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Measurement of Human Capabilities

**Previous Title: The Development of Capability Indicators and their
Relation of Life Satisfaction, released in September 2005**

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The Development of Capability Indicators and their Relation to Life Satisfaction

Running Title: Measurement of Human Capabilities

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The Development of Capability Indicators and their Relation to Life Satisfaction³

Abstract

The paper is motivated by sustained interest in the capabilities approach to welfare economics combined with the purported paucity of economic statistics that measure capabilities at the individual level. Specifically, it takes a focal account of normatively desirable capabilities constitutive of a good life and operationalizes that account by means of a new survey instrument used to elicit information about capabilities at the individual level. The paper explores the extent to which these capabilities are co-variates of a life satisfaction measure of utility ('happiness') and finds that many are. Aspects of robustness are explored using standard socio-demographic variables as well as a relatively novel control for personality; in addition, a range of different models are explored and sub-population differences are examined.

JEL Codes: D60, C80

Keywords: capabilities, indicators, measurement, human development, welfare, happiness, life satisfaction, controls, personality

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The Development of Capability Indicators and their Relation to Life Satisfaction

I. Introduction

How economists conceptualise and measure human welfare is central to both economic theorising and policy-making. At an axiomatic level, many theorists now accept that generalisations of expected utility are required to model choice behaviour and, together with a growing number of philosophers and psychologists, many accept these generalisations as normative.⁴ Further, it is particularly significant to note that these foundational developments have been accompanied by parallel and related changes in the fields of social choice theory and applied welfare economics.

First and foremost, conceptual developments in social choice have been profoundly influenced by the concerns of Sen and others about the inappropriate informational basis of traditional welfare economics, concerns that have given rise, *inter alia*, to the ‘capabilities’ approach to welfare. This approach has been highly influential in development and has helped shape the way in which economic progress is conceived of, and measured by, policy-makers at the international level (eg United Nations 2004). The approach, which is still evolving, continues to be strongly influenced by its non-utilitarian origins but there is now beginning to emerge a corpus of quantitative, empirical literature that applies it to issues of concern in high income countries.⁵ However, a number of researchers have commented on the lack of data that measure people’s capabilities *per se* even though such data are vital to both policy-makers and academics if the approach is to have the empirical and policy purchase that theory promises and it is this gap which the paper seeks, mainly, to address.

A second theme, however, which runs through the paper relates to appreciation amongst economists conducting applied welfare research of the value of subjective wellbeing data. Although the use of self-report data on happiness originated in the field of psychology, there are many mainstream economics articles now which use it as a dependent variable, generally as an indicator of experienced utility (Kahneman et al, 1997). This represents something of a methodological departure from the traditional practice in economics of focusing on objective behaviour measures but there are many situations where their use is either infeasible or

⁴ See, for instance, surveys by Anand (1987) and Machina (1989).

⁵ Empirical applications can be found in Schokkaert and van Ootegem (1990), Qizilbash (1996), Chiappero-Martinetti (2000), Layte et al (2000), Laderchi (2001), Alkire (2002), Burchardt and Le Grand (2002), Burchardt and Zaidi (2003), Clark (2003), Qizilbash (2004), Alkire (2005), Kuklys (2005), Anand Hunter and Smith (forthcoming)). The theoretical literature on freedom is perhaps not as closely related to empirical work on capabilities as it might be though more recent papers suggest modest evidence of conceptual convergence – see for example Gaertner and Xu (2005), van Hees (2004), Nehring and Puppe (2002) and Pattanaik and Xu (1998).

conceptually inappropriate. Typically, economists using SWB data have tended to work within the utilitarian tradition of conventional welfare economics but the link need not be exclusive or essential - as we shall see, even Sen's account of capabilities has an explicit role for happiness. In any case, we shall use subjective wellbeing (life satisfaction) data to ask which, if any, of the capabilities measured, are its co-variates. Strictly speaking, the normative theory with which we are concerned could be defended against apparent counter-evidence on the grounds that normative claims cannot be shown to be true or false. But equally, it would be a strange theory of human wellbeing that could not be supported by any empirical evidence. That said, there are particular reasons, as we shall see, why the theory might be valid, and yet not be supportable by the evidence. In any case, there is a growing recognition (particularly amongst behavioural economists) that this work should have implications for the measurement of wellbeing at national and international level (eg Kahneman et al, 2004) and yet it is clear that such applications can only develop if researchers develop appropriate raw data of the sort this paper seeks to generate.

The rest of the paper is structured as follows. Section II provides an introduction to aspects of the capability approach, particularly the concept of capability itself, which emphasises what people are free or able to do, its relation to happiness and a philosophical account of capabilities essential for a good life. Section III describes the methods employed, particularly the questions devised, their relation to Nussbaum's account, and the methods used to implement them. The results of the analysis, in which capabilities are used to explain variations in life satisfaction, are presented in section V which also includes analysis of robustness and discussion of results. Summary and concluding remarks appear in section V.

III. The Capabilities Approach to Welfare

Capabilities theory, more often and perhaps properly referred to as an approach, emerged from concerns about the informational basis of traditional welfare economics. In particular, the approach developed from Sen's analysis of axiomatic social theory, Sen (1970), (1976) and (1979), from which he concludes that there are good normative reasons for wanting to modify conventional welfare economics. These concerns centre around the informational basis on which social choice and welfare theory operate: in the first instance, there are claims other than utility, like rights and freedoms, which society often wants to acknowledge but which enter neither explicitly nor directly the utilitarian approach to social choice.⁶ On the

⁶ Rights and freedoms enter into utilitarian calculations to the extent that people value them. However, this contingent approach to valuing so-called de-ontological claims is one of the aspects that causes many to object to utilitarian approaches to welfare.

other hand, there may be some preferences, like the desire to discriminate on grounds of skin colour, which we want to exclude from many decision-making processes. So the informational basis of welfare economics is too ‘fat’ in some ways (includes too many preferences) and too ‘thin’ in others (ignores non utility based claims on social choice). And as has been shown elsewhere, though the basis of these theoretical concerns is normative, they are supported by evidence concerning how people do, in fact, want social choices to be made.⁷

In his monograph *Commodities and Capabilities*, Sen (1985) outlined a constructive approach which attempted to address at least some of these informational deficiencies in traditional welfare economics. Since then, the approach has been taken up, discussed and elaborated by many researchers across a range of disciplines from philosophy to development though a central theme remains the importance of freedom for wellbeing, and therefore the distinction between what people are free to do (their ‘capabilities’) and what they do (their ‘functionings’). The approach has supported the creation of statistical indicators which add to income measures of educational attainment and longevity but it is widely recognised that these are limited additions; furthermore, the needs of policy in high-income countries may warrant a rather more detailed approach to capability measurement. Indeed, in her much discussed account of what capabilities are essential for human wellbeing, Nussbaum (2000) proposes the following ten items: life expectancy, bodily health, bodily integrity, senses imagination and thought, emotions, practical reason, affiliation, other species, play and control over the environment. We shall say more about what these capabilities are in section III but it is sufficient to remark for present that this constitutes a substantive, normative theory which may not, at first sight, be consistent with a completely subjective approach to preference and welfare. Indeed one of the objections that has attracted much attention is the possibility that different people(s) may place different weights on the capabilities. So from this perspective, if we can derive capability indicators, Nussbaum’s claims give rise to two potentially testable hypotheses, namely whether the capabilities proposed are indeed related to human wellbeing and secondly, whether there is any variation between people in the weights they might ascribe to their capabilities; the analysis presented in section IV addresses both questions.

There are a number of ways in which the empirical work to come can be linked to capabilities theory but for our purposes, ideas in Sen (1985a), provide a sufficient basis for the analysis

⁷ See for instance Anand and Wailoo (2000).

that follows. There, Sen (op. cit. p11 equation 2.2) defines utility as the happiness derived from doing or being a set of things thus:

$$u = h(f(c(x))) \quad (1)$$

where h is a ‘happiness’ function related to ‘functionings achieved’, f is a function that maps goods characteristics onto functionings achieved, and c is a function that maps the consumer’s bundle of goods onto a vector of characteristics. If one wanted to estimate the happiness specified in Sen (1985a), then this is the function one would examine though our interest is in a somewhat different relationship.

A key element of the capabilities approach both in Sen’s original monograph and as it has developed is the distinction between functionings achieved - what a person is or does – and capabilities in the sense of the functionings that is feasible for a person to achieve. To identify this concept, Sen introduces a set Q which is defined thus (op cit p13):

$$Q = \{f(c(x))\} \quad (2),$$

where the set of feasible functions is dependent on a person’s own features and their entitlements to commodities. As Sen notes, this represents a person’s capability set or *freedom* as a set of functionings from which one could be chosen. Our underlying approach is to model life satisfaction as a function of the freedom that a person has and amounts to estimating:

$$SWB = g(Q) \quad (3)$$

where $g(\cdot)$ can be viewed as just a different ‘happiness’ function to that described in (1). If there is an intrinsic value to freedom, as Carter (1999, 2003) for instance argues, or if there are process aspects to experienced utility as Frey and Stutzer (2000, 2005) show, then (3) is a superior specification to (1).

There is one further point to make, which ultimately derives from the fact that the behavioural use of the term happiness tends to be more permissive than its use in normative circles. Happiness in philosophical accounts of utilitarianism tends to be associated with hedonism whereas it is used synonymously with a variety of terms like ‘life satisfaction’ in economic work. In this study, SWB is measured by responses to the question: How satisfied or

dissatisfied are you with your life as a whole? This is a standard version of that question and one used in the BHPS but it suggests an evaluative response to an inquiry about something deeper than a person's hedonic state. In Sen (1985), there is also defined a function (op cit pp13-4), which relates to the *value of wellbeing* v , a person attaches to his or her functioning state thus:

$$v = h'(f(c(x))) \quad (4).$$

The point of (4), when taken together with (1), is that it allows for the possibility that people might, say, have high levels of functioning, objectively speaking, and yet not place much value on them. The provenance of Sen's ideas is philosophical but the growing evidence supports such distinctions and we suggest that it would be possible to interpret the analyses to follow as estimate of:

$$v = h''(Q) \quad (5).$$

Those familiar with the capability approach will have observed that we have not, thus far, made use of the individual differences that Sen (1985a) allows for in his framework. There, both the original happiness function in (1) and the set Q are subscripted to allow for different personal production functions. One method of allowing for this source of heterogeneity would be to use person specific effects, as indeed Clark et al (2005) suggest, though this option is not open to us as we have only cross-sectional data to work with. However, Ferrer-i-Carbonell and Frijters (2004) have suggested that there is indeed a need for more information on the aspects of persons that influence life satisfaction and to that end, we present analyses which both break down the data by sub-populations and which incorporate a measure of personality.⁸

III. Measuring the Capability Set, Q

Though there have been many studies related to this approach, it is still widely felt that secondary, quantitative data sources provide little evidence about capabilities, *per se*,

⁸ The instrument used to measure personality is a short form developed for incorporation into research where personality is not the sole focus. Devised by Gosling and Rentfrow (2003), it consists of 5 pairs of questions which are responded to on a one to seven scale with agreement semantic anchors. The score is summed in each pair thus giving five dimension scores in the range 2 to 14.

Brandolini and D'Alessio (1998) and Kuklys and Robeyns (2005).⁹ The next step, therefore, is to develop indicators of the capability set Q. To do this, we need an account that will specify, substantively, what those capabilities should be and in a series of works, the political theorist Martha Nussbaum (op cit) has offered, defended and refined just such an account. Her view provides a checklist of capabilities that are essential to human flourishing and it has attracted considerable controversy not least because of the universal, political constitutional approach she takes. However, these objections are somewhat beside the point for present purposes as our analysis can be interpreted as treating the assertions of Nussbaum as testable claims in need of supporting empirical evidence.

What does matter, from an empirical perspective, is that whatever method is used to generate a set of capability variables has some grounds for being viewed as principled. In this case, we are especially concerned with the existence of a normative justification, as well as certain qualities of the taxonomy itself, particularly the diversity and comprehensiveness of its constituent elements (see also Atkinson et al 2002 for a fuller discussion of the properties that social indicators might usefully possess). Nussbaum's is undoubtedly the most concrete attempt to provide an account of substantive capabilities and it is a natural place to turn. However, and as Robeyns (2005 forthcoming) has cogently argued – different accounts or lists may be appropriate for different purposes so that the idea that there should be one single list for all purposes is questionable. For example, the items for inclusion on such a list may vary across cultures. However, if we look both at the headline categories and the more detailed descriptions provided by Nussbaum (see appendix), it is noticeable that this is intended to be a high-level list – i.e. one sufficiently abstracted from empirical sources of variation that it is universal by construction. Furthermore, the claims to comprehensiveness and universality at this level of abstraction may have some merit if they are compared with other such lists. Alkire (2002) reviews some 40 lists produced by philosophers, psychologists and other social scientists and as Mozaffar Qizilbash has argued, it is difficult to conclude that there is not a large degree of similarity between them. Together, these considerations suggest that Nussbaum's account can be taken as a general, high-level account of capabilities that public policy must address.

Given the somewhat abstract nature of this list, we need to construct questions that people can reasonably be expected to ask. Elsewhere, Anand, Hunter and Smith (2005), identify sets of

⁹ In their latter survey presented to the most recent AEA conference at time of writing, Kuklys and Robeyns (op cit) suggest that only three studies from nearly fifty have concentrated on capabilities. Yet such exercises are vital for operationalisation, Comin (2001).

questions from the British Household Panel Survey¹⁰ which are closely, and sometimes directly, related to items on Nussbaum's list. As they note, questions in the BHPS indicate that some secondary data concerning capabilities can be found but that the coverage of items compared against such lists is substantially incomplete. This incompleteness provides a key motive for developing further indicators and the results of this activity appear in Table 1. Wherever possible, BHPS questions were used and these are indicated in the table though the majority of questions are new: the final column of table 3 indicates how responses were coded for present purposes.¹¹ Without attempting to discuss each question in turn, we observe that to match the detailed descriptions of capabilities is easier in some cases than in others and that there at points, redundancies in the list. That said, it is clear that the ten headline category titles belie a large and diverse set of capabilities.

IV Methods

For analysis, we employ the measure of life satisfaction referred to in section II. This is identical to that used in the BHPS and was chosen to facilitate comparisons with other studies that use life satisfaction. It was asked at the end of the survey and thereby reflects a 'considered' opinion, the opinion that arguably most closely satisfies the concept of reflection consistency, Sen (1985b).¹² The questions discussed thus far (over 60 indicators of Q, our measure of experienced utility, SWB, and the questions relating to personality) together with a small number of socio-demographics comprised the survey instrument that takes approximately 20 minutes to complete.

To deliver the survey and code responses, a professional social research company with a panel of nationally representative citizens was employed.¹³ The approach taken is one increasingly adopted following recent legislation in the UK that limits access to the electoral registers and results in a quota sample design that is common, if not standard, in social and economic surveys such as this one (eg BHPS). Because of the overlap in questions with the

¹⁰ The value of choosing the BHPS is that it is a secondary data source with similar counterpart surveys in many countries around the world. This means that any questions which come from it are likely to be asked regularly and in similar form in other countries which in turn implies that such questions could, in principle, be used as a basis for international monitoring and comparison.

¹¹ The questions were devised through a process that included a workshop held at Wolfson College, Oxford in September 2004 and piloting with potential respondents. In some cases, responses are recorded in a more detailed manner than indicated in Table 1. Usually categories have been collapsed where cell responses were deemed small though the original categories may well be of interest to future survey designers and are available from the authors on request.

¹² There are a number of discussions in mainstream economics journals about the use of SWB as a measure of wellbeing though Oswald (1997) remains one of the best. Manski (2004) provides a useful complement in that he focuses on evidence which indicates the reliability of such data.

¹³ Respondents are from England, Scotland and Wales and will not be entirely representative of the elderly.

BHPS it is, nonetheless, possible to conduct *ex post* checks on our sample and these are presented in the appendix. None of the substantive variables so checked are significantly different when our survey is compared with the BHPS and though two socio-demographic variables examined are statistically different at a 5% level, it is not obvious that the differences in average age or sex ratios are that material. Indeed the samples are relatively large and so even small differences can be expected to be statistically significant.

V. Results

The dataset generated by the survey instrument is rich and there are a number of possible pathways through it. Our emphasis here is on understanding which capabilities can be taken to be co-variates of life satisfaction which we do by analysing first a basic regression model before moving on to report the results of additional analyses that address robustness and sub-population variations. Throughout the analysis, the dependent variable is a measure of life satisfaction (SWB) which is distributed as indicated in Figure 1 below.

Insert Figure 1 About Here

The first two models presented, see Table 2 below, depict an OLS model of SWB as a function of 65 capability indicators plus two dummy variables, MDSWORKF (1 if a person intends to seek work in future, 0 otherwise) and MWORK (1 if a person is in work, 0

Insert Table 2 About Here

otherwise) which are used to reflect current and expected work status. A number of capability indicators have significant co-efficients but a larger number do not and the second model (see column 1 of Table 3) represents the results of a backward elimination exercise.¹⁴ This second model provides a benchmark for subsequent analyses and shows that 17 capability indicators, drawn from a wide range of life domains, had coefficients that were significant at the 5% level, a finding that is consistent both with the economics literature on poverty, which now accepts that welfare is inherently multi-dimensional, as well as the psychological literature on happiness which indicates that many domains are important for life satisfaction.¹⁵

¹⁴ Least significant variables were eliminated sequentially and the model re-run until all remaining capability variables were significant at the 5% level.

To pursue the issue of robustness, we take this second model and ask whether different variables or models make an impact on our results. Table 3 indicates the impact of adding in socio-demographic and personality variables. The introduction of socio-demographic controls causes two capability indicators (CDASALPT and JSEARCH concerning sexual assault and arbitrary ‘stop and search’) to become insignificant, though only one of these controls, general household income, is itself significant. The motivation for exploring the impact of personality has already been described and it is interesting to note that two dimensions, *extraversion* and *stability* are significantly related to life satisfaction, whilst the others are not – even at the 10% level. That said, only the FEVALUATE (a practical reasoning question to do with life evaluation) capability indicator ceases to be significant as the personality variables are introduced. These findings confirm the view that life satisfaction is related to personality, which underlines the value of using panel data with person specific effects where such data are available or the inclusion of at least some personality measures in cross-sectional surveys where this is possible. On the other hand, where measures of personality are not available, these findings suggest that conclusions about significance of variables may be reasonably robust. The last model in Table 2, in which demographics and personality are combined, appears to confirm that the personality and demographic variables do not substantially alter the conclusions one might draw about the relations between capabilities and life satisfaction.

The OLS results lead to co-efficients that apply throughout the parameter space and are therefore easier to interpret than they are for other models but it is nonetheless important to ask whether other model forms are appropriate. The most frequently used models here are those designed to model variables where the responses take the form of ordered categories - particularly the ordered logit and probit models. In addition, we mention results relating to a corresponding multi-nomial model which, it has been suggested to us, would constitute a useful additional diagnostic check (see Table 3). Table 4 presents an evaluation of these models in terms of the proportion of responses modelled correctly. In these terms, the ordered logit and probit models are significantly better predictors than the OLS model though they are virtually identical. The multi-nomial model does best of all but at the expense of ignoring the fact that the response categories are ordered. As we have no strong reason to doubt the ordering assumption, the multinomial model is perhaps best viewed as a benchmark against which the other models can be compared.

¹⁵ It has to be said that the psychological literature has tended in the past to concentrate on bi-variate analyses – so multi-variate analyses make a valuable addition to that literature.

To this point, the analysis indicates a degree of robustness in the relationship between life satisfaction and capability co-variables. However, an important element of the capabilities approach is, as noted in section II, that it recognises the fact that people convert goods and their characteristics into functionings and happiness at different rates – a point that has implications for economic justice. Personality variables are significant but apart from income, no other control variables are. And whilst the co-efficients on age and sex are not significant, one expects some differences both *a priori* as well from the literature so finally we present two analyses of the model in Table 2 estimated for two sets of population sub-samples. Table 6 presents results for a breakdown of respondents by sex, whilst Table 7 summarises a similar analysis for respondents below and above 45 years of age – the approximate mean age for the overall sample.

Insert Tables 6 and 7 about here

At this point, a more heterogeneous picture begins to emerge. Of course some differences are to be expected as the partial de-pooling of the data reduces the sample size for each regression but the differences are generally consistent with prior expectations about within population variations. The fact that BSHELTER (adequacy of accommodation) has a significant coefficient for women but not for men could reflect either gender based differences in attitudes to domestic accommodation or different amounts of time spent in the home. However, the regression does already control for work status, which has been suggested to us as a possible proxy for time in the home so perhaps the sexes do weigh accommodation quality differently. Differences between the sexes in terms of opportunities to seek sexual satisfaction (CSEXSAT) and the ability to enjoy the love of others (ELOVE) are unsurprising. The fact that EFEELING (the ease with which a person can express their feelings) and ESTRAIN (the extent to which they feel under strain) are similarly related to life satisfaction but only significant for men suggests that similar processes might be present in both men and women but that the main consequence of gender differences has to do with the impact of the process. There are a few similarities also: FPLAN (having a plan for one's life), FROLE (feeling one is playing a useful role) and GWORTH (having a sense of self worth) – are significant for both men and women but they are the only variables of which this is true. Together they might be taken as relating to agency, Nussbaum and Sen (1993), autonomy, Raz (1986) or going further back to psychological work on achievement-motivation, McClennen (1988),

and they suggest the shared importance to men and women of life structure. So perhaps this string of concepts related to autonomy is a candidate for being a universal, master value.¹⁶

Discrimination is important from a capabilities perspective (as it constrains autonomy and redistributes freedom) after controlling for income, there appears to be an impact on life satisfaction. Specifically, JRACEWP, an indicator of racial discrimination at work in the past, is negatively related to life satisfaction for men as one would expect. In addition, it has the correct (negative) sign for women but this is not significant – a fact that could simply reflect less time in paid work settings. The finding appears to be strong as it occurs in regressions that control for income, personality and a substantial number of other (mainly capability) variables. But the results are also striking by virtue of what they do not say. The fact that other forms of discrimination are not statistically significant may be due to the paucity of cell observations (eg discrimination on grounds of sexual orientation) but could also reflect the nature of such discrimination or the extent to which people adapt to it. A more significant difficulty, however, arises with the related variable JRACEWF (expectation of racial discrimination) which has a significant coefficient, but in the wrong direction for the pooled data, and is also positively related to life satisfaction (though not significant either for men or women). It may be that the salient comparison is with the person's own past, or the position of their parents or friends and relatives in a different country and that by those lights, most outcomes seem preferable.

If we turn to Table 7, the final analysis concerning age differences suggests a reduction in the number of significant capabilities over time as well as a somewhat changed pattern. ELOVE, FPLAN and FROLE are the only variables significant for both age groups, a finding not dissimilar to that for sex differences suggesting that agency, in some form, provides a common core of life satisfaction for men and women across the age spectrum. The fact that BSHELTER is significant only for those under 45 might indicate that accommodation improves as people accumulate assets over the life course, though combined with the previously noted fact that the variable is only significant for females suggests that concern about adequacy could be heightened by the needs of bringing up young children. The importance of the opportunity to use skills at work and the cost of being in work change with age though it is impossible to distinguish whether this reflects cohort variations or the effect of ageing. It is certainly plausible that the rising negative impact on life satisfaction of being in work is related to ageing but it is less obvious why opportunities to use skills and talents in

¹⁶ This is also consistent both with our finding that the quality of a job has a positive impact on life satisfaction and Winkelmann and Winkelmann (1998) who also control for income and find that the non-pecuniary costs of unemployment are high.

work have a greater impact on life satisfaction. A particularly striking difference seems to arise from the fact that the number of capability indicators that have significant coefficients drops by nearly half as one moves from the younger to the older age group. It is well known that life-satisfaction exhibits a u-shaped relationship with respect to age (though not why the relation exists) but it has not previously been shown that certain capability covariates decline in importance with age or that there are multiple causes. One possible component of an explanation is that over the life course, people's aspirations do adapt in a number of areas but that could not be the whole story as age-related adaptation does not explain why, for example, the coefficient of EFEELING (the ability to articulate one's feelings) is significant for the older group, but not the younger group, a finding that suggests the opposite of adaptation.

In short, to interpret these data, care is warranted and a number of analyses are necessary before any conclusions can be drawn, even tentatively. Nonetheless, some final comments are warranted. Firstly, although our focus has been on the significance of co-efficients, some researchers have commented on the relatively high R-squareds reported throughout (0.5 to 0.6 compared with 0.4 to 0.5 in psychology). A number of the items in the emotions, practical reason and affiliation (E, F and G) categories are taken, via the BHPS, from work related to mental health and so we should not be too surprised if they then turn out to be partly constitutive of life satisfaction. However, it is consistent both with theoretical concerns about materialism in the capabilities approach, as well as empirical evidence from the happiness literature, which shows that income is only weakly related to life satisfaction. The implications depend on the theory of justice one prefers but where poverty proves stubbornly resistant to attempts at alleviation by conventional economic means, it suggests that a wider range of quality of life issues, if addressed by policy, could have a significant impact on quality of life.

These considerations raise a second point about the relationship between the capabilities approach and the emerging literature on the economics of happiness. Both have origins that include literatures outside economics but perhaps because of their very different methodological underpinnings, there has been very little constructive engagement between the two traditions to this point. The attitude to utilitarianism, which in turn provided foundations for traditional welfare analysis, is a key issue that has tended to divide these two traditions but we are not compelled to accept this. For one thing, the substantive content of particular versions of the capabilities approach, as well as the general recognition by all versions of the approach helps provide content that can be used in happiness research: the 60 plus variables used here make that point unambiguously. Whether there is a contribution the other way, i.e. from the research on the economics of happiness to the capabilities approach

has become a more open ended question because of the implications that are thought to follow from making allowance for the adaptive aspect of preferences. Both camps recognise that such aspects are significant for issues of welfare assessment and we should not ignore the fact that that in itself represents an agreement that goes beyond what is assumed in textbook welfare economics to which most students and policy-makers are exposed. So long as adaptation is not both instantaneous and complete, then changes in valued capabilities can be expected to be reflected by changes in life satisfaction. Layard (2005) suggests that the economic policy consequence of adaptation is that we should focus on areas where preferences are resistant to change and one can think of situations where this might well make sense. For example, there is evidence (Brower et al, 2005) that people find reduced physical mobility as they become older acceptable whereas the same is not true of pain, a fact that suggests pain alleviation be given a relatively high priority. Capabilities researchers are not committed to rejecting such an approach though they would refine Layard's point by saying that there are some adaptations which need to be discounted – for example, the acceptance of discrimination. And yet it seems difficult to think that anyone trying to operationalise the capabilities approach would not, at some point, want to consult some kind of evidence regarding those capabilities that have a beneficial impact on life satisfaction. There are bridges to be built between the capabilities and life satisfaction camps and this paper illustrates one way in which they might be constructed.

VI. Conclusions

To summarise briefly, the paper was motivated by a purported dearth of detailed information about people's capabilities combined with the need for such information that new approaches to welfare economics require. Using one much discussed account of what capabilities are valuable due to Nussbaum, a survey instrument was constructed which provides indicators of capability across a wide range of life domains and issues. The research reported here illustrates the feasibility though non-triviality of the task of devising such indicators. It also suggests that lists such as Nussbaum's require further development if they are to generate data that speaks more directly to the interaction between economic activity and human welfare. Nonetheless, the questions developed here provide an illustration of the economic statistics that the capabilities approach requires for its operationalisation with quantitative empirical work.

For present purposes, we analysed the resulting data on capabilities by asking what evidence there was for relations between capabilities and life satisfaction, a variable now used frequently by labour and other economists. Using backward elimination we developed a

short(er) list of capability indicator variables for which there is strongest evidence of a statistical link to subjective wellbeing. Subsequent analyses suggested that the relations were reasonably robust with respect to the addition of socio-demographic and personality variables, to the use of ordered logit, ordered probit and multi-nomial models but that there is evidence of sub-population variations by sex and age.

Much work remains to be done, not least of all in tailoring samples to focus on specific issues, like the impacts of constraints on reproductive choice, or the role of ethnicity. From a practical perspective, it would also be particularly valuable to link some of the capability indicators of the sort developed here to environmental variables which policy-makers can influence. Nonetheless, the paper brings an economics and social statistics approach to bear on a philosophically principled oriented approach to welfare economics in a way that will be of value to both those interested in the operationalisation of this approach and also to those doing applied empirical work in the area of life satisfaction. Focusing on capabilities or opportunities is especially important where preferences are at least partially heterogeneous, an assumption that appears to be confirmed rather starkly by our analyses by gender and to a lesser extent, by those for age. Findings apart, we suggest that the questions developed here illustrate the sorts of data that policy-makers and capability researchers alike could gather both in one-off and in regular surveys. The capabilities approach is undoubtedly a useful complement to conventional analysis but it is one that seems, from this work to speak particularly explicitly to measurement issues of choice and the multi-variate nature of wellbeing and poverty.

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Figure 1: Distribution of Subjective Well-being

Table 1 Capabilities, Questions and Variables

Main Corresponding Question(s)	Variable Name and Response Code
1. Given your family history, dietary habits, lifestyle and health status, until what age do you expect to live?	ALIFEXP = years
2. Does your health in any way limit your daily activities compared to most people of your age?	BEHALTH = 1 if N, 0
3. Are you able to have children?	BPEPRODT = 0 if Y or N*, 0
4. Do you eat fresh meat, chicken or fish at least twice a week?	BNOURISH = 1 if Y or N*, 0
5. Is your current accommodation adequate or inadequate for your current needs?	BSHELTER = 1 if A, 0
6. Are you prevented from moving home for any reason?	BCANMOVE=0 if Pa, 0
7. Please indicate how safe you feel walking alone in the area near your home during the daytime?	CSAFEDAY = 1-7(Cs)
8. Please indicate how safe you feel walking alone in the area near your home after dark	CSAFENYT = 1-7(Cs)
9. Have you ever been the victim of some other form of violent assault or attack?	CVASALPT 1=Y,0
10. How likely do you think it is that you will be a victim of violent assault or attack in the future?	CVASALTF = 1-7(EI)
11. Have you ever been a victim of sexual assault?	CSASALTP 1=Y,0
12. Please indicate how vulnerable you feel to sexual assault or attack	CSASALTF = 1-7(EI)
13. Have you ever been a victim of domestic violence?	
14. Please indicate how vulnerable you feel to domestic violence in the future.	CDASALPT 1=Y,0 CDASALPF = 1-7(Vv)
15. Do you have sufficient opportunities to satisfy your sexual needs?	CSEXSAT 1=Y,0
16. Even if you don't need or have never needed any of the following [contraception, abortion or infertility treatment], are you prohibited from using any of the following for any reason (eg religious beliefs, family pressure)?	CCHOICE 1=Y,0
17. What is the highest educational or work related qualification you have?	DQUAL 1=A+, 0
18. How often do you use your imagination and or reasoning in your day to day life?	DIMAGINE = 1-7(At)
19. I am free to express my political views.	DXPRSPOL =1-7(As)
20. I am free to practice my religion as I want to.	DXPRSRLG = 1-7(As)
21. Have you recently been able to enjoy your normal day to day activities?	DENDJOY2 = 1-4(Mu)
22. How difficult do you find it to make friendships which last with people outside work?	EFRIENDS = 1-7(Ee)
23. At present, how easy or difficult do you find it to enjoy the love care and support of your immediate family?	ELOVE = 1-7(Ee)
24. Do you find it easy or difficult to express feelings of love, grief, longing, gratitude and anger compared to most people of your age?	EFEELING = 1-7(Ee)
25. Have you recently lost much sleep over worry?	ENOSLEEP = 1-4(Mu)
26. Have you recently felt constantly under strain?	ESTRAIN = 1-4(Mu)
27. My idea of a good life is based on my own judgement.	FGOOD = 1-7(As)
28. I have a clear plan of how I would like my life to be.	FPLAN = 1-7(As)
29. How often, if at all, do you evaluate how you lead your life and where you are going in life?	F EVALUATE = 1-7(Att)
30. Outside of work, have you recently felt that you were playing a useful part in things?	FROLE = 1-4(Mu)

31. I respect, value and appreciate other people.	GCONCERN = 1-7(As)
32. Do you normally have at least one week's (seven days) annual holiday away from home?	GHOLIDAY = 1 if Y, 0
33. Do you normally meet up with friends or family for a drink or a meal at least once a month?	GMEAL = 1 if Y, 0
34. Do you tend to find it easy or difficult to imagine the situation of other people (ie to put yourself in others shoes)?	GIMAGINE = 1-7(Ee)
35. Have you recently been thinking of yourself as a worthless person?	GWORTH = 1-4 (Na)
36-41 Outside of any employment or work situation, have you ever experienced discrimination because of your race, sexual orientation, gender, religion, age?	GRACEP = 0 if N, 0 GSEXOP = 0 if N, 0 GGENP = 0 if N, 0 GRELIGNP = 0 if N, 0 GAGEP = 0 if N, 0
42-46 Outside of any employment or work situation, do you think is it that in the future you will be discriminated against because of your race, sexual orientation, gender, religion, age?	GRACEF = 1-7(Eu) GSEXOF = 1-7(Eu) GGENF = 1-7(Eu) GRELIGNF = 1-7(Eu) GAGEF = 1-7(Eu)
47. I appreciate and value plants, animals and the world of nature.	HSPECIES = 1-7(As)
48. Have you recently been enjoying your recreational activities?	IPLAY = 1-4(Mu)
49. I am able to participate in the political activities that affect my life if I want to.	JPARTPOL = (As)
50. For which of the following reasons, if any, have you not bought your home? [U=forced not for reasons or affordability or difficulty obtaining mortgage, 1 = home owner or chose not to buy for other reasons.]	JOWN = 0 if U, 1
51-55. When seeking work in the past, have you ever experienced discrimination because of your race, sexual orientation, gender, religion, age?	JRACEWP = 1 if Y, 0 JSEXOWP = 1 if Y, 0 JGENDWP = 1 if Y, 0 JRLIGNWP = 1 if Y, 0 JAGEWP = 1 if Y, 0
56-60. When seeking work in the future, how likely do think it is that you will experience discrimination because of you race, sexual orientation, gender, religion, age?	JRACEWF = 1-7(Eu) or 0** JSEXOWF = 1-7(Eu) or 0** JGENDWF = 1-7(Eu) or 0** JRLIGNWF = 1-7(Eu) or 0**
61 How likely do you think it is that within the next 12 months you will be stopped and search by the police when it is not warranted?	JAGEWF = 1-7(Eu) or 0** JSEARCH = 1-7(Eu) or 0**
62. To what extent does your work make use of your skills and talents?	JSKILLSW = 1-7(At) or 0***
63. At work, have you recently felt that you were playing a useful part in things?	JROLEW = 1-4(Mu) or 0***
64. Do you tend to find it easy or difficult to relate to your colleagues at work?	JREALTEW = 1-7(Ee) or 0***
65. At work, are you treated with respect?	JRESPECTW = 1-7(At) or 0***

Note

1. The terms 1-4, 1-7 indicate 4 four and 7 point scales and attached to each maximum is an abbreviation denoting the semantic anchor used for that point.

Key

N=No, Y=Yes, N*=No for reasons of choice, A=Adequate, Pa=Prevented for reasons of affordability, Cs=Completely satisfied, El=Extremely likely, Vv=Very vulnerable, A+=A Level or above, As=Agree Strongly, Mu=Much more usual than often, At=All the time, ** indicates variable = 0 if there is an intention to work in future (MDSWORKF=1, 0 if there is no such intention), *** indicates variable = 0 if the respondent is in work (MWORK=1, 0 if out of work).

Table 2: Regression of Subjective Well-being on Capability Indicators

Variable	Coef	Std. Error	t stat	p value	Variable	Coef	Std. Error	t stat	p value
C	-0.43	0.8	-0.53	0.59	GRACEF	0	0.05	0.03	0.98
ALIFEXP	0	0	-0.26	0.8	GGENDP	0.25	0.16	1.57	0.12
BHEALTH	0.13	0.1	1.25	0.21	GGENDF	-0.05	0.04	-1.19	0.24
BREPRODT	-0.03	0.19	-0.17	0.87	GSEXOP	-0.26	0.27	-0.98	0.33
BNOURISH	0.33	0.27	1.24	0.22	GSEXOF	0.07	0.06	1.26	0.21
BSHELTER	0.23	0.13	1.79	0.07	GRELIGNP	0.12	0.22	0.54	0.59
BCANMOVE	0.12	0.1	1.17	0.24	GRELIGNF	0.02	0.06	0.36	0.72
CSAFEDAY	0.01	0.05	0.12	0.9	GAGEF	-0.01	0.03	-0.24	0.81
CSAFENYT	-0.01	0.04	-0.37	0.71	GAGEP	0.15	0.13	1.14	0.26
CVASALTP	-0.05	0.1	-0.5	0.62	HSPECIES	-0.06	0.04	-1.46	0.14
CVASALTF	-0.02	0.03	-0.49	0.63	IPLAY	-0.02	0.06	-0.3	0.77
CSASALTP	-0.04	0.13	-0.28	0.78	JPARTPOL	0.04	0.04	1.1	0.27
CSASALTF	-0.04	0.03	-1.15	0.25	JOWN	0.12	0.12	0.98	0.33
CDASALTP	-0.19	0.11	-1.77	0.08	JRACEWP	-0.65	0.22	-2.99	0
CDASALTF	0.03	0.04	0.71	0.48	JRACEWF	0.1	0.06	1.62	0.11
CSEXSAT	0.3	0.09	3.2	0	JSEXOWP	-0.16	0.3	-0.53	0.59
CCHOICE	-0.12	0.15	-0.79	0.43	JSEXOWF	-0.01	0.08	-0.14	0.89
DQUAL	0.04	0.08	0.47	0.64	JGENDWP	0.14	0.14	1	0.32
DIMAGINE	0.08	0.04	2.09	0.04	JGENDWF	0	0.05	-0.1	0.92
DXPRSPOL	-0.01	0.05	-0.14	0.89	JRLIGNWP	0.29	0.3	0.98	0.33
DXPRSR LG	-0.05	0.04	-1.45	0.15	JRLIGNWF	-0.03	0.07	-0.42	0.68
DENJOYD2	0.07	0.08	0.81	0.42	JAGEWP	-0.04	0.1	-0.43	0.67
EFRIENDS	0.01	0.03	0.33	0.74	JAGEWF	-0.01	0.03	-0.39	0.7
ELOVE	0.08	0.03	2.46	0.01	MDSWORKF	-0.13	0.18	-0.72	0.47
EFEELING	0.13	0.03	3.71	0	JSEARCH	-0.05	0.03	-1.4	0.16
ENOSLEEP	-0.03	0.06	-0.53	0.6	JSKILLSW	0.04	0.04	0.95	0.34
ESTRAIN	-0.07	0.07	-1.04	0.3	JROLEW	-0.01	0.06	-0.24	0.81
FGOOD	0.05	0.04	1.37	0.17	JRELATEW	0	0.05	-0.08	0.94
FPLAN	0.16	0.03	5.05	0	JRESPCTW	0.03	0.06	0.57	0.57
FEVALUATE	-0.12	0.04	-3.3	0	MWORK	-0.38	0.32	-1.21	0.23
FROLE	0.37	0.07	5.23	0					
GCONCERN	0.1	0.05	2.12	0.03					
GHOLIDAY	0.2	0.11	1.85	0.07					
GMEAL	0.14	0.09	1.56	0.12	R2		0.61		
GIMAGINE	0.02	0.04	0.63	0.53	Adjusted R2		0.56		
GWORTH	0.34	0.06	5.73	0	Log likelihood		-673.90		
GRACEP	-0.08	0.18	-0.45	0.65	Observations		559		

Table 3. Regression of Subjective Well-being on Capabilities, with Demographics, and Personality Controls

Variable	Capabilities				Capabilities and Demographics				Capabilities and Personality				Capabilities, Demographics and Personality			
	Coef.	Std.Error	t stat	p value	Coef.	Std.Error	t stat	P value	Coef.	Std.Error	t stat	p value	Coef.	Std.Error	t stat	p value
BSHELTER	0.27	0.09	2.93	0.00	0.29	0.10	2.99	0.00	0.22	0.09	2.37	0.02	0.23	0.09	2.43	0.02
CDASALTP	-0.17	0.08	-2.01	0.04	-0.13	0.09	-1.53	0.13	-0.17	0.08	-2.03	0.04	-0.14	0.09	-1.69	0.09
CSEXSAT	0.25	0.07	3.33	0.00	0.21	0.08	2.86	0.00	0.25	0.07	3.47	0.00	0.22	0.07	2.91	0.00
ELOVE	0.08	0.03	3.03	0.00	0.08	0.03	2.94	0.00	0.08	0.03	3.16	0.00	0.08	0.03	2.99	0.00
EFEELING	0.11	0.03	4.14	0.00	0.11	0.03	4.14	0.00	0.10	0.03	3.68	0.00	0.10	0.03	3.62	0.00
ESTRAIN	-0.13	0.04	-3.24	0.00	-0.10	0.04	-2.48	0.01	-0.11	0.04	-2.72	0.01	-0.08	0.04	-2.09	0.04
FGOOD	0.09	0.03	3.17	0.00	0.10	0.03	3.56	0.00	0.08	0.03	3.01	0.00	0.09	0.03	3.37	0.00
FPLAN	0.12	0.02	5.10	0.00	0.13	0.02	5.26	0.00	0.10	0.02	4.17	0.00	0.11	0.02	4.25	0.00
FEVALUATE	-0.06	0.03	-2.15	0.03	-0.06	0.03	-2.16	0.03	-0.03	0.03	-1.23	0.22	-0.03	0.03	-1.22	0.22
FROLE	0.36	0.05	6.89	0.00	0.38	0.05	7.35	0.00	0.35	0.05	6.72	0.00	0.37	0.05	7.15	0.00
GCONCERN	0.09	0.03	2.69	0.01	0.12	0.04	3.26	0.00	0.11	0.04	3.01	0.00	0.13	0.04	3.38	0.00
GHOLIDAY	0.27	0.08	3.28	0.00	0.21	0.09	2.49	0.01	0.25	0.08	3.08	0.00	0.20	0.08	2.35	0.02
GWORTH	0.35	0.04	7.86	0.00	0.37	0.05	8.00	0.00	0.29	0.05	6.36	0.00	0.31	0.05	6.65	0.00
JRACEWP	-0.54	0.17	-3.18	0.00	-0.55	0.17	-3.24	0.00	-0.58	0.17	-3.46	0.00	-0.59	0.17	-3.49	0.00
JRACEWF	0.08	0.03	2.26	0.02	0.07	0.03	2.18	0.03	0.07	0.03	2.23	0.03	0.07	0.03	2.16	0.03
MDSWORKF	-0.23	0.09	-2.41	0.02	-0.25	0.10	-2.43	0.02	-0.24	0.09	-2.61	0.01	-0.28	0.10	-2.74	0.01
JSEARCH	-0.05	0.02	-2.20	0.03	-0.04	0.02	-1.70	0.09	-0.06	0.02	-2.38	0.02	-0.04	0.02	-1.75	0.08
JSKILLSW	0.08	0.03	2.61	0.01	0.07	0.03	2.33	0.02	0.07	0.03	2.60	0.01	0.07	0.03	2.30	0.02
MWORK	-0.32	0.16	-2.01	0.05	-0.36	0.17	-2.17	0.03	-0.35	0.16	-2.19	0.03	-0.37	0.16	-2.28	0.02
MMALE					-0.04	0.07	-0.61	0.54					-0.08	0.07	-1.06	0.29
MAGE					-0.02	0.01	-1.64	0.10					-0.02	0.01	-1.41	0.16
MAGE2					0.00	0.00	1.38	0.17					0.00	0.00	1.12	0.26
MGHI					0.07	0.03	2.40	0.02					0.06	0.03	2.09	0.04
MRSOUTH					-0.20	0.10	-1.96	0.05					-0.18	0.10	-1.75	0.08
MRMIDWLS					0.00	0.10	-0.04	0.97					0.04	0.10	0.36	0.72
MRNORTH					-0.17	0.10	-1.71	0.09					-0.14	0.10	-1.43	0.15
MRSCOT					-0.04	0.13	-0.30	0.77					0.00	0.13	0.00	1.00
PXTRAVRT									0.08	0.03	3.04	0.00	0.07	0.03	2.74	0.01
PAGREEBL									-0.04	0.03	-1.41	0.16	-0.04	0.03	-1.17	0.24
PCONSCS									-0.04	0.03	-1.54	0.13	-0.03	0.03	-1.22	0.22
PSTABLE									0.11	0.03	4.19	0.00	0.12	0.03	4.42	0.00
POPEN									-0.04	0.03	-1.16	0.25	-0.03	0.03	-1.02	0.31
R ²	0.54				0.55				0.56				0.57			
Adjusted R ²	0.53				0.54				0.55				0.55			
Log likelihood	-999.89				-990.71				-983.08				-974.19			
Observations	778				778				778				778			

Table 4. OLS, Ordered Logit, Ordered Probit, and Multinomial Model Results Compared

Variable	Ordinary Least Squares				Ordered Logit				Ordered Probit				Multinomial		
	Coef.	Std.Error	t stat	p value	Coef.	Std.Error	z stat	p value	Coeff	Std.Error	z stat	p value	LL Difference	$\chi^2(i)$	p value
INTERCEPT													1561.72	0	
BSHELTER	0.23	0.09	2.43	0.02	0.46	0.22	2.12	0.03	0.26	0.12	2.17	0.03	1575.37	13.65	0.03
CDASALTP	-0.14	0.09	-1.69	0.09	-0.23	0.19	-1.21	0.23	-0.16	0.11	-1.44	0.15	1571.45	9.72	0.14
CSEXSAT	0.22	0.07	2.91	0.00	0.54	0.17	3.21	0.00	0.30	0.09	3.13	0.00	1577.01	15.28	0.02
ELOVE	0.08	0.03	2.99	0.00	0.21	0.06	3.61	0.00	0.10	0.03	3.25	0.00	1577.34	15.62	0.02
EFEELING	0.10	0.03	3.62	0.00	0.23	0.06	3.56	0.00	0.13	0.04	3.71	0.00	1583.69	21.97	0.00
ESTRAIN	-0.08	0.04	-2.09	0.04	-0.32	0.10	-3.22	0.00	-0.18	0.06	-3.28	0.00	1581.34	19.62	0.00
FGOOD	0.09	0.03	3.37	0.00	0.16	0.06	2.49	0.01	0.10	0.04	2.67	0.01	1572.60	10.88	0.09
FPLAN	0.11	0.02	4.25	0.00	0.21	0.06	3.68	0.00	0.13	0.03	4.13	0.00	1602.66	40.94	0.00
FEVALUATE	-0.03	0.03	-1.22	0.22	-0.06	0.06	-0.93	0.35	-0.05	0.03	-1.35	0.18	1566.06	4.34	0.63
FROLE	0.37	0.05	7.15	0.00	0.71	0.12	5.93	0.00	0.41	0.07	5.98	0.00	1605.09	43.37	0.00
GCONCERN	0.13	0.04	3.38	0.00	0.26	0.09	2.75	0.01	0.14	0.05	2.73	0.01	1570.16	8.43	0.21
GHOLIDAY	0.20	0.08	2.35	0.02	0.42	0.19	2.21	0.03	0.22	0.11	2.03	0.04	1569.26	7.54	0.27
GWORTH	0.31	0.05	6.65	0.00	0.54	0.11	4.82	0.00	0.32	0.06	5.13	0.00	1602.53	40.81	0.00
JRACEWP	-0.59	0.17	-3.49	0.00	-1.12	0.39	-2.84	0.00	-0.69	0.21	-3.24	0.00	(ii)		
JRACEWF	0.07	0.03	2.16	0.03	0.18	0.08	2.38	0.02	0.09	0.04	2.11	0.04	1569.38	7.65	0.27
MDSWORKF	-0.28	0.10	-2.74	0.01	-0.74	0.23	-3.23	0.00	-0.38	0.13	-2.97	0.00	1572.27	10.55	0.10
JSEARCH	-0.04	0.02	-1.75	0.08	-0.16	0.06	-2.90	0.00	-0.09	0.03	-2.73	0.01	1584.31	22.58	0.00
JSKILLSW	0.07	0.03	2.30	0.02	0.19	0.07	2.81	0.01	0.11	0.04	3.06	0.00	1585.76	24.04	0.00
MWORK	-0.37	0.16	-2.28	0.02	-0.95	0.37	-2.56	0.01	-0.61	0.21	-2.96	0.00	1586.56	24.84	0.00
MMALE	-0.08	0.07	-1.06	0.29	-0.13	0.16	-0.84	0.40	-0.07	0.09	-0.79	0.43	1568.47	6.75	0.35
MAGE	-0.02	0.01	-1.41	0.16	-0.09	0.04	-2.54	0.01	-0.05	0.02	-2.31	0.02	1581.20	19.48	0.00
MAGE2	0.00	0.00	1.12	0.26	0.00	0.00	2.36	0.02	0.00	0.00	2.12	0.03	1579.32	17.59	0.01
MGHI	0.06	0.03	2.09	0.04	0.13	0.06	2.09	0.04	0.08	0.04	2.14	0.03	1577.21	15.49	0.02
MRSOUTH	-0.18	0.10	-1.75	0.08	-0.42	0.23	-1.87	0.06	-0.24	0.13	-1.85	0.06	(ii)		
MRMIDWLS	0.04	0.10	0.36	0.72	0.04	0.23	0.17	0.86	0.02	0.13	0.12	0.90	1576.97	15.25	0.02
MRNORTH	-0.14	0.10	-1.43	0.15	-0.31	0.22	-1.45	0.15	-0.20	0.12	-1.63	0.10	1570.75	9.03	0.17
MRSCOT	0.00	0.13	0.00	1.00	-0.06	0.29	-0.22	0.83	-0.08	0.16	-0.51	0.61	1569.57	7.84	0.25
PXTRAVRT	0.07	0.03	2.74	0.01	0.14	0.06	2.49	0.01	0.08	0.03	2.51	0.01	1573.75	12.03	0.06
PAGREEBL	-0.04	0.03	-1.17	0.24	-0.07	0.07	-1.05	0.29	-0.04	0.04	-1.06	0.29	1570.94	9.22	0.16
PCONSCS	-0.03	0.03	-1.22	0.22	-0.10	0.06	-1.62	0.10	-0.06	0.04	-1.69	0.09	1582.78	21.05	0.00
PSTABLE	0.12	0.03	4.42	0.00	0.27	0.06	4.40	0.00	0.15	0.03	4.36	0.00	1580.95	19.23	0.00
POPEN	-0.03	0.03	-1.02	0.31	-0.05	0.07	-0.69	0.49	-0.03	0.04	-0.81	0.42	1569.59	7.87	0.25
R ²	0.57														
Adjusted R ²	0.55														

Table 4 (cont.): OLS, Ordered Logit, Ordered Probit, and Multinomial Model Results Compared

Variable	Ordinary Least Squares				Ordered Logit				Ordered Probit				Multinomial		
	Coef.	Std.Error	t stat	p value	Coef.	Std.Error	z stat	p value	Coeff	Std.Error	z stat	p value	LL Difference	$\chi^2(i)$	p value
Pseudo-R ² measures															
LR index					0.26				0.26				0.65		
Cox and Snell															
Log likelihood	-974.19				-885.85				-882.38						
Observations	778				778				778				778		

Notes

1. The chi-square statistic is the difference between the log likelihood of the final model and a reduced model formed by omitting an effect from the final model. The null hypothesis is that all parameters of that effect are zero. If the p-value of the test is small (less than 0.05) then the effect contributes to the model

2. A full multi-nomial with JRACEWP and MRSOUTH gives rise to potential estimation difficulties and the model presented, without these two variables included, is the closest model estimated that was problem. Estimates from non-completed iterations for the full model are, however, very similar.

3. In this table and following, p values ≤ 0.05 are in bold.

Table 5: OLS, Ordered Logit, Ordered Probit, and Multinomial Model Predictions

Model		z stat ¹	p value
OLS			
	Correct	365	
	% Correct	46.9%	
Ordered Logit			
	Correct	418	
	% Correct	53.7%	2.68 0.01
Ordered Probit			
	Correct	417	
	% Correct	53.6%	2.64 0.01
Multinomial Logit			
	Correct	454	
	% Correct	58.4%	4.54 0.00

Notes

1. n=778

2. For the predicted proportion for each models compared to the OLS model. (The z stat and p values for the multinomial model against the ordered logit and ordered probit models are 1.88 (0.06) 1.91 (0.06) and respectively.)

Table 6. Model Estimates for Sub-samples by Gender

Variable	Female					Male				
	OLS Coef	Std Error	t stat	p value	Ordered Logit p value	OLS Coef	Std Error	t stat	p value	Ordered Logit p value
BSHELTER	0.39	0.13	3.05	0.00	0.01	0.02	0.15	0.14	0.89	0.96
CDASALTP	-0.18	0.10	-1.75	0.08	0.19	-0.18	0.17	-1.10	0.27	0.36
CSEXSAT	0.14	0.11	1.29	0.20	0.09	0.29	0.11	2.70	0.01	0.00
ELOVE	0.12	0.03	3.54	0.00	0.00	0.02	0.04	0.62	0.54	0.20
EFEELING	0.04	0.04	1.00	0.32	0.38	0.16	0.04	3.91	0.00	0.00
ESTRAIN	-0.04	0.05	-0.69	0.49	0.07	-0.16	0.06	-2.44	0.02	0.01
FGOOD	0.16	0.04	3.93	0.00	0.00	0.05	0.04	1.37	0.17	0.44
FPLAN	0.11	0.04	3.17	0.00	0.00	0.09	0.04	2.52	0.01	0.03
FEVALU8	-0.03	0.04	-0.90	0.37	0.48	-0.02	0.04	-0.62	0.54	0.70
FROLE	0.41	0.07	5.91	0.00	0.00	0.30	0.08	3.64	0.00	0.00
GCONCERN	0.13	0.05	2.60	0.01	0.03	0.08	0.06	1.32	0.19	0.30
GHOLIDAY	0.12	0.11	1.09	0.28	0.37	0.27	0.14	2.00	0.05	0.02
GWORTH	0.32	0.06	5.09	0.00	0.00	0.28	0.07	3.92	0.00	0.01
JRACEWP	-0.23	0.26	-0.88	0.38	0.54	-0.73	0.23	-3.24	0.00	0.00
JRACEWF	0.04	0.05	0.87	0.39	0.34	0.07	0.05	1.56	0.12	0.04
MDSWORKF	-0.40	0.14	-2.89	0.00	0.00	-0.11	0.15	-0.73	0.47	0.23
JSEARCH	-0.03	0.04	-0.87	0.38	0.11	-0.05	0.03	-1.37	0.17	0.02
JSKILLSW	0.02	0.04	0.44	0.66	0.37	0.11	0.04	2.63	0.01	0.00
MWORK	-0.03	0.23	-0.13	0.90	0.57	-0.75	0.25	-3.02	0.00	0.00
MAGE	-0.03	0.02	-1.92	0.06	0.06	0.01	0.02	0.80	0.42	0.55
MAGE2	0.00	0.00	1.19	0.24	0.16	0.00	0.00	-0.58	0.56	0.41
MGHI	0.03	0.04	0.89	0.37	0.36	0.10	0.04	2.30	0.02	0.04
MRSOUTH	-0.16	0.14	-1.14	0.25	0.20	-0.17	0.15	-1.14	0.26	0.17
MRMIDWLS	0.14	0.14	0.99	0.32	0.34	-0.11	0.15	-0.71	0.48	0.30
MRNORTH	-0.13	0.13	-1.00	0.32	0.45	-0.12	0.14	-0.82	0.41	0.23
MRSCOT	0.13	0.18	0.73	0.47	0.74	-0.12	0.18	-0.63	0.53	0.47
PXTRAVRT	0.08	0.03	2.39	0.02	0.02	0.03	0.04	0.78	0.44	0.53
PAGREEBL	-0.06	0.04	-1.34	0.18	0.24	0.00	0.05	-0.08	0.93	0.80
PCONSCS	-0.07	0.04	-1.80	0.07	0.03	0.00	0.04	0.01	0.99	0.80
PSTABLE	0.13	0.04	3.52	0.00	0.00	0.14	0.04	3.32	0.00	0.00
POPEN	-0.01	0.04	-0.32	0.75	0.90	-0.05	0.05	-1.13	0.26	0.30
R ²	0.61					0.58				
Adjusted R ²	0.58					0.54				
Log likelihood	-505.9					-445.0				
Observations	418					360				

Table 7: Model Estimates for Sub-samples by Age Group

Variable	Aged under 45					Aged 45 and over				
	OLS Coef	Std Error	t stat	p value	Ordered Logit p value	OLS Coef	Std Error	t stat	p value	Ordered Logit p value
BSHELTER	0.22	0.11	2.02	0.04	0.02	0.35	0.20	1.71	0.09	0.16
CDASALTP	-0.02	0.12	-0.20	0.84	0.83	-0.25	0.12	-2.01	0.05	0.04
CSEXSAT	0.29	0.10	2.83	0.00	0.01	0.09	0.11	0.87	0.38	0.17
ELOVE	0.10	0.04	2.56	0.01	0.00	0.10	0.04	2.63	0.01	0.00
EFEELING	0.07	0.04	1.60	0.11	0.13	0.13	0.04	3.25	0.00	0.00
ESTRAIN	-0.05	0.06	-0.83	0.41	0.16	-0.13	0.07	-1.92	0.06	0.03
FGOOD	0.11	0.04	2.99	0.00	0.01	0.06	0.05	1.22	0.22	0.38
FPLAN	0.08	0.03	2.55	0.01	0.01	0.13	0.04	3.18	0.00	0.01
FEVALU8	-0.01	0.04	-0.26	0.80	0.89	-0.05	0.04	-1.36	0.17	0.23
FROLE	0.35	0.07	4.95	0.00	0.00	0.35	0.08	4.13	0.00	0.00
GCONCERN	0.12	0.06	2.14	0.03	0.04	0.08	0.06	1.42	0.16	0.08
GHOLIDAY	0.29	0.11	2.73	0.01	0.01	0.00	0.14	-0.03	0.97	0.93
GWORTH	0.31	0.06	5.07	0.00	0.00	0.26	0.08	3.29	0.00	0.01
JRACEWP	-0.28	0.23	-1.22	0.22	0.74	-0.94	0.26	-3.65	0.00	0.00
JRACEWF	0.06	0.04	1.45	0.15	0.13	0.05	0.06	0.84	0.40	0.20
MDSWORKF	-0.29	0.14	-2.02	0.04	0.02	-0.26	0.16	-1.58	0.11	0.05
JSEARCH	-0.07	0.03	-2.13	0.03	0.01	-0.03	0.04	-0.95	0.34	0.21
JSKILLSW	0.09	0.04	2.29	0.02	0.01	0.08	0.05	1.70	0.09	0.18
MWORK	-0.27	0.21	-1.31	0.19	0.09	-0.63	0.28	-2.26	0.02	0.06
MAGE	-0.02	0.03	-0.51	0.61	0.43	0.01	0.02	0.39	0.70	0.75
MAGE2	0.00	0.00	0.27	0.79	0.51	0.00	0.00	-0.01	0.99	0.85
MGHI	0.00	0.04	-0.05	0.96	0.95	0.11	0.04	2.68	0.01	0.01
MRSOUTH	-0.08	0.14	-0.60	0.55	0.47	-0.26	0.16	-1.67	0.10	0.09
MRMIDWLS	0.18	0.14	1.32	0.19	0.23	-0.08	0.16	-0.48	0.63	0.59
MRNORTH	-0.14	0.13	-1.10	0.27	0.30	-0.16	0.15	-1.04	0.30	0.29
MRSCOT	-0.02	0.17	-0.10	0.92	0.80	0.05	0.20	0.26	0.79	0.88
PXTRAVRT	0.12	0.03	3.51	0.00	0.00	0.01	0.04	0.40	0.69	0.83
PAGREEBL	-0.06	0.04	-1.40	0.16	0.11	-0.03	0.05	-0.58	0.56	0.88
PCONSCS	-0.05	0.04	-1.31	0.19	0.20	-0.05	0.04	-1.12	0.26	0.24
PSTABLE	0.13	0.04	3.45	0.00	0.00	0.11	0.04	2.69	0.01	0.00
POPEN	-0.06	0.04	-1.32	0.19	0.33	-0.03	0.05	-0.67	0.50	0.85
R ²	0.58					0.60				
Adjusted R ²	0.55					0.56				
Log likelihood	-523.9					-432.0				
Observations	418					360				

Note

Tables 6 and 7 include p values associated with coefficients from an ordered logit model estimated on the same set of variables as used for the OLS model

Appendix

List of Capabilities Used (Nussbaum 2000)

A. Life: Being able to live to the end of a human life of normal length; not dying prematurely, or before one's life is so reduced as to be not worth living.

B. Bodily Health: Being able to have good health, including reproductive health; to be adequately nourished; to have adequate shelter.

C. Bodily Integrity: Being able to move freely from place to place: to be secure against violent assault, including sexual assault and domestic violence; having opportunities for sexual satisfaction and for choice in matters of reproduction.

D. Senses Imagination and Thought: Being able to use the sense to imagine, think and reason and to do these things in a 'truly human' way, a way informed and cultivated by an adequate education, including, but by no means limited to, literacy and basic mathematical and scientific training. Being able to use imagination and thought in connection with experiencing and producing works and events of one's own choice, religious, literary, musical and so forth. Being able to use one's mind in ways protected by guarantees of freedom of expression with respect to both political and artistic speech, and freedom of religious exercise. Being able to have pleasurable experiences and to avoid non-beneficial pain.

E. Emotions: Being able to have attachments to things and people outside ourselves; to love those who love and care for us, to grieve at their absence; in general to love, to grieve, to experience longing, gratitude and justified anger. Not having one's emotional development blighted by fear and anxiety. (Supporting this capability means supporting forms of human association that can be shown to be crucial in their development.)

F. Practical Reason: Being able to form a conception of the good and to engage in critical reflection about the planning of one's own life. (This entails protection for the liberty of conscience and religious observance.)

G. Affiliation: A. Being able to live with and toward others, to recognize and show concern for other human beings, to engage in various forms of social interaction; to be able to imagine the situation of another. (Protecting this capability means protecting institutions that constitute and nourish such forms of affiliation, and also protecting the freedom of assembly and political speech.) B. Having the social bases of self-respect and non-humiliation; being able to be treated as a dignified being whose worth is equal to that of others. This entails provisions of non-discrimination on the basis of race, sex, sexual orientation, ethnicity, caste, religion, and national origin.

H. Other Species: Being able to live with concern for and in relation to animals, plants and the world of nature.

I. Play: Being able to laugh, play, to enjoy recreational activities.

J. Control over One's Environment:

A. Political Being to participate effectively in political choices that govern one's life; having the right political participation, protection of free speech and association.

B. Material. Being able to hold property (both land and movable goods), and having property rights on an equal basis with others; having the right to seek employment on an equal basis with others, having the freedom from unwarranted search and seizure. In work, being able to work as a human being, exercising practical reason and entering into meaningful relationships of mutual recognition with other workers.

Key to Controls

Socio-Demographics

MMALE	Gender (1=female, 0=male)
MAGE	Age (in years)
MAGE2	Age ²
MGHI	What is your gross household income?
MRSOUTH	South of England excluding London
MRMIDWLS	Midlands and Wales
MRNORTH	North of England
MRSCOT	Scotland

Ten Item Personality Inventory

PXTRAVRT	I see myself as extraverted, enthusiastic.
PAGREEBL	I see myself as reserved quiet, I see myself as critical quarrelsome,
PCONSCS	I see myself as sympathetic, warm, I see myself as dependable, self-disciplined,
PSTABLE	I see myself as disorganised, careless, I see myself as anxious, easily upset,
POPEN	I see myself as calm, emotionally stable, I see myself as open to new experience, complex, I see myself as conventional, uncreative

Comparison with BHPS Results

	This Survey		BHPS (Wave 10)		p value (of pairwise t test)
	Mean	Std Dev	Mean	Std Dev	
BNOURISH	0.97	0.17	0.98	0.14	0.06
DQUAL	0.60	0.49	0.47	0.49	0.27
ENOSLEEP	2.06	0.86	1.90	0.78	0.19
ESTRAIN	2.31	0.88	2.13	0.78	0.20
GHOLIDAY	0.79	0.40	0.83	0.37	0.10
GMEAL	0.63	0.48	0.94	0.23	0.65
GWORTH	1.72	0.90	1.44	0.69	0.31
MAGE	44.13	15.08	43.59	15.64	0.04
MMALE	0.45	0.50	0.47	0.50	0.04

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