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**An empirical exploration of integrating subjective health perceptions into
multidimensional capability measures**

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An empirical exploration of integrating subjective health perceptions into multidimensional capability measures

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Abstract

Despite widespread agreement that subjective states are an important component of wellbeing and that they can be measured, researchers have challenged their use in multidimensional capability measures, above all for their implicit acceptance of adaptive preference. In turn, a debate has sprung up over the extent to which adaptation represents resignation versus learning. This paper seeks to contribute to this debate by analysing the extent to which individuals adapt to health shocks and reasons underlying adaptive behavior. Using British household panel data on health satisfaction, we find evidence of incomplete adaptation over a five year period. We are unable to explain this adaptation by an improved ability to function on the part of individuals who have suffered either moderate or severe shocks. These results are consistent with the hypothesis that adaptation represents resignation rather than learning. They suggest caution in incorporating subjective measures into a multidimensional capability index and that such measures may potentially need to be ‘corrected’ for the effects of adaptation.

1. Introduction

In this paper, we discuss the determinants of satisfaction with health and the implications for interpersonal comparison of subjective states, and by extension, for the multidimensional measurement of capabilities. It has been argued that only when free from adaptive preference do subjective data provide reliable measures of individual and interpersonal wellbeing, an argument we revisit below. This paper explores empirically the extent to which individuals exhibit adaptation to health shocks, using British household panel data, and the reasons underlying such adaptation. Health is an interesting domain in which to examine this phenomenon because individuals might plausibly react to a persistent shock by learning to function despite it or, on the contrary, by becoming resigned to their condition. For instance, a person who loses her sight might learn Braille, while a semi-paralyzed person might master the use of a wheelchair; and/or these individuals might adjust their aspirations downward to reflect their constrained ability. It is difficult to imagine commensurate learning processes for domains such as income and

unemployment, two other areas that are also frequently scrutinized for evidence of adaptation.

In common with Oswald and Powdhathee (2008), who explored adaptation to disability in British panel data, we find incomplete adaptation to both moderate and severe health shocks over a short time period. Turning to the reasons underlying adaptation, we argue that the data are consistent with the hypothesis that adaptation to a health shock appears to be largely driven by getting accustomed to the constraints associated with ill health rather than a learning process in which individuals regain the ability to function despite its persistence. This argues against a strand in the capability literature which suggests adaptation may be less problematic than currently supposed because it may affect the relatively advantaged more than those deprived in a given dimension; that it may reflect a process of learning and in fact be considered a capability (c.f., Bagnoli *et al.* 2004, Clark 2007). Our findings suggest in contrast that most adaptation associated with health shocks may instead reflect ‘illegitimate’ sources of difference (following terminology introduced by Schokkaert 2007) and hence that we ought to proceed with caution when introducing subjective health data into multidimensional wellbeing measures.

To begin, we review the debate over the use of subjective measures and their role in multidimensional comparisons of wellbeing, as well as literature to date that has sought to test for adaptive preferences. Then, using the British Household Panel Survey (BHPS), we explore empirically the extent to which individuals adapt to health shocks in a five year period and possible reasons for this adaptation. We consider in particular whether adaptation in this instance appears associated with learning or resignation. We conclude by reflecting on the implications for this exercise for the incorporation of subjective data on health into multidimensional capability measurement.

2. Critiques of a unidimensional focus on subjective wellbeing

Spurred on by a resurgence of interest and data availability in subjective wellbeing, some critics have proposed a shift from using income to measure utility to using happiness or

life satisfaction as a more direct indicator (see Layard 2005).¹ This idea has also surfaced in practice: As early as 1976, the Kingdom of Bhutan decided to measure Gross National Happiness in place of gross national product.²

However, a single-minded focus on happiness suffers from the same problems as income or any other unidimensional measure in that it does not correlate well with other key dimensions of wellbeing (see Ranis *et al.* 2006). Other problems arise too in attributing too much importance to subjective wellbeing: its fleeting nature, possible conflict with other values (the logic for privileging happiness above justice, responsibility, etc. is unclear), potential undermining of democracy and implicit acceptance of adaptive preferences (see Samman 2007). Sen (1979: 12) writes:

Can the living standard of a person be high if the life that he or she leads is full of deprivation? The standard of life cannot be so detached from the nature of the life the person leads. As an object of value, happiness or pleasure (even with a broad coverage) cannot possibly make a serious claim to exclusive relevance.

A paradox emerges: On the one hand, subjective states are clearly important. Sen refers to happiness as a ‘momentous achievement’ (Sen 1987b: 66); he notes: “it is quite easy to be persuaded that being happy is an achievement that is valuable and that in evaluating the standard of living, happiness is an object of value” (Sen, 1985:12). This philosophical affirmation has received strong empirical confirmation. Diener (2000) sums up the evidence from a 1998 study of 7,200 individuals in 42 countries:³ mean levels of happiness were important in all the countries they surveyed; only six percent of respondents rated money as more important than happiness; and 69 percent placed happiness at the top of the importance scale.

Subjective measures clearly have a role to play in multidimensional capability measurement alongside other elements that intrinsically matter to wellbeing. As

¹ The terms happiness and life satisfaction recur interchangeably in the economics literature though psychologists argue that the former represents the predominance of positive over negative affect and the latter, a more considered judgement (see Samman 2007). The term subjective wellbeing embraces both concepts, referring “to what people think and how they feel about their lives – to the cognitive and affective conclusions they reach when they evaluate their existence” (Seligman and Csikszentmihalyi 2000, p. 9). We rely upon this broader concept here.

² “A new measure of wellbeing from a happy little kingdom”, *The New York Times*, 4 October 2005.

³ Suh *et al.* 1998.

Schokkaert writes: “According to the traditional view associated with the capability approach, the most adequate way of taking ‘subjective happiness’ into account is to take it up as one element in the vector of functionings or capabilities. It should definitely not be seen as an indication of the overall evaluation of life” (Schokkaert 2007: 417).

On the other hand, to what extent can self-reported measures of wellbeing be trusted and compared?

In the literature, there are two key reasons to be wary about using subjective well-being (or satisfaction or happiness) information (Schokkaert 2007). Firstly, it is argued that it is difficult, if not impossible, to obtain reliable interpersonal comparable data. The last decade has witnessed an expansion of happiness studies which address this concern and, primarily through econometric techniques (individual fixed-effect estimation) have been able to successfully deal with this problem (see next section). Secondly, even if such data are available, these will be subject to what Sen terms ‘physical condition neglect’ (Sen 1985), which includes the adaptive preference argument.⁴

Concern over adaptive preferences is based on the premise that any measure of overall subjective wellbeing fundamentally cannot account for the fact that people’s valuations of their circumstances are in part a function of their reference frame, the expectations that they hold for themselves – and in the case of deprived persons, these may adapt quite sharply. Sen has repeatedly drawn attention to this significant problem, observing that the magnitude of change in subjective well-being may not track in any predictable fashion the objective change that occurs.⁵ He often gives the example of how the perennially deprived become reconciled with their circumstances and appreciative of small mercies, thus their desires are muted and their psychic pleasure at small improvements to their situation is disproportionate to the benefit judged from another perspective. He writes:

‘He that desires but little has no need of much’ may well be good advice for contentment and for coming to terms with a harsh reality. But it is not a formula for judging well-being. Nor is it a recipe for social justice. (Sen 1984, p. 34)

⁴ The second critique highlighted by Sen (1985) is that of ‘valuation neglect’, which relates to the fact that “valuing a life is a reflective activity in a way that ‘being happy’ or ‘desiring’ need not be” (Sen 1985: 29, cited in Schokkaert 2007: 417).

⁵ Sen (1979, 1985, 1987a, 1993, 2002).

A thoroughly deprived person, leading a very reduced life, might not appear to be badly off in terms of the mental metric of utility, if the hardship is accepted with non-grumbling resignation. In situations of longstanding deprivation, the victims do not go on weeping all the time, and very often make great efforts to take pleasure in small mercies and cut down personal desires to modest – ‘realistic’ – proportions. The person’s deprivation then, may not at all show up in the metrics of pleasure, desire fulfilment, etc., even though he or she may be quite unable to be adequately nourished, decently clothed, minimally educated and so on’ (Sen, 1990, p. 45).

The existence of adaptive preference has been at the core of Sen and Nussbaum’s rejection of utility as a relevant metric (Barr and Clark, 2007).⁶ However subsequent studies have argued that adaptation may challenge not only the utility metric but in fact the capability metric insofar as adaptation may be incompatible with individual autonomy (Elster 1983); individuals’ ability to exercise the freedoms they value and have reason to value is constrained. It may also compromise the capacity for the exercise of deliberative democracy to arrive at a given set of capabilities; people who have adapted to their circumstances may not voice the preferences they would otherwise, and therefore may not be able to participate fully in these debates (Clark 2007).

Some authors assert that adaptation may not be so pernicious (Bagolin *et al.* 2004, Teschl and Comim 2005, Clark 2007). Bagolin *et al.* observe that it might be a capability, reflecting not only resignation to one’s circumstances but also a form of positive functioning that helps people live more fulfilled lives. Meanwhile, Clark argues that most empirical evidence finds adaptation to wellbeing gains rather than losses, thereby indicating psychological health, and points to a literature linking adaptive response with improved physiological functioning (see Frederick and Loewenstein 1999, Salovey *et al.* 2000). Drawing on Elsters’ work on adaptive preference formation (Elster 1983), Techchl and Comim (2005) draw a key distinction between two types of adaptation: first, change induced by learning and experience; and second, change wrought by habituation and resignation (p. 232-233). Along similar lines, Lucas (2007a) signals the need for further work on factors underlying the adaptive process:

⁶ The problem of adaptive preferences is one of three key critiques Sen makes of the utility approach (the other two being that it overlooks the importance of agency as well as distributional considerations).

“Adaptation may result from physiological processes that reduce emotional reactivity to constant stimuli, or it could result from psychological processes that change the way people think about events that have occurred in their lives. For instance, adaptation effects may emerge when people disengage from goals that have become unattainable and set new goals toward which they can strive, or it may occur as people develop strengths or acquire new skill that enable them to deal more effectively with less-than-ideal life circumstances” (p. 78).

In short, perceived wellbeing has both intrinsic and instrumental value, and stands to contribute to a richer understanding of human experience and values, particularly their non-material components. Yet the extent to which adaptation exists and to which it is evident in satisfaction with various domains of wellbeing clearly requires scrutiny as do its underlying determinants. In this paper, we will test for the existence of adaptation then seek to distinguish empirically between adaptation as reflecting learning – as revealed in an improved ability to function – and adaptation as reflecting habituation and resignation. Only once the presence of and mechanisms underlying adaptation are more fully clear will it be possible to reach any conclusions regarding how such subjective measures ought to be included in multidimensional capability assessments.

3. Testing adaptive preferences

3.1. Literature review

Adaptation implies, on the one hand, people living in an abject state often perceive themselves to be far better off than their objective circumstances would suggest. On the other hand, people may adapt their aspirations to gains they experience, negating much of the material impact of any gain. The extent to which adaptation exists and to which it is manifest in various dimensions of wellbeing requires scrutiny.

The lack of correspondence between objective conditions and subjective perceptions of them can be linked with individual personality traits – e.g., optimism, socio-demographic correlates and situational responses (including adaptation).⁷ The links between these factors and their impact on perceptions need further clarification. Longitudinal data is

⁷ As much as 80 percent of subjective wellbeing has been attributed to heritable personality traits (see Lykken & Tellegen 1996).

useful here in allowing us to control for time-invariant personality traits and for socio-demographic correlates of subjective wellbeing. Taking these factors into account and tracing how subjective wellbeing responds to given life events over time should allow us to document the extent to which adaptation is emerging.

Sen's primary contribution to this debate is conceptual; he "provides relatively little hard evidence to support the adaptation argument" (Clark 2007, p. 17). Early empirical work focused mainly on cross-sectional comparisons of responses to income and health shocks. For instance, Brickman *et al.* (1978) demonstrate that paraplegics after a period of hardship, return to almost their previous levels of happiness, while lottery winners become not much happier than they had been previously. Brickman and Campbell (1971) point to evidence of a 'hedonic treadmill' such that once people's objective conditions begin to improve, their tastes alter also, negating much of the subjective impact of the objective gain. The often-cited Easterlin paradox (see Easterlin 1994, 1995) refers to the now widely-accepted finding that while within any given country, wealthy people tend to be happier than poorer ones, above an average level of per capita income, there is no relationship between average income and subjective wellbeing either among countries or within countries over time. Most recent studies of adaptation tend to rely on panel data, permitting a more robust analysis, and have focused on responses to shifts in income and employment status; a small number address adaptation to health shocks.

Income

Studies of income mostly report that people adapt fully and quite quickly to income gains; and that they adapt to losses more slowly. Van Praag and Fritjers (1999) report that a 1 percent gain in income raises aspirations by between .35 and .65 percent. Using British panel data and measures of respondent satisfaction with their financial situation, Burchardt (2003) finds individuals experiencing an increase in income adapt, but those whose incomes fall do not. These findings are particularly strong when cross-section techniques are used, but she reports no strong evidence of adaptation when using individual fixed- and random-effect estimations. Stutzer (2004) finds that people's aspirations adjust in line with their income (and the average income of their community) using Swiss panel data. Using a panel of 7800 West Germans between 1984 and 2000, Di Tella *et al.* (2007) also find complete adaptation to increases in income (but not status) over a four year period. Gardner and Oswald (2006) use longitudinal data on British

respondents experiencing medium-sized lottery windfalls (between £1000 and £120,000) and find that after a two year period, they report higher psychological wellbeing than two control groups, though data limitations preclude a longer term evaluation.

The aforementioned studies are all concerned with adaptation in life satisfaction to income. Studies of domain-specific satisfaction and the extent to which adaptation may occur in other dimensions are limited. Andrew Clark (2007) highlights the importance of a multidimensional approach: research pointing to adaptation with respect to income often implicitly assume that adaptation is not present in other domains of life and that measurement (and policy prescriptions) anchored in other domains will therefore be more robust. This is a particular issue from the capability perspective where wellbeing is conceptualized explicitly as multidimensional.

Unemployment

A relatively sizeable body of work has focused adaptation to unemployment, which repeated studies point to a key life event to which people have great difficulty in adapting, particularly if they live in low-unemployment regions (e.g., see Clark *et al.* 2007). A common finding is that the unemployed exhibit lower satisfaction and psychological wellbeing in a range of countries (see, e.g., Clark and Oswald 1994, Blanchflower 1996, Korpi 1997, Winkelmann and Winkelmann 1998, Woittiez and Theeuwes 1998, Frey and Stutzer 2000, Di Tella *et al.* 2001, Blanchflower 2001). We have not been able to find any studies considering adaptation to job *quality* despite its pivotal importance to wellbeing (see Lugo 2007).

Health

For health, the evidence is scarce and mixed. The early work of Brickman *et al.* (1978) is often cited as an early study of adaptation; the empirical part in fact draws on the experiences of 29 paraplegic accident victims and compares their reported wellbeing with a control group: it finds that these accident victims are less happy than the control group but “did not appear nearly as unhappy as might be expected” (p. 921).⁸ Using larger samples and a more sophisticated design, subsequent research has revisited this issue.

⁸ Their happiness was above neutral on the scale employed but they were significantly less happy than the control group on average.

Two recent studies use cross-sectional samples to study the existence of adaptation to health shocks. Riis *et al.* (2005) compare about 50 hemodialysis patients with a control group using Ecological Momentary Assessments of mood as well as reported satisfaction; they find little evidence that these patients were any less happy than the control group and suggest that this implies an adaptive response. Fafchamps and Kebede (2007) use Ethiopian data to show that disability has a significant negative impact on welfare (defined as overall satisfaction with life). Though restricted to cross-sectional data, they find little adaptation to disability: lower levels of subjective well-being are found to be related to disability irrespective of the time lapse since the onset of the disability. Fafchamps and Kebede explain their finding with reference to the developing country context: “in an economy where there is no social protection against disability and where production depends on physical labor, disabled individuals are less able to contribute to household income, and this permanently reduces the household’s material welfare” (p. 2). When they control for absolute and relative wealth, the independent effect of disability on subjective wellbeing disappears. The disability duration variable is not statistically significant in any of their models.

Finally, three samples use longitudinal survey data. Using British household panel data from 1996 through 2002, Oswald and Powdhavee (2008) find that individuals who become disabled exhibit a recovery in reported satisfaction levels (and general psychological wellbeing) within three years – but adaptation to severe disability is incomplete. Lucas (2007b) investigates the effect of long-term disability in British and German panel data; he associates the onset of disability with moderate to large falls in happiness using much the same data as Oswald and Powdthavee (2008) and finds little adaptation over time in either dataset. The multilevel method he employs is technically closer to a random-effects than a fixed-effects model which might explain the disparate results (Oswald and Powdthavee 2008); when applied to the same dataset, fixed effects tend to reveal evidence of adaptation that random effects overlook. Finally, Wu (2001) uses panel data (1992 and 1994 waves) from a sample of about 11,000 men and women aged roughly from 50 to 60 in the United States. He finds that respondents who have had a heart condition in the past are less likely to report worse self-reported health and emotional health with the onset of a new heart condition. He suggests the presence of this earlier condition enables the respondent to adapt to the new condition. However, when using single-item measures associated with depression or happiness, he does not find the

same adaptive response – suggesting the need for a range of subjective measures to be used in this type of analysis.

To sum up, for income, individuals tend to adapt to gains more than losses. For unemployment, most studies suggest individuals do not adapt, except possibly when in a high unemployment area. For health, the evidence is more sparse and mixed, but it tends to suggest at least some adaptation to health shocks. We are unaware of any empirical studies exploring the basis for revealed adaptive behaviour.

3.2. Data and methodology

The dataset

The data used in this paper are drawn from the British Household Panel Study (BHPS), carried out since 1991 by the ESRC UK Longitudinal Studies Centre with the Institute for Social and Economic Research (ISER) at the University of Essex. The main objective of the survey is to collect information on social and economic aspects of individuals and households in Britain. The survey collects annual information on adults (16+) from a nationally representative sample of more than 5,000 households and 10,000 individuals. Individuals are re-interviewed in successive years, wherever they move in the UK, and new members of households are also added to the sample. The survey collects information about household organisation, labour market, income and wealth, housing, health and socio-economic values. As part of a self-completion questionnaire, since 1996 individuals are asked a series of questions related to their satisfaction with various aspects of their lives. In particular, they are asked about how satisfied they are with their current level of health.⁹ The answers are categorised in seven categories from (1) “Not satisfied at all” to (7) “Completely satisfied”. This will be our main dependent variable.

The health and caring questionnaire collects information on health problems that individuals have – or perceive having – and the extent to which these health issues impinge on their daily activities and/or their work (paid or unpaid). Recorded health problems include problems or disability connected with limbs and neck, difficulty in

⁹ Satisfaction is also asked with respect to income, one’s house/flat, husband/wife/partner, job (if it applies), social life, amount of leisure time, and the way the leisure time is spent.

seeing (other than needing glasses to read normal size print), difficulty in hearing, skin conditions/allergies, chest/breathing problems, heart/high blood pressure or blood circulation problems, stomach/liver/kidneys or digestive problems, diabetes, epilepsy, and migraines.¹⁰ We use this information to construct our main explanatory variable, the number of health problems the respondent identifies each year.

Given that the data do not allow us to ascertain the severity of these health problems, we also use information on any limiting effects of general health status on daily and work activities. Specifically, individuals are asked whether due to health issues they find it difficult to manage daily activities (such as climbing stairs, getting dressed, walking for more than 10 minutes, or doing household); and whether they feel that their health limits the type or amount of work (paid or unpaid) they can do. We use these questions in respective models as controls and in defining which individuals suffer from moderate and severe health problems.

Two other studies exist focusing on adaptation to a health shock using the same data (Lucas 2007, Oswald and Powdthavee 2008). The methodological issues in the Lucas paper (namely the use of a technique close to fixed effects) have already been noted. The study by Oswald and Powdthavee (2008) (O&P) differs in several respects from our own that should be mentioned briefly. First, as an objective health indicator, they focus on respondents that report being unable to work owing to a long-term illness or disability – the category comes from the employment status question. Our definition of a health shock, in contrast, takes into account the sum of physical health problems a person reports (excluding depression and alcoholism/drug abuse on the grounds that these problems have more complicated implications for subjective states). We choose this broader approach because we do not want to restrict our sample to the extreme cases of individuals that, due to their health problems, are not able to participate at all in the labor market. We also classify individual health shocks as either moderate or severe as described above. Our choice of objective health indicator allows us to work with a sample of 43,898 of which 3,104 suffer at least one health problem in the course of the 10 years considered (as opposed to the 183 individuals declaring themselves inactive due to long-term sickness or disability).

¹⁰ We ignored questions on psychological problems (anxiety, depression, bad nerves or psychiatric problems) and addictions. In the last four years of the survey the questionnaire also includes cancer and strokes. These are not considered in the present study because we lack information for the previous years.

Second, O&P use overall life satisfaction as their subjective measure; we use satisfaction with health as a more direct indicator. Third, to represent the duration of a disability, O&P compute the proportion of years in the previous three years in which the person experienced the disability; we focus on five years succeeding the onset of an additional health shock.

Estimation strategy

The estimation strategy in the paper follows closely that used by Di Tella *et al.* (2007) in testing for the existence of adaptation to income and occupational status. In order to test whether health problems have a long-lasting impact on individual satisfaction with their health or whether with time they adapt, we use individual fixed-effects regressions including lagged values of the number of health problems experienced. The main equation to be estimated is as follows:

$$hsatisf_{it} = \alpha_0 + \alpha_1 hprob_{it} + \alpha_2 hprob_{it-1} + \alpha_3 hprob_{it-2} + \alpha_4 hprob_{it-3} + \alpha_5 hprob_{it-4} + \alpha_6 hprob_{it-5} + X_{it}\beta + y_t + f_i + e_{it},$$

where $hsatisf_{it}$ is the level of satisfaction with health of individual i in time t , $hprob_{it}$ is the number of health problems in time t , $hprob_{it-1}$ is the number of health problems in time $t-1$, and so on. X_{it} are a set of individual characteristics that may vary through time: private health insurance, per capita household income (in logs), marital status (dummy variables for single, married, divorced, living as a couple, widowed, separated), employment status (employed, self-employed, unemployed, retired, at school, at home, or long-term sick or disabled), and number of members of the household. f_i is an individual fixed-effect term to capture time invariant characteristics of the individual, y_t is year fixed effect, and e_{it} represents the individual error term.

The estimation is conducted using an ordinary least squared (OLS) fixed-effects model, though robustness tests using a logistic regression are included in the appendix (see Ferrer-i-Carbonell and Frijters 2004 for a discussion on the appropriateness of using OLS for ordinal subjective variables). Using individual fixed-effect estimation implies that the effects will be identified based on the existence of changes in both the explanatory and

dependent variables for each individual across time. This is certainly more demanding than the (often used) cross-sectional estimation with controls. It requires a sufficient number of persons with changes in the number of health problems they experience and in their corresponding level of satisfaction. The advantage of this strategy is that we can control for individual unobserved time-invariant characteristics, such as their specific degree of optimism or pessimism. In such way, we are able to deal, to a certain extent, with the traditional critique of interpersonal incomparability of subjective questions. We compare the same individual's satisfaction (in the past) with his or her current level.

We test for adaptation by examining the estimated coefficients on the lagged variables. In the present context, the habituation hypothesis would be supported if for an increase in the number of health problems, the initial level of satisfaction fell ($\alpha_1 < 0$), but with the passage of time, the effect diminishes and eventually becomes positive ($\alpha_{t-T} > 0$, for some $T = 1, 2, \dots, 5$). The adaptation is complete if the sum of all $\alpha_{t-T}, T = 0, \dots, 5$ equal to zero; otherwise, it is incomplete. If there is no adaptation, all estimated coefficients associated with the lagged variables will be statistically equal to zero.

3.3 Results

Before presenting the main results of the paper, we describe briefly the sample and basic summary statistics of the key variables used. Of the total 13,000 individuals interviewed at least once from 1996 to 2005, we restrict our sample to 7,880 individuals (see table 1 for details). These are adults of working age (between 16 and 65 years old), with complete information for all variables used in the regressions. Additionally, we exclude individuals who appear to have a pre-existing health condition –previous to the time that we observe them for the first time. For each of the nearly 8,000 individuals we have complete information for, on average, 6 of the 10 years that the sample covers, so that the total number of observations (individual-year) that we work with is close to 44,000.

Of the total number of people in our subsample, 40% of them declare to have at least one health problem at any point in the 10 year period observed. When we restrict the group of individuals with health problems to those that appear to have moderate limiting

functioning, the sample is further reduced to 500 individuals, less than half of whom have severe mobility limitations (i.e. cannot perform at least one basic daily activity)

Table 2 shows that the average level of satisfaction with health is 5.14 for the whole sample (where 1 is “dissatisfied” and is 7 “completely satisfied”). For those individuals/year that declared no health problems, average satisfaction is slightly higher (5.56), and as expected, the level decreases monotonically as the number of health problems increases. It is not surprising then that the number of health problems emerges as negatively related to individuals’ satisfaction with health, once we control for other personal characteristics. The question then becomes whether not only the current health condition but also the past conditions have a permanent effect on the level of health satisfaction.

Evidence of adaptation to health shocks

In the first series of regressions (Tables 4-6), the dependent variable is satisfaction with health while the independent variables include a series of controls, the effects of each additional health problem, and lagged effects dating back five years. Figure 1 highlights our main results. It shows the effect that adding a new health problem has on individual satisfaction with health at the onset of the additional health problem and over the ensuing 5 year period. Starting from an (unconditional) average satisfaction level of 5.14 (out of 7) in time $t-1$ (see table for summary statistics), the evidence shows for all specifications a large initial fall in health satisfaction of about 7 percent with the addition of a health problem at time t , regardless of the extent to which it inhibits functioning.¹¹ The following year ($t + 1$), health satisfaction falls slightly further before recovering moderately from these abrupt declines. We incorporate the extent to which a health problem is limiting activity in two ways (and incorporate both moderate and severe impediments to activity, respectively). For the specifications in which we look at adaptation to an additional health problem regardless of its effect on the ability to function), we find an initial fall in health satisfaction followed by weak adaptation.¹² For the specification that only consider health problems that impede the respondent’s

¹¹ These results correspond to column (2) in table 4.

¹² These correspond to tables 5 and 6.

(perceived) ability to function, we find a much sharper fall in initial satisfaction followed by moderate adaptation. We consider each specification in further detail.

Table 4 presents a basic overview of the determinants of satisfaction with health for an additive specification that considers the effect of each additional problem, and then controls for the extent to which health is limiting functioning (defined as whether an individual's health affects the amount or type of work he or she can undertake). (For full results with estimated coefficients of the control variables, see table 8.) Column (1) looks simply at the effect of an additional health problem on satisfaction with health, column (2) adds five year lags and columns (3) and (4) control for a moderate and severe impeded ability to function, respectively. Across the specifications, each additional health problem exerts a clear negative effect on satisfaction with health. Column (2) gives evidence of an adaptive process (see also Figure 1). After the first year, we see a weak adaptive process; however net effect of adaptation in years 1-5 is not statistically different from zero –we cannot reject the null hypothesis that the sum of coefficients is equal to zero. Looking at the next two columns, the coefficient on limited mobility (our moderate indicator of impaired functioning) is substantial and it is even larger (and negative) for severe limiting functioning. Again, in both cases, the net effect of the adaptive process (summing the five years after the onset of the problem does not statistically differ from zero). The coefficients of the lagged variables do not differ much between column (2) to (4) giving an initial indication that adaptation may not be associated with improved functioning.

In table 5, we consider a stricter definition of a health shock: we consider the sum of health problems only when an individual's health limits the type or amount of work he or she can undertake. Column (1) is concerned with the whole of our sample while column (2) excludes individuals registered as long-term sick/disabled and therefore unable to work – to ensure the inclusion of this population is not unduly conditioning our results. The same pattern appears in both specifications. Again, the initial response to an additional health problem is a reduction in satisfaction with health, followed by incomplete adaptation. Compared to table 4, the evidence supports more strongly the hypothesis that in the years following an onset of a health problem the individual's satisfaction with his health first decreases (quite significantly) and then decreases (also quite significantly). For these specifications too, the net effect of adaptation in years 1 to 5 is not statistically different from zero. In sum, there is evidence of significant

movements down and up of health satisfaction for a while but after 5 years the net effect of these movements is not significant and satisfaction returns back to the level achieved with the onset of the problem.

Finally, table 3 considers a more binding set of conditions still: the impact on health satisfaction of an additional problem with health that limits the respondent's ability to undertake at least one basic daily activity. Here column (1) considers the impact on the sample as a whole while column (2) excludes the registered disabled. Results are similar to those found in the previous table. Specifically, we find a sharp initial impact on health satisfaction associated with the onset of an additional health problem followed by some adaptation 4 and 5 years after the fact.

Does adaptation represent resignation or learning?

In the second series of regressions, we investigate determinants of adaptation: whether the data are consistent with the interpretation that people are learning to cope with their disability and that this results in a greater ability to function, as evinced by being able to undertake the type and amount of work that they want, or by being able to undertake one or more basic daily activities, respectively. Table 2 presents the results for fixed-effect logit regressions. The results in columns (1) and (2) suggest that each additional health problem sharply restricts the ability of respondents to undertake the type and amount of work they would like. Column (2) suggests a year later, respondents feel more restricted still – and for the subsequent four years, none of the coefficients are statistically significant. In other words, the passage of time exerts absolutely no effect on the respondent's ability to undertake the amount and type of work they would like following any type of additional health shock. Columns (3) and (4) replicate this exercise using the more severe constraint on functioning as the dependent variable. Again the average impact of an additional health problem is severe, and none of the lagged variables are statistically significant. Five years later, the respondents are no more able to undertake one or more daily activities than they were before experiencing the health shock. These results supports the idea that the (incomplete) adaptation that we found in the previous set of regressions represent indeed a resignation of people's aspirations rather than their learning to function better despite the presence of a negative health condition.

4. Conclusions

As argued above, subjective data have the potential to positively inform multidimensional poverty comparison, but this potential may be tempered by the extent to which these measures reflect respondent adaptation to circumstance. Capability theorists have suggested however that adaptation may have positive effects too: it may reflect not only resignation to one's circumstances but on the contrary, the effects of learning and experience. The difference between resignation and proactive reaction emerges as crucially important, both in understanding adaptation and in considering whether and how to use information on subjective states of health as part of a multidimensional capability measure.

We argued above that a focus on health has many merits in tackling this exercise and pursued an estimation strategy designed first to investigate whether and the extent to which adaptation was occurring, and second, to provide some insight into mechanisms underlying this process. We showed above that people within five years tend to exhibit some adaptation both to shocks that moderately affect their ability to function and those that have a more severe effect. A similar pattern emerges when the specification considers simply the effect of an additional health problem (however severe), when it includes a control for limits to functioning, and when we introduce a stricter definition of a health shock involving both health problems and limits on ones ability to work or undertake basic activities. Finally we turn to the determinants of the ability to take on work/basic daily activities and find that the passage of time has absolutely no effect on this, despite the presence of adaptation in the data. This is consistent with our hypothesis that adaptation in fact represents habituation or resignation to circumstance rather than a pro-active experience of learning. In terms of the design of a multidimensional capability measure, our findings suggest a cautionary approach. Given that we are unable to interpret adaptation (so far) in the health domain as anything other than resignation to the effects of a health shock, it becomes very difficult to recommend introducing subjective measures of health into a multidimensional index without 'correcting' a health satisfaction measure for these effects. Further work is needed to substantiate these results and to suggest what form a potential 'correction' might take.

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Table 1: Sample

	Individual-year	Individual
General filters. (increasing		
Years: 1996-2005	145,883	12,992
- and adult population (16-65)	120,100	10,680
- and variables with no missing or incomplete values	51,970	9,805
- and with no pre-1991 health condition	43,898	7,880
Observations with health problems within the sample		
With at least one health problem	19,857	3,104
- and have some limitation in work activities	3,163	456
- or some limitation in daily activities	1,392	196

Table 2: Average satisfaction with health by number of health problems

Sum of health problems	mean	N
0	5.56	24,043
1	4.90	12,861
2	4.37	4,894
3	3.77	1,461
4	3.15	468
5	2.92	128
6	2.89	36
7	3.17	6
8	1	2
9	4	1
Total	5.14	43,900

Source: BHPS 1996-2005

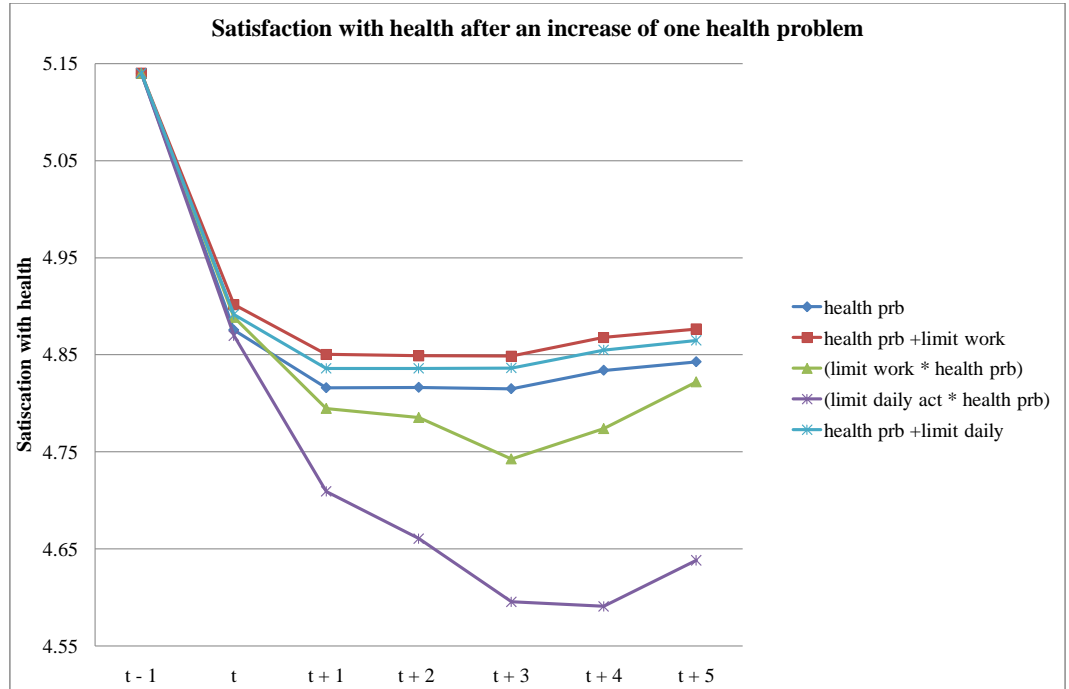


Figure 1: Adaptation to health shocks

Table 3: Determinants of satisfaction with health. United Kingdom, BHPS Panel 1996-2005

	Outcome variable: how satisfied are you with your health?			
	(1)	(2)	(3)	(4)
Number of health problems (t)	-.269 (.012)***	-.265 (.012)***	-.238 (.011)***	-.249 (.012)***
Number of health problems ($t - 1$)		-.060 (.011)***	-.051 (.011)***	-.056 (.011)***
Number of health problems ($t - 2$)		.0004 (.011)	-.001 (.011)	.00002 (.011)
Number of health problems ($t - 4$)		.019 (.011)*	.019 (.011)*	.019 (.011)*
Number of health problems ($t - 5$)		.009 (.010)	.009 (.010)	.010 (.010)
Health limits the type/amount of work			-.612 (.035)***	
Health limits at least one daily activity				-.742 (.052)***
individual and household characteristics	yes	yes	yes	yes
year dummies	yes	yes	yes	yes
individual fixed effect	yes	yes	yes	yes
<u>Results from F tests</u>				
$\sum_{T=1}^5 hprob_{t-T}$		-0.032	-0.025	-0.027
Prob $\left(\sum_{T=1}^5 hprob_{t-T} = 0\right)$		0.22	0.34	0.31
Obs.	43898	43898	43898	43898
R^2	.05	.051	.067	.062

Table 4: Determinants of satisfaction with health with health problems defined with moderate limiting functioning (type/amount of work). United Kingdom, BHPS Panel 1996-2005

	Outcome variable: how satisfied are you with your health?	
	(1)	(2)
(N health prb * limit work) (t)	-.252 (.018)***	-.293 (.020)***
(N health prb * limit work) ($t - 1$)	-.094 (.018)***	-.116 (.019)***
(N health prb * limit work) ($t - 2$)	-.009 (.017)	-.020 (.018)
(N health prb * limit work) ($t - 3$)	-.043 (.017)**	-.046 (.020)**
(N health prb * limit work) ($t - 4$)	.031 (.018)*	.045 (.021)**
(N health prb * limit work) ($t - 5$)	.048 (.017)***	.035 (.019)*
individual and household characteristics	yes	yes
year dummies	yes	yes
individual fixed effect	yes	yes
<u>Results from F tests</u>		
$\sum_{T=1}^5 hprob_{t-T}$	-0.066	-0.102
Prob $\left(\sum_{T=1}^5 hprob_{t-T} = 0\right)$	0.21	0.06
Obs.	43898	42625
R^2	.039	.032

Note: Column (2) filters out individuals who declared to be inactive in the labor market due to long-term sickness or disability. These are 183 individuals, followed through on average 10 years, hence we are leaving out 1,273 observations

Table 5: Determinants of satisfaction with health with health problems defined with severe limiting functioning (daily activities). United Kingdom, BHPS Panel 1996-2005

	Outcome variable: how satisfied are you with your health?	
	(1)	(2)
(N health prb * limit daily act) (t)	-.270 (.023)***	-.362 (.030)***
(N health prb * limit daily act) ($t - 1$)	-.160 (.022)***	-.200 (.029)***
(N health prb * limit daily act) ($t - 2$)	-.049 (.025)*	-.051 (.027)*
(N health prb * limit daily act) ($t - 3$)	-.065 (.022)***	-.071 (.026)***
(N health prb * limit daily act) ($t - 4$)	-.005 (.023)	-.001 (.030)
(N health prb * limit daily act) ($t - 5$)	.048 (.025)*	.032 (.031)
individual and household characteristics	yes	yes
year dummies	yes	yes
individual fixed effect	yes	yes
<u>Results from F tests</u>		
$\sum_{T=1}^5 hprob_{t-T}$	-0.231	-0.292
Prob $\left(\sum_{T=1}^5 hprob_{t-T} = 0\right)$	0.00	0.00
Obs.	43898	42625
R^2	.037	.03

Note: Column (2) filters out individuals who declared to be inactive in the labor market due to long-term sickness or disability. These are 183 individuals, followed through on average 10 years, hence we are leaving out 1,273 observations

Table 6: Determinants of moderate (type/amount of work) and severe (daily activities) limiting functioning. United Kingdom, BHPS Panel 1996-2005

	Outcome variable: limiting functioning			
	moderate		severe	
	(1)	(2)	(3)	(4)
Number of health problems (t)	.735 (.044)***	.717 (.044)***	.605 (.057)***	.597 (.058)***
Number of health problems ($t - 1$)		.188 (.043)***		.060 (.058)
Number of health problems ($t - 2$)		.00004 (.043)		.027 (.058)
Number of health problems ($t - 3$)		.070 (.044)		.033 (.057)
Number of health problems ($t - 4$)		-.025 (.044)		-.003 (.059)
Number of health problems ($t - 5$)		.039 (.044)		.038 (.057)
individual and hh characteristics	yes	yes	yes	yes
year dummies	yes	yes	yes	yes
individual fixed effect	yes	yes	yes	yes
Obs.	10090	10090	4667	4667

Appendix

Table 7: Summary Statistics

variable	N. obs (ind-year)	mean	sd	min	max
Satisfaction with health (1-7)	43898	5.14	1.46	1.00	7.00
Number of health problems	43898	0.68	0.93	0.00	9.00
At least one health problem (0-1)	43898	0.45	0.50	0.00	1.00
Health limits the type/amount of work (0-1)	43898	0.08	0.27	0.00	1.00
Health limits at least one daily activity (0-1)	43898	0.03	0.18	0.00	1.00
Private health insurance (0-1)	43898	0.21	0.41	0.00	1.00
Per capita hh income(in logs)	43898	6.74	0.72	0.38	10.43
Household size	43898	3.03	1.28	1.00	13.00
<i>Marital status</i>					
Married	43898	0.64	0.48	0.00	1.00
Couple	43898	0.12	0.32	0.00	1.00
Widowed	43898	0.02	0.13	0.00	1.00
Divorced	43898	0.06	0.24	0.00	1.00
Separated	43898	0.02	0.14	0.00	1.00
Single-never married	43898	0.15	0.36	0.00	1.00
<i>Employment status</i>					
Self-employed	43898	0.09	0.29	0.00	1.00
Employed	43898	0.68	0.47	0.00	1.00
Unemployed	43898	0.03	0.17	0.00	1.00
Retired	43898	0.06	0.24	0.00	1.00
At home	43898	0.09	0.29	0.00	1.00
At school	43898	0.01	0.12	0.00	1.00
Long-term sick or disable	43898	0.03	0.17	0.00	1.00

Source: BPHS 1996-2005

Table 8: Appendix of Table 1. Determinants of satisfaction with health. United Kingdom, BHPS Panel 1996-2005

	Outcome variable: how satisfied are you with your health?		
	(1)	(2)	(3)
Number of health problems (t)	-.269 (.012)***	-.265 (.012)***	-.238 (.011)***
Number of health problems ($t - 1$)		-.060 (.011)***	-.051 (.011)***
Number of health problems ($t - 2$)		.0004 (.011)	-.001 (.011)
Number of health problems ($t - 3$)		-.001 (.010)	-.0004 (.010)
Number of health problems ($t - 4$)		.019 (.011)*	.019 (.011)*
Number of health problems ($t - 5$)		.009 (.010)	.009 (.010)
Health limits the type/amount of work			-.612 (.035)***
Private health insurance (bl: no priv)	-.021 (.023)	-.022 (.023)	-.018 (.022)
Per capita hh income (in logs)	-.024 (.015)	-.023 (.015)	-.021 (.014)
Married (bl: never married)	.054 (.047)	.054 (.047)	.061 (.046)
Couple (bl: never married)	.061 (.038)	.062 (.038)	.066 (.038)*
Widowed (bl: never married)	-.261 (.119)**	-.266 (.119)**	-.256 (.118)**
Divorced (bl: never married)	-.024 (.068)	-.024 (.068)	-.006 (.066)
Separated (bl: never married)	-.067 (.070)	-.067 (.070)	-.056 (.069)
Number of household members	-.018 (.010)*	-.019 (.010)*	-.018 (.010)*
Employed (bl: self-empl)	-.068 (.034)**	-.067 (.034)**	-.066 (.034)*
Unemployed (bl: self-empl)	-.230 (.055)***	-.228 (.055)***	-.203 (.054)***
Retired (bl: self-empl)	-.064 (.054)	-.055 (.054)	-.031 (.052)
At home (bl: self-empl)	-.093 (.045)**	-.092 (.045)**	-.082 (.044)*
At school (bl: self-empl)	-.159 (.068)**	-.159 (.068)**	-.148 (.068)**
long-term sick or disable (bl: self-empl)	-.896 (.084)***	-.887 (.084)***	-.717 (.082)***
year dummies	yes	yes	yes
individual fixed effect	yes	yes	yes
Obs.	43898	43898	43898
R^2	.05	.051	.067

Table 9: Appendix to Table 2. Determinants of satisfaction with health with health problems defined with moderate limiting functioning (type/amount of work). United Kingdom, BHPS Panel 1996-2005

	Outcome variable: how satisfied are you with your health?	
	(1)	(2)
(N health prb * limit work) (t)	-.252 (.018)***	-.293 (.020)***
(N health prb * limit work) ($t - 1$)	-.094 (.018)***	-.116 (.019)***
(N health prb * limit work) ($t - 2$)	-.009 (.017)	-.020 (.018)
(N health prb * limit work) ($t - 3$)	-.043 (.017)**	-.046 (.020)**
(N health prb * limit work) ($t - 4$)	.031 (.018)*	.045 (.021)**
(N health prb * limit work) ($t - 5$)	.048 (.017)***	.035 (.019)*
Private health insurance (bl: no priv)	-.021 (.023)	-.017 (.023)
Per capita hh income(in logs)	-.024 (.015)	-.025 (.015)*
Married (bl: never married)	.057 (.047)	.048 (.048)
Couple (bl: never married)	.057 (.039)	.046 (.039)
Widowed (bl: never married)	-.238 (.122)*	-.289 (.120)**
Divorced (bl: never married)	-.004 (.068)	.005 (.069)
Separated (bl: never married)	-.047 (.071)	-.056 (.072)
Number of household members	-.013 (.011)	-.013 (.011)
Employed (bl: self-empl)	-.073 (.035)**	-.073 (.035)**
Unemployed (bl: self-empl)	-.225 (.055)***	-.215 (.056)***
Retired (bl: self-empl)	-.073 (.054)	.0002 (.054)
At home (bl: self-empl)	-.084 (.045)*	-.056 (.045)
At school (bl: self-empl)	-.163 (.068)**	-.156 (.068)**
long-term sick or disable (bl: self-empl)	-.844 (.084)***	
year dummies	yes	yes
individual fixed effect	yes	yes
Obs.	43898	42625
R^2	.039	.032

Table 10: Appendix to Table 3. Determinants of satisfaction with health with health problems defined with severe limiting functioning (daily activities). United Kingdom, BHPS Panel 1996-2005

	Outcome variable: how satisfied are you with your health?	
	(1)	(2)
(N health prb * limit daily activities) (t)	-.270 (.023)***	-.362 (.030)***
(N health prb * limit daily activities) ($t - 1$)	-.160 (.022)***	-.200 (.029)***
(N health prb * limit daily activities) ($t - 2$)	-.049 (.025)*	-.051 (.027)*
(N health prb * limit daily activities) ($t - 3$)	-.065 (.022)***	-.071 (.026)***
(N health prb * limit daily activities) ($t - 4$)	-.005 (.023)	-.001 (.030)
(N health prb * limit daily activities) ($t - 5$)	.048 (.025)*	.032 (.031)
Private health insurance (bl: no priv)	-.021 (.023)	-.017 (.023)
Per capita hh income(in logs)	-.023 (.015)	-.024 (.015)*
Married (bl: never married)	.055 (.048)	.046 (.048)
Couple (bl: never married)	.056 (.039)	.047 (.039)
Widowed (bl: never married)	-.241 (.119)**	-.291 (.118)**
Divorced (bl: never married)	-.006 (.069)	.007 (.069)
Separated (bl: never married)	-.047 (.072)	-.056 (.072)
Number of household members	-.013 (.011)	-.012 (.011)
Employed (bl: self-empl)	-.077 (.034)**	-.076 (.035)**
Unemployed (bl: self-empl)	-.234 (.055)***	-.221 (.056)***
Retired (bl: self-empl)	-.076 (.053)	-.003 (.054)
At home (bl: self-empl)	-.085 (.045)*	-.053 (.045)
At school (bl: self-empl)	-.168 (.068)**	-.164 (.068)**
long-term sick or disable (bl: self-empl) ³³	-.834 (.084)***	
year dummies	yes	yes
individual fixed effect	yes	yes
Obs.	43898	42625
R^2	.037	.03

Table 11: Appendix to Table 4. Determinants of moderate (type/amount of work) and severe (daily activities) limiting functioning. United Kingdom, BHPS Panel 1996-2005

	Outcome variable: limiting functioning			
	moderate		severe	
	(1)	(2)	(3)	(4)
Number of health problems (t)	.735 (.044)***	.717 (.044)***	.605 (.057)***	.597 (.058)***
Number of health problems ($t - 1$)		.188 (.043)***		.060 (.058)
Number of health problems ($t - 2$)		.00004 (.043)		.027 (.058)
Number of health problems ($t - 3$)		.070 (.044)		.033 (.057)
Number of health problems ($t - 4$)		-.025 (.044)		-.003 (.059)
Number of health problems ($t - 5$)		.039 (.044)		.038 (.057)
Private health insurance (bl: no priv)	.157 (.124)	.168 (.125)	.035 (.198)	.041 (.199)
Per capita hh income(in logs)	-.004 (.067)	-.019 (.067)	.067 (.103)	.051 (.103)
Married (bl: never married)	.342 (.270)	.324 (.270)	.981 (.466)**	.995 (.467)**
Couple (bl: never married)	.270 (.233)	.247 (.234)	.225 (.421)	.240 (.421)
Widowed (bl: never married)	.407 (.493)	.385 (.496)	.713 (.603)	.693 (.605)
Divorced (bl: never married)	.701 (.316)**	.696 (.317)**	1.181 (.513)**	1.198 (.513)**
Separated (bl: never married)	.297 (.354)	.308 (.355)	.859 (.554)	.877 (.555)
Number of household members	.013 (.051)	.025 (.051)	.096 (.080)	.103 (.080)
Employed (bl: self-empl)	.110 (.192)	.131 (.193)	.122 (.347)	.130 (.348)
Unemployed (bl: self-empl)	.881 (.239)***	.883 (.240)***	1.034 (.404)**	1.044 (.405)***
Retired (bl: self-empl)	.822 (.230)***	.761 (.231)***	1.087 (.383)***	1.057 (.384)***
At home (bl: self-empl)	.476 (.228)**	.488 (.229)**	.955 (.374)**	.955 (.375)**
At school (bl: self-empl)	.443 (.437)	.483 (.439)	.586 (.776)	.597 (.780)
long-term sick or disable (bl: self-empl) ³⁴	2.883 (.288)***	2.865 (.289)***	2.478 (.382)***	2.456 (.383)***
Obs.	10090	10090	4667	4667