)	(0.144)	(0.176)
College/university	-0.2203***	-0.2459**	-0.4917***	-0.5343***	-0.3216**
	(0.075)	(0.114)	(0.108)	(0.172)	(0.159)
Permanent income quartiles (reference is bottom 25%)					
Q2: second poorest 25%	-0.0367	0.0704	-0.1003	0.1146	-0.0168
	(0.059)	(0.062)	(0.061)	(0.118)	(0.117)
Q3: second richest 25%	-0.1007	-0.0684	-0.0392	-0.1068	-0.0736
	(0.069)	(0.070)	(0.076)	(0.143)	(0.120)
Q4: richest 25%	-0.3381***	-0.1622*	-0.2207***	0.0946	-0.1450
	(0.077)	(0.085)	(0.071)	(0.131)	(0.135)
Panel B: Objective chronic health conditions					
Arthritis	0.6870***	0.5300***	0.4482***	0.6971***	0.8775***
	(0.032)	(0.059)	(0.048)	(0.060)	(0.099)
Stroke	0.4352***	0.5989***	0.4220***	0.0780	0.1014
	(0.069)	(0.111)	(0.120)	(0.118)	(0.220)
Angina	0.3394***	0.2684***	0.3601***	0.2612***	0.3801**
	(0.058)	(0.080)	(0.065)	(0.070)	(0.172)
Diabetes	0.0975	-0.0568	0.1110	0.3843***	0.1642
	(0.066)	(0.132)	(0.085)	(0.109)	(0.100)
Chronic lung disease	-0.2295	0.0287	0.3454**	0.9540***	0.2823
	(0.215)	(0.426)	(0.163)	(0.290)	(0.341)
Asthma	0.4447**	0.0078	0.1337	-0.4924*	0.0739
	(0.205)	(0.250)	(0.174)	(0.266)	(0.305)
Depression	0.6134***	0.4406***	0.3020***	0.4336**	0.2889
	(0.207)	(0.146)	(0.081)	(0.169)	(0.215)
Hypertension	0.1041***	0.1325*	0.1726**	0.1190*	0.3114***
	(0.038)	(0.080)	(0.087)	(0.072)	(0.093)

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	China	Ghana	India	Russia	South Africa
Panel B: Objective chronic health conditions					
Cataracts	0.1878***	0.3558***	0.2067***	0.3861***	0.1317
	(0.043)	(0.054)	(0.057)	(0.095)	(0.138)
Poor oral health	0.2043***	0.2252***	0.1804***	0.2673***	0.1094
	(0.041)	(0.074)	(0.061)	(0.087)	(0.117)
Injuries from traffic accident	0.2649***	0.1897*	0.3736***	0.4147***	0.1698
	(0.060)	(0.100)	(0.052)	(0.151)	(0.185)
N	9,267	3,031	4,839	2,614	2,032

Notes: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Sample weights are applied. The entries in each column are country-specific partial association of socio-demographic characteristics and objective chronic health conditions with bodily discomfort using ordered probit regression models. Ethnic minority is not considered in China where the ethnic group "Han" represents 99% of the sample. Sample includes older adults with age 50 or older.

Table 2.B4: Association of individual characteristics with pain-related difficulty in daily life

Model: Ordered probit					
	China	Ghana	India	Russia	South Africa
Panel A: Socio-demographic characteristics					
Female	0.1408***	0.1650***	0.1483***	0.2250**	-0.2078**
	(0.036)	(0.057)	(0.055)	(0.107)	(0.095)
Married/cohabiting	0.0917**	0.0575	-0.1940**	0.2741**	-0.2469***
	(0.042)	(0.063)	(0.093)	(0.132)	(0.093)
Rural	0.5090***	0.1896**	0.2820***	-0.0323	0.1662
	(0.076)	(0.082)	(0.080)	(0.140)	(0.119)
Ethnic minority		-0.0421	0.1446*	0.0891	-0.2420**
		(0.062)	(0.074)	(0.096)	(0.096)
Household size (standardized)	-0.0198	0.0387	0.0234	-0.1953***	0.1146***
	(0.018)	(0.026)	(0.022)	(0.044)	(0.041)
Working	-0.1768***	-0.3512***	-0.2054***	-0.1966	-0.2767**
	(0.047)	(0.060)	(0.047)	(0.121)	(0.111)
Violent crime victim	0.0988	-0.1557	0.0717	-0.2040	0.1165
	(0.139)	(0.195)	(0.127)	(0.360)	(0.145)
Age group (reference is 50-59 yo)					
Age 60-69	-0.0161	0.1657***	0.1003*	0.2348**	0.0451
	(0.039)	(0.057)	(0.057)	(0.103)	(0.102)
Age 70-79	0.1497***	0.3072***	0.1977***	0.4542***	0.2120**
	(0.043)	(0.061)	(0.073)	(0.128)	(0.102)
Age 80+	0.2377***	0.3984***	0.4428***	0.7385***	0.2232
	(0.068)	(0.088)	(0.121)	(0.196)	(0.178)
Education level (reference is less than or completed primary)					
Secondary	-0.0976**	0.0315	-0.0851	-0.0752	-0.1283
	(0.047)	(0.149)	(0.095)	(0.182)	(0.112)
High School	-0.1529***	-0.1601**	-0.0536	-0.2718	-0.3665**
	(0.058)	(0.079)	(0.107)	(0.182)	(0.171)
College/university	-0.2594***	-0.0842	-0.4785***	-0.3976**	-0.4780***
	(0.081)	(0.130)	(0.104)	(0.186)	(0.145)
Permanent income quartiles (reference is bottom 25%)					
Q2: second poorest 25%	-0.0444	-0.0107	-0.0804	-0.0583	-0.0796
	(0.059)	(0.065)	(0.065)	(0.135)	(0.139)
Q3: second richest 25%	-0.1145	-0.0832	-0.0551	-0.2466*	-0.2035
	(0.071)	(0.072)	(0.071)	(0.140)	(0.135)
Q4: richest 25%	-0.3790***	-0.2530***	-0.2177***	-0.2214	-0.1643
	(0.077)	(0.080)	(0.069)	(0.147)	(0.140)
Panel B: Objective chronic health conditions					
Arthritis	0.6730***	0.4721***	0.4480***	0.6291***	0.7509***
	(0.032)	(0.059)	(0.053)	(0.078)	(0.106)
Stroke	0.4960***	0.5038***	0.3956***	0.1221	0.1745
	(0.072)	(0.127)	(0.132)	(0.128)	(0.184)
Angina	0.3554***	0.2848***	0.2760***	0.2345***	0.1964
	(0.063)	(0.082)	(0.063)	(0.078)	(0.149)
Diabetes	0.0990	0.0225	0.1156	0.3048***	0.2063*
	(0.064)	(0.126)	(0.099)	(0.102)	(0.119)
Chronic lung disease	-0.3200	-0.0888	0.2988**	0.8854***	-0.1085
	(0.275)	(0.364)	(0.132)	(0.214)	(0.259)
Asthma	0.5134*	0.0649	0.1284	-0.3379*	0.2949
	(0.266)	(0.239)	(0.143)	(0.182)	(0.251)
Depression	0.6962***	0.1075	0.3278***	0.5156**	0.2791*
	(0.225)	(0.129)	(0.086)	(0.201)	(0.168)
Hypertension	0.0914**	0.1698*	0.1107	0.0376	0.3476***
	(0.040)	(0.091)	(0.077)	(0.070)	(0.116)

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	China	Ghana	India	Russia	South Africa
Panel B: Objective chronic health conditions					
Cataracts	0.1997***	0.3740***	0.2420***	0.3726***	0.1333
	(0.045)	(0.057)	(0.052)	(0.096)	(0.122)
Poor oral health	0.2315***	0.1386**	0.1913***	0.2483***	0.1046
	(0.037)	(0.070)	(0.051)	(0.088)	(0.122)
Injuries from traffic accident	0.2987***	0.2120**	0.4124***	0.4708***	0.2284
	(0.058)	(0.105)	(0.066)	(0.152)	(0.189)
N	9,267	3,031	4,839	2,614	2,032

Notes: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Sample weights are applied. The entries in each column are country-specific partial association of socio-demographic characteristics and objective chronic health conditions with pain-related difficulty in daily life using ordered probit regression models. Ethnic minority is not considered in China where the ethnic group "Han" represents 99% of the sample. Sample includes older adults with age 50 or older.

Table 2.B5: Partial association of pain (composite measure with all 3 pain domains—top 30%) with well-being and time use

	China	Ghana	India	Russia	South Africa
Panel A: Aggregate well-being dimensions					
General life satisfaction	-0.357***	-0.395***	-0.333***	-0.398***	-0.362***
WHOQoL8 index	-0.519***	-0.495***	-0.449***	-0.554***	-0.609***
Emotion score	-0.377***	-0.207***	-0.432***	-0.404	-0.292***
Experienced utility	-0.146***	-0.052**	-0.150***	-0.185***	-0.137***
Panel B: Activity-specific net affects					
Work	-0.220***	-0.088	-0.039	-0.134**	0.059*
Housework	-0.219***	-0.113**	-0.201***	-0.291**	-0.125
Travel	-0.031	-0.028	-0.104	-0.792***	-0.192**
Leisure	-0.090*	-0.057*	-0.133***	-0.127***	-0.117***
Self-care	-0.122***	-0.018	-0.133***	-0.162***	-0.118***
Panel C: Time use					
Work	-0.023***	-0.030*	-0.04***5	-0.081***	-0.067***
Housework	-0.017***	-0.009***	0.001	0.011	-0.026**
Travel	0.002	-0.009	-0.010**	-0.007***	0.008
Leisure	0.034**	0.048***	0.035**	0.072***	0.087***
Self-care	0.004**	0.000	0.019***	0.004	-0.002
N	9,267	3,031	4,839	2,614	2,032
Socio-demographic controls	YES	YES	YES	YES	YES
Chronic ill-health controls	YES	YES	YES	YES	YES
Health-state vignettes	YES	YES	YES	YES	YES

Notes: *** p<0.01, ** p<0.05, * p<0.1. Standard errors are computed using 250 bootstrap replications. Sample weights applied. The entries in each column are country-specific average partial effects of pain (composite measure with all 3 pain domains—top 30%) on Aggregate dimensions of SWB(Panel A), activity-specific net affects (Panel B), and time use (Panel C). Average partial effects are estimated based on a linear regression (equation (2.6) in Panel A and equation (2.7) Panel B) or multivariate fractional estimators (equations (2.8) and (2.9) in Panel C). All well-being and net affects measures are standardized to mean zero and standard deviation equal to 1 using country-specific mean and standard deviation. All regressions control for a large set of socio-demographic characteristics including age dummies, gender, marital status, area of residence, ethnic minority status (except in China), household size, violent crime victim status, education, permanent income, social cohesion indicators, and long-term health conditions (angina, arthritis, asthma, cataracts, chronic lung disease, depression, diabetes, hypertension, injuries from traffic accident, poor oral health, and stroke). In addition, each regression in Panels A and B adjusts for anchoring vignettes for health-state description. The regression models for activity-specific net affects (Panel B) use lower number of observations than reported in the table. Sample includes older adults with age 50 or older.

Table 2.B6: Partial association of pain (composite measure with all 3 pain domains—top 40%) with well-being and time use

	China	Ghana	India	Russia	South Africa
Panel A: Aggregate well-being dimensions					
General life satisfaction	-0.370***	-0.401***	-0.334***	-0.401***	-0.361***
WHOQoL8 index	-0.536***	-0.490***	-0.436***	-0.518***	-0.573***
Emotion score	-0.350***	-0.220***	-0.433***	-0.315***	-0.262***
Experienced utility	-0.144***	-0.036	-0.155***	-0.112**	-0.139***
Panel B: Activity-specific net affects					
Work	-0.221***	-0.158***	-0.091**	0.071	-0.031*
Housework	-0.213***	-0.145**	-0.251***	-0.244***	-0.147
Travel	-0.030	-0.008	-0.091	-0.457	-0.280***
Leisure	-0.091***	-0.016	-0.148***	-0.144**	-0.099***
Self-care	-0.123***	0.027	-0.123***	-0.109***	-0.150***
Panel C: Time use					
Work	-0.024***	-0.010	-0.034***	-0.079***	-0.051**
Housework	-0.004	-0.004***	-0.005	0.017*	-0.028*
Travel	0.003	-0.007	-0.012***	-0.004**	-0.001
Leisure	0.018*	0.031**	0.032*	0.062***	0.074***
Self-care	0.007***	-0.011	0.020***	0.004**	0.006
N	9,267	3,031	4,839	2,614	2,032
Socio-demographic controls	YES	YES	YES	YES	YES
Chronic ill-health controls	YES	YES	YES	YES	YES
Health-state vignettes	YES	YES	YES	YES	YES

Notes: *** p<0.01, ** p<0.05, * p<0.1. Standard errors are computed using 250 bootstrap replications. Sample weights applied. The entries in each column are country-specific average partial effects of pain (composite measure with all 3 pain domains—top 40%) on Aggregate dimensions of SWB(Panel A), activity-specific net affects (Panel B), and time use (Panel C). Average partial effects are estimated based on a linear regression (equation (2.6) in Panel A and equation (2.7) Panel B) or multivariate fractional estimators (equations (2.8) and (2.9) in Panel C). All well-being and net affects measures are standardized to mean zero and standard deviation equal to 1 using country-specific mean and standard deviation. All regressions control for a large set of socio-demographic characteristics including age dummies, gender, marital status, area of residence, ethnic minority status (except in China), household size, violent crime victim status, education, permanent income, social cohesion indicators, and long-term health conditions (angina, arthritis, asthma, cataracts, chronic lung disease, depression, diabetes, hypertension, injuries from traffic accident, poor oral health, and stroke). In addition, each regression in Panels A and B adjusts for anchoring vignettes for health-state description. The regression models for activity-specific net affects (Panel B) use lower number of observations than reported in the table. Sample includes older adults with age 50 or older.

Table 2.B7: Partial saddening and time composition effects of pain (composite measure with all 3 pain domains—top 30%) on experienced utility

	China	Ghana	India	Russia	South Africa
Panel A: Difference in experienced utility and its components					
Difference -0.146***	-0.052**	-0.150***	-0.185***	-0.137***	
Saddening effect	-0.139***	-0.062***	-0.132***	-0.209***	-0.103***
Time composition effect	0.022***	0.020***	0.023***	0.057***	0.014
Additive decomposition of experienced utility components across activity groups					
Panel B: Saddening effect					
Work	-0.036***	-0.018	-0.005	-0.027**	0.006*
Housework	-0.043***	-0.014**	-0.040***	-0.078**	-0.025
Travel	-0.001	-0.002	-0.007	-0.040***	-0.010**
Leisure	-0.045*	-0.026*	-0.057***	-0.049***	-0.050***
Self-care	-0.014***	-0.003	-0.024***	-0.016***	-0.024***
Panel C: Time composition effect					
Work	0.012***	0.008*	0.014***	0.032***	-0.001**
Housework	0.004***	0.001	0.000	-0.001	-0.003**
Travel	0.000	0.001	0.000	0.002***	0.000
Leisure	0.005**	0.010***	0.006*	0.023***	0.018***
Self-care	0.000**	0.000	0.004***	0.002	0.000
N	9,267	3,031	4,839	2,614	2,032
Socio-demographic controls	YES	YES	YES	YES	YES
Chronic ill-health controls	YES	YES	YES	YES	YES
Health-state vignettes	YES	YES	YES	YES	YES

Notes: *** p<0.01, ** p<0.05, * p<0.1. Standard errors are computed using 250 bootstrap replications. Sample weights applied. The entries in each column are country-specific average partial saddening and time composition effects of pain (composite measure with all 3 pain domains—top 30%) on experienced utility. Experienced utility and net affects measures are standardized to mean zero and standard deviation equal to 1 using country-specific mean and standard deviation. Each component of the saddening effect is computed using equation (2.10) and each component of the time composition effect is computed using equation (2.11). The first row of Panel A (Total difference) repeats the pain coefficients for experienced utility in Table 2.B5.

Table 2.B8: Partial saddening and time composition effects of pain (composite measure with all 3 pain domains—top 40%) on experienced utility

	China	Ghana	India	Russia	South Africa
Panel A: Difference in experienced utility and its components					
Difference	-0.144***	-0.036	-0.155***	-0.112**	-0.139***
Saddening effect	-0.138***	-0.052**	-0.153***	-0.140***	-0.121***
Time composition effect	0.017***	0.008	0.020***	0.052***	0.013*
Additive decomposition of experienced utility components across activity groups					
Panel B: Saddening effect					
Work	-0.036***	-0.031***	-0.012**	0.014	-0.003**
Housework	-0.042***	-0.018**	-0.050***	-0.065***	-0.029
Travel	-0.001	-0.001	-0.006	-0.023	-0.015***
Leisure	-0.045***	-0.007	-0.063***	-0.056***	-0.042***
Self-care	-0.014***	0.004	-0.022***	-0.011***	-0.031***
Panel C: Time composition effect					
Work	0.013***	0.003	0.010***	0.031***	-0.001
Housework	0.001	0.000	0.001	-0.002	-0.003*
Travel	0.000	0.001	0.000*	0.001***	0.000
Leisure	0.003*	0.007**	0.006*	0.019***	0.015***
Self-care	0.001***	-0.003	0.004***	0.002**	0.001
N	9,267	3,031	4,839	2,614	2,032
Socio-demographic controls	YES	YES	YES	YES	YES
Chronic ill-health controls	YES	YES	YES	YES	YES
Health-state vignettes	YES	YES	YES	YES	YES

Notes: *** p<0.01, ** p<0.05, * p<0.1. Standard errors are computed using 250 bootstrap replications. Sample weights applied. The entries in each column are country-specific average partial saddening and time composition effects of pain (composite measure with all 3 pain domains—top 40%) on experienced utility. Experienced utility and net affects measures are standardized to mean zero and standard deviation equal to 1 using country-specific mean and standard deviation. Each component of the saddening effect is computed using equation (2.10) and each component of the time composition effect is computed using equation (2.11). The first row of Panel A (Total difference) repeats the pain coefficients for experienced utility in Table 2.B6.

Table 2.B9: Partial association of pain (standardized composite measure combining all three pain domains) with SWB

	China	Ghana	India	Russia	South Africa
Panel A: Aggregate well-being dimensions					
General life satisfaction	-0.2542***	-0.2711***	-0.2236***	-0.3002***	-0.2473***
WHOQoL8 index	-0.3404***	-0.3300***	-0.2925***	-0.3508***	-0.3671***
Emotion score	-0.2454***	-0.1525***	-0.2735***	-0.2133***	-0.1594***
Experienced utility	-0.0903***	-0.0439**	-0.1245***	-0.1418***	-0.1259***
Panel B: Activity-specific net affects					
Work	-0.0987**	-0.1071**	-0.1347***	-0.0032	-0.0420
Housework	-0.1014***	-0.0436	-0.1473***	-0.2559***	-0.0985***
Travel	-0.0732*	-0.0532*	-0.1173***	-0.2777**	-0.1455***
Leisure	-0.0837***	-0.0447*	-0.1064***	-0.1251***	-0.0909***
Self-care	-0.0731***	-0.0260	-0.0886***	-0.2383***	-0.0772***
N	9,267	3,031	4,839	2,614	2,032
Socio-demographic controls	YES	YES	YES	YES	YES
Chronic ill-health controls	YES	YES	YES	YES	YES
Health-state vignettes	YES	YES	YES	YES	YES

Notes: *** p<0.01, ** p<0.05, * p<0.1. Sample weights applied. The entries in each column are country-specific average partial effects of pain (standardized composite measure combining all three pain domains) on Aggregate dimensions of SWB (Panel A) and activity-specific net affects (Panel B). Average partial effects are estimated based on a linear regression (equation (2.6) in Panel A and equation (2.7) Panel B). All well-being and net affects measures are standardized to mean zero and standard deviation equal to 1 using country-specific mean and standard deviation. All regressions control for a large set of socio-demographic characteristics including age dummies, gender, marital status, area of residence, ethnic minority status (except in China), household size, violent crime victim status, education, permanent income, social cohesion indicators, and long-term health conditions (angina, arthritis, asthma, cataracts, chronic lung disease, depression, diabetes, hypertension, injuries from traffic accident, poor oral health, and stroke). In addition, each regression in Panels A and B adjusts for anchoring vignettes for health-state description. The regression models for activity-specific net affects (Panel B) use lower number of observations than reported in the table. Sample includes older adults with age 50 or older.

Table 2.B10: Partial association of pain (standardized bodily aches or pains (pain domain 1)) with SWB

	China	Ghana	India	Russia	South Africa
Panel A: Aggregate well-being dimensions					
General life satisfaction	-0.2149***	-0.2484***	-0.1896***	-0.2632***	-0.2264***
WHOQoL8 index	-0.2914***	-0.2930***	-0.2493***	-0.3079***	-0.3469***
Emotion score	-0.2284***	-0.1389***	-0.2565***	-0.1939***	-0.1458***
Experienced utility	-0.0845***	-0.0433**	-0.1062***	-0.1274***	-0.1155***
Panel B: Activity-specific net affects					
Work	-0.1091***	-0.1257***	-0.1327***	-0.0123	-0.0586
Housework	-0.0938***	-0.0463	-0.1150***	-0.2569***	-0.0813***
Travel	-0.0619	-0.0483*	-0.1128***	-0.2413**	-0.1574***
Leisure	-0.0702***	-0.0409*	-0.0751***	-0.1190***	-0.0897***
Self-care	-0.0717***	-0.0134	-0.0570**	-0.2121***	-0.0679***
N	9,267	3,031	4,839	2,614	2,032
Socio-demographic controls	YES	YES	YES	YES	YES
Chronic ill-health controls	YES	YES	YES	YES	YES
Health-state vignettes	YES	YES	YES	YES	YES

Notes: *** p<0.01, ** p<0.05, * p<0.1. Sample weights applied. The entries in each column are country-specific average partial effects of pain (standardized bodily aches or pains (pain domain 1)) on Aggregate dimensions of SWB (Panel A) and activity-specific net affects (Panel B). Average partial effects are estimated based on a linear regression (equation (2.6) in Panel A and equation (2.7) Panel B). All well-being and net affects measures are standardized to mean zero and standard deviation equal to 1 using country-specific mean and standard deviation. All regressions control for a large set of socio-demographic characteristics including age dummies, gender, marital status, area of residence, ethnic minority status (except in China), household size, violent crime victim status, education, permanent income, social cohesion indicators, and long-term health conditions (angina, arthritis, asthma, cataracts, chronic lung disease, depression, diabetes, hypertension, injuries from traffic accident, poor oral health, and stroke). In addition, each regression in Panels A and B adjusts for anchoring vignettes for health-state description. The regression models for activity-specific net affects (Panel B) use lower number of observations than reported in the table. Sample includes older adults with age 50 or older.

Table 2.B11: Partial association of pain (standardized bodily discomfort (pain domain 2)) with SWB

	China	Ghana	India	Russia	South Africa
Panel A: Aggregate well-being dimensions					
General life satisfaction	-0.2366***	-0.2458***	-0.2193***	-0.2749***	-0.2449***
WHOQoL8 index	-0.3137***	-0.3041***	-0.2881***	-0.3166***	-0.3532***
Emotion score	-0.2278***	-0.1387***	-0.2478***	-0.1800***	-0.1390***
Experienced utility	-0.0856***	-0.0215	-0.1209***	-0.1278***	-0.1108***
Panel B: Activity-specific net affects					
Work	-0.0791**	-0.0770*	-0.1131**	-0.0005	-0.0165
Housework	-0.0944***	-0.0348	-0.1547***	-0.1957***	-0.0821***
Travel	-0.0652	-0.0374	-0.1266***	-0.2554**	-0.0854
Leisure	-0.0777***	-0.0265	-0.1118***	-0.1162***	-0.0741***
Self-care	-0.0632***	-0.0071	-0.0989***	-0.2425***	-0.0685***
N	9,267	3,031	4,839	2,614	2,032
Socio-demographic controls	YES	YES	YES	YES	YES
Chronic ill-health controls	YES	YES	YES	YES	YES
Health-state vignettes	YES	YES	YES	YES	YES

Notes: *** p<0.01, ** p<0.05, * p<0.1. Sample weights applied. The entries in each column are country-specific average partial effects of pain (standardized bodily discomfort (pain domain 2)) on Aggregate dimensions of SWB (Panel A) and activity-specific net affects (Panel B). Average partial effects are estimated based on a linear regression (equation (2.6) in Panel A and equation (2.7) Panel B). All well-being and net affects measures are standardized to mean zero and standard deviation equal to 1 using country-specific mean and standard deviation. All regressions control for a large set of socio-demographic characteristics including age dummies, gender, marital status, area of residence, ethnic minority status (except in China), household size, violent crime victim status, education, permanent income, social cohesion indicators, and long-term health conditions (angina, arthritis, asthma, cataracts, chronic lung disease, depression, diabetes, hypertension, injuries from traffic accident, poor oral health, and stroke). In addition, each regression in Panels A and B adjusts for anchoring vignettes for health-state description. The regression models for activity-specific net affects (Panel B) use lower number of observations than reported in the table. Sample includes older adults with age 50 or older.

Table 2.B12: Partial association of pain (standardized pain-related challenges in doing activities of daily living (pain domain 3)) with SWB

	China	Ghana	India	Russia	South Africa
Panel A: Aggregate well-being dimensions					
General life satisfaction	-0.2622***	-0.2535***	-0.2076***	-0.2851***	-0.2303***
WHOQoL8 index	-0.3502***	-0.3133***	-0.2690***	-0.3375***	-0.3413***
Emotion score	-0.2315***	-0.1430***	-0.2496***	-0.2114***	-0.1675***
Experienced utility	-0.0829***	-0.0562***	-0.1162***	-0.1339***	-0.1309***
Panel B: Activity-specific net affects					
Work	-0.0873*	-0.0873**	-0.1238**	0.0044	-0.0386
Housework	-0.0967***	-0.0398	-0.1304***	-0.2479***	-0.1154***
Travel	-0.0803*	-0.0619*	-0.0832**	-0.2837***	-0.1642***
Leisure	-0.0864***	-0.0563**	-0.1066***	-0.1093***	-0.0939***
Self-care	-0.0714***	-0.0523***	-0.0892***	-0.2006***	-0.0822***
N	9,267	3,031	4,839	2,614	2,032
Socio-demographic controls	YES	YES	YES	YES	YES
Chronic ill-health controls	YES	YES	YES	YES	YES
Health-state vignettes	YES	YES	YES	YES	YES

Notes: *** p<0.01, ** p<0.05, * p<0.1. Sample weights applied. The entries in each column are country-specific average partial effects of pain (standardized pain-related challenges in doing activities of daily living (pain domain 2)) on Aggregate dimensions of SWB (Panel A) and activity-specific net affects (Panel B). Average partial effects are estimated based on a linear regression (equation (2.6) in Panel A and equation (2.7) Panel B). All well-being and net affects measures are standardized to mean zero and standard deviation equal to 1 using country-specific mean and standard deviation. All regressions control for a large set of socio-demographic characteristics including age dummies, gender, marital status, area of residence, ethnic minority status (except in China), household size, violent crime victim status, education, permanent income, social cohesion indicators, and long-term health conditions (angina, arthritis, asthma, cataracts, chronic lung disease, depression, diabetes, hypertension, injuries from traffic accident, poor oral health, and stroke). In addition, each regression in Panels A and B adjusts for anchoring vignettes for health-state description. The regression models for activity-specific net affects (Panel B) use lower number of observations than reported in the table. Sample includes older adults with age 50 or older.

Table 2.B13: Partial association of pain (composite measure with all 3 pain domains—top 20%) with well-being and time use—using only sub-sample with vignettes about pain

	Pooled (1)	China (2)	Ghana (3)	India (4)	Russia (5)	South Africa (6)
Panel A: Aggregate well-being dimensions						
General life satisfaction	-0.408***	-0.328***	-0.603***	-0.336***	-0.487***	-0.453***
WHOQoL8 index	-0.584***	-0.551***	-0.721***	-0.470***	-0.619***	-0.654***
Emotion score	-0.447***	-0.480***	-0.497***	-0.385***	-0.306***	-0.140
Experienced utility	-0.185***	-0.190***	-0.205**	-0.101	-0.043	-0.043
Panel B: Activity-specific net affects						
Work	-0.253***	-0.244*	-0.304*	0.050	-0.000	0.177
Housework	-0.212***	-0.263***	-0.147	-0.001	-0.072	-0.279**
Travel	-0.161**	-0.219	-0.149	0.057	-1.053	-0.571*
Leisure	-0.135***	-0.117**	-0.234***	-0.180**	0.109	-0.059
Self-care	-0.154***	-0.104*	-0.019	-0.157*	-0.132	-0.200***
Panel C: Time use						
Work	-0.029***	-0.008	-0.099***	-0.045**	0.006	-0.133***
Housework	-0.024	-0.020*	-0.018	0.007	-0.018	-0.084***
Travel	-0.001	-0.004	0.014	-0.005	0.011	-0.021
Leisure	0.039***	0.026*	0.070**	0.016	-0.002	0.187***
Self-care	0.015**	0.006	0.032**	0.027***	0.003	0.052**
N	7,136	3,112	978	1,634	769	643
Socio-demographic controls	YES	YES	YES	YES	YES	YES
Chronic ill-health controls	YES	YES	YES	YES	YES	YES
Health-state vignettes	YES	YES	YES	YES	YES	YES
Country dummies	YES	NO	NO	NO	NO	NO

Notes: *** p<0.01, ** p<0.05, * p<0.1. Standard errors in Column (1) are computed using 250 bootstrap replications (bootstrapping was not possible in Columns (2)-(6) due to the country-specific small sample sizes). Sample weights applied. The entries are pooled (Column (1)) and country-specific (Columns (2)-(6)) average partial effects of pain (composite measure with all 3 pain domains—top 20%) on Aggregate dimensions of SWB (Panel A), activity-specific net affects (Panel B), and time use (Panel C). Average partial effects are estimated based on a linear regression (equation (2.6) in Panel A and equation (2.7) Panel B) or multivariate fractional estimators (equations (2.8) and (2.9) in Panel C). All well-being and net affects measures are standardized to mean zero and standard deviation equal to 1 using country-specific mean and standard deviation. All regressions control for a large set of socio-demographic characteristics including age dummies, gender, marital status, area of residence, ethnic minority status (except in China), household size, violent crime victim status, education, permanent income, social cohesion indicators, and long-term health conditions (angina, arthritis, asthma, cataracts, chronic lung disease, depression, diabetes, hypertension, injuries from traffic accident, poor oral health, and stroke). In addition, each regression in Panels A and B adjusts for anchoring vignettes for health-state description, restricting the sample to the afternoon group of the abbreviated version of DRM that respond only to pain and personal relationships vignettes. The regression models for activity-specific net affects (Panel B) use lower number of observations than reported in the table. Sample includes older adults with age 50 or older.

Table 2.B14: Partial saddening and time composition effects of pain (composite measure with all 3 pain domains—top 20%) on experienced utility—using only sub-sample with vignettes about pain

	Pooled
Panel A: Difference in experienced utility and its components	
Difference	-0.185***
Saddening effect	-0.176***
Time composition effect	0.027***
Additive decomposition of experienced utility components across activity groups	
Panel B: Saddening effect	
Work	-0.048***
Housework	-0.041***
Travel	-0.008***
Leisure	-0.062***
Self-care	-0.016***
Panel C: Time composition effect	
Work	0.012***
Housework	0.003
Travel	0.000
Leisure	0.008***
Self-care	0.003**
N	7,136
Socio-demographic controls	YES
Chronic ill-health controls	YES
Health-state vignettes	YES
Country dummies	YES

Notes: *** p<0.01, ** p<0.05, * p<0.1. Standard errors are computed using 250 bootstrap replications. Sample weights applied. The entries are pooled average partial saddening and time composition effects of pain (composite measure with all 3 pain domains—top 20%) on experienced utility, restricting the sample to the afternoon group of the abbreviated version of DRM that respond only to pain and personal relationships vignettes (country-specific decomposed coefficients are not reported because (bootstrapped) standard errors are not computed due to their small sample sizes). Experienced utility and net affects measures are standardized to mean zero and standard deviation equal to 1 using country-specific mean and standard deviation. Each component of the saddening effect is computed using equation (2.10) and each component of the time composition effect is computed using equation (2.11). The first row of Panel A (Total difference) repeats the pain coefficients for experienced utility in Table 2.B13.

Table 2.B15: Partial association of pain (composite measure with all 3 pain domains—top 30%) with well-being and time use—using only sub-sample with vignettes about pain

	Pooled (1)	China (2)	Ghana (3)	India (4)	Russia (5)	South Africa (6)
Panel A: Aggregate well-being dimensions						
General life satisfaction	-0.382***	-0.345***	-0.511***	-0.293***	-0.437***	-0.435***
WHOQoL8 index	-0.542***	-0.536***	-0.590***	-0.429***	-0.556***	-0.652***
Emotion score	-0.379***	-0.384***	-0.295***	-0.338***	-0.334***	-0.235***
Experienced utility	-0.185***	-0.184***	-0.089	-0.130**	-0.120	-0.180***
Panel B: Activity-specific net affects						
Work	-0.218***	-0.233**	-0.160	-0.031	0.115	0.034
Housework	-0.257***	-0.241***	-0.203*	-0.134	-0.335**	-0.286***
Travel	-0.198***	-0.220*	-0.054	0.033	-0.719	-0.460**
Leisure	-0.132***	-0.111**	-0.136*	-0.152**	-0.005	-0.102*
Self-care	-0.128***	-0.080	-0.007	-0.147**	-0.188	-0.200***
Panel C: Time use						
Work	-0.031***	-0.010	-0.075***	-0.051***	-0.007	-0.104***
Housework	-0.017	-0.022**	-0.025	0.000	0.012	-0.052**
Travel	0.001	0.001	0.007	-0.004	0.012	0.004
Leisure	0.037***	0.026**	0.064***	0.034**	-0.026	0.139***
Self-care	0.011*	0.006	0.028**	0.021**	0.009	0.013
N	7,136	3,112	978	1,634	769	643
Socio-demographic controls	YES	YES	YES	YES	YES	YES
Chronic ill-health controls	YES	YES	YES	YES	YES	YES
Health-state vignettes	YES	YES	YES	YES	YES	YES
Country dummies	YES	NO	NO	NO	NO	NO

Notes: *** p<0.01, ** p<0.05, * p<0.1. Standard errors in Column (1) are computed using 250 bootstrap replications (bootstrapping was not possible in Columns (2)-(6) due to their small sample sizes). Sample weights applied. The entries are pooled (Column (1)) and country-specific (Columns (2)-(6)) country-specific average partial effects of pain (composite measure with all 3 pain domains—top 30%) on Aggregate dimensions of SWB (Panel A), activity-specific net affects (Panel B), and time use (Panel C). Average partial effects are estimated based on a linear regression (equation (2.6) in Panel A and equation (2.7) Panel B) or multivariate fractional estimators (equations (2.8) and (2.9) in Panel C). All well-being and net affects measures are standardized to mean zero and standard deviation equal to 1 using country-specific mean and standard deviation. All regressions control for a large set of socio-demographic characteristics including age dummies, gender, marital status, area of residence, ethnic minority status (except in China), household size, violent crime victim status, education, permanent income, social cohesion indicators, and long-term health conditions (angina, arthritis, asthma, cataracts, chronic lung disease, depression, diabetes, hypertension, injuries from traffic accident, poor oral health, and stroke). In addition, each regression in Panels A and B adjusts for anchoring vignettes for health-state description, restricting the sample to the afternoon group of the abbreviated version of DRM that respond only to pain and personal relationships vignettes. The regression models for activity-specific net affects (Panel B) use lower number of observations than reported in the table. Sample includes older adults with age 50 or older.

Table 2.B16: Partial saddening and time composition effects of pain (composite measure with all 3 pain domains—top 30%) on experienced utility—using only sub-sample with vignettes about pain

	Pooled
Panel A: Difference in experienced utility and its components	
Difference	-0.185***
Saddening effect	-0.176***
Time composition effect	0.026***
Additive decomposition of experienced utility components across activity groups	
Panel B: Saddening effect	
Work	-0.042***
Housework	-0.050***
Travel	-0.010***
Leisure	-0.060***
Self-care	-0.013***
Panel C: Time composition effect	
Work	0.013***
Housework	0.002
Travel	0.000
Leisure	0.008***
Self-care	0.002
N	7,136
Socio-demographic controls	YES
Chronic ill-health controls	YES
Health-state vignettes	YES
Country dummies	YES

Notes: *** p<0.01, ** p<0.05, * p<0.1. Standard errors are computed using 250 bootstrap replications. Sample weights applied. The entries are pooled average partial saddening and time composition effects of pain (composite measure with all 3 pain domains—top 30%) on experienced utility, restricting the sample to the afternoon group of the abbreviated version of DRM that respond only to pain and personal relationships vignettes (country-specific decomposed coefficients are not reported because (bootstrapped) standard errors are not computed due to their small sample sizes). Experienced utility and net affects measures are standardized to mean zero and standard deviation equal to 1 using country-specific mean and standard deviation. Each component of the saddening effect is computed using equation (2.10) and each component of the time composition effect is computed using equation (2.11). The first row of Panel A (Total difference) repeats the pain coefficients for experienced utility in Table 2.B15.

Table 2.B17: Partial association of pain (composite measure with all 3 pain domains—top 40%) with well-being and time use—using only sub-sample with vignettes about pain

	Pooled (1)	China (2)	Ghana (3)	India (4)	Russia (5)	South Africa (6)
Panel A: Aggregate well-being dimensions						
General life satisfaction	-0.384***	-0.380***	-0.458***	-0.337***	-0.390***	-0.396***
WHOQoL8 index	-0.526***	-0.544***	-0.499***	-0.466***	-0.500***	-0.612***
Emotion score	-0.351***	-0.339***	-0.264***	-0.403***	-0.266***	-0.189**
Experienced utility	-0.176***	-0.181***	-0.101	-0.152***	-0.062	-0.166***
Panel B: Activity-specific net affects						
Work	-0.251***	-0.299***	-0.289**	-0.159	0.388*	-0.215
Housework	-0.261***	-0.221***	-0.126	-0.196**	-0.479***	-0.225**
Travel	-0.162***	-0.132	0.035	-0.089	-0.331	-0.454***
Leisure	-0.109***	-0.102***	-0.055	-0.169***	-0.017	-0.063
Self-care	-0.113***	-0.098**	-0.016	-0.103	-0.114	-0.167**
Panel C: Time use						
Work	-0.029***	-0.008	-0.040*	-0.048***	-0.049*	-0.094***
Housework	-0.009	-0.010	-0.010	-0.006	0.030	-0.051**
Travel	-0.002	-0.002	-0.002	-0.005	0.016	-0.004
Leisure	0.028***	0.012	0.037*	0.036**	-0.004	0.132***
Self-care	0.011	0.008**	0.016	0.024***	0.006	0.018
N	7,136	3,112	978	1,634	769	643
Socio-demographic controls	YES	YES	YES	YES	YES	YES
Chronic ill-health controls	YES	YES	YES	YES	YES	YES
Health-state vignettes	YES	YES	YES	YES	YES	YES
Country dummies	YES	NO	NO	NO	NO	NO

Notes: *** p<0.01, ** p<0.05, * p<0.1. Standard errors in Column (1) are computed using 250 bootstrap replications (bootstrapping was not possible in Columns (2)-(6) due to their small sample sizes). Sample weights applied. The entries are pooled (Column (1)) and country-specific (Columns (2)-(6)) country-specific average partial effects of pain (composite measure with all 3 pain domains—top 40%) on Aggregate dimensions of SWB (Panel A), activity-specific net affects (Panel B), and time use (Panel C). Average partial effects are estimated based on a linear regression (equation (2.6) in Panel A and equation (2.7) Panel B) or multivariate fractional estimators (equations (2.8) and (2.9) in Panel C). All well-being and net affects measures are standardized to mean zero and standard deviation equal to 1 using country-specific mean and standard deviation. All regressions control for a large set of socio-demographic characteristics including age dummies, gender, marital status, area of residence, ethnic minority status (except in China), household size, violent crime victim status, education, permanent income, social cohesion indicators, and long-term health conditions (angina, arthritis, asthma, cataracts, chronic lung disease, depression, diabetes, hypertension, injuries from traffic accident, poor oral health, and stroke). In addition, each regression in Panels A and B adjusts for anchoring vignettes for health-state description, restricting the sample to the afternoon group of the abbreviated version of DRM that respond only to pain and personal relationships vignettes. The regression models for activity-specific net affects (Panel B) use lower number of observations than reported in the table. Sample includes older adults with age 50 or older.

Table 2.B18: Partial saddening and time composition effects of pain (composite measure with all 3 pain domains—top 40%) on experienced utility—using only sub-sample with vignettes about pain

	Pooled
Panel A: Difference in experienced utility and its components	
Difference	-0.176***
Saddening effect	-0.169***
Time composition effect	0.022***
Additive decomposition of experienced utility components across activity groups	
Panel B: Saddening effect	
Work	-0.048***
Housework	-0.051***
Travel	-0.009***
Leisure	-0.050***
Self-care	-0.012***
Panel C: Time composition effect	
Work	0.012***
Housework	0.001
Travel	0.000
Leisure	0.006***
Self-care	0.002
N	7,136
Socio-demographic controls	YES
Chronic ill-health controls	YES
Health-state vignettes	YES
Country dummies	YES

Notes: *** p<0.01, ** p<0.05, * p<0.1. Standard errors are computed using 250 bootstrap replications. Sample weights applied. The entries are pooled average partial saddening and time composition effects of pain (composite measure with all 3 pain domains—top 40%) on experienced utility, restricting the sample to the afternoon group of the abbreviated version of DRM that respond only to pain and personal relationships vignettes (country-specific decomposed coefficients are not reported because (bootstrapped) standard errors are not computed due to their small sample sizes). Experienced utility and net affects measures are standardized to mean zero and standard deviation equal to 1 using country-specific mean and standard deviation. Each component of the saddening effect is computed using equation (2.10) and each component of the time composition effect is computed using equation (2.11). The first row of Panel A (Total difference) repeats the pain coefficients for experienced utility in Table 2.B17.

Table 2.B19: Partial association of pain (composite measure with all 3 pain domains—top 30%) with well-being and time use—adjusted for functional limitations

	China	Ghana	India	Russia	South Africa
Panel A: Aggregate well-being dimensions					
General life satisfaction	-0.200***	-0.149***	-0.109***	-0.178***	-0.068***
WHOQoL8 index	-0.300***	-0.188***	-0.147***	-0.271***	-0.254***
Emotion score	-0.254***	-0.149***	-0.218***	-0.234***	-0.196***
Experienced utility	-0.097***	0.012	0.019	-0.068***	-0.070
Panel B: Activity-specific net affects					
Work	-0.190***	-0.006	0.121	0.055	0.062**
Housework	-0.143**	-0.097	-0.024	-0.144	-0.060
Travel	-0.043	0.024	0.029*	-0.520	-0.052**
Leisure	-0.021	0.019	0.037	0.046	-0.048
Self-care	-0.075	0.008	0.073	-0.024**	-0.041*
Panel C: Time use					
Work	-0.003	-0.026	-0.017**	-0.042	-0.058***
Housework	-0.005	0.000	0.015***	0.030	-0.004
Travel	0.002	-0.004*	-0.007*	0.002	0.021***
Leisure	0.005	0.031	0.008	0.018	0.063**
Self-care	0.001	-0.001	0.000***	-0.008	-0.023
N	9,267	3,031	4,839	2,614	2,032
Socio-demographic controls	YES	YES	YES	YES	YES
Chronic ill-health controls	YES	YES	YES	YES	YES
Health-state vignettes	YES	YES	YES	YES	YES
Functional limitations adjusted	YES	YES	YES	YES	YES

Notes: *** p<0.01, ** p<0.05, * p<0.1. Standard errors are computed using 250 bootstrap replications. Sample weights applied. The entries in each column are country-specific average partial effects of pain (composite measure with all 3 pain domains—top 30%) on Aggregate dimensions of SWB(Panel A), activity-specific net affects (Panel B), and time use (Panel C) adjusting for functional limitations. Average partial effects are estimated based on a linear regression (equation (2.6) in Panel A and equation (2.7) Panel B) or multivariate fractional estimators (equations (2.8) and (2.9) in Panel C). All well-being and net affects measures are standardized to mean zero and standard deviation equal to 1 using country-specific mean and standard deviation. All regressions control for a large set of socio-demographic characteristics including age dummies, gender, marital status, area of residence, ethnic minority status (except in China), household size, violent crime victim status, education, permanent income, social cohesion indicators, and long-term health conditions (angina, arthritis, asthma, cataracts, chronic lung disease, depression, diabetes, hypertension, injuries from traffic accident, poor oral health, and stroke). In addition, each regression in Panels A and B adjusts for anchoring vignettes for health-state description. The regression models for activity-specific net affects (Panel B) use lower number of observations than reported in the table. Sample includes older adults with age 50 or older.

Table 2.B20: Partial saddening and time composition effects of pain (composite measure with all 3 pain domains—top 30%) on experienced utility—adjusted for functional limitations

	China	Ghana	India	Russia	South Africa
Panel A: Difference in experienced utility and its components					
Difference	-0.097***	0.012	0.019	-0.068***	-0.070
Saddening effect	-0.080	-0.002	0.042	-0.038***	-0.037***
Time composition effect	0.003*	0.014	0.005	0.015	0.008
Additive decomposition of experienced utility components across activity groups					
Panel B: Saddening effect					
Work	-0.031**	-0.001	0.016	0.011	0.007**
Housework	-0.028**	-0.012	-0.005	-0.038	-0.012
Travel	-0.001	0.002	0.002*	-0.026	-0.003**
Leisure	-0.010	0.008	0.016	0.018*	-0.020
Self-care	-0.008	0.001	0.013	-0.002***	-0.008*
Panel C: Time composition effect					
Work	0.001	0.007	0.005**	0.017	-0.001**
Housework	0.001	0.000	-0.002***	-0.003	0.000
Travel	0.000	0.001*	0.000	-0.001*	0.001
Leisure	0.001	0.006	0.001	0.006	0.013**
Self-care	0.000	0.000	0.000**	-0.004	-0.004
N	9,267	3,031	4,839	2,614	2,032
Socio-demographic controls	YES	YES	YES	YES	YES
Chronic ill-health controls	YES	YES	YES	YES	YES
Health-state vignettes	YES	YES	YES	YES	YES
Functional limitations adjusted	YES	YES	YES	YES	YES

Notes: *** p<0.01, ** p<0.05, * p<0.1. Standard errors are computed using 250 bootstrap replications. Sample weights applied. The entries in each column are country-specific average partial saddening and time composition effects of pain (composite measure with all 3 pain domains—top 30%) on experienced utility adjusting for functional limitations. Experienced utility and net affects measures are standardized to mean zero and standard deviation equal to 1 using country-specific mean and standard deviation. Each component of the saddening effect is computed using equation (2.10) and each component of the time composition effect is computed using equation (2.11). The first row of Panel A (Total difference) repeats the pain coefficients for experienced utility in Table 2.B5.

Table 2.B21: Partial association of pain (composite measure with all 3 pain domains—top 40%) with well-being and time use—adjusted for functional limitations

	China	Ghana	India	Russia	South Africa
Panel A: Aggregate well-being dimensions					
General life satisfaction	-0.231***	-0.150***	-0.123***	-0.205***	-0.081***
WHOQoL8 index	-0.343***	-0.172***	-0.147***	-0.260***	-0.229***
Emotion score	-0.237***	-0.167***	-0.233***	-0.148***	-0.164***
Experienced utility	-0.100***	0.034	0.000	0.004	-0.077**
Panel B: Activity-specific net affects					
Work	-0.194**	-0.075**	0.061	0.250	-0.062*
Housework	-0.145***	-0.138*	-0.098*	-0.101	-0.092
Travel	-0.041	0.058	0.054	-0.187	-0.161**
Leisure	-0.030	0.072	0.008	0.009	-0.027
Self-care	-0.083**	0.064	0.067**	0.025*	-0.091**
Panel C: Time use					
Work	-0.006	0.000	-0.005	-0.044***	-0.040*
Housework	0.009**	0.007	0.006**	0.035***	-0.007
Travel	0.003	-0.002*	-0.011***	0.003	0.010
Leisure	-0.010*	0.010	0.007	0.013	0.048
Self-care	0.005***	-0.015	0.002	-0.006	-0.011
N	9,267	3,031	4,839	2,614	2,032
Socio-demographic controls	YES	YES	YES	YES	YES
Chronic ill-health controls	YES	YES	YES	YES	YES
Health-state vignettes	YES	YES	YES	YES	YES
Functional limitations adjusted	YES	YES	YES	YES	YES

Notes: *** p<0.01, ** p<0.05, * p<0.1. Standard errors are computed using 250 bootstrap replications. Sample weights applied. The entries in each column are country-specific average partial effects of pain (composite measure with all 3 pain domains—top 40%) on Aggregate dimensions of SWB(Panel A), activity-specific net affects (Panel B), and time use (Panel C) adjusting for functional limitations. Average partial effects are estimated based on a linear regression (equation (2.6) in Panel A and equation (2.7) Panel B) or multivariate fractional estimators (equations (2.8) and (2.9) in Panel C). All well-being and net affects measures are standardized to mean zero and standard deviation equal to 1 using country-specific mean and standard deviation. All regressions control for a large set of socio-demographic characteristics including age dummies, gender, marital status, area of residence, ethnic minority status (except in China), household size, violent crime victim status, education, permanent income, social cohesion indicators, and long-term health conditions (angina, arthritis, asthma, cataracts, chronic lung disease, depression, diabetes, hypertension, injuries from traffic accident, poor oral health, and stroke). In addition, each regression in Panels A and B adjusts for anchoring vignettes for health-state description. The regression models for activity-specific net affects (Panel B) use lower number of observations than reported in the table. Sample includes older adults with age 50 or older.

Table 2.B22: Partial saddening and time composition effects of pain (composite measure with all 3 pain domains—top 40%) on experienced utility—adjusted for functional limitations

	China	Ghana	India	Russia	South Africa
Panel A: Difference in experienced utility and its components					
Difference	–0.100***	0.034	0.000	0.004	-0.077**
Saddening effect	-0.086**	0.014	0.008	0.020	-0.064***
Time composition effect	0.000	-0.002	0.002	0.014**	0.007
Additive decomposition of experienced utility components across activity groups					
Panel B: Saddening effect					
Work	-0.032**	-0.015**	0.008	0.050	-0.007**
Housework	-0.029***	-0.017*	-0.019*	-0.027	-0.018
Travel	-0.001	0.004	0.004	-0.009	-0.009**
Leisure	-0.015	0.032	0.004	0.004	-0.012
Self-care	-0.009**	0.010	0.012**	0.002*	-0.018**
Panel C: Time composition effect					
Work	0.003	0.000	0.002	0.018***	-0.001
Housework	-0.002*	0.000	-0.001**	-0.004**	-0.001
Travel	0.000	0.000*	0.000*	-0.001	0.000
Leisure	-0.002*	0.002	0.001	0.004	0.010
Self-care	0.000**	-0.004	0.001	-0.003	-0.002
N	9,267	3,031	4,839	2,614	2,032
Socio-demographic controls	YES	YES	YES	YES	YES
Chronic ill-health controls	YES	YES	YES	YES	YES
Health-state vignettes	YES	YES	YES	YES	YES
Functional limitations adjusted	YES	YES	YES	YES	YES

Notes: *** p<0.01, ** p<0.05, * p<0.1. Standard errors are computed using 250 bootstrap replications. Sample weights applied. The entries in each column are country-specific average partial saddening and time composition effects of pain (composite measure with all 3 pain domains—top 40%) on experienced utility adjusting for functional limitations. Experienced utility and net affects measures are standardized to mean zero and standard deviation equal to 1 using country-specific mean and standard deviation. Each component of the saddening effect is computed using equation (2.10) and each component of the time composition effect is computed using equation (2.11). The first row of Panel A (Total difference) repeats the pain coefficients for experienced utility in Table 2.B6.

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CHAPTER 3

Assessing the Direct Relationship Between Experienced and Evaluative Well-being Among Older Adults in the Developing World

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This paper applies an abbreviated version of the Day Reconstruction Method (DRM) to assess the extent to which people's subjective assessment of their emotional experiences during the course of their day (called experienced well-being) is related to their overall cognitive judgments of their lives (called evaluative well-being) using the WHO Study on Global Ageing and Adult Health. To identify direct association, we account for common objective determinants of both dimensions of subjective well-being and adjust for self-reporting behavior between the two by using anchoring vignettes for health-state description as control functions in a multivariable linear regression framework. The results show that distinct aspects of evaluative well-being are moderately and non-linearly associated with measures of experienced well-being. Furthermore, the results suggest that age has a dampening effect on the association of evaluative well-being with experienced well-being but income does not appear to have such an effect.

Keywords: *subjective well-being; experienced well-being; evaluative well-being.*
JEL Classification: *D12, I31.*

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3.1 INTRODUCTION

Notions of subjective well-being (SWB) have a long tradition as central elements of quality of life. This is in part due to insufficiency of conventional market-based measures of income, wealth and consumption to adequately portray human well-being due to the presence of externalities or environmental damage caused by production and consumption activities [Stiglitz et al., 2009]. Also, SWB does not only complement standard aggregate well-being measures such as GDP, but also it reflects a wider range of experiences, including those unrelated to market exchange [Diener & Seligman, 2004; Kahneman & Krueger, 2006]. In recent decades, a large body of evidence has shown that distinct dimensions of SWB can be reliably and quantitatively measured using state-of-the-art surveying techniques [Benjamin, Heffetz, Kimball, & Szembrot, 2014; Krueger & Schkade, 2008; National Research Council, 2013; OECD, 2013]. This evidence has been reflected in the increasing interest in SWB from both researchers and policy-makers as well as in the exponential growth of research in this field in recent years [OECD, 2013], leading economists to increasingly use SWB questions as an empirical proxy for utility.

Research distinguishes between two broad forms of SWB, namely, evaluative and experienced well-being [National Research Council, 2013; OECD, 2013].[1] They are distinct yet complementary aspects of well-being with different determinants, antecedents and consequences that go well beyond people's income and material conditions [Stiglitz et al., 2009]. Evaluative well-being consist of individuals' cognitive global evaluation of their lives when they pause and reflect whereas experienced well-being comprises individuals' feelings (affective experiences) during day-to-day moments of life such as joy or worry [Killingsworth, 2021]. While evaluative well-being focuses on cognitive judgments about life in general and is thus heavily influenced by introspective evaluation, memory, cultural disposition and self-conceptualization, experienced well-being characterizes individuals' continuous flows of pleasure and pain, i.e., sequences of momentary positive or negative affective experiences over the life course, and is thus less influenced by introspection, memory or cultural disposition [Kahneman & Riis, 2005]. While test-retest reliability of experienced well-being is close to that of evaluative well-being when surveys are administered two weeks apart [Krueger & Schkade, 2008], day-to-day variability of experienced well-being may be higher due to, say daily mood patterns [National Research Council, 2013; Stone et al., 2012].

Individuals' choices tend to maximize their evaluative well-being, with evaluative well-being and choice (decision utility) coinciding 83% of the time on average [Benjamin et al., 2012]. Both SWB

[1] Experienced and emotional well-being are used interchangeably in the literature.

dimensions often show different relationships with important demographic and socioeconomic characteristics, such as age [Kieny et al., 2020; Stone et al., 2010], gender [Kieny et al., 2021], health [Amo-Agyei & Maurer, 2022; Miret et al., 2017], income [Kahneman & Deaton, 2010; Kapteyn et al., 2015; Killingsworth, 2021] and unemployment [Knabe et al., 2010]. Yet, there is not adequate evidence that quantify the direct relationship between these two forms of SWB. This paper attempts to fill this gap in the literature by studying the direct association between different dimensions of both evaluative and experienced well-being.

From the viewpoint of economic theory, the difference between evaluative and experienced well-being closely mirrors the common distinction between decision utility on the one hand and experienced utility on the other. Decision utility is based on personal cognitive evaluations about life and can therefore be deduced from observed choices. In contrast, experienced utility captures the continuous stream of individuals' momentary affective experiences [Dolan & Kahneman, 2007; Kahneman & Krueger, 2006]. While experienced utility may differ from persons' cognitively constructed evaluations of different time uses due to, say, biases in memory, cultural dispositions or self-conceptualization [Benjamin et al., 2012; Benjamin, Heffetz, Kimball, & Rees-Jones, 2014], it can be directly measured from data on time use and individuals' affective experiences during these activities using methods such as experienced sampling [Csikszentmihalyi & Hunter, 2003; Larson & Csikszentmihalyi, 1983] or the Day Reconstruction Method (DRM) [Kahneman et al., 2004a]. Both SWB concepts are in line with utility concepts in economic theory: evaluative well-being reflects utility stock over a life course or the value function which is conceptually equivalent to the indirect utility function whereas experienced well-being reflects the concept of flow utility (over a day), instantaneous utility function or the felicity function.

We consider two primary issues in our study. First, we ask to what extent evaluative well-being predicts experienced well-being in the population of older adults using data from the first wave of the WHO Study on Global Ageing and Adult Health (SAGE), collected between 2007-2010 [Kowal et al., 2012]. To do so, we estimate the partial association of evaluative well-being with experienced well-being using linear regression estimations while controlling for age and gender only (*age- and gender-adjusted model*). We do this estimation separately for five low- and middle-income countries (LMICs) where SAGE is implemented, namely, China, Ghana, India, the Russian Federation and South Africa.

Second, we attempt to assess the channels of association between the two forms of SWB. We hypothesize three potential channels of association between the two: (i) common objective causes; (ii) fixed personality traits that result in common rating style between the two SWB dimensions; and

(iii) direct association between the two due to, say, differential aspirations, expectations and personality factors of respondents. Keeping personal characteristics and life circumstances constant, we assess the association between the two forms of SWB. We do this by expanding the regression analysis in the first question to include covariates that capture respondents' personal characteristics and life circumstances (referred to as *fully-adjusted model*) as well as controls for reporting heterogeneity (referred to as *fully- and reporting scale-adjusted model*).

Our approach follows a more behavioral economics perspective and deviates from standard preferences/utility representation framework such as the framework proposed by Epstein & Zin [1989, 1991] and Weil [1990] which expresses an individual life's utility stock (which is reflected by evaluative well-being in this paper) as a combination of the individual's discounted felicity function (experienced well-being in this paper) which captures the flow of utility from consumption and leisure, and their expected utility over the life course (continuation utility). Our approach deviates from this standard utility representations by setting experienced well-being as the outcome variable and evaluative well-being as the explanatory variable. This approach has the advantage of better handling the potential measurement errors in the experienced well-being measures due to say, temporal instability of the responses.

Our analysis yields two main results. First, we find that in all the five countries studied, evaluative well-being is moderately associated with measures of experienced well-being. This association is attenuated when we account for individuals' demographic and socioeconomic characteristics as well as individual reporting heterogeneity. Our second main result is that age appears to have a dampening effect on the association of evaluative well-being with experienced well-being whereas income does not.

These results are important for applied work, in particular in the use of SWB as a proxy for utility or as a portrayal of human well-being. Our estimates suggest that there should be caution in using both SWB dimensions interchangeably as a proxy for utility in applied work due to the weak to moderate association between the two. Our findings confirm that though they are complementary, evaluative and experienced well-being dimensions capture different underlying phenomena.

We use a variety of SWB definitions and empirical approaches to test the robustness of our main results. First, we use two measures of evaluative well-being: general life satisfaction and WHO Quality of Life Index (modeled after individuals' cognitively evaluations across eight distinct life domains). Similarly, we use two measures of experienced well-being, comprising experienced utility (duration-weighted affective experiences during everyday activities) and emotion score (sum of binary responses of how individuals felt overall in the day preceding the survey interview).

Second, we test the direct association between the two measures of evaluative well-being and five activity-group-specific net affects (reflecting various scenarios of experienced utility). We analyse how our results differ across the various measures of SWB and across scenarios.

Comparing the two measures of evaluative well-being with the experienced well-being measures—experienced utility and emotion score—, we find that the association of general life satisfaction with the measures of experienced well-being is at least as high as that of the WHO Quality of Life Index. We also find that across the countries in the study sample, the association of general life satisfaction with emotion score is much higher compared to its association with experienced utility. Similarly, the association of the WHO Quality of Life Index with emotion score is much higher compared to its association with experienced utility. Lastly, comparing estimates across the five activity-group-specific net affects and across all countries, we observe much stronger and robust link between leisure- and housework-specific net affects and evaluative well-being compared to net affects associated with work, travel or self-care when demographic and socioeconomic characteristics as well as reporting heterogeneity are held constant.

Much previous research has studied the relationship between evaluative and experienced well-being through how both dimensions of well-being predict individuals' choices or how they relate with demographic and socioeconomic characteristics.[2] Our work is most closely related to studies reported in Diener et al. [2010, 1995]; Kahneman & Krueger [2006]; Kapteyn et al. [2015]; OECD [2013]; and Tellegen et al. [1994] that assess the direct relationship between life evaluation and experienced well-being. Diener et al. [1995], Kapteyn et al. [2015] and Tellegen et al. [1994] study the relationship between positive and negative affect (both reflecting experienced well-being) and show a moderate correlation between the two. Diener et al. [2010] show that there is a high correlation across countries between the most commonly used average measures of life evaluation, but a much lower correlation between net affect and life evaluation measures. Similarly, Kahneman & Krueger [2006] report only a moderate correlation between life satisfaction and net affect. In OECD [2013], the authors assess the correlation between individual measures of life evaluation derived from the Gallup World Poll, positive affect, negative affect and eudaimonic well-being (purpose) across respondents in 34 OECD countries and show that correlation is highest between positive and negative affect, lowest between purpose and negative affect, and moderate between life satisfaction, affect and purpose.

However, our paper differs from the previous studies in two major ways. The first difference lies in the manner in which our SWB measures are constructed. Apart from general life satisfaction

[2]See examples of such studies in the third paragraph of the introduction secion (Section 3.1).

and emotion score which are similar to well-being measures in the previous studies, our measures of experienced utility and WHO Quality of Life Index are much different. We express experienced utility as duration-weighted affective experiences during everyday activities. Specifically, we use detailed data on time use and activity-specific affective experiences during the previous day from SAGE's abbreviated DRM module. This way, the net affect we use accounts for the duration of each emotion spell experienced by individuals during the day. The WHO Quality of Life Index, on the other hand, is a composite measure of respondents' satisfaction encompassing eight life domains including overall quality of life, health, energy for everyday life, ability to perform activities of daily living (ADL), self-esteem, personal relationships, financial situation, and living conditions. Secondly, our analyses go beyond estimating simple correlations by controlling for common objective determinants of evaluative and experienced well-being as well as adjusting for common self-rating behavior between the two in a multivariable linear regression framework. As far as we are aware, our study is the first to quantitatively estimate the direct relationship between experienced and evaluative well-being using diary-based measures of experienced well-being in broad populations of mature adults in LMICs while adjusting for heterogeneous reporting behaviour. Our study thus fills an important gap in the literature, as previous evidence on the relationship between evaluative and experienced well-being either show only correlations and/or are mainly based on surveys from higher income countries.

We proceed as follows. The next section describes the data, discusses the measures of SWB and outlines the econometric approach we adopt in the study. Section 3.3 presents summary statistics of the studied sample followed by the main empirical results in Section 3.4. The last section concludes.

3.2 METHODS

3.2.1 Data

We use data from the first wave of the WHO Study on Global AGEing and Adult Health (SAGE), collected between 2007-2010 [Kowal et al., 2012].[3] SAGE is a multi-disciplinary and multi-country study on aging in six LMICs, namely China, Ghana, India, Mexico, the Russian Federation and South Africa. The study focuses on individuals with age 50 years or older but also includes small comparison samples of adults with age 18-49 years. We use SAGE data from China, Ghana, India, the Russian Federation and South Africa from WHO's public use files, and restrict the sample to

[3]WHO's SAGE is designed as a longitudinal study collecting data on adults aged 50 years and older, plus a smaller comparison sample of adults aged 18-49 years, from nationally representative samples in six LMICs. As of the time of this writing this, only data from wave 1 (collected between 2007 and 2010) were publicly available.

respondents with age 50 years or older.[4]

SAGE has several features that make it unique. Reflecting its design as a multi-purpose survey, SAGE contains extensive individual- and household-level data on several life domains, such as socio-demographic characteristics, family and social relationships, and health and healthcare use. It also contains extensive information on individuals' SWB, covering aspects of both evaluative and experienced well-being. Regarding evaluative well-being, SAGE contains a range of measures comprising general life satisfaction as well as domain-specific satisfaction such as satisfaction with oneself, health, personal relationships, conditions of living place, among others. In terms of experienced well-being, SAGE collects data on 14 positive and negative emotions over the day preceding the survey interview as well as an abbreviated version of the Day Reconstruction Method (DRM) [Kahneman et al., 2004a], which combines data on time use with measurements of affective experiences through time. In addition, the SAGE data facilitates conducting parallel analyses on countries in different regions of the world and across different cultural contexts at the same time based on fully harmonized data (in terms of sampling and interview procedures). Such analyses allow to determine whether estimates are robust across multiple settings and, therefore, whether they represent a general pattern or some country-specific idiosyncratic associations.

To measure experienced well-being, SAGE randomly allocates individuals to four sets of assessments of emotional well-being referring to the morning, afternoon, evening or entire day preceding the survey interview. The randomly selected full day sample (7,649 observations) does not report a detailed time diary along with activity-specific affects as required for the measurement of experienced utility and is therefore dropped from the sample. Dropping observations with missing information on any variable we used in the regression analysis results in an additional loss of 1,313 observations. Following the above sample selection procedures, the final sample in the analysis comprises 21,835 respondents from all five countries, with country-specific sample sizes ranging from 2,059 in South Africa to 9,265 in China.

3.2.2 Measures

We distinguish two major dimensions of SWB, namely evaluative well-being and experienced well-being.

[4]We exclude the Mexican sample (2,070 observations) from our analysis, as about 50% of this sample has incomplete interviews with missing information on our main outcomes of interest from the well-being module.

3.2.2.1 *Evaluative well-being*

Evaluative well-being refers to peoples' cognitive assessment of the quality or goodness of various aspects of their lives, their overall life satisfaction, or sometimes how happy they are generally with their lives. This dimension of SWB reflects key economic concepts such as utility stock or the value function, which is conceptually equivalent to the indirect utility function—the individual's maximal attainable utility when faced with a vector of goods prices or choice and a budget constraint.

In this paper, we analyze two different measures of evaluative well-being. The first is general life satisfaction, which is measured on a five-point Likert scale. It is based on individuals' responses to the question "*Taking all things together, how satisfied are you with your life as a whole these days?*", with responses ranging from 0 (very dissatisfied) to 4 (very satisfied).[5]

The second is a composite quality of life measure—the WHO Quality of Life Index (also referred to as EUROHIS-QOL 8 index [Power, 2003]), which we will refer to as 'WHOQoL8' hereafter. We construct WHOQoL8 by summing the scores of individuals' cognitive evaluation of their satisfaction in eight different life domains,[6] each measured on a five-point scale ranging from 0(very dissatisfied) to 4 (very satisfied). Our constructed WHOQoL8 score therefore ranges from 0 to 32 with higher values depicting higher quality of life. To complement our composite measure of quality of life, we also include analysis of the eight separate domains of the WHOQoL8 score.

3.2.2.2 *Experienced well-being*

Experienced well-being characterizes individuals' continuous flows of feelings during day-to-day moments of life. This dimension of SWB reflects the economic concept of flow utility, instantaneous utility function or the felicity function, which characterizes the utility of a given individual's consumption at any given point in time.

We measure experienced well-being by using two strategies. First, we construct an emotion score based on individuals' binary responses to questions about whether they experienced a total of 14 distinct emotions overall for much of the day preceding the survey interview.[7] To make the emotion score increasing in better well-being, we reversed the original binary codes of the negative

[5] We have transformed and reversed the original scores of all well-being measures so that a higher score represents better well-being.

[6] (i) Overall quality of life; (ii) Health; (iii) Energy for everyday life; (iv) Ability to perform activities of daily living (ADL); (v) Themselves/their self-esteem; (vi) Personal relationships; (vii) Ability to meet personal needs; and (viii) Conditions of living place.

[7] Three positive emotions comprising *smiled or laughed a lot, enjoyed what one did much of the day* and *felt calm or relaxed much of the day*; and 11 negative emotions consisting of felt *worried, rushed, irritated or angry, depressed, tense or stressed, lonely, bored, physical pain, sleepy* and had *stomach ache or headache*.

emotions such that an emotion takes value 1 if a respondent reports the presence of a positive emotion or the absence of a negative emotion and 0 otherwise. The emotion score thus ranges from 0 (least net affects) to 14 (greatest net affects). We also include the detailed 14 separate domains of emotion score in the analysis to show a more complete picture.

The second measure of experienced well-being, experienced utility, is duration-weighted affective experiences during everyday activities of the preceding day of the interview. We use detailed data on time use and activity-specific affective experiences provided by the abbreviated DRM module of the SAGE data. Time use and corresponding affective experiences during the previous day were assessed for up to 10 successive activities from a list of 22 possible non-sleep activities. Measurement of time and affective experiences started at the time after waking up (morning group), at mid-day (afternoon group) or at 6 p.m. (evening group), depending on the respondents' randomly assigned group. Combining the data from all respondents, we are able to estimate time use and affective experiences of different population groups throughout the entire day. The abbreviated DRM adopted by SAGE has been shown to lead to measures of experienced well-being similar to full DRM instruments [Miret et al., 2012].

For each non-sleep activity reported in the SAGE's time diary, respondents rate the presence or absence, as well as the intensity of two positive (*felt calm or relaxed* and *enjoyed* when doing the activity) and five negative (*felt worried, rushed, irritated or angry, depressed* and *tense or stressed* when doing the activity) affects on a three-point scale ranging from 0 (not at all) to 2 (very much). Using a detailed list of 22 possible non-sleep activities results in a relatively high frequency of non-participation for certain infrequent activities such as religious activities or intimate relations. To make the data more easily presentable, we follow previous studies [Flores et al., 2015; Kieny et al., 2020, 2021] and regroup the 22 activities into five naturally-related broader categories corresponding to work, housework, traveling/commuting, leisure and self-care to avoid very small participation rates in certain detailed activity groups.[8]

Based on the broader grouping of activities, we follow the general approach of Kahneman et al. [2004b] and Knabe et al. [2010]—which has been previously used in Flores et al. [2015] and Kieny et al. [2020, 2021]—and compute experienced utility as duration-weighted net affect, i.e., the sum

[8]Similar to previous studies, our work classification comprises working and subsistence farming activities. Housework includes preparing food, doing housework, watching children, shopping and providing care to someone. Traveling by bicycle, public transportation and walking somewhere are classified as traveling and commuting. We define leisure as resting (including tea or coffee break), chatting with someone, playing (including cards and games), reading, watching TV or listening to radio, exercising or leisure walking, and other leisure activities. Finally, self-care groups grooming or bathing (oneself), eating, religious activities, and intimate relations/sex. Resulting individual-level participation rates for our broader five activity groups across all country samples range from 14.9% for traveling in China to 90.5% for leisure in India.

of the stream of pleasures and pains associated with activities performed during the part of the day covered by the abbreviated DRM. We define individual i's net affect during activity group a (called 'activity-specific net affect') as

$$u_{ia} = \sum_{s} \left(\sum_{l} h_{is} PA_{is}^{l} - \sum_{k} h_{is} NA_{is}^{k} \right) \quad \forall a = 1, \ldots, 5 \tag{3.1}$$

where PA_{is}^{l} represents the affect rating of the lth positive emotion reported by individual i for a single spell s of possible multiple mentions of activity group a, and NA_{is}^{k} represents the affect rating of the kth negative emotion. The time weight h_{is} is thereby defined as

$$h_{is} = \frac{t_{is}}{T_{ia}} \tag{3.2}$$

where t_{is} refers to the duration of a single spell s of possible multiple mentions of activity group a and T_{ia} refers to the overall time individual i spent on activity group a.

We further define experienced utility of individual i as aggregated net affect, i.e., as the duration-weighted sum of net affects by activity group:

$$U_i = \sum_{a} \tau_{ia} u_{ia} \tag{3.3}$$

where τ_{ia}=T_{ia}/T_i is the fraction of non-sleep time individual i spent on activity group a relative to their total time covered by the 10 successive activities reported in their randomly assigned set of the abbreviated DRM (morning, afternoon or evening set). Non-sleep time is unevenly distributed across morning, afternoon and evening sets of the abbreviated DRM. Thus, to ensure comparability of results across DRM groups with different starting times, we use time shares rather than absolute activity group durations as weighting factors. Similar to emotion score, experienced utility also ranges from 0 (least duration-weighted net affect) to 14 (greatest duration-weighted net affect).

All the four measures of SWB used in this study, as well as other household level characteristics such as household size are standardized using country level means and standard deviations such that estimated differences ought to be interpreted in country-specific standard deviation units of the respective outcome. Hereafter, we refer to the two measures of evaluative well-being as 'life satisfaction', 'WHOQoL8', and the two measures of experienced well-being as 'emotion score' and 'experienced utility'.

3.2.3 Covariates

To isolate the direct association of evaluative well-being—life satisfaction and WHOQoL8—with experienced well-being—emotion score and experienced utility—, we control for demographic and socioeconomic characteristics as well as other life circumstances that may be correlated with both SWB dimensions. Specifically, our multivariable models control for respondents' age, gender, marital/partnership status, household composition, minority status, place of residence (rural versus urban), level of education, employment status, whether the respondent has ever been a victim of violent crime, and an indicator of household permanent income—which we derive from a household asset/wealth index. We also control for individuals' social cohesion indicators comprising community involvement, trust in others, and perceived safety of their environment, as well as their health status, which we proxy for by a measure of the respondents' disability status based on a 12-item version of the WHO Disability Assessment Schedule (WHODAS 2.0) which includes impairments and limitations in performing activities of daily living (ADL) [Üstün et al., 2010].[9]

To make the estimates comparable across countries, we normalize the respondents' social cohesion indicators as well as their disability score using the minimum and maximum values of each score for each country based on the following algorithm inspired by Gertler & Gruber [2002] and Stewart et al. [1990]:

$$Indicator = \frac{\text{Score} - \text{Min score}}{\text{Max score} - \text{Min score}}$$

where $Indicator \in [0, 1]$ represents the respondents' social cohesion indicators and disability score. The *Indicator* index takes on a value of zero if the respondent has no disability or no social cohesion and value 1 if the respondent has complete social cohesion or severe disability.

To improve comparability of responses across individuals and to adjust for common self-rating behavior between evaluative and experienced well-being, we use anchoring vignettes for health-state description as a form of control functions [Wooldridge, 2015] in our multivariable linear regression framework. The SAGE data contains health-state vignettes that consist of brief stories describing the health-state of someone of the same age and background as the respondent. Respondents from the same randomly assigned group of the abbreviated DRM responded to the same set of vignettes, with each set including 10 vignettes with two questions each.[10]

[9] See Flores et al. [2015] for a complete discussion of the disability measure (WHODAS-12) we use in this study.

[10] The morning group (Group A) responded to 'mobility and affect' vignettes, the afternoon group (Group B) responded to 'pain and personal relationships' vignettes, whiles the evening group (Group C) responded to 'vision, sleep and energy' vignettes.

3.2.4 Econometric approach

The relationship between evaluative and experienced well-being can be estimated using two alternative approaches. One approach is by following the standard utility representation framework such as the framework proposed by Epstein & Zin [1989, 1991] and Weil [1990] where the theoretical direction of causality is from experienced well-being (utility flow) to evaluative well-being (utility stock). The second approach which we adopt in this paper is an approach based on behavioral economics perspective, which deviates from the standard approach by setting experienced well-being as the outcome variable and evaluative well-being as the explanatory variable. The latter approach has the advantage of better handling the potential measurement errors in the experienced well-being measures due to temporal instability, that is the day-to-day variability in the flow of experienced well-being.

The objective of this study is to analyse the direct association of evaluative well-being with experienced well-being while accounting for common sources of dependence between the two. In addition, we assess the relative association of evaluative well-being with activity-specific affective experiences to understand where among the activity groups is the association strongest. We do the estimation separately for each country to avoid potential issues of unobserved country-specific heterogeneity due to say, response category differential item functioning (DIF) across countries [King et al., 2004].[11] To the extent that we do not attempt to make explicit cross-country comparisons, the multi-country setting of SAGE has the important advantage of allowing us to check the consistency of our findings across different cultural settings and levels of economic development. We thus interpret potential similarities in our findings across countries as evidence for the robustness and consistency of the close association of evaluative well-being with experienced well-being across different countries.

We first assess the overall association of evaluative well-being with experienced well-being using an *age- and gender-adjusted* specification by regressing standardized measures of experienced well-being—experienced utility, activity-specific net affects, and emotion score—on standardized evaluative well-being measures—life satisfaction and WHOQoL8—, while controlling for gender and age only (expression (3.4)). We then control for additional demographic and socioeconomic characteristics as well as other life circumstances in the framework of a *fully-adjusted* specification to adjust for common objective sources of dependence between the two SWB dimensions (expres-

[11] For example, countries may differ in their use of response categories, that is, in where along the general life satisfaction spectrum they locate thresholds between "very dissatisfied" and "dissatisfied", "neutral" and "satisfied", and so on. Several studies find evidence of differential use of response categories of subjective reporting across countries [see, e.g., Banks et al., 2007; Jürges, 2007; Zimmer et al., 2000].

sion (3.5)). Finally, in expression (3.6), we adjust for individual reporting heterogeneity by including vignettes for health-state description as control functions based on Cameron & Trivedi [2005, p. 37] and Wooldridge [2015] to appropriately control for unobserved individual personality traits such as common self-reporting style between evaluative and experienced well-being. To estimate the partial associations of evaluative well-being with experienced well-being, we estimate country-specific weighted linear regressions of the form:[12]

$$\text{ExWB}_i = \beta_0 + \beta_1 \text{EvWB}_i + \beta_2 \text{Female}_i + \beta_3 \text{Age}_i + \varepsilon_i \tag{3.4}$$

$$\text{ExWB}_i = \beta_0 + \beta_1 \text{EvWB}_i + X_i' \Gamma_1 + \epsilon_i \tag{3.5}$$

$$\text{ExWB}_i = \beta_0 + \beta_1 \text{EvWB}_i + X_i' \Gamma_1 + V_i' \rho + \eta_i \tag{3.6}$$

by ordinary least squares (OLS), where ExWB_i represents experienced well-being comprising experienced utility, activity-specific net affects, and emotion score; EvWB_i is evaluative well-being (life satisfaction and WHOQoL8); X_i is a vector of observed individual demographic and socioeconomic characteristics as well as other life circumstances; and V_i is a vector of control functions, that is anchoring vignettes for health-state description.

3.3 Summary statistics

Table 3.1 presents summary statistics of the pooled baseline sample used in the estimation.[13] The sample is restricted to individuals with age 50 years or older, which is the main population focus of SAGE. The average respondent across the five countries is about 62 years old, with country-specific age averages ranging from 61.4 in India to 64.3 in Ghana. About 52% of the sample are women and 75% are married or cohabiting. Fifty-six percent live in rural areas and about 10% are ethnic minorities with notable variations across countries—while only 1% of older adults in China belong to minority ethnic groups, the corresponding share in Ghana is more than 51%. There are about 3 persons (including adults and children) in a typical household across the studied sample.

In terms of socioeconomic status, on average, about 42% of the respondents have less than primary education with only about 7% having college or university education. Of course there are wide variations across countries. For example, while about 64% of respondents from Ghana have less than primary education, only 2% of those from Russia have less than primary education.

[12] All regression estimates reported in this chapter use country-specific sample weights. The weighted estimates are closely comparable to the unweighted ones (not reported).

[13] Tables 3.A1-3.A5 in Appendix 3.A provide details of country-specific summary statistics.

Around 43% of the sample are actively employed whiles only about 2% were victims of a violent crime in the past 12 months preceding the survey interview. Pointing to the social cohesion indicators, older adults on average have a good level of trust in others (they score 0.47 out of 1 on the trust indicator), generally feel safe in their communities (score 0.64 out of 1) but tend to be moderately involved in their communities (score 0.25 out of 1). We also observe a notable degree of disability (measured by WHODAS-12 score) in the population of older adults in the five countries. The average disability score is 0.16 out of 1, with the country-specific averages ranging from 0.08 in China to 0.24 in India.

Pointing to the SWB measures, respondents on average have high levels of both evaluative and experienced well-being. Average life satisfaction is 2.7 out of a maximum of score of 4 and WHOQoL8 has a mean of 20.2 out of a total score of 32. Similarly, average emotion score and experienced utility are 11.4 and 12.1, respectively out of a total score of 14 in each category. Average activity-specific net affect also ranges from 11.4 (in the case of working) to 12.4 (in the case of self-care) out of a total of 14 in each activity-specific group. Going beyond the aggregates SWB measures, we also report estimates of the eight separate domains of WHOQoL8, the 14 domains of emotion score, as well as the positive and negative components of experienced utility (Table 3.2. By looking at the separate WHOQoL8 domains, the respondents' quality of life measures range from 2.1 (for ability to meet personal needs) and 2.8 (satisfaction with personal relationships) on average out of a maximum score of 4. For positive emotions, 75% of respondents report feeling calm or relaxed much of the day, 74% report they enjoyed their activities much of the day, while only 43% report they smiled or laughed during the day. The incidence of negative emotions was rather low with sleepiness, physical pain, and feeling rushed or worried being among the most reported in the sample. Turning to experienced utility, respondents on average report duration-weighted positive affects of 2.7 out of a maximum score of 4 and reversed negative affects of 9.34 out of a maximum of 10.

Table 3.1: Summary statistics

	Obs.	Mean	Std. dev.	Min	5th percentile	Median	95th percentile	Max
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Demographics								
Age (years)	21,835	62.33	9.31	50	51	60	80	114
50-59	21,835	0.47	0.50	0	0	0	1	1
60-69	21,835	0.30	0.46	0	0	0	1	1
70-79	21,835	0.18	0.38	0	0	0	1	1
80+	21,835	0.05	0.23	0	0	0	1	1
Female	21,835	0.52	0.50	0	0	1	1	1
Married/cohabiting	21,835	0.75	0.43	0	0	1	1	1
Rural	21,835	0.56	0.50	0	0	1	1	1
Ethnic minority	21,835	0.10	0.31	0	0	0	1	1
No. of adults	21,835	2.58	2.17	1	1	2	7	19
No. of kids	21,835	0.89	1.64	0	0	0	4	20
Household size	21,835	3.47	3.22	1	1	2	10	28
Socioeconomic status								
Education: Less than primary	21,835	0.42	0.49	0	0	0	1	1
Primary	21,835	0.16	0.36	0	0	0	1	1
Secondary	21,835	0.16	0.36	0	0	0	1	1
High school	21,835	0.19	0.39	0	0	0	1	1
$\geq$ College/university	21,835	0.07	0.26	0	0	0	1	1
Permanent income: Q1 (poorest 25%)	21,835	0.24	0.43	0	0	0	1	1
Q2 (second poorest 25%)	21,835	0.24	0.43	0	0	0	1	1
Q3 (second richest 25%)	21,835	0.25	0.43	0	0	0	1	1
Q4 (richest 25%)	21,835	0.26	0.44	0	0	0	1	1
Working	21,835	0.43	0.49	0	0	0	1	1
Violent crime victim	21,835	0.02	0.14	0	0	0	0	1
Social cohesion indicators								
Community involvement	21,835	0.25	0.15	0	0.04	0.23	0.54	1
Trust in others	21,835	0.47	0.20	0	0.08	0.50	0.75	1
Safety	21,835	0.64	0.25	0	0.13	0.75	1	1
Disability measure								
Disability score	21,835	0.16	0.17	0	0	0.10	0.52	1
Evaluative well-being								
General life satisfaction	21,835	2.65	0.74	0	1	3	4	4
WHOQoL8	21,835	20.19	4.81	0	12	21	27	32
Experienced well-being								
Emotion score	21,835	11.43	2.65	0	6	12	14	14
Total experienced utility	21,835	12.07	1.95	0	8.3	12.3	14	14
Activity-specific net affect								
Working	6,275	11.43	2.37	0	7.0	12	14	14
Housework	12,180	11.80	2.19	0	7.5	12	14	14
Travel	5,008	11.75	2.37	0	7.0	12	14	14
Leisure	18,201	12.39	1.91	0	8.4	13	14	14
Self-care	16,743	12.44	1.83	0	9.0	13	14	14

Notes: The entries are pooled country averages using population weights. Income quartiles are country-specific and derived from an asset/wealth index. Community involvement represents individuals' participation in activities of their communities. Trust is a score based on questions about individuals' perceived trust in neighbors, colleagues and strangers. Safety is a score based on information about perceived safety at home and in the neighborhood. Tables 3.A1-3.A5 in Appendix 3.A provide summary statistics for each country.

Table 3.2: Summary of the separate domains of WHOQoL8, emotion score and experienced utility

	Obs.	Mean	Std. dev.	Min	5th percentile	Median	95th percentile	Max
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: Separate WHOQoL8 domains								
Satistied with overall quality of life	21,776	2.24	0.72	0	1	2	3	4
Satistied with health	21,831	2.41	0.92	0	1	3	4	4
Has enough energy for everyday life	21,818	2.54	1.03	0	1	3	4	4
Satisfied with ADL	21,823	2.6	0.82	0	1	3	4	4
Satisfied with ownself	21,823	2.7	0.78	0	1	3	4	4
Satisfied with personal relationships	21,821	2.84	0.69	0	2	3	4	4
Ability to meet personal needs	21,761	2.1	1.08	0	0	2	4	4
Satisfied with conditions of living place	21,809	2.73	0.83	0	1	3	4	4
Panel B: Separate emotion score domains								
Calm/relaxed	21,794	0.75	0.43	0	0	1	1	1
Enjoyed	21,792	0.74	0.44	0	0	1	1	1
Smiled/laughed	21,781	0.43	0.49	0	0	0	1	1
Not worried	21,792	0.86	0.35	0	0	1	1	1
Not rushed	21,790	0.85	0.36	0	0	1	1	1
Not irritated/angry	21,792	0.89	0.31	0	0	1	1	1
Not depressed	21,791	0.91	0.28	0	0	1	1	1
Not tense/stressed	21,782	0.87	0.34	0	0	1	1	1
Not lonely	21,796	0.89	0.31	0	0	1	1	1
Not bored	21,792	0.88	0.33	0	0	1	1	1
No physical pain	21,793	0.78	0.41	0	0	1	1	1
No sleepiness	21,797	0.82	0.39	0	0	1	1	1
No stomach-ache	21,791	0.94	0.24	0	0	1	1	1
No headache	21,794	0.86	0.35	0	0	1	1	1
Panel C: Experienced utility								
Positive affects	21,835	2.73	1.10	0	0.69	2.77	4	4
Negative affects (reversed)	21,835	9.34	1.25	0	6.67	10	10	10

Notes: The entries are pooled country averages using population weights.

3.4 RESULTS

3.4.1 Age- and gender-adjusted associations

Tables 3.3-3.5 report country-specific population weighted baseline estimates of the partial association of evaluative well-being with experienced well-being while adjusting for age and gender only using the specification in expression (3.4). Panel A in each table reports results for life satisfaction while Panel B reports results for WHOQoL8.

Looking at these three tables, we point out two facts that illustrate this section's two main findings. First, in each country, the degree of associations of life satisfaction and WHOQoL8 with experienced utility is similar. For example, Panel A of Table 3.3 shows that after controlling for age and gender, a one-standard-deviation increase in life satisfaction is associated with between 0.140 (in Ghana) and 0.257 (in Russia) standard-deviation increase in experienced utility. Similarly,

Panel B shows that a one-standard-deviation increase in WHOQoL8 is associated with between 0.136 (in Ghana) and 0.300 (in Russia) standard-deviation increase in experienced utility. Further disaggregating the associations of life satisfaction and WHOQoL8 with experienced utility based on activity-specific net affects also shows that life satisfaction and WHOQoL8 have similar associations with the activity-specific net affects (Table 3.4). Examining Panels A and B of Table 3.5 shows that the finding above is not unique to the associations of life satisfaction and WHOQoL8 with experienced utility but it is also true for their respective associations with emotion score. That is, the degree of association of life satisfaction with emotion score (between 0.246 (in Ghana) and 0.363 (in India) standard-deviation increase in emotion score for a one-standard-deviation increase in life satisfaction) is similar to that of WHOQoL8 with emotion score (between 0.267 (in Ghana) and 0.456 (in India) standard-deviation increase in emotion score for a one-standard-deviation increase in WHOQoL8). These partial associations of life satisfaction and WHOQoL8 with both categories of experienced well-being—experienced utility and emotion score—are statistically significant at the 1% level for all the five countries.

The second main finding of this section is that the associations of the two measures of evaluative well-being with emotion score appears stronger than their respective associations with experienced utility. While a one-standard-deviation increase in life satisfaction (WHOQoL8) is associated with between 0.246 and 0.363 (0.267 and 0.456) standard-deviation increase in emotion score, a one-standard-deviation increase in life satisfaction (WHOQoL8) is associated with between only 0.140 and 0.257 (0.136 and 0.300) standard-deviation increase in experienced utility. This suggests that although the two measures of experienced well-being—emotion score and experienced utility—are similar representations of the same underlying psychological states during the course of a day, they are not exactly identical. Tables 3.B6 & 3.B7 in Appendix 3.B replicate the baseline specifications in Tables 3.3 & 3.5 by using dummies for life satisfaction categories and quartiles of WHOQoL8, respectively. These additional results provide evidence that the association of evaluative well-being with experienced well-being is non-linear.

Indeed, the degree of partial association of evaluative well-being with experienced well-being we find in our baseline specification is only moderate. This is in line with the overwhelming evidence that people's cognitive global evaluation of their lives capture something very different from that which drives people's emotional affects during the course of a day [see, e.g., Benjamin et al., 2012; National Research Council, 2013; OECD, 2013].

Table 3.3: Partial association of evaluative well-being (life satisfaction and WHO-QoL8) with experienced utility

	(1)	(2)	(3)	(4)	(5)
	China	Ghana	India	Russia	South Africa
Panel A: Life satisfaction					
Life satisfaction	0.2538***	0.1399***	0.2375***	0.2569***	0.2505***
	(0.024)	(0.026)	(0.026)	(0.040)	(0.039)
Female	-0.0414*	-0.0860**	-0.1194**	-0.1515*	-0.1204*
	(0.021)	(0.043)	(0.053)	(0.081)	(0.065)
Age group (reference is 50-59 yo)					
60-69	0.0710**	0.1434***	0.1114**	0.0076	0.2701***
	(0.029)	(0.047)	(0.045)	(0.108)	(0.070)
70-79	0.1713***	0.1226**	0.1870***	0.1726*	0.1281
	(0.038)	(0.054)	(0.065)	(0.087)	(0.151)
80+	0.2079***	0.1762**	0.0276	0.1659	0.2803***
	(0.058)	(0.077)	(0.132)	(0.141)	(0.106)
R^2	0.068	0.024	0.065	0.073	0.083
Panel B: WHOQoL8					
WHOQoL8	0.2548***	0.1364***	0.2997***	0.2944***	0.2548***
	(0.023)	(0.029)	(0.027)	(0.046)	(0.033)
Female	-0.0319	-0.0722*	-0.0714	-0.1086	-0.1022
	(0.021)	(0.043)	(0.054)	(0.074)	(0.063)
Age group (reference is 50-59 yo)					
60-69	0.0878***	0.1594***	0.1475***	0.0487	0.2728***
	(0.029)	(0.049)	(0.046)	(0.103)	(0.070)
70-79	0.2067***	0.1513***	0.2568***	0.2685***	0.1569
	(0.041)	(0.058)	(0.069)	(0.077)	(0.151)
80+	0.2659***	0.2078**	0.1109	0.2429*	0.3163***
	(0.059)	(0.082)	(0.131)	(0.126)	(0.095)
R^2	0.068	0.022	0.094	0.087	0.085
N	9,265	3,070	4,848	2,593	2,059

Notes: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Sample weights are applied. The entries in each column are country-specific average partial association of standardized life satisfaction (Panel A) and WHO-QoL8 (Panel B) with standardized experienced utility. Average partial effects are based on the linear regression expressed in model (3.4).

Table 3.4: Partial association of evaluative well-being (life satisfaction and WHO-QoL8) with activity-specific net affects

	(1)	(2)	(3)	(4)	(5)
	China	Ghana	India	Russia	South Africa
Activity-specific net affects					
Panel A: Life satisfaction					
Work	0.2920***	0.0644*	0.2120***	0.0786	0.3200***
	(0.033)	(0.034)	(0.042)	(0.098)	(0.098)
Housework	0.2822***	0.1830***	0.2745***	0.3087***	0.2869***
	(0.026)	(0.037)	(0.037)	(0.041)	(0.055)
Travel	0.2321***	0.1393***	0.2444***	0.3836***	0.2222***
	(0.042)	(0.031)	(0.052)	(0.115)	(0.085)
Leisure	0.2207***	0.1804***	0.2205***	0.2030***	0.1962***
	(0.025)	(0.029)	(0.024)	(0.042)	(0.032)
Self-care	0.2410***	0.0869***	0.1929***	0.2454***	0.2730***
	(0.023)	(0.024)	(0.030)	(0.047)	(0.063)
Panel B: WHOQoL8					
Work	0.3086***	0.1032***	0.2948***	0.1790**	0.3361***
	(0.036)	(0.039)	(0.045)	(0.078)	(0.103)
Housework	0.2777***	0.1523***	0.3478***	0.3892***	0.3082***
	(0.028)	(0.044)	(0.036)	(0.076)	(0.057)
Travel	0.2572***	0.1666***	0.3141***	0.2710**	0.2294***
	(0.039)	(0.034)	(0.046)	(0.104)	(0.077)
Leisure	0.2261***	0.1725***	0.2588***	0.2510***	0.2246***
	(0.023)	(0.033)	(0.024)	(0.043)	(0.033)
Self-care	0.2502***	0.0588**	0.2354***	0.2803***	0.2654***
	(0.021)	(0.023)	(0.030)	(0.060)	(0.050)
Age and gender controls	YES	YES	YES	YES	YES

Notes: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Sample weights are applied. The entries in each column are country-specific average partial association of standardized life satisfaction (Panel A) and WHOQoL8 (Panel B) with standardized activity-specific net affects. Average partial effects are based on the linear regression expressed in model (3.4). All regressions control for age and gender only.

Table 3.5: Partial association of evaluative well-being (life satisfaction and WHO-QoL8) with emotion score

	(1)	(2)	(3)	(4)	(5)
	China	Ghana	India	Russia	South Africa
Panel A: Life satisfaction					
Life satisfaction	0.3257***	0.2459***	0.3632***	0.3147***	0.2691***
	(0.018)	(0.028)	(0.024)	(0.041)	(0.043)
Female	-0.0775***	-0.1308***	-0.2542***	-0.1927***	-0.1676**
	(0.023)	(0.042)	(0.036)	(0.054)	(0.069)
Age group (reference is 50-59 yo)					
60-69	0.0333	-0.0638	0.0644*	-0.0094	0.1765**
	(0.030)	(0.049)	(0.039)	(0.088)	(0.082)
70-79	0.0905**	-0.0503	0.0681	-0.0592	0.1766*
	(0.038)	(0.053)	(0.052)	(0.078)	(0.100)
80+	-0.0224	-0.0732	0.1421*	-0.1038	0.4053***
	(0.061)	(0.071)	(0.081)	(0.098)	(0.090)
R^2	0.109	0.071	0.153	0.119	0.093
Panel B: WHOQoL8					
WHOQoL8	0.3496***	0.2672***	0.4556***	0.4114***	0.3110***
	(0.019)	(0.031)	(0.026)	(0.031)	(0.043)
Female	-0.0630***	-0.0992**	-0.1816***	-0.1272**	-0.1415**
	(0.022)	(0.044)	(0.037)	(0.052)	(0.067)
Age group (reference is 50-59 yo)					
60-69	0.0567*	-0.0286	0.1189***	0.0541	0.1787**
	(0.029)	(0.049)	(0.038)	(0.077)	(0.081)
70-79	0.1408***	0.0134	0.1737***	0.0915	0.2077**
	(0.039)	(0.054)	(0.058)	(0.077)	(0.096)
80+	0.0621	0.0074	0.2675***	0.0222	0.4533***
	(0.064)	(0.076)	(0.088)	(0.084)	(0.085)
R^2	0.124	0.077	0.220	0.175	0.117
N	9,265	3,070	4,848	2,593	2,059

Notes: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Sample weights are applied. The entries in each column are country-specific average partial association of standardized life satisfaction (Panel A) and WHOQoL8 (Panel B) with standardized emotion score. Average partial effects are based on the linear regression expressed in model (3.4).

3.4.2 Fully- and reporting scale-adjusted associations

The central question raised by our results is, what are the channels of the associations reported in the *age- and gender-adjusted* specification in Section 3.4.1? The relationship between experienced and

evaluative well-being could have various causes. Besides a genuine relationship between the two, it could be that other factors that are correlated both with experienced and evaluative well-being are the true causes of any association between the two dimensions of well-being. To control for such factors, we include additional set of covariates based on socioeconomic characteristics and social cohesion indicators contained in Table 3.1, which we do in a *fully-adjusted* specification (expression 3.5).

The results from this specification are presented in columns (1)-(5) of Tables 3.6-3.10.[14] By comparing estimated partial associations in Tables 3.3-3.5 and Tables 3.6-3.10, we find that irrespective of the measure of well-being and across all countries, controlling for socioeconomic characteristics and social cohesion indicators significantly reduces the size of the association of evaluative well-being with experienced well-being. For example, in China, a little over a quarter of the partial association of general life satisfaction with experienced utility reported in Table 3.3 is due to common objective causes that are correlated both with life satisfaction and experienced utility. In particular, we find in Tables 3.6-3.10 that disability, age, income, and being socially involved in one's community are common sources of dependence between evaluative and experienced well-being.

After accounting for the source of dependence between experienced and evaluative well-being that is from demographic and socioeconomic characteristics, it could also be that unobserved common self-rating behavior between the two SWB dimensions is the true cause of the remaining association. Since our data is cross-sectional and not a panel, we cannot use standard fixed-effects estimating approach to preclude the possibility that the remaining association between experienced and evaluative well-being captures differences in general degrees of optimism between people that simultaneously affect both SWB dimensions.

To circumvent this issue, in columns (6)-(10) of Tables 3.6-3.10, we report results in which we use anchoring vignettes for health-state description as control functions. The use of vignettes in such regressions could be interpreted as capturing common reporting patterns between experienced and evaluative well-being or fixed personality traits. The estimates after including the vignettes are reassuring. The association of evaluative well-being with experienced well-being remains stable and close to the estimates in columns (1)-(5)—where the vignettes are excluded. We, therefore, interpret the results in columns (6)-(10) of Tables 3.6-3.10 as the direct partial association of evaluative well-being with experienced well-being, keeping individuals' socio-demographic characteristics and personality traits fixed. The results show that a one-standard-deviation increase

[14] Regression results for the relationship between experienced and evaluative well-being using dummies for life satisfaction categories and quartiles of WHOQoL8, rather than using standardized life satisfaction and WHOQoL8, yield similar findings. These additional results are presented in the appendix (Tables 3.B8 and 3.B9).

in life satisfaction [WHOQoL8] is directly associated with between 0.072 (in Ghana) and 0.221 (in Russia) [0.060 (in Ghana) and 0.251 (in Russia)] standard-deviation increase in experienced utility, all things been equal (columns (6)-(10) of Tables 3.6 and 3.7). The disaggregated associations of life satisfaction and WHOQoL8 with experienced utility in terms of the activity-specific net affects also remain stable, although attenuated compared to the *age- and gender-adjusted* estimates (Tables 3.8). Similarly, a one-standard-deviation increase in life satisfaction [WHOQoL8] is directly associated with between 0.156 (in Ghana) and 0.220 (in China) [0.184 (in Ghana) and 0.294 (in India)] standard-deviation increase in emotion score (columns (6)-(10) of Tables 3.9 and 3.10).

Table 3.6: Partial association of life satisfaction with experienced utility - full model

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Without controls for health-state vignettes					With controls for health-state vignettes				
	China	Ghana	India	Russia	South Africa	China	Ghana	India	Russia	South Africa
Life satisfaction	0.1818***	0.1037***	0.1091***	0.1916***	0.1646***	0.1809***	0.0722***	0.1245***	0.2210***	0.1212***
	(0.020)	(0.029)	(0.032)	(0.041)	(0.041)	(0.019)	(0.024)	(0.026)	(0.029)	(0.030)
Female	-0.0074	-0.0861	-0.0947	-0.0927	-0.0605	-0.0179	-0.0550	-0.1271***	-0.0208	-0.1031**
	(0.025)	(0.053)	(0.062)	(0.072)	(0.068)	(0.021)	(0.046)	(0.046)	(0.043)	(0.049)
Married	0.0459	-0.0464	-0.0837*	-0.1137	0.0877	0.0421	-0.0704	-0.0951**	-0.1017*	0.0371
	(0.041)	(0.058)	(0.044)	(0.098)	(0.076)	(0.038)	(0.052)	(0.040)	(0.061)	(0.044)
Rural	-0.2847***	-0.0454	-0.0700	0.0461	-0.0983	-0.3334***	-0.0634	-0.0653	0.0626	-0.1704***
	(0.080)	(0.062)	(0.061)	(0.096)	(0.108)	(0.064)	(0.050)	(0.054)	(0.080)	(0.059)
Ethnic minority	-0.0908	-0.2260***	-0.0926	-0.0043	-0.1640	-0.0450	-0.1856***	-0.1569**	0.0212	-0.0072
	(0.159)	(0.057)	(0.081)	(0.102)	(0.124)	(0.127)	(0.047)	(0.075)	(0.092)	(0.054)
Household size	-0.0044	0.0436**	0.0173	0.0733**	-0.0004	0.0009	0.0398**	0.0238	0.0793***	0.0140
	(0.016)	(0.021)	(0.021)	(0.034)	(0.040)	(0.014)	(0.017)	(0.018)	(0.023)	(0.022)
Working	-0.0422	0.0564	-0.0867*	-0.2521**	-0.0300	-0.0558	-0.0115	-0.1095***	-0.2856***	-0.0448
	(0.050)	(0.061)	(0.046)	(0.101)	(0.091)	(0.045)	(0.052)	(0.037)	(0.069)	(0.054)
Victim	0.0036	0.0845	-0.0766	0.0143	-0.0336	0.0065	0.0779	-0.0889	-0.1522	-0.0710
	(0.118)	(0.082)	(0.079)	(0.310)	(0.133)	(0.101)	(0.078)	(0.087)	(0.307)	(0.080)
Disability	-0.4426**	-0.1857	-1.3581***	-1.1543***	-0.9067***	-0.4187**	-0.1993	-1.2387***	-1.0363***	-0.5175***
	(0.191)	(0.200)	(0.193)	(0.389)	(0.162)	(0.172)	(0.170)	(0.153)	(0.205)	(0.140)
Age group (reference is 50-59 yo)										
Age 60-69	0.0976***	0.1710***	0.1247***	-0.0331	0.3521***	0.0958***	0.1755***	0.1092***	-0.0159	0.2269***
	(0.031)	(0.052)	(0.047)	(0.090)	(0.084)	(0.029)	(0.042)	(0.038)	(0.070)	(0.048)
Age 70-79	0.2236***	0.1910***	0.2396***	0.1753	0.2619*	0.2090***	0.1520***	0.2011***	0.1425*	0.3028***
	(0.039)	(0.066)	(0.077)	(0.117)	(0.151)	(0.036)	(0.051)	(0.055)	(0.086)	(0.068)
Age 80+	0.3445***	0.2512**	0.1473	0.2292	0.4854***	0.3313***	0.1679**	0.1405	0.1849	0.2725***
	(0.063)	(0.103)	(0.130)	(0.144)	(0.120)	(0.056)	(0.083)	(0.104)	(0.130)	(0.097)
Education level (reference is less than primary education)										
Primary education	0.0563	-0.1374**	0.0682	-0.1578	0.0064	0.0379	-0.1494***	0.1125**	0.0740	-0.0592
	(0.036)	(0.063)	(0.068)	(0.185)	(0.098)	(0.033)	(0.057)	(0.047)	(0.168)	(0.057)
Secondary	0.0385	0.0157	0.0128	-0.4630**	0.0967	0.0227	0.0545	0.0218	-0.2030	0.0328
	(0.044)	(0.102)	(0.072)	(0.186)	(0.122)	(0.038)	(0.094)	(0.061)	(0.135)	(0.066)
High School	0.0645	0.0456	0.0537	-0.3291*	0.0715	0.0417	0.0861	0.0795	-0.0652	-0.0015
	(0.047)	(0.066)	(0.067)	(0.172)	(0.141)	(0.044)	(0.056)	(0.063)	(0.134)	(0.077)
College/university	0.0210	0.1418	0.0686	-0.3142	0.1470	0.0208	0.0944	0.0822	-0.0379	0.1226
	(0.059)	(0.095)	(0.088)	(0.191)	(0.109)	(0.061)	(0.074)	(0.074)	(0.155)	(0.093)
Income quartiles (reference is bottom 25%)										
Q2: second poorest 25%	0.0763	0.0288	0.0815	0.2667**	-0.0010	0.0621	0.0751	0.0568	0.2769***	-0.0510
	(0.046)	(0.057)	(0.064)	(0.110)	(0.105)	(0.042)	(0.054)	(0.054)	(0.092)	(0.061)
Q3: second richest 25%	0.2112***	0.1180**	0.0458	0.2224*	0.0993	0.1672***	0.1457***	0.0266	0.1607**	-0.0963
	(0.061)	(0.059)	(0.065)	(0.123)	(0.095)	(0.053)	(0.055)	(0.059)	(0.076)	(0.063)
Q4: richest 25%	0.1951***	0.0410	0.2163***	0.3280***	0.0213	0.1836***	0.1298*	0.1752***	0.2159***	-0.1019
	(0.053)	(0.078)	(0.065)	(0.116)	(0.113)	(0.049)	(0.068)	(0.058)	(0.081)	(0.063)
Social cohesion indicators										
Community involvement	0.1688	0.3617***	-0.3430*	-0.6119***	-0.0414	0.1841	0.6291***	-0.4110***	-0.6026***	0.0667
	(0.171)	(0.129)	(0.177)	(0.233)	(0.216)	(0.147)	(0.128)	(0.138)	(0.197)	(0.164)
Trust in others	0.0277	0.0083	0.0210	-0.1969	-0.1561	0.0719	0.1619	0.0545	-0.1125	-0.0239
	(0.193)	(0.097)	(0.095)	(0.145)	(0.168)	(0.155)	(0.100)	(0.082)	(0.136)	(0.099)
Safety	0.7657***	0.1488	0.3518***	0.4177**	-0.1029	0.7041***	0.0787	0.2999***	0.2161	-0.0121
	(0.114)	(0.111)	(0.097)	(0.179)	(0.154)	(0.101)	(0.112)	(0.078)	(0.155)	(0.096)
N	9,265	3,070	4,848	2,593	2,059	9,265	3,070	4,848	2,593	2,059
R^2	0.125	0.054	0.139	0.145	0.120	0.202	0.270	0.285	0.372	0.559
F-statistic that all vignette terms are jointly equal to zero						150.59	84.23	17.88	27.33	10.45
P-value of F-test						0.0000	0.0000	0.0000	0.0000	0.0000

Notes: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Sample weights are applied. The entries in each column are country-specific average partial association of standardized life satisfaction with standardized experienced utility. Average partial effects are based on the linear regressions expressed in models (3.5) & (3.6).

Table 3.7: Partial association of WHOQoL8 with experienced utility - full model

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Without controls for health-state vignettes					With controls for health-state vignettes				
	China	Ghana	India	Russia	South Africa	China	Ghana	India	Russia	South Africa
WHOQoL8	0.1686***	0.0832**	0.1568***	0.2502***	0.1708***	0.1694***	0.0598**	0.1830***	0.2514***	0.1580***
	(0.021)	(0.035)	(0.037)	(0.044)	(0.044)	(0.021)	(0.028)	(0.028)	(0.040)	(0.033)
Female	-0.0039	-0.0767	-0.1063*	-0.0773	-0.0569	-0.0147	-0.0497	-0.1398***	-0.0099	-0.1053**
	(0.025)	(0.053)	(0.062)	(0.066)	(0.069)	(0.021)	(0.046)	(0.046)	(0.043)	(0.049)
Married	0.0483	-0.0365	-0.0934**	-0.1514	0.0865	0.0430	-0.0642	-0.1031**	-0.1174**	0.0310
	(0.041)	(0.058)	(0.044)	(0.098)	(0.078)	(0.037)	(0.052)	(0.040)	(0.058)	(0.045)
Rural	-0.2705***	-0.0435	-0.0616	0.0273	-0.0951	-0.3204***	-0.0615	-0.0527	0.0444	-0.1638***
	(0.081)	(0.063)	(0.061)	(0.098)	(0.108)	(0.064)	(0.050)	(0.054)	(0.082)	(0.058)
Ethnic minority	-0.0995	-0.2256***	-0.0710	0.0054	-0.1706	-0.0519	-0.1861***	-0.1328*	0.0189	-0.0214
	(0.163)	(0.057)	(0.080)	(0.099)	(0.122)	(0.131)	(0.047)	(0.074)	(0.091)	(0.052)
Household size	-0.0041	0.0445**	0.0128	0.0784**	0.0057	0.0012	0.0400**	0.0180	0.0792***	0.0182
	(0.016)	(0.021)	(0.022)	(0.035)	(0.041)	(0.014)	(0.018)	(0.018)	(0.023)	(0.022)
Working	-0.0476	0.0503	-0.1008**	-0.2989***	-0.0438	-0.0606	-0.0154	-0.1261***	-0.3104***	-0.0590
	(0.051)	(0.061)	(0.046)	(0.094)	(0.092)	(0.046)	(0.053)	(0.037)	(0.065)	(0.055)
Victim	0.0094	0.0830	-0.0612	0.0507	-0.0110	0.0133	0.0769	-0.0639	-0.1491	-0.0635
	(0.119)	(0.082)	(0.082)	(0.311)	(0.134)	(0.101)	(0.078)	(0.086)	(0.294)	(0.078)
Disability	-0.3152	-0.2113	-1.1675***	-0.8148**	-0.8638***	-0.2765	-0.2074	-1.0029***	-0.7695***	-0.3738***
	(0.203)	(0.212)	(0.218)	(0.365)	(0.187)	(0.179)	(0.176)	(0.167)	(0.229)	(0.143)
Age group (reference is 50-59 yo)										
Age 60-69	0.1044***	0.1789***	0.1285***	-0.0409	0.3408***	0.1032***	0.1816***	0.1103***	-0.0065	0.2126***
	(0.031)	(0.052)	(0.047)	(0.088)	(0.084)	(0.029)	(0.042)	(0.038)	(0.067)	(0.047)
Age 70-79	0.2365***	0.2044***	0.2465***	0.1611	0.2658*	0.2225***	0.1608***	0.2031***	0.1397*	0.2994***
	(0.041)	(0.066)	(0.077)	(0.107)	(0.148)	(0.037)	(0.051)	(0.055)	(0.083)	(0.067)
Age 80+	0.3590***	0.2599**	0.1394	0.1604	0.4739***	0.3455***	0.1739**	0.1239	0.1524	0.2605***
	(0.065)	(0.104)	(0.132)	(0.136)	(0.115)	(0.058)	(0.084)	(0.105)	(0.127)	(0.092)
Education level (reference is less than primary education)										
Primary education	0.0582	-0.1380**	0.0736	-0.1206	0.0128	0.0394	-0.1509***	0.1163**	0.0776	-0.0490
	(0.037)	(0.064)	(0.067)	(0.195)	(0.098)	(0.033)	(0.057)	(0.048)	(0.180)	(0.056)
Secondary	0.0382	-0.0027	0.0043	-0.4304**	0.0801	0.0216	0.0439	0.0089	-0.1938	0.0260
	(0.046)	(0.100)	(0.073)	(0.186)	(0.122)	(0.039)	(0.093)	(0.061)	(0.143)	(0.066)
High School	0.0623	0.0384	0.0379	-0.3116*	0.0399	0.0400	0.0822	0.0637	-0.0669	-0.0245
	(0.050)	(0.067)	(0.071)	(0.179)	(0.141)	(0.046)	(0.056)	(0.063)	(0.140)	(0.078)
College/university	0.0149	0.1322	0.0561	-0.3240*	0.1166	0.0141	0.0875	0.0610	-0.0521	0.0977
	(0.061)	(0.094)	(0.087)	(0.195)	(0.107)	(0.060)	(0.072)	(0.074)	(0.162)	(0.094)
Income quartiles (reference is bottom 25%)										
Q2: second poorest 25%	0.0832*	0.0247	0.0707	0.2487**	-0.0120	0.0691	0.0714	0.0445	0.2525***	-0.0677
	(0.049)	(0.058)	(0.064)	(0.109)	(0.104)	(0.043)	(0.054)	(0.054)	(0.092)	(0.062)
Q3: second richest 25%	0.2148***	0.1180**	0.0130	0.2212*	0.1016	0.1716***	0.1441**	-0.0083	0.1616**	-0.1140*
	(0.064)	(0.060)	(0.066)	(0.119)	(0.098)	(0.056)	(0.056)	(0.060)	(0.077)	(0.065)
Q4: richest 25%	0.1911***	0.0404	0.1731**	0.3247***	-0.0078	0.1815***	0.1275*	0.1245**	0.1970**	-0.1404**
	(0.057)	(0.081)	(0.067)	(0.120)	(0.120)	(0.052)	(0.070)	(0.060)	(0.081)	(0.066)
Social cohesion indicators										
Community involvement	0.1685	0.3522***	-0.4022**	-0.6001***	-0.1264	0.1833	0.6180***	-0.4821***	-0.5795***	-0.0032
	(0.170)	(0.128)	(0.179)	(0.226)	(0.215)	(0.145)	(0.129)	(0.140)	(0.193)	(0.162)
Trust in others	0.0034	0.0068	-0.0179	-0.2470*	-0.1518	0.0470	0.1688*	0.0068	-0.1418	-0.0273
	(0.196)	(0.098)	(0.096)	(0.148)	(0.170)	(0.158)	(0.101)	(0.081)	(0.138)	(0.100)
Safety	0.7691***	0.1473	0.3226***	0.3908**	-0.1009	0.7092***	0.0720	0.2733***	0.1764	-0.0250
	(0.119)	(0.111)	(0.099)	(0.187)	(0.153)	(0.103)	(0.112)	(0.079)	(0.162)	(0.096)
N	9,265	3,070	4,848	2,593	2,059	9,265	3,070	4,848	2,593	2,059
R^2	0.117	0.051	0.143	0.153	0.117	0.196	0.269	0.290	0.371	0.562
F-statistic that all vignette terms are jointly equal to zero						174.01	84.92	22.71	26.54	22.86
P-value of F-test						0.0000	0.0000	0.0000	0.0000	0.0000

Notes: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Sample weights are applied. The entries in each column are country-specific average partial association of standardized WHOQoL8 with standardized experienced utility. Average partial effects are based on the linear regressions expressed in models (3.5) & (3.6).

Table 3.8: Partial association of evaluative well-being (life satisfaction and WHO-QoL8) with activity-specific net affects - full model

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Without controls for health-state vignettes					With controls for health-state vignettes				
	China	Ghana	India	Russia	South Africa	China	Ghana	India	Russia	South Africa
Activity-specific net affects										
Panel A: Life satisfaction										
Work	0.2121***	0.0109	0.1221***	0.0673	0.1738*	0.1925***	-0.0334	0.0952**	0.1024*	0.1476**
	(0.027)	(0.041)	(0.047)	(0.080)	(0.089)	(0.029)	(0.042)	(0.039)	(0.053)	(0.060)
						[41.7]	[312.8]	[4.7]	[814.2]	[>6900]
Housework	0.2157***	0.1566***	0.1355***	0.2207***	0.2146***	0.2100***	0.0882***	0.1489***	0.2685***	0.2066***
	(0.022)	(0.041)	(0.038)	(0.040)	(0.057)	(0.021)	(0.031)	(0.029)	(0.047)	(0.039)
						[393.3]	[12.0]	[25.9]	[81.2]	[3584.6]
Travel	0.1874***	0.0896**	0.1490**	0.2103**	0.1722*	0.1942***	0.0603	0.1259***	0.1681*	0.1142
	(0.036)	(0.039)	(0.058)	(0.088)	(0.092)	(0.030)	(0.037)	(0.033)	(0.088)	(0.073)
						[499.2]	[24.3]	[3.4]	[1375.1]	[4070.5]
Leisure	0.1447***	0.1488***	0.1170***	0.1309***	0.1020***	0.1439***	0.1243***	0.1160***	0.1482***	0.1131***
	(0.022)	(0.028)	(0.029)	(0.045)	(0.038)	(0.021)	(0.025)	(0.025)	(0.034)	(0.032)
						[63.8]	[21.4]	[16.2]	[184.5]	[48.8]
Self-care	0.1632***	0.0568*	0.0829**	0.1584***	0.1818***	0.1592***	0.0258	0.0978***	0.2036***	0.1175***
	(0.021)	(0.030)	(0.033)	(0.045)	(0.051)	(0.020)	(0.023)	(0.027)	(0.039)	(0.036)
						[117.9]	[48.3]	[15.5]	[86711.8]	[35.4]
Panel B: WHOQoL8										
Work	0.2179***	0.0284	0.1773***	0.1273	0.1714*	0.1945***	0.0463	0.1647***	0.1287**	0.2517***
	(0.032)	(0.053)	(0.044)	(0.078)	(0.100)	(0.030)	(0.045)	(0.043)	(0.061)	(0.081)
						[74.0]	[>18000]	[4.7]	[1365.8]	[>19000]
Housework	0.1938***	0.1130**	0.1838***	0.2783***	0.2270***	0.1895***	0.0617	0.2126***	0.2862***	0.2643***
	(0.025)	(0.053)	(0.044)	(0.066)	(0.067)	(0.024)	(0.037)	(0.033)	(0.050)	(0.046)
						[171.7]	[11.6]	[24.6]	[263.3]	[8874.2]
Travel	0.2094***	0.1017**	0.2169***	0.1006	0.1991**	0.2101***	0.0853*	0.1869***	0.1076	0.2419***
	(0.035)	(0.044)	(0.060)	(0.100)	(0.095)	(0.035)	(0.043)	(0.038)	(0.078)	(0.092)
						[>4000]	[25.0]	[3.8]	[1018.3]	[7157.1]
Leisure	0.1343***	0.1309***	0.1482***	0.1690***	0.1443***	0.1383***	0.1178***	0.1668***	0.1566***	0.1386***
	(0.021)	(0.036)	(0.034)	(0.046)	(0.037)	(0.022)	(0.030)	(0.028)	(0.038)	(0.038)
						[70.1]	[21.1]	[18.9]	[218.6]	[49.6]
Self-care	0.1591***	-0.0067	0.0976**	0.1641**	0.1574***	0.1538***	-0.0161	0.1322***	0.1572***	0.1811***
	(0.021)	(0.029)	(0.038)	(0.069)	(0.045)	(0.021)	(0.025)	(0.032)	(0.047)	(0.043)
						[154.1]	[40.2]	[17.5]	[4964.4]	[922.8]
Other covariates	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

Notes: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Sample weights are applied. F-statistic that all vignette terms are jointly equal to zero are in square brackets in columns (6)-(10). The entries in each column are country-specific average partial association of standardized life satisfaction (Panel A) and WHOQoL8 (Panel B) with standardized activity-specific net affects. Average partial effects are based on the linear regressions expressed in models (3.5) & (3.6). All regressions control for the large set of individual characteristics included in Table 3.1.

Table 3.9: Partial association of life satisfaction with emotion score - full model

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Without controls for health-state vignettes					With controls for health-state vignettes				
	China	Ghana	India	Russia	South Africa	China	Ghana	India	Russia	South Africa
Life satisfaction	0.2239***	0.1954***	0.1894***	0.1942***	0.1698***	0.2201***	0.1557***	0.2012***	0.2161***	0.1726***
	(0.017)	(0.028)	(0.026)	(0.036)	(0.047)	(0.017)	(0.022)	(0.023)	(0.036)	(0.036)
Female	-0.0534**	-0.0819	-0.1958***	-0.1113**	-0.0636	-0.0408*	-0.0800*	-0.2234***	-0.0667	-0.0617
	(0.023)	(0.054)	(0.051)	(0.051)	(0.073)	(0.022)	(0.041)	(0.043)	(0.046)	(0.057)
Married	0.0889**	0.0198	-0.0436	0.1298*	0.1100	0.0889**	-0.0259	-0.0097	0.1287**	0.0597
	(0.040)	(0.056)	(0.051)	(0.074)	(0.078)	(0.041)	(0.044)	(0.044)	(0.051)	(0.055)
Rural	-0.1687***	-0.0301	-0.0736	0.0417	-0.1778*	-0.1850***	-0.0331	-0.1166**	-0.0949	-0.1154*
	(0.045)	(0.066)	(0.060)	(0.113)	(0.090)	(0.042)	(0.049)	(0.050)	(0.087)	(0.064)
Ethnic minority	-0.0476	-0.1042*	-0.0010	-0.1571*	-0.0554	-0.0042	-0.0648	-0.0435	-0.0584	-0.0438
	(0.111)	(0.058)	(0.070)	(0.091)	(0.080)	(0.095)	(0.043)	(0.057)	(0.054)	(0.065)
Household size	0.0117	0.0338	0.0133	-0.0365*	0.0019	0.0127	0.0380*	0.0138	-0.0407*	0.0169
	(0.014)	(0.023)	(0.022)	(0.021)	(0.033)	(0.012)	(0.020)	(0.019)	(0.022)	(0.030)
Working	-0.0612	0.2855***	-0.1334***	0.1231	0.0342	-0.0571	0.1990***	-0.1486***	0.0371	0.0550
	(0.040)	(0.060)	(0.041)	(0.082)	(0.090)	(0.037)	(0.048)	(0.035)	(0.064)	(0.065)
Victim	-0.1737	0.1450	-0.2823***	-0.1440	-0.0112	-0.1855	0.1342	-0.3254***	-0.0603	-0.1097
	(0.119)	(0.123)	(0.102)	(0.129)	(0.089)	(0.116)	(0.090)	(0.100)	(0.159)	(0.087)
Disability	-1.7146***	-0.1328	-1.9986***	-1.5334***	-0.7772***	-1.7155***	-0.3261*	-1.9269***	-1.3699***	-0.6382***
	(0.162)	(0.197)	(0.172)	(0.305)	(0.242)	(0.146)	(0.167)	(0.138)	(0.235)	(0.170)
Age group (reference is 50-59 yo)										
Age 60-69	0.0778***	0.0115	0.1172***	0.1276	0.2832***	0.0832***	-0.0163	0.0989***	0.1630**	0.2274***
	(0.027)	(0.049)	(0.039)	(0.083)	(0.086)	(0.026)	(0.040)	(0.036)	(0.068)	(0.055)
Age 70-79	0.2280***	0.1018*	0.1769***	0.2602***	0.3726***	0.2397***	0.0595	0.1712***	0.2124***	0.3182***
	(0.032)	(0.057)	(0.060)	(0.092)	(0.110)	(0.032)	(0.045)	(0.053)	(0.067)	(0.081)
Age 80+	0.2852***	0.1495*	0.3991***	0.4073***	0.7251***	0.3138***	0.0622	0.3236***	0.3580***	0.5882***
	(0.064)	(0.081)	(0.093)	(0.130)	(0.120)	(0.062)	(0.066)	(0.082)	(0.107)	(0.105)
Education level (reference is less than primary education)										
Primary education	-0.0370	-0.0669	-0.0034	-0.1469	-0.0206	-0.0305	-0.0843	0.0065	0.0718	-0.0456
	(0.033)	(0.074)	(0.054)	(0.346)	(0.088)	(0.034)	(0.059)	(0.049)	(0.251)	(0.075)
Secondary	-0.0365	0.0679	-0.0014	0.0436	-0.0520	-0.0245	0.0942	0.0230	0.1451	-0.0565
	(0.037)	(0.107)	(0.061)	(0.294)	(0.125)	(0.037)	(0.087)	(0.055)	(0.227)	(0.076)
High School	-0.0050	-0.0596	-0.0343	-0.0495	0.1273	0.0075	-0.0204	-0.0552	0.1448	0.1261
	(0.034)	(0.066)	(0.063)	(0.280)	(0.098)	(0.036)	(0.056)	(0.065)	(0.211)	(0.082)
College/university	-0.1013*	0.1217	-0.0237	-0.0968	0.0320	-0.0979	0.1421*	0.0014	0.1085	0.0220
	(0.053)	(0.100)	(0.071)	(0.283)	(0.106)	(0.063)	(0.078)	(0.067)	(0.227)	(0.102)
Income quartiles (reference is bottom 25%)										
Q2: second poorest 25%	-0.0118	0.0529	0.0676	0.0237	0.0172	-0.0051	0.0782	0.0713	0.0412	0.0671
	(0.043)	(0.060)	(0.057)	(0.101)	(0.115)	(0.039)	(0.051)	(0.045)	(0.085)	(0.079)
Q3: second richest 25%	0.1045**	0.1780***	0.1831***	-0.0022	0.0010	0.1128***	0.2294***	0.1906***	-0.0291	-0.1002
	(0.044)	(0.059)	(0.054)	(0.128)	(0.107)	(0.040)	(0.052)	(0.048)	(0.082)	(0.085)
Q4: richest 25%	0.1411***	0.1252*	0.2685***	0.1103	0.0115	0.1473***	0.1879***	0.2385***	0.1244	0.0510
	(0.044)	(0.068)	(0.057)	(0.106)	(0.124)	(0.039)	(0.059)	(0.053)	(0.088)	(0.082)
Social cohesion indicators										
Community involvement	0.2185*	0.5142***	0.0288	0.0143	0.7298***	0.2565**	0.6428***	-0.0285	0.0426	0.5077***
	(0.126)	(0.124)	(0.148)	(0.158)	(0.280)	(0.117)	(0.104)	(0.132)	(0.156)	(0.188)
Trust in others	0.2269*	-0.5435***	0.0354	0.1855	-0.1708	0.2442**	-0.2157**	0.1109	0.1351	-0.0192
	(0.122)	(0.111)	(0.094)	(0.166)	(0.149)	(0.115)	(0.085)	(0.077)	(0.142)	(0.136)
Safety	0.3946***	0.4019***	0.0134	0.1384	-0.0294	0.4311***	0.2302**	-0.0554	0.2512**	-0.0194
	(0.086)	(0.116)	(0.090)	(0.146)	(0.191)	(0.077)	(0.099)	(0.079)	(0.113)	(0.118)
N	9,265	3,070	4,848	2,593	2,059	9,265	3,070	4,848	2,593	2,059
R^2	0.170	0.135	0.267	0.177	0.147	0.210	0.353	0.364	0.376	0.430
F-statistic that all vignette terms are jointly equal to zero						90.16	46.91	6.84	47.52	19.17
P-value of F-test						0.0000	0.0000	0.0000	0.0000	0.0000

Notes: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Sample weights are applied. The entries in each column are country-specific average partial association of standardized life satisfaction with standardized emotion score. Average partial effects are based on the linear regressions expressed in models (3.5) & (3.6).

Table 3.10: Partial association of WHOQoL8 with emotion score - full model

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Without controls for health-state vignettes					With controls for health-state vignettes				
	China	Ghana	India	Russia	South Africa	China	Ghana	India	Russia	South Africa
WHOQoL8	0.2309***	0.2192***	0.2803***	0.3009***	0.2154***	0.2297***	0.1842***	0.2941***	0.2739***	0.2389***
	(0.020)	(0.032)	(0.030)	(0.035)	(0.049)	(0.021)	(0.025)	(0.026)	(0.040)	(0.036)
Female	-0.0498**	-0.0666	-0.2175***	-0.0923*	-0.0625	-0.0378*	-0.0699*	-0.2437***	-0.0556	-0.0662
	(0.023)	(0.055)	(0.051)	(0.048)	(0.071)	(0.022)	(0.040)	(0.044)	(0.048)	(0.057)
Married	0.0912**	0.0354	-0.0608	0.0855	0.1027	0.0891**	-0.0152	-0.0226	0.1100**	0.0495
	(0.040)	(0.056)	(0.053)	(0.074)	(0.078)	(0.041)	(0.044)	(0.043)	(0.053)	(0.055)
Rural	-0.1489***	-0.0217	-0.0591	0.0173	-0.1716*	-0.1665***	-0.0257	-0.0962**	-0.1146	-0.1043
	(0.045)	(0.067)	(0.059)	(0.107)	(0.090)	(0.041)	(0.050)	(0.047)	(0.086)	(0.064)
Ethnic minority	-0.0591	-0.1056*	0.0384	-0.1438	-0.0734	-0.0137	-0.0659	-0.0049	-0.0601	-0.0689
	(0.111)	(0.059)	(0.068)	(0.095)	(0.077)	(0.095)	(0.043)	(0.055)	(0.057)	(0.063)
Household size	0.0119	0.0378	0.0052	-0.0296	0.0082	0.0129	0.0396*	0.0044	-0.0395*	0.0230
	(0.014)	(0.023)	(0.022)	(0.021)	(0.033)	(0.013)	(0.021)	(0.019)	(0.022)	(0.030)
Working	-0.0716*	0.2630***	-0.1587***	0.0699	0.0123	-0.0669*	0.1806***	-0.1751***	0.0107	0.0324
	(0.041)	(0.059)	(0.040)	(0.083)	(0.089)	(0.038)	(0.048)	(0.035)	(0.066)	(0.065)
Victim	-0.1641	0.1534	-0.2551***	-0.0939	0.0107	-0.1745	0.1421	-0.2850***	-0.0516	-0.0983
	(0.121)	(0.115)	(0.094)	(0.136)	(0.088)	(0.119)	(0.087)	(0.092)	(0.175)	(0.082)
Disability	-1.4714***	0.0063	-1.6446***	-1.0329***	-0.6433***	-1.4534***	-0.1758	-1.5509***	-1.0177***	-0.4013**
	(0.175)	(0.203)	(0.190)	(0.286)	(0.245)	(0.159)	(0.171)	(0.151)	(0.235)	(0.175)
Age group (reference is 50-59 yo)										
Age 60-69	0.0838***	0.0264	0.1239***	0.1165	0.2615***	0.0899***	-0.0035	0.1006***	0.1699**	0.2043***
	(0.027)	(0.049)	(0.039)	(0.078)	(0.086)	(0.026)	(0.040)	(0.036)	(0.067)	(0.054)
Age 70-79	0.2377***	0.1241**	0.1889***	0.2392***	0.3642***	0.2499***	0.0768*	0.1745***	0.2066***	0.3099***
	(0.035)	(0.057)	(0.063)	(0.085)	(0.108)	(0.034)	(0.044)	(0.053)	(0.065)	(0.080)
Age 80+	0.2933***	0.1662**	0.3848***	0.3096**	0.6953***	0.3210***	0.0772	0.2970***	0.3122***	0.5657***
	(0.065)	(0.082)	(0.095)	(0.126)	(0.114)	(0.063)	(0.067)	(0.084)	(0.107)	(0.101)
Education level (reference is less than primary education)										
Primary education	-0.0364	-0.0722	0.0063	-0.1068	-0.0094	-0.0303	-0.0894	0.0126	0.0749	-0.0299
	(0.033)	(0.073)	(0.055)	(0.340)	(0.086)	(0.033)	(0.058)	(0.050)	(0.266)	(0.074)
Secondary	-0.0383	0.0215	-0.0165	0.0750	-0.0702	-0.0269	0.0636	0.0023	0.1550	-0.0664
	(0.038)	(0.106)	(0.063)	(0.292)	(0.127)	(0.037)	(0.084)	(0.056)	(0.243)	(0.077)
High School	-0.0086	-0.0772	-0.0631	-0.0301	0.0875	0.0046	-0.0324	-0.0806	0.1452	0.0911
	(0.035)	(0.065)	(0.063)	(0.279)	(0.101)	(0.036)	(0.056)	(0.065)	(0.228)	(0.084)
College/university	-0.1115**	0.0944	-0.0465	-0.1089	-0.0101	-0.1088*	0.1176	-0.0327	0.0944	-0.0167
	(0.054)	(0.096)	(0.071)	(0.281)	(0.110)	(0.062)	(0.077)	(0.066)	(0.243)	(0.106)
Income quartiles (reference is bottom 25%)										
Q2: second poorest 25%	-0.0092	0.0340	0.0478	-0.0018	-0.0073	-0.0022	0.0595	0.0516	0.0111	0.0394
	(0.044)	(0.060)	(0.057)	(0.103)	(0.114)	(0.040)	(0.051)	(0.045)	(0.085)	(0.080)
Q3: second richest 25%	0.0995**	0.1644***	0.1236**	-0.0036	-0.0132	0.1086***	0.2122***	0.1346***	-0.0322	-0.1311
	(0.044)	(0.059)	(0.054)	(0.122)	(0.106)	(0.041)	(0.052)	(0.048)	(0.081)	(0.086)
Q4: richest 25%	0.1234***	0.0893	0.1893***	0.0950	-0.0437	0.1319***	0.1520**	0.1575***	0.0959	-0.0118
	(0.044)	(0.071)	(0.057)	(0.107)	(0.126)	(0.041)	(0.061)	(0.055)	(0.088)	(0.086)
Social cohesion indicators										
Community involvement	0.2095	0.4736***	-0.0806	0.0031	0.6276**	0.2457**	0.6017***	-0.1420	0.0552	0.4025**
	(0.129)	(0.124)	(0.146)	(0.146)	(0.260)	(0.118)	(0.104)	(0.132)	(0.147)	(0.189)
Trust in others	0.1736	-0.5645***	-0.0356	0.1089	-0.1650	0.1900*	-0.2139**	0.0345	0.0923	-0.0243
	(0.119)	(0.113)	(0.095)	(0.150)	(0.150)	(0.114)	(0.087)	(0.075)	(0.137)	(0.137)
Safety	0.3842***	0.3872***	-0.0395	0.0833	-0.0396	0.4223***	0.2070**	-0.0981	0.1924	-0.0436
	(0.086)	(0.116)	(0.090)	(0.145)	(0.189)	(0.078)	(0.098)	(0.077)	(0.119)	(0.118)
N	9,265	3,070	4,848	2,593	2,059	9,265	3,070	4,848	2,593	2,059
R^2	0.165	0.133	0.282	0.200	0.152	0.206	0.353	0.377	0.382	0.437
F-statistic that all vignette terms are jointly equal to zero						150.20	42.82	6.81	51.84	19.38
P-value of F-test						0.0000	0.0000	0.0000	0.0000	0.0000

Notes: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Sample weights are applied. The entries in each column are country-specific average partial association of standardized WHOQoL8 with standardized emotion score. Average partial effects are based on the linear regressions expressed in models (3.5) & (3.6).

3.4.3 Are there age- and income-interaction effects on the association of evaluative well-being with experienced well-being?

An important concern is that age and income may affect the way experienced and evaluative well-being are related. To examine this, we add to the regression in expression (3.6) the interaction of evaluative well-being with age, and then with income. The specification with interaction terms corresponds to the estimates reported in Tables 3.11 & 3.12 (showing the interactions with age categories) and Tables 3.13 & 3.14 (showing the interactions with permanent income quartiles). Panel A in each table reports the results of life satisfaction whereas Panel B reports that of WHOQoL8.

The coefficients of the interactions of life satisfaction and WHOQoL8 with the various age cohorts are negative and generally statistically significant in a majority of the surveyed countries. We are able to reject at conventional levels that the interaction terms between evaluative well-being and age are jointly equal to zero, at least in Ghana and India (Table 3.11), and in South Africa (Tables 3.11 & 3.12). The results suggest a pattern which shows that age appears to have a dampening effect on the association of evaluative well-being with experienced well-being. However, we do not find consistent evidence of a similar effect for the interaction of evaluative well-being and income (Tables 3.13 & 3.14).

Table 3.11: Partial association of evaluative well-being (life satisfaction and WHO-QoL8) with experienced utility: Age-interaction effects

	(1)	(2)	(3)	(4)	(5)
	China	Ghana	India	Russia	South Africa
Panel A: Life satisfaction					
Life satisfaction	0.1846***	0.1323***	0.1729***	0.1547***	0.1705***
	(0.026)	(0.040)	(0.035)	(0.040)	(0.039)
Age group (reference is 50-59 yo)					
Age 60-69	0.0960***	0.1836***	0.1131***	-0.0136	0.2350***
	(0.029)	(0.043)	(0.038)	(0.068)	(0.048)
Age 70-79	0.2104***	0.1569***	0.2019***	0.1261	0.3091***
	(0.036)	(0.050)	(0.054)	(0.085)	(0.070)
Age 80+	0.3227***	0.1335	0.1388	0.2053	0.2746***
	(0.056)	(0.082)	(0.096)	(0.129)	(0.094)
Age 60-69 × Life satisfaction	-0.0084	-0.0659	-0.0932**	0.2008*	-0.1234***
	(0.030)	(0.051)	(0.045)	(0.106)	(0.047)
Age 70-79 × Life satisfaction	0.0077	-0.0907*	-0.0852	0.0234	-0.0992
	(0.038)	(0.051)	(0.054)	(0.063)	(0.063)
Age 80+ × Life satisfaction	-0.0568	-0.1481**	-0.0701	0.1624*	-0.0347
	(0.046)	(0.063)	(0.078)	(0.094)	(0.073)
R^2	0.203	0.272	0.287	0.377	0.561
F-statistic that all the age-life satisfaction interaction terms are jointly equal to zero	0.74	2.14	1.81	1.73	2.69
P-value of F-test	0.5323	0.0961	0.1454	0.1645	0.0462
F-statistic that all vignette terms are jointly equal to zero	149.05	84.24	16.70	14.60	8.34
P-value of F-test	0.0000	0.0000	0.0000	0.0000	0.0000
Panel B: WHOQoL8					
WHOQoL8	0.1772***	0.1446***	0.2264***	0.2029***	0.1876***
	(0.029)	(0.046)	(0.036)	(0.051)	(0.042)
Age group (reference is 50-59 yo)					
Age 60-69	0.1043***	0.2014***	0.1176***	-0.0113	0.2205***
	(0.029)	(0.045)	(0.039)	(0.068)	(0.048)
Age 70-79	0.2235***	0.1733***	0.2024***	0.1128	0.2971***
	(0.038)	(0.052)	(0.054)	(0.082)	(0.066)
Age 80+	0.3325***	0.1012	0.0650	0.1065	0.2788***
	(0.056)	(0.088)	(0.099)	(0.121)	(0.084)
Age 60-69 × WHOQoL8	-0.0057	-0.0782	-0.0624	0.1939*	-0.0972**
	(0.036)	(0.054)	(0.046)	(0.104)	(0.049)
Age 70-79 × WHOQoL8	-0.0200	-0.1134*	-0.0862*	0.0300	-0.0355
	(0.042)	(0.060)	(0.051)	(0.061)	(0.063)
Age 80+ × WHOQoL8	-0.0578	-0.2301***	-0.1766**	0.0114	0.0417
	(0.045)	(0.066)	(0.077)	(0.092)	(0.087)
R^2	0.196	0.273	0.292	0.375	0.563
F-statistic that all the age-WHOQoL8 interaction terms are jointly equal to zero	0.58	4.25	2.34	1.29	1.95
P-value of F-test	0.629	0.0060	0.0728	0.2816	0.1214
F-statistic that all vignette terms are jointly equal to zero	118.50	78.38	14.80	12.80	10.32
P-value of F-test	0.0000	0.0000	0.0000	0.0000	0.0000
N	9,265	3,070	4,848	2,593	2,059
Other covariates	Yes	Yes	Yes	Yes	Yes
Controls for health-state vignettes	Yes	Yes	Yes	Yes	Yes

Notes: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Sample weights are applied. The entries in each column are country-specific average partial association of standardized life satisfaction (Panel A) and WHOQoL8 (Panel B) with standardized experienced utility. Average partial effects are based on the linear regression expressed in model (3.6). All regressions control for the large set of individual characteristics included in Table 3.1 as well as vignettes for health-state description.

Table 3.12: Partial association of evaluative well-being (life satisfaction and WHO-QoL8) with emotion score: Age-interaction effects

	(1)	(2)	(3)	(4)	(5)
	China	Ghana	India	Russia	South Africa
Panel A: Life satisfaction					
Life satisfaction	0.2139***	0.1766***	0.2300***	0.1335***	0.2225***
	(0.026)	(0.033)	(0.032)	(0.050)	(0.050)
Age group (reference is 50-59 yo)					
Age 60-69	0.0828***	-0.0117	0.1009***	0.1621**	0.2293***
	(0.027)	(0.041)	(0.036)	(0.064)	(0.055)
Age 70-79	0.2386***	0.0656	0.1715***	0.2044***	0.3345***
	(0.032)	(0.045)	(0.053)	(0.069)	(0.084)
Age 80+	0.3187***	0.0622	0.3539***	0.3471***	0.5671***
	(0.058)	(0.069)	(0.081)	(0.103)	(0.103)
Age 60-69 × Life satisfaction	0.0120	-0.0603	-0.0671*	0.2275**	-0.0579
	(0.034)	(0.047)	(0.040)	(0.107)	(0.065)
Age 70-79 × Life satisfaction	0.0042	-0.0046	-0.0526	0.0971	-0.1606**
	(0.034)	(0.049)	(0.059)	(0.059)	(0.077)
Age 80+ × Life satisfaction	0.0421	-0.0304	0.0260	0.0933	-0.1971**
	(0.077)	(0.054)	(0.075)	(0.103)	(0.086)
R^2	0.210	0.353	0.365	0.382	0.433
F-statistic that all the age-life satisfaction interaction terms are jointly equal to zero	0.10	0.68	1.10	1.85	2.40
P-value of F-test	0.9573	0.5675	0.3497	0.1423	0.0681
F-statistic that all vignette terms are jointly equal to zero	63.35	44.50	6.58	19.24	16.95
P-value of F-test	0.0000	0.0000	0.0000	0.0000	0.0000
Panel B: WHOQoL8					
WHOQoL8	0.2197***	0.2228***	0.3106***	0.2148***	0.2649***
	(0.033)	(0.040)	(0.035)	(0.050)	(0.046)
Age group (reference is 50-59 yo)					
Age 60-69	0.0893***	0.0077	0.1039***	0.1613**	0.2044***
	(0.027)	(0.042)	(0.036)	(0.067)	(0.055)
Age 70-79	0.2445***	0.0957**	0.1679***	0.1984***	0.3118***
	(0.034)	(0.044)	(0.051)	(0.067)	(0.079)
Age 80+	0.3389***	0.0621	0.2824***	0.2454**	0.5480***
	(0.058)	(0.070)	(0.084)	(0.100)	(0.098)
Age 60-69 × WHOQoL8	0.0340	-0.0897*	-0.0125	0.1821*	-0.0213
	(0.035)	(0.048)	(0.040)	(0.102)	(0.062)
Age 70-79 × WHOQoL8	-0.0220	-0.0125	-0.0585	0.1025	-0.1065
	(0.039)	(0.056)	(0.054)	(0.064)	(0.077)
Age 80+ × WHOQoL8	0.0622	-0.0836	-0.0544	-0.0038	-0.0959
	(0.079)	(0.056)	(0.067)	(0.087)	(0.091)
R^2	0.207	0.355	0.377	0.386	0.439
F-statistic that all the age-WHOQoL8 interaction terms are jointly equal to zero	1.01	1.73	0.54	1.64	0.86
P-value of F-test	0.3887	0.1614	0.6571	0.1833	0.4630
F-statistic that all vignette terms are jointly equal to zero	102.76	42.67	6.45	23.58	20.19
P-value of F-test	0.0000	0.0000	0.0000	0.0000	0.0000
N	9,265	3,070	4,848	2,593	2,059
Other covariates	Yes	Yes	Yes	Yes	Yes
Controls for health-state vignettes	Yes	Yes	Yes	Yes	Yes

Notes: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Sample weights are applied. The entries in each column are country-specific average partial association of standardized life satisfaction (Panel A) and WHOQoL8 (Panel B) with standardized experienced utility. Average partial effects are based on the linear regression expressed in model (3.6). All regressions control for the large set of individual characteristics included in Table 3.1 as well as vignettes for health-state description.

Table 3.13: Partial association of evaluative well-being (life satisfaction and WHO-QoL8) with experienced utility: Income-interaction effects

	(1)	(2)	(3)	(4)	(5)
	China	Ghana	India	Russia	South Africa
Panel A: Life satisfaction					
Life satisfaction	0.1971***	0.0373	0.0949**	0.3009***	0.0508
	(0.030)	(0.036)	(0.044)	(0.074)	(0.043)
Income quartiles (reference is bottom 25%)					
Q2: second poorest 25%	0.0584	0.0918*	0.0693	0.2542***	-0.0228
	(0.041)	(0.055)	(0.053)	(0.088)	(0.060)
Q3: second richest 25%	0.1608***	0.1554***	0.0328	0.1410*	-0.0710
	(0.053)	(0.055)	(0.059)	(0.073)	(0.064)
Q4: richest 25%	0.1921***	0.1315*	0.1987***	0.2046**	-0.0838
	(0.051)	(0.072)	(0.059)	(0.083)	(0.065)
Q2: second poorest 25% × Life satisfaction	0.0245	0.0994**	0.0628	-0.0957	0.1325**
	(0.038)	(0.046)	(0.056)	(0.079)	(0.062)
Q3: second richest 25% × Life satisfaction	-0.0189	-0.0127	0.0720	-0.1162	0.0821
	(0.041)	(0.045)	(0.061)	(0.112)	(0.069)
Q4: richest 25% × Life satisfaction	-0.0734	0.0577	-0.0164	-0.1396	0.0906
	(0.047)	(0.059)	(0.059)	(0.099)	(0.071)
R^2	0.203	0.272	0.286	0.374	0.561
F-statistic that all the income-life satisfaction interaction terms are jointly equal to zero	1.65	2.30	1.37	0.72	1.58
P-value of F-test	0.1819	0.0778	0.2518	0.5432	0.1944
F-statistic that all vignette terms are jointly equal to zero	150.78	51.09	14.59	22.80	8.84
P-value of F-test	0.0000	0.0000	0.0000	0.0000	0.0000
Panel B: WHOQoL8					
WHOQoL8	0.2123***	0.0320	0.1963***	0.3088***	0.0759
	(0.030)	(0.041)	(0.042)	(0.071)	(0.050)
Income quartiles (reference is bottom 25%)					
Q2: second poorest 25%	0.0468	0.0900	0.0406	0.2312**	-0.0264
	(0.042)	(0.056)	(0.052)	(0.089)	(0.058)
Q3: second richest 25%	0.1501***	0.1543***	-0.0196	0.1390*	-0.0742
	(0.055)	(0.058)	(0.060)	(0.074)	(0.062)
Q4: richest 25%	0.1744***	0.1237	0.1618***	0.1752**	-0.1002
	(0.053)	(0.077)	(0.061)	(0.084)	(0.069)
Q2: second poorest 25% × WHOQoL8	-0.0493	0.0923*	-0.0001	-0.0747	0.1483**
	(0.036)	(0.051)	(0.051)	(0.077)	(0.075)
Q3: second richest 25% × WHOQoL8	-0.0406	-0.0325	0.0419	-0.1165	0.0875
	(0.041)	(0.051)	(0.063)	(0.088)	(0.076)
Q4: richest 25% × WHOQoL8	-0.0798*	0.0646	-0.1048*	-0.0652	0.0786
	(0.046)	(0.071)	(0.058)	(0.093)	(0.076)
R^2	0.196	0.271	0.292	0.373	0.564
F-statistic that all the income-WHOQoL8 interaction terms are jointly equal to zero	1.14	2.67	2.34	0.58	1.32
P-value of F-test	0.3365	0.0484	0.0735	0.6310	0.2680
F-statistic that all vignette terms are jointly equal to zero	171.00	60.11	21.17	22.24	17.20
P-value of F-test	0.0000	0.0000	0.0000	0.0000	0.0000
N	9,265	3,070	4,848	2,593	2,059
Other covariates	Yes	Yes	Yes	Yes	Yes
Controls for health-state vignettes	Yes	Yes	Yes	Yes	Yes

Notes: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Sample weights are applied. The entries in each column are country-specific average partial association of standardized life satisfaction (Panel A) and WHOQoL8 (Panel B) with standardized experienced utility. Average partial effects are based on the linear regression expressed in model (3.6). All regressions control for the large set of individual characteristics included in Table 3.1 as well as vignettes for health-state description.

Table 3.14: Partial association of evaluative well-being (life satisfaction and WHO-QoL8) with emotion score: Income-interaction effects

	(1)	(2)	(3)	(4)	(5)
	China	Ghana	India	Russia	South Africa
Panel A: Life satisfaction					
Life satisfaction	0.2709***	0.1764***	0.2517***	0.2806***	0.1217**
	(0.027)	(0.033)	(0.040)	(0.080)	(0.059)
Income quartiles (reference is bottom 25%)					
Q2: second poorest 25%	-0.0213	0.0754	0.0541	0.0220	0.0874
	(0.038)	(0.050)	(0.045)	(0.083)	(0.075)
Q3: second richest 25%	0.0922**	0.2256***	0.1787***	-0.0493	-0.0847
	(0.039)	(0.051)	(0.049)	(0.079)	(0.084)
Q4: richest 25%	0.1582***	0.1745***	0.2260***	0.1251	0.0548
	(0.039)	(0.060)	(0.053)	(0.084)	(0.084)
Q2: second poorest 25% × Life satisfaction	0.0157	-0.0163	-0.0710	-0.1124	0.0649
	(0.039)	(0.047)	(0.049)	(0.089)	(0.078)
Q3: second richest 25% × Life satisfaction	-0.0554	-0.0662	-0.0901*	-0.0271	0.0810
	(0.040)	(0.044)	(0.054)	(0.127)	(0.083)
Q4: richest 25% × Life satisfaction	-0.1699***	0.0114	-0.0539	-0.1483	0.0899
	(0.039)	(0.053)	(0.052)	(0.104)	(0.079)
R^2	0.214	0.353	0.365	0.379	0.431
F-statistic that all the income-life satisfaction interaction terms are jointly equal to zero	10.54	1.04	1.08	1.47	0.54
P-value of F-test	0.0000	0.3744	0.3569	0.2251	0.6530
F-statistic that all vignette terms are jointly equal to zero	64.29	31.03	6.76	31.26	18.72
P-value of F-test	0.0000	0.0000	0.0000	0.0000	0.0000
Panel B: WHOQoL8					
WHOQoL8	0.3239***	0.2248***	0.3629***	0.3065***	0.1827***
	(0.028)	(0.041)	(0.037)	(0.076)	(0.060)
Income quartiles (reference is bottom 25%)					
Q2: second poorest 25%	-0.0443	0.0460	0.0235	-0.0032	0.0677
	(0.037)	(0.050)	(0.046)	(0.083)	(0.076)
Q3: second richest 25%	0.0630	0.1981***	0.1105**	-0.0438	-0.1057
	(0.038)	(0.051)	(0.049)	(0.076)	(0.084)
Q4: richest 25%	0.1326***	0.1300**	0.1580***	0.0970	0.0300
	(0.040)	(0.062)	(0.055)	(0.084)	(0.088)
Q2: second poorest 25% × WHOQoL8	-0.0595	-0.0508	-0.0550	-0.0655	0.1067
	(0.036)	(0.055)	(0.046)	(0.076)	(0.081)
Q3: second richest 25% × WHOQoL8	-0.0978**	-0.0829*	-0.1265**	0.0144	0.0732
	(0.041)	(0.047)	(0.052)	(0.097)	(0.084)
Q4: richest 25% × WHOQoL8	-0.2165***	-0.0184	-0.1362***	-0.0800	0.0269
	(0.042)	(0.055)	(0.047)	(0.085)	(0.071)
R^2	0.211	0.354	0.379	0.383	0.439
F-statistic that all the income-WHOQoL8 interaction terms are jointly equal to zero	8.88	1.16	3.66	0.91	0.71
P-value of F-test	0.0000	0.3254	0.0127	0.4375	0.5474
F-statistic that all vignette terms are jointly equal to zero	90.83	32.83	6.49	29.37	18.55
P-value of F-test	0.0000	0.0000	0.0000	0.0000	0.0000
N	9,265	3,070	4,848	2,593	2,059
Other covariates	Yes	Yes	Yes	Yes	Yes
Controls for health-state vignettes	Yes	Yes	Yes	Yes	Yes

Notes: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Sample weights are applied. The entries in each column are country-specific average partial association of standardized life satisfaction (Panel A) and WHOQoL8 (Panel B) with standardized experienced utility. Average partial effects are based on the linear regression expressed in model (3.6). All regressions control for the large set of individual characteristics included in Table 3.1 as well as vignettes for health-state description.

3.5 Conclusions

The literature on SWB provides strong empirical evidence for the indirect relationship between experienced and evaluative well-being through how both dimensions of well-being predict individuals' choices or how they relate with demographic and socioeconomic characteristics. This study contributes to our understanding of how experienced and evaluative well-being are directly related. Using an abbreviated version of the DRM, we establish the extent to which people's subjective assessment of their emotional affects during the course of a day is related to their self-reported general life satisfaction and quality of life based on broad population data on older persons from five countries in the developing world.

Across a wide range of alternative specifications, we document robust evidence in favour of a moderate to high direct relationship between experienced and evaluative well-being. This picture emerges irrespective of whether we use general life satisfaction or WHO quality of life index as the measure of evaluative well-being and whether we use experienced utility or emotion score as the measure of experienced well-being. Holding individuals' demographic and socioeconomic characteristics as well as their personality traits fixed, our results show that a one-standard-deviation increase in life satisfaction (WHOQoL8) is directly associated with between 0.072 and 0.221 (0.060 and 0.251) standard-deviation increase in experienced utility. Similarly, a one-standard-deviation increase in life satisfaction (WHOQoL8) is directly associated with between 0.156 and 0.220 (0.184 and 0.294) standard-deviation increase in emotion score. The results further suggest that age appears to have a dampening effect on the association of evaluative well-being with experienced well-being but income does not appear to have a similar effect across the studied countries.

Since our paper is the first detailed study of the direct relationship between experienced and evaluative well-being among older persons in the developing world, there is still ample opportunity for further research on this topic. There are two noteworthy limitations of our paper. First, our estimates are mainly descriptive and as such may be potentially plagued by issues of endogeneity and selection. As a result, we cannot interpret any of our reported associations as causal effects of evaluative well-being on experienced well-being. In particular, there could still be other unobserved individual heterogeneity that drive the cognitive global evaluation of their lives as well as their emotional affects during their activities of the day which we could not adequately eliminate by using anchoring vignettes for health-state description. This could be achievable if the data were, for example, of longitudinal nature. The second limitation concerns our model specification which takes a more behavioral economics perspective rather than using the standard approach where the

theoretical direction of causality is from experienced well-being (utility flow) to evaluative well-being (utility stock). Future work should look at the topic from a more structural approach which preserves the theoretical direction of causality.

Despite this limitation, we nonetheless regard our descriptive approach as a valuable initial exploration of stylized facts regarding the relationship between experienced and evaluative well-being, and the findings therefore have important implications for applied work, in particular in the use of SWB as a portrayal of human well-being. Our estimates of weak to moderate association between experienced and evaluative well-being suggest that there should be caution in using both SWB dimensions interchangeably as a proxy for utility in applied work. The results confirm that though they are complementary, evaluative and experienced well-being dimensions capture different underlying phenomena and therefore should be measured separately in SWB surveys and used complementarily.

APPENDICES

3.A COUNTRY-SPECIFIC SUMMARY STATISTICS

Table 3.A1: Descriptive statistics - China

	Obs.	Mean	Std. dev.	Min	5th percentile	Median	95th percentile	Max
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Demographics								
Age (years)	9,265	62.49	8.92	50	51	61	79	95
50-59	9,265	0.45	0.50	0	0	0	1	1
60-69	9,265	0.32	0.47	0	0	0	1	1
70-79	9,265	0.19	0.39	0	0	0	1	1
80+	9,265	0.05	0.21	0	0	0	0	1
Female	9,265	0.50	0.50	0	0	0	1	1
Married/cohabiting	9,265	0.86	0.35	0	0	1	1	1
Rural	9,265	0.53	0.50	0	0	1	1	1
Ethnic minority	9,265	0.01	0.10	0	0	0	0	1
No. of adults	9,265	1.98	1.06	1	1	2	4	10
No. of kids	9,265	0.22	0.50	0	0	0	1	4
Household size	9,265	2.20	1.25	1	1	2	5	11
Socioeconomic status								
Education: Less than primary	9,265	0.42	0.49	0	0	0	1	1
Primary	9,265	0.21	0.41	0	0	0	1	1
Secondary	9,265	0.20	0.40	0	0	0	1	1
High school	9,265	0.13	0.33	0	0	0	1	1
$\geq$ College/university	9,265	0.04	0.20	0	0	0	0	1
Income: Q1 (poorest 25%)	9,265	0.21	0.41	0	0	0	1	1
Q2 (second poorest 25%)	9,265	0.24	0.43	0	0	0	1	1
Q3 (second richest 25%)	9,265	0.28	0.45	0	0	0	1	1
Q4 (richest 25%)	9,265	0.28	0.45	0	0	0	1	1
Working	9,265	0.44	0.50	0	0	0	1	1
Violent crime victim	9,265	0.02	0.13	0	0	0	0	1
Social cohesion indicators								
Community involvement	9,265	0.23	0.13	0	0.04	0.22	0.44	1
Trust in others	9,265	0.53	0.13	0	0.33	0.50	0.75	1
Safety	9,265	0.71	0.18	0	0.38	0.75	1	1
Disability measure								
Disability score	9,265	0.08	0.12	0	0	0.04	0.31	1
Evaluative well-being								
General life satisfaction	9,265	2.68	0.68	0	2	3	4	4
WHO quality of life index	9,265	20.93	4.57	1	13	22	28	32
Experienced well-being								
Emotion score	9,265	12.32	1.98	0	8	13	14	14
Total experienced utility	9,265	12.74	1.55	0	10	13.2	14	14
Activity-specific net affect								
Working	2,570	12.15	1.97	0	8	12	14	14
Housework	5,674	12.48	1.68	0	10	12.3	14	14
Travel	1,360	12.71	1.65	0	10	13	14	14
Leisure	7,651	13.04	1.4	0	10	14	14	14
Self-care	6,750	12.95	1.42	0	10	14	14	14

Note: The entries are country-specific averages using population weights.

Table 3.A2: Descriptive statistics - Ghana

	Obs.	Mean	Std. dev.	Min	5th percentile	Median	95th percentile	Max
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Demographics								
Age (years)	3,070	64.27	10.70	50	50	62	84	114
50-59	3,070	0.40	0.49	0	0	0	1	1
60-69	3,070	0.27	0.44	0	0	0	1	1
70-79	3,070	0.23	0.42	0	0	0	1	1
80+	3,070	0.09	0.29	0	0	0	1	1
Female	3,070	0.48	0.50	0	0	0	1	1
Married/partnership	3,070	0.59	0.49	0	0	1	1	1
Rural	3,070	0.58	0.49	0	0	1	1	1
Ethnic minority	3,070	0.51	0.50	0	0	1	1	1
No. of adults	3,070	1.42	1.43	1	1	1	5	13
No. of kids	3,070	1.89	1.91	0	0	1	6	12
Household size	3,070	3.31	2.46	1	1	3	8	16
Socioeconomic status								
Education: Less than primary	3,070	0.64	0.48	0	0	1	1	1
Primary	3,070	0.11	0.31	0	0	0	1	1
Secondary	3,070	0.04	0.20	0	0	0	0	1
High school	3,070	0.17	0.38	0	0	0	1	1
$\geq$ College/university	3,070	0.04	0.19	0	0	0	0	1
Income: Q1 (poorest 25%)	3,070	0.23	0.42	0	0	0	1	1
Q2 (second poorest 25%)	3,070	0.25	0.44	0	0	0	1	1
Q3 (second richest 25%)	3,070	0.26	0.44	0	0	0	1	1
Q4 (richest 25%)	3,070	0.26	0.44	0	0	0	1	1
Working	3,070	0.70	0.46	0	0	1	1	1
Violent crime victim	3,070	0.04	0.19	0	0	0	0	1
Social cohesion indicators								
Community involvement	3,070	0.46	0.21	0	0.06	0.45	0.79	1
Trust in others	3,070	0.49	0.24	0	0	0.50	0.83	1
Safety	3,070	0.76	0.21	0	0.38	0.75	1	1
Disability measure								
Disability score	3,070	0.20	0.18	0	0	0.17	0.54	1
Evaluative well-being								
General life satisfaction	3,070	2.47	0.85	0	1	3	4	4
WHO quality of life index	3,070	18.07	5.16	0	8	19	26	32
Experienced well-being								
Emotion score	3,070	11.92	2.29	0	7	13	14	14
Total experienced utility	3,070	12.67	1.88	0	9	13.2	14	14
Activity-specific net affect								
Working	1,069	12.17	2.12	0	8.0	12	14	14
Housework	1,219	12.58	1.73	0	9.3	13	14	14
Travel	1,151	12.35	1.76	0	9.7	12.2	14	14
Leisure	2,468	13.02	1.80	0	9.3	14	14	14
Self-care	2,622	13.09	1.64	0	9.6	14	14	14

Note: The entries are country-specific averages using population weights.

Table 3.A3: Descriptive statistics - India

	Obs.	Mean	Std. dev.	Min	5th percentile	Median	95th percentile	Max
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Demographics								
Age (years)	4,848	61.43	8.82	50	50	60	78	106
50-59	4,848	0.49	0.50	0	0	0	1	1
60-69	4,848	0.31	0.46	0	0	0	1	1
70-79	4,848	0.16	0.37	0	0	0	1	1
80+	4,848	0.04	0.21	0	0	0	0	1
Female	4,848	0.49	0.50	0	0	0	1	1
Married/partnership	4,848	0.76	0.43	0	0	1	1	1
Rural	4,848	0.74	0.44	0	0	1	1	1
Ethnic minority	4,848	0.14	0.35	0	0	0	1	1
No. of adults	4,848	3.68	2.92	1	1	3	9	19
No. of kids	4,848	1.92	2.16	0	0	1	6	20
Household size	4,848	5.60	4.13	1	1	5	14	28
Socioeconomic status								
Education: Less than primary	4,848	0.61	0.49	0	0	1	1	1
Primary	4,848	0.15	0.35	0	0	0	1	1
Secondary	4,848	0.10	0.30	0	0	0	1	1
High school	4,848	0.09	0.28	0	0	0	1	1
$\geq$ College/university	4,848	0.06	0.23	0	0	0	1	1
Income: Q1 (poorest 25%)	4,848	0.28	0.45	0	0	0	1	1
Q2 (second poorest 25%)	4,848	0.24	0.43	0	0	0	1	1
Q3 (second richest 25%)	4,848	0.24	0.42	0	0	0	1	1
Q4 (richest 25%)	4,848	0.24	0.43	0	0	0	1	1
Working	4,848	0.43	0.49	0	0	0	1	1
Violent crime victim	4,848	0.03	0.16	0	0	0	0	1
Social cohesion indicators								
Community involvement	4,848	0.25	0.15	0	0.03	0.23	0.51	1
Trust in others	4,848	0.47	0.22	0	0.08	0.50	0.83	1
Safety	4,848	0.69	0.26	0	0.25	0.75	1	1
Disability measure								
Disability score	4,848	0.24	0.18	0	0	0.21	0.58	1
Evaluative well-being								
General life satisfaction	4,848	2.70	0.78	0	1	3	4	4
WHO quality of life index	4,848	19.69	4.91	0	11	20	27	32
Experienced well-being								
Emotion score	4,848	10.45	3.00	0	4	11	14	14
Total experienced utility	4,848	11.44	2.04	0	7.6	12	14	14
Activity-specific net affect								
Working	1,289	10.82	2.61	0	5.5	11.3	14	14
Housework	2,668	10.99	2.43	0	6.0	11.7	14	14
Travel	1,524	11.23	2.50	0	6.0	12	14	14
Leisure	4,410	11.71	2.09	0	7.8	12	14	14
Self-care	4,190	11.85	2.01	0	8.0	12	14	14

Note: The entries are country-specific averages using population weights.

Table 3.A4: Descriptive statistics - Russia

	Obs.	Mean	Std. dev.	Min	5th percentile	Median	95th percentile	Max
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Demographics								
Age (years)	2,593	63.77	10.65	50	51	61	83	99
50-59	2,593	0.47	0.50	0	0	0	1	1
60-69	2,593	0.23	0.42	0	0	0	1	1
70-79	2,593	0.21	0.41	0	0	0	1	1
80+	2,593	0.09	0.28	0	0	0	1	1
Female	2,593	0.60	0.49	0	0	1	1	1
Married/partnership	2,593	0.57	0.49	0	0	1	1	1
Rural	2,593	0.28	0.45	0	0	0	1	1
Ethnic minority	2,593	0.17	0.38	0	0	0	1	1
No. of adults	2,593	1.80	1.11	1	1	1	4	8
No. of kids	2,593	0.16	0.53	0	0	0	1	5
Household size	2,593	1.96	1.35	1	1	2	5	10
Socioeconomic status								
Education: Less than primary	2,593	0.02	0.14	0	0	0	0	1
Primary	2,593	0.05	0.23	0	0	0	1	1
Secondary	2,593	0.20	0.40	0	0	0	1	1
High school	2,593	0.54	0.50	0	0	1	1	1
$\geq$ College/university	2,593	0.18	0.39	0	0	0	1	1
Income: Q1 (poorest 25%)	2,593	0.23	0.42	0	0	0	1	1
Q2 (second poorest 25%)	2,593	0.25	0.43	0	0	0	1	1
Q3 (second richest 25%)	2,593	0.24	0.42	0	0	0	1	1
Q4 (richest 25%)	2,593	0.29	0.45	0	0	0	1	1
Working	2,593	0.41	0.49	0	0	0	1	1
Violent crime victim	2,593	0.01	0.11	0	0	0	0	1
Social cohesion indicators								
Community involvement	2,593	0.28	0.17	0	0.04	0.25	0.58	1
Trust in others	2,593	0.37	0.21	0	0	0.33	0.67	1
Safety	2,593	0.45	0.24	0	0	0.50	0.75	1
Disability measure								
Disability score	2,593	0.17	0.17	0	0	0.11	0.51	1
Evaluative well-being								
General life satisfaction	2,593	2.51	0.76	0	1	3	3	4
WHO quality of life index	2,593	20.01	4.80	0	11	21	26	32
Experienced well-being								
Emotion score	2,593	11.38	2.45	0	6	12	14	14
Total experienced utility	2,593	11.79	1.95	0	8	12	14	14
Activity-specific net affect								
Working	864	11.01	2.12	0	7	11.2	14	14
Housework	1,488	11.64	2.19	0	7	12	14	14
Travel	406	11.68	2.44	1	7	12	14	14
Leisure	1,931	12.37	1.86	0	8	13	14	14
Self-care	1,510	12.62	1.77	3	9	13	14	14

Note: The entries are country-specific averages using population weights.

Table 3.A5: Descriptive statistics - South Africa

	Obs.	Mean	Std. dev.	Min	5th percentile	Median	95th percentile	Max
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Demographics								
Age (years)	2,059	61.51	9.30	50	50	59	79	97
50-59	2,059	0.50	0.50	0	0	1	1	1
60-69	2,059	0.30	0.46	0	0	0	1	1
70-79	2,059	0.15	0.35	0	0	0	1	1
80+	2,059	0.05	0.22	0	0	0	0	1
Female	2,059	0.61	0.49	0	0	1	1	1
Married/cohabiting	2,059	0.52	0.50	0	0	1	1	1
Rural	2,059	0.37	0.48	0	0	0	1	1
Ethnic minority	2,059	0.25	0.44	0	0	0	1	1
No. of adults	2,059	1.82	1.48	1	1	1	5	10
No. of kids	2,059	0.90	1.30	0	0	0	3	11
Household size	2,059	2.71	2.06	1	1	2	7	14
socioeconomic status								
Education: Less than primary	2,059	0.48	0.50	0	0	0	1	1
Primary	2,059	0.23	0.42	0	0	0	1	1
Secondary	2,059	0.14	0.35	0	0	0	1	1
High school	2,059	0.10	0.30	0	0	0	1	1
$\geq$ College/university	2,059	0.05	0.22	0	0	0	1	1
Income: Q1 (poorest 25%)	2,059	0.27	0.44	0	0	0	1	1
Q2 (second poorest 25%)	2,059	0.27	0.45	0	0	0	1	1
Q3 (second richest 25%)	2,059	0.23	0.42	0	0	0	1	1
Q4 (richest 25%)	2,059	0.23	0.42	0	0	0	1	1
Working	2,059	0.33	0.47	0	0	0	1	1
Violent crime victim	2,059	0.06	0.24	0	0	0	1	1
Social cohesion indicators								
Community involvement	2,059	0.40	0.18	0	0.1	0.39	0.68	1
Trust in others	2,059	0.34	0.21	0	0	0.33	0.67	1
Safety	2,059	0.37	0.27	0	0	0.38	0.75	1
Disability measure								
Disability score	2,059	0.20	0.21	0	0	0.14	0.63	1
Evaluative well-being								
General life satisfaction	2,059	2.56	0.84	0	1	3	4	4
WHO quality of life index	2,059	18.86	5.08	0	10	19	27	32
Experienced well-being								
Emotion score	2,059	12.30	2.27	0	8	13	14	14
Total experienced utility	2,059	12.83	2.38	0	8.3	14	14	14
Activity-specific net affect								
Working	483	12.35	3.19	0	5	14	14	14
Housework	1,131	12.80	2.08	0	9	14	14	14
Travel	567	12.73	2.37	0	7	14	14	14
Leisure	1,741	13.05	2.17	0	9	14	14	14
Self-care	1,671	13.12	1.89	0	10	14	14	14

Note: The entries are country-specific averages using population weights.

3.B ADDITIONAL RESULTS

Table 3.B6: Partial association of evaluative well-being with experienced utility, using dummies for life satisfaction and WHOQoL8 quartiles: Age- and gender-adjusted model

	(1)	(2)	(3)	(4)	(5)
	China	Ghana	India	Russia	South Africa
Panel A: Life satisfaction (reference is very dissatisfied)					
Dissatisfied	0.2576	0.0517	0.9890***	0.0043	0.2868
	(0.413)	(0.197)	(0.371)	(0.165)	(0.320)
Neutral	0.8696**	0.1956	1.2841***	0.3672**	0.3826
	(0.395)	(0.189)	(0.366)	(0.178)	(0.336)
Satisfied	1.2302***	0.4229**	1.5657***	0.7405***	0.8357**
	(0.400)	(0.183)	(0.368)	(0.150)	(0.327)
Very satisfied	1.4229***	0.4532**	1.8296***	1.1299***	1.0382***
	(0.396)	(0.192)	(0.365)	(0.228)	(0.327)
Female	-0.0425**	-0.0869**	-0.1199**	-0.1597*	-0.1143*
	(0.021)	(0.043)	(0.053)	(0.082)	(0.065)
Age group (reference is 50-59 yo)					
60-69	0.0696**	0.1407***	0.1077**	0.0121	0.2682***
	(0.028)	(0.047)	(0.044)	(0.107)	(0.069)
70-79	0.1683***	0.1206**	0.1902***	0.1840**	0.1171
	(0.038)	(0.054)	(0.065)	(0.084)	(0.149)
80+	0.2088***	0.1687**	0.0187	0.1834	0.2552**
	(0.058)	(0.075)	(0.133)	(0.137)	(0.099)
R^2	0.073	0.026	0.068	0.075	0.088
Panel B: WHOQoL8 (reference is WHOQoL8 - Q1)					
WHOQoL8 - Q2	0.3471***	0.0284	0.3040***	0.4466***	0.3492***
	(0.048)	(0.072)	(0.079)	(0.098)	(0.116)
WHOQoL8 - Q3	0.4884***	0.1899**	0.5621***	0.5908***	0.5300***
	(0.048)	(0.077)	(0.067)	(0.096)	(0.107)
WHOQoL8 - Q3	0.6137***	0.3339***	0.7687***	0.7643***	0.6300***
	(0.065)	(0.071)	(0.073)	(0.131)	(0.107)
Female	-0.0364*	-0.0747*	-0.0732	-0.1112*	-0.0969
	(0.021)	(0.043)	(0.053)	(0.066)	(0.064)
Age group (reference is 50-59 yo)					
60-69	0.0789***	0.1595***	0.1353***	0.0202	0.2787***
	(0.029)	(0.050)	(0.046)	(0.107)	(0.073)
70-79	0.1858***	0.1507***	0.2364***	0.2525***	0.1552
	(0.041)	(0.057)	(0.067)	(0.072)	(0.147)
80+	0.2221***	0.1668**	0.0897	0.2131*	0.3068***
	(0.058)	(0.082)	(0.131)	(0.123)	(0.094)
R^2	0.056	0.023	0.083	0.076	0.079
N	9,265	3,070	4,848	2,593	2,059

Notes: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Sample weights are applied. The entries in each column are country-specific average partial association of life satisfaction (Panel A) and WHOQoL8 (Panel B) with experienced utility. Average partial effects are based on the linear regression expressed in model (3.4). Very dissatisfied individuals, those in the first quartile of the WHOQoL8 score (WHOQoL8 - Q1) and those aged 50-59 are the reference group for life satisfaction, WHOQoL8 and age, respectively.

Table 3.B7: Partial association of evaluative well-being with emotion score, using dummies for life satisfaction and WHOQoL8 quartiles: Age- and gender-adjusted model

	(1)	(2)	(3)	(4)	(5)
	China	Ghana	India	Russia	South Africa
Panel A: Life satisfaction (reference is very dissatisfied)					
Dissatisfied	0.9772***	0.0056	0.1070	0.1962	0.6835
	(0.373)	(0.247)	(0.274)	(0.246)	(0.417)
Neutral	1.9581***	0.0655	0.9423***	0.7158***	0.9694**
	(0.372)	(0.233)	(0.269)	(0.208)	(0.465)
Satisfied	2.3796***	0.5681**	1.3887***	1.1224***	1.3600***
	(0.372)	(0.230)	(0.268)	(0.218)	(0.459)
Very satisfied	2.5124***	0.7083***	1.6324***	1.4268***	1.4654***
	(0.334)	(0.233)	(0.274)	(0.283)	(0.460)
Female	-0.0790***	-0.1318***	-0.2612***	-0.1937***	-0.1656**
	(0.022)	(0.041)	(0.036)	(0.053)	(0.069)
Age group (reference is 50-59 yo)					
60-69	0.0307	-0.0680	0.0724*	-0.0082	0.1795**
	(0.029)	(0.048)	(0.040)	(0.087)	(0.082)
70-79	0.0880**	-0.0554	0.0678	-0.0592	0.1716*
	(0.037)	(0.053)	(0.052)	(0.076)	(0.099)
80+	-0.0169	-0.1115	0.1701**	-0.0972	0.3911***
	(0.056)	(0.072)	(0.081)	(0.099)	(0.088)
R^2	0.129	0.083	0.165	0.120	0.098
Panel B: WHOQoL8 (reference is WHOQoL8 - Q1)					
WHOQoL8 - Q2	0.5184***	0.2435***	0.6330***	0.4472***	0.4893***
	(0.048)	(0.079)	(0.065)	(0.098)	(0.110)
WHOQoL8 - Q3	0.7101***	0.5145***	0.9988***	0.7665***	0.6224***
	(0.044)	(0.079)	(0.063)	(0.097)	(0.102)
WHOQoL8 - Q3	0.7702***	0.7172***	1.1336***	0.9571***	0.7005***
	(0.051)	(0.069)	(0.071)	(0.092)	(0.102)
Female	-0.0714***	-0.1003**	-0.1888***	-0.1357**	-0.1432**
	(0.021)	(0.044)	(0.039)	(0.055)	(0.066)
Age group (reference is 50-59 yo)					
60-69	0.0439	-0.0216	0.0999***	0.0103	0.1879**
	(0.029)	(0.049)	(0.037)	(0.088)	(0.082)
70-79	0.1087***	0.0194	0.1443**	0.0610	0.2019**
	(0.039)	(0.054)	(0.058)	(0.086)	(0.097)
80+	0.0014	-0.0399	0.2515***	-0.0368	0.4410***
	(0.066)	(0.071)	(0.083)	(0.091)	(0.089)
R^2	0.099	0.080	0.199	0.133	0.098
N	9,265	3,070	4,848	2,593	2,059

Notes: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Sample weights are applied. The entries in each column are country-specific average partial association of life satisfaction (Panel A) and WHOQoL8 (Panel B) with emotion score. Average partial effects are based on the linear regression expressed in model (3.4). Very dissatisfied individuals, those in the first quartile of the WHOQoL8 score (WHOQoL8 - Q1) and those aged 50-59 are the reference group for life satisfaction, WHOQoL8 and age, respectively.

Table 3.B8: Partial association of evaluative well-being with experienced utility, using dummies for life satisfaction and WHOQoL8 quartiles: full model

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Without controls for health-state vignettes					With controls for health-state vignettes				
	China	Ghana	India	Russia	South Africa	China	Ghana	India	Russia	South Africa
Panel A: Life satisfaction (reference is very dissatisfied)										
Dissatisfied	0.1917	-0.0778	0.8854**	0.0545	0.2378	0.2282	-0.0564	0.9172***	0.3594	0.2870
	(0.406)	(0.216)	(0.360)	(0.194)	(0.293)	(0.383)	(0.146)	(0.341)	(0.228)	(0.312)
Neutral	0.6863*	0.0642	0.9957***	0.2755	0.2057	0.7434**	-0.0022	1.0548***	0.6017***	0.1174
	(0.386)	(0.211)	(0.357)	(0.180)	(0.320)	(0.364)	(0.150)	(0.348)	(0.218)	(0.323)
Satisfied	0.9369**	0.2347	1.0883***	0.5628***	0.5420*	0.9889***	0.1472	1.1629***	0.9311***	0.4406
	(0.386)	(0.218)	(0.366)	(0.149)	(0.311)	(0.366)	(0.149)	(0.353)	(0.215)	(0.322)
Very satisfied	1.0619***	0.2292	1.2441***	0.9288***	0.7054**	1.1010***	0.1375	1.3416***	1.0522***	0.5402*
	(0.382)	(0.226)	(0.363)	(0.206)	(0.318)	(0.363)	(0.163)	(0.351)	(0.244)	(0.324)
R^2	0.128	0.056	0.143	0.146	0.126	0.206	0.271	0.289	0.373	0.565
Panel B: WHOQoL8 (reference is WHOQoL8 - Q1)										
WHOQoL8 - Q2	0.2286***	-0.0547	0.1253	0.3185***	0.1896*	0.2333***	-0.0526	0.1849***	0.3669***	0.2481***
	(0.043)	(0.066)	(0.082)	(0.091)	(0.109)	(0.040)	(0.057)	(0.057)	(0.076)	(0.066)
WHOQoL8 - Q3	0.2992***	0.0511	0.2529***	0.4350***	0.3180***	0.2981***	0.0716	0.2983***	0.5462***	0.2626***
	(0.041)	(0.082)	(0.076)	(0.092)	(0.100)	(0.040)	(0.071)	(0.057)	(0.082)	(0.072)
WHOQoL8 - Q3	0.3455***	0.1594**	0.3489***	0.5783***	0.4023***	0.3508***	0.1077*	0.4006***	0.5612***	0.3621***
	(0.058)	(0.077)	(0.096)	(0.128)	(0.102)	(0.056)	(0.064)	(0.072)	(0.099)	(0.078)
R^2	0.112	0.052	0.140	0.144	0.116	0.191	0.270	0.285	0.369	0.561
N	9,265	3,070	4,848	2,593	2,059	9,265	3,070	4,848	2,593	2,059

Notes: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Sample weights are applied. The entries in each column are country-specific average partial association of life satisfaction (Panel A) and WHOQoL8 (Panel B) with experienced utility. Average partial effects are based on the linear regressions expressed in models (3.5) & (3.6). Very dissatisfied individuals and those in the first quartile of the WHOQoL8 score (WHOQoL8 - Q1) are the reference group for life satisfaction and WHOQoL8, respectively. All regressions control for the large set of individual characteristics included in Table 3.1.

Table 3.B9: Partial association of evaluative well-being with emotion score, using dummies for life satisfaction and WHOQoL8 quartiles: full model

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Without controls for health-state vignettes					With controls for health-state vignettes				
	China	Ghana	India	Russia	South Africa	China	Ghana	India	Russia	South Africa
Panel A: Life satisfaction (reference is very dissatisfied)										
Dissatisfied	0.6067**	-0.0881	-0.0568	0.1680	0.6154	0.5542**	0.0662	0.0320	0.3801	0.4744
	(0.291)	(0.258)	(0.250)	(0.253)	(0.420)	(0.266)	(0.194)	(0.254)	(0.232)	(0.425)
Neutral	1.3731***	-0.0298	0.5175**	0.5084**	0.7168	1.3194***	0.0725	0.5845**	0.7084***	0.4838
	(0.291)	(0.251)	(0.247)	(0.217)	(0.460)	(0.264)	(0.185)	(0.254)	(0.193)	(0.436)
Satisfied	1.6602***	0.3764	0.7155***	0.7430***	1.0086**	1.5954***	0.4144**	0.7913***	1.0052***	0.8169*
	(0.292)	(0.252)	(0.255)	(0.216)	(0.462)	(0.265)	(0.188)	(0.258)	(0.206)	(0.439)
Very satisfied	1.7145***	0.4736*	0.8247***	0.9233***	1.0284**	1.6587***	0.4732**	0.9406***	0.9231***	0.9166**
	(0.270)	(0.254)	(0.260)	(0.271)	(0.469)	(0.249)	(0.191)	(0.264)	(0.268)	(0.440)
R^2	0.182	0.143	0.274	0.178	0.151	0.222	0.358	0.369	0.379	0.433
Panel B: WHOQoL8 (reference is WHOQoL8 - Q1)										
WHOQoL8 - Q2	0.3421***	0.1477**	0.3855***	0.2670***	0.3130***	0.3393***	0.1541***	0.4090***	0.3763***	0.3948***
	(0.044)	(0.071)	(0.063)	(0.085)	(0.108)	(0.044)	(0.055)	(0.056)	(0.070)	(0.073)
WHOQoL8 - Q3	0.4531***	0.3654***	0.5985***	0.4759***	0.3661***	0.4312***	0.3529***	0.6041***	0.5372***	0.3985***
	(0.040)	(0.075)	(0.063)	(0.093)	(0.107)	(0.042)	(0.061)	(0.055)	(0.081)	(0.081)
WHOQoL8 - Q3	0.4360***	0.5386***	0.6181***	0.5860***	0.4033***	0.4382***	0.4310***	0.6479***	0.5810***	0.5208***
	(0.051)	(0.073)	(0.072)	(0.100)	(0.105)	(0.054)	(0.063)	(0.064)	(0.095)	(0.081)
R^2	0.158	0.134	0.277	0.178	0.145	0.199	0.353	0.371	0.375	0.435
N	9,265	3,070	4,848	2,593	2,059	9,265	3,070	4,848	2,593	2,059

Notes: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Sample weights are applied. The entries in each column are country-specific average partial association of life satisfaction (Panel A) and WHOQoL8 (Panel B) with emotion score. Average partial effects are based on the linear regressions expressed in models (3.5) & (3.6). Very dissatisfied individuals and those in the first quartile of the WHOQoL8 score (WHOQoL8 - Q1) are the reference group for life satisfaction and WHOQoL8, respectively. All regressions control for the large set of individual characteristics included in Table 3.1.

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