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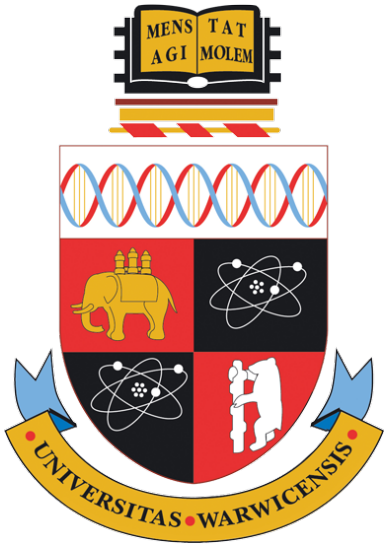

Essays on the Economics of Subjective Well-Being

by

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Declarations

The research reported in this thesis is my own work unless otherwise stated. No part of this thesis has been submitted for a degree at another institution. Chapters 2 and 5 were written in collaboration with Gordon Brown and John Gathergood. Chapter 3 was written in collaboration with Gordon Brown. Chapter 4 was written in collaboration with Gordon Brown and Colin Angus. This research was funded by the Economic and Social Research Council.

Sidney Sherborne

Abstract

This thesis uses data from national surveys to investigate how personal economic outcomes and health behaviours influence subjective well-being (SWB).

Chapter 2 investigates how different dimensions of SWB are related to net wealth, total assets and debts, and individual forms of asset and debt. Among other things, it shows that current account balances have a disproportionately large positive effect on evaluative, experienced and eudaimonic SWB compared to savings account balances and many other asset types.

Chapter 3 examines whether different types of SWB are influenced by income rank, absolute income or both while controlling for individual life trajectories. It finds income rank improves several measures of global and domain-specific evaluative SWB. Absolute income, in addition to rank of income, is found to influence some measures of SWB, though inconsistently. Neither income measure predicts experienced SWB or mental functioning.

Chapter 4 highlights the association between alcohol consumption and SWB. Frequent binge drinking, high intensities of consumption and risk of alcohol dependency are associated with worsened psychological distress and mental functioning; risk of dependency is also associated with lower life satisfaction. In comparison to life satisfaction, mental functioning and psychological distress are associated with more alcohol consumption behaviours.

Chapter 5 provides evidence of an interaction effect between consumption and non-working time, indicating these are complementary goods. Longer working hours are associated with lower life satisfaction for all but those with the highest levels of consumption. Non-working hours are a better predictor of life satisfaction than leisure hours.

Taken together these results show different measures of SWB can have different relationships with economic outcomes and behaviours.

Acronyms

AIC Akaike Information Criterion.

AUDIT-C Alcohol Use Disorders Identification Test.

BIC Bayesian Information Criterion.

DSM Diagnostic and Statistical Manual of Mental Disorders.

FE Fixed Effects.

FEIS Fixed Effects Individual Slopes.

GHQ Genereal Health Questionnaire.

GSOEP German Socio-Economic Panel.

HILDA Household, Income and Labour Dynamics in Australia.

Kessler-6 Kessler Psychological Distress Scale.

LSA Life Satisfaction Approach.

MCS-12 12-Item Short Form Health Survey (Mental Component Summary).

ONS Office for National Statistics.

PSID Panel Study of Income Dynamics.

SWB Subjective Well-Being.

SWEMWBS Warwick-Edinburgh Mental Well-Being Scale (Short).

USS Understanding Society Survey.

WAS Wealth and Assets Survey.

Chapter 1

Introduction

Well-being, or prudential value, is that which is good for a person (Tiberius, 2015). It is that with which a rational agent is largely (or only) concerned, and that which other benevolent parties have reason to promote (Scanlon, 1986). A person's well-being can be assessed from their own perspective, i.e., subjectively, or assessed according to objective criteria (Haybron, 2008b). Subjective indicators of well-being are increasingly a target for public policy (Stiglitz et al., 2009) and are used to complement objective measures such as Gross Domestic Product, literacy and poverty in assessing the performance of countries and governments, with several governments making explicit commitments to improve societal subjective well-being (Musikanski, 2013). Consequently, *subjective well-being* (SWB) measures are now commonplace in regular surveys of national populations (e.g., the ONS-4 in the UK; Dolan and Metcalfe, 2012). Through empirical analysis of these surveys, this thesis attempts to add to our knowledge of what contributes to subjective well-being. Each chapter investigates how an aspect of an individual's objective circumstances, such as their level of income, consumption or leisure, influences their subjective well-being. Each analysis uses as many SWB measures as is practicable, thereby representing SWB as being composed of multiple, irreducible components as much as is feasible (Mitchell and Alexandrova, 2021). Where possible, multiple datasets are used.

1.1 The Philosophy of Well-Being

There are many different accounts of what it is that is actually *good for* a person, and these accounts generally fall into three classes: mental state accounts, preference satisfaction accounts and objective-list accounts (Parfit, 1986). Each of these accounts captures an important aspect of well-being. However, serious objections arise when they are asserted as exhaustive accounts of that which is good for people. This section briefly discusses each of these classes and concludes that subjective well-being is a necessary component of well-being.

For mental state accounts what is good for a person is the presence of positive mental states and the absence of negative mental states. Hedonism is one such account. It contends well-being is the presence of pleasure and the absence of pain. Other mental state accounts contend that well-being consists in the moods, emotions and other affective states a person experiences (Haybron, 2016). The strength of mental state accounts lies in the intuition that some mental states are intrinsically good and others intrinsically bad. It seems fair to say that a life with more pleasure and less pain is going better than another, holding all else equal. Problems arise, however, if mental states are held to be the sole standard by which well-being is evaluated.

Robert Nozick's (1974, 646) experience machine thought experiment asks us to consider two people with identical mental states, one plugged into a machine which stimulates their brain, and the other living a conventional life. If mental states are all that is good for people then the well-being of these two people is equivalent and their lives are equally valuable and equally desirable. Experimental evidence indicates that a majority of participants (71%) would not willingly plug themselves into a machine that induced a perfect mental state (Hindriks and Douven, 2017).

For preference satisfaction accounts, what is good for a person is the satisfaction of their preferences. Since the experience machine can only simulate the sensation of preferences being satisfied, not actually cause them to be satisfied in the real world, plugging oneself into it would not yield greater well-being. However, the preference satisfaction account is also subject to significant objections. Firstly, if a preference is satisfied without you being aware it has been satisfied, how can represent an improvement in your well-being? (Taylor, 2012, 21). Secondly, what if you experience a pleasant surprise? You can enjoy listening to a genre of music for the first time without having previously desired to do so (Sumner, 1999). Both of these cases suggest that mental states are also relevant to well-being. Thirdly, there are cases where the satisfaction of a preference doesn't seem to go well for a person (Taylor, 2012, 30). For example, a person might prefer to be be harmed or killed and it seems absurd to suggest that this would improve their well-being (Baber, 2010). A common response to this objection is to argue that well-being consists only in the satisfaction of preferences under 'ideal conditions', i.e., preferences formed after careful reflection and in possession of all the relevant information (Harsanyi, 1977).

Even when preferences are laundered in this way, objections remain. John Rawls' grass-counter thought experiment asks us to imagine a skilled mathematician who has an extremely strong preference for counting blades of grass (Rawls, 1971, 432). Additionally, we can imagine that he is fully aware of the other activities he could be doing. Nonetheless he spends his life counting grass, thereby satisfying his preference to do so, and, under the satisfaction

account, yielding the highest level of well-being possible. For some, it seems intuitively wrong that well-being be identified with the satisfaction of such an absurd and worthless desire. Instead, he would be better off engaging in more objectively worthwhile activities, such as making use of his mathematical skills (Griffin, 1988, 39). However, even if the grass-counter's life is absurd and worthless compared to that of conventional human lives, it is not obvious why what is generally or usually good for humans should take precedence over what the grass-counter thinks is good for him (Taylor, 2012, 45).

Objections to the prudential value of the life of the grass-counter rely on asserting that there are objective features of human life that are good for all people. Unlike the previous two accounts, objective-list accounts do not necessarily respect the perspective of individuals and can be insensitive to their idiosyncratic pleasures, pains or preferences. For example, we might contend that knowledge, achievement and virtue are good for people irrespective of the mental states they cause or the preferences they satisfy (Hurka, 2016). They a good for a person even they induce negative mental states and even if the person actively does not want them (Fletcher, 2015).

Objective-list theories of well-being can be derived in various ways. For example, they can be based on theological accounts (Kader, 2021), accounts of the essential nature of human beings (Hurka, 1999), or from arguments that certain things are simply evidently good (Finnis, 2011, 85-6). An example of an objective-list is given by Murphy (2001):

> Life, knowledge, aesthetic experience, excellence in play and work, excellence in agency, inner peace, friendship and community, religion, and happiness.

Some objective-list accounts are not susceptible to the experience machine objection because at least some of their contents refer to features of the real world. Neither are they susceptible to the grass-counter objection, because such behaviour could reflect a failure to meet some objective standard. For example, it could be argued that something has gone wrong with the grass-counter's human development, or alternatively, that the grass-counter is lacking in virtue. To rectify this, human development or virtue could be included in an objective list (Taylor, 2012, 44). In the case of the given example list, the grass-counter could not achieve excellence in his mathematical work if all his time was spent counting grass.

However, objective-list accounts are not without their own objections. Assertions of what is good for all people can seem elitist or paternalistic, but this is not necessarily so. Firstly, autonomy could be included in the list (Crisp, 2021). Secondly, the list could consist of people's capability to do things which they could then choose not to do (Nussbaum, 2012). Or thirdly, it could be

accompanied with a stringent commitment against paternalistic interference (Fletcher, 2015). Even if such accommodations are not made, it must be acknowledged that an objective list theory could be true despite being elitist or paternalistic (Crisp, 2021).

A more serious objection to objective list-theories is that of alienation. Objective-list theories risk alienating people when they are insufficiently sensitive to people's mental states and preferences. To illustrate this Fletcher (2015) asks us to imagine a list consisting of one item: knowledge. Under this account, a person who had a lot of knowledge yet was not interested in it, would have a high-level of well-being despite the lack of joy or satisfaction it brought them. Any account of well-being that results in alienation in this way seems to have failed to capture the full extent of what is good for humans (though see Duncan, 2014 for a critique of this 'conversation-stopping' argument). To avoid alienation, objective-list theories must include elements from mental state and preference satisfaction accounts.

A substantive part of person's well-being must therefore depend on that person's own perspective, both of the mental states they experience, and the satisfaction of their preferences (Haybron, 2008b). Well-being thus has *subjective* components. It is these subjective components that are the subject of investigation for this thesis.

1.2 Definitions of Well-Being

The definition of well-being varies between academic disciplines. This section discusses how well-being is defined first in psychiatry, secondly in psychology and finally in economics. Additionally, it details the specific role of subjective well-being in these definitions, as well as how these disciplines study and utilise subjective well-being.

1.2.1 In Psychiatry

Psychiatrists diagnose disorders by observing clusters of symptoms in their patients; they then use treatments to try and relieve these symptoms and thereby cure the disorder. Well-being, as far as traditional psychiatry is concerned, is the absence of disorder. What exactly this means depends on how disorder is defined. Operational criteria which define mental disorders are detailed in manuals such as the Diagnostic and Statistical Manual of Mental Disorders (DSM). The DSM defines a mental disorder as:

> [A] syndrome characterized by clinically significant disturbance in an individual's cognition, emotion regulation, or behavior that

> reflects a dysfunction in the psychological, biological, or developmental processes underlying mental functioning. Mental disorders are usually associated with significant distress or disability in social, occupational, or other important activities. An expectable or culturally approved response to a common stressor or loss, such as the death of a loved one, is not a mental disorder. Socially deviant behavior (e.g., political, religious, or sexual) and conflicts that are primarily between the individual and society are not mental disorders unless the deviance or conflict results from a dysfunction in the individual, as described above. (American Psychiatric Association, 2013, 20).

The basis of the psychiatric conception of disorder, and therefore the basis of its conception of well-being, is disturbance in normal functioning. Though not explicitly defined in the DSM, a symptom is taken to be a particular expression of disturbed functioning. Symptoms are subjectively experienced and reported by the patient, or they are observed in the patient by the psychiatrist. The psychiatrist then compares these symptoms to diagnostic criteria to establish whether a disorder is present. As an illustrative example, the DSM stipulates six diagnostic criteria for an adult diagnosis of generalised anxiety disorder (American Psychiatric Association, 2013, 222). These criteria either require 1) the presence of a particular symptom; 2) that a symptom is sufficiently severe; 3) that the symptoms cannot be attributed to consumption of a substance or an alternative medical condition; or 4) that the symptoms cannot be better explained by another mental disorder. Diagnostic criteria are designed to be as objective as possible in order to minimise the influence of psychiatrists' own value assumptions in the determination of others' well-being (Wood and Davidson, 2020).

Despite the goal of objectivity, the presence of symptoms alone is not sufficient for a diagnosis. Psychiatrists have to distinguish between someone who exhibits a symptom but is otherwise healthy, such as a person with depression who has recently been bereaved, and someone for whom the depression is indicative of a disorder which ought to be treated. Besides this, many of the DSM's criteria depend on subjective evaluation by psychiatrists and comparison of the patient to societal norms (Fulford et al., 2005). A truly value-free DSM is unfeasible and so where value judgements are made they reflect the current consensus on the relative importance of autonomy, dignity and functioning (Sisti et al., 2013). The legitimacy of this consensus depends on whether it was reached in the right way (Powell and Scarffe, 2019) and by the right people (Carel, 2019) but ultimately a consensus, even if imperfect, is pragmatically and morally necessary for treatment of people who are suffering.

Wood and Davidson (2020) argue that because value judgements are inevitable in the definition of disorder, it would be appropriate to extend the psychiatric concept of well-being to also include positive individual functioning, despite the additional value judgements this would necessarily involve. Such a change would ethically oblige psychiatrists to, in addition to treating disorders as traditionally defined, increase the presence of positive psychological states of their patients, establish positive psychological traits and create positive environmental conditions (Jeste et al., 2015). Supporting this idea is evidence that positive functioning has a protective effect against mental distress (van Steenbergen et al., 2021), can drive desirable changes in behaviour (Shiota et al., 2021), and can aid recovery from mental disorders (Garland et al., 2010). However, some psychiatrists argue that blurring of the boundary between mental illness and mental health risks damaging the well-being of those with severe mental disorders (Craddock et al., 2008). Others think that changing the medical conception of well-being to incorporate positive functioning would morally oblige psychiatric professionals to intervene to correct any deviations from human perfection (Misselbrook, 2014). Further, it is not clear that reaching a consensus on the nature of positive functioning is feasible (Stein, 2012) given that what is considered 'good' is culturally-bound (Frawley, 2015), is influenced by the prevailing political and economic system (McDonald and O'Callaghan, 2008), and ultimately varies from person to person (Haybron and Tiberius, 2015). A further complication is that sub-clinical negative emotional states, such as sadness, are beneficial to certain types of positive functioning (Forgas, 2013). A more fundamental problem is that some forms of positive functioning can have negative consequences (Diener et al., 1991; Oishi et al., 2007). A pragmatic compromise between the traditional and positive perspectives may be to retain psychiatry's conception of well-being as lack of disorder, but acknowledge that the promotion of a type of positive functioning is justified if it has been empirically shown to heal and protect from disorder.

Another criticism of the concept of disorder, and thereby the psychiatric definition of well-being, is that it does not adequately reflect the well-being of the patient as it is conceived of by the patient, and thereby does not respect the patient's autonomy (Roache and Savulescu, 2018). Indeed a patient may exhibit the diagnostic criteria of a disorder but argue that from their subjective perspective no disorder is present. Katschnig and Krautgartner (2002) argue that it is necessary to incorporate the patient's subjective well-being when considering a diagnosis but that subjective well-being alone is not sufficient to establish or rule-out disorder. Firstly, patients who have had psychiatric disorders for long periods of time can adapt to their condition and report that they are satisfied with their lives. Secondly, subjective assessments made by people with mental disorders can be distorted by three psychopathological

fallacies (Katschnig, 1997). The affective fallacy occurs when subjective assessments are influenced by a person's current affective state. For example, a depressed patient may be unduly negative, while a manic patient may be unduly positive. Relying solely on subjective well-being could therefore obscure the presence of such disorders. Reality distortion fallacies occur when patients suffering from delusions or hallucinations make subjective assessments, and cognitive fallacies occur when patients are asked to make subjective assessments despite being intellectually unable to do so. Consequently, situations may arise where the assessment of a psychiatrist conflicts with the subjective well-being of the patient. Determining whether the patient's assessment is the product of a rational mind risks paternalism, which must be carefully weighed against other ethical concerns (Breeze, 1998). Despite these issues, empirical evidence has established that subjective measures of well-being have a legitimate role to play in screening patients for assessment (Ried et al., 2006), assessing the progress of psychiatric patients (Vothknecht et al., 2011), as well as increasing compliance with treatment and improving treatment outcomes (de Millas et al., 2006).

1.2.2 In Psychology

Historically, psychology has assumed a similar conception of well-being to psychiatry: well-being was assumed to consist of the absence of negative functioning. Though the goal of studying positive functioning in psychology dates back to 1902 (James, 1902; Joseph and Wood, 2010), until the 1950s there was little discussion within psychology of what actually constitutes well-being (Fromm, 1959). Maslow (1954) summarises this state of affairs:

> The science of psychology has been far more successful on the negative than on the positive side; it has revealed to us much about man's shortcomings, his illnesses, his sins, but little about his potentialities, his virtues, his achievable aspirations, or his full psychological height. It is as if psychology had voluntarily restricted itself to only half its rightful jurisdiction, and that the darker, meaner half.

Positive measures of subjective well-being, such as happiness and pleasure, had long since been discussed by psychologists and philosophers (McMahon, 2004), but it was not until the late 1920s that quantitative subjective well-being data began being collected and statistically examined by psychologists (see Wilson, 1967, for a review of this early literature). A substantial growth in the study of subjective well-being began in 1990 (Kullenberg and Nelhans, 2015) which some have labelled the "happiness turn" (Ahmed, 2007). This

coincided with the establishment of the positive psychology "movement" by Seligman and Csikszentmihalyi (2000) who called for psychology to address the field's unbalanced approach to well-being as previously identified by Maslow. They distinguished between two levels of personal well-being. Firstly, the presence of positive functioning at the subjective level, giving examples of contentment, satisfaction, hope, optimism, flow and happiness (i.e. subjective well-being). Secondly, positive functioning at the individual level, giving the examples: capacity for love and vocation, courage, interpersonal skill, aesthetic sensibility, perseverance, forgiveness, originality, future mindedness, spirituality, high talent and wisdom (i.e. positive individual-level traits). The stated goal of this movement is to promote the scientific investigation of positive functioning and find ways of instilling it in people, with the goal of helping individuals and groups to flourish (Seligman and Csikszentmihalyi, 2000). Since then, positive psychology's concept of well-being has influenced many other fields beyond psychology (Rusk and Waters, 2013).

A second wave of positive psychology reconsidered its conceptualisation of well-being (Wong, 2011). It argues that both negative and positive functioning are required for flourishing. Indeed, there are downsides to forms of positive functioning (Forgas, 2014) and upsides to forms of negative functioning (Forgas, 2013). Second-wave positive psychology does not conceive positive and negative functioning to be opposing but instead have the potential to play complementary roles in the finding of meaning and the achieving of self-transcendence (Wong, 2016).

Other branches of psychology also use measures of SWB. Responses to SWB can provide insight into important mental processes (Diener et al., 2018). In this thesis, Chapter 2 investigates how different types of income relate to SWB and Chapter 3 investigates whether level of income or rank of income (or both) relate to SWB. The conclusions of these studies are relevant not just to those who aim to improve individual or societal well-being, but also to those concerned with the mental processes by which we appreciate, understand and value money.

1.2.2.1 Individual-Level Well-Being

The key idea underlying individual well-being is that which makes a person's life go well is not merely the subjective states that they experience, but the possession of human virtues and other objective conditions required for flourishing. The possession of these things constitutes well-being regardless of the positive mental states or satisfaction they bring about (Hurka, 2016). Theories of individual well-being, therefore, are objective-list accounts of well-being. What the conditions of optimal well-being are varies greatly depending on philosophical

viewpoint (Fletcher, 2015) and this has given rise to multiple operationalisations of individual well-being. The most prominent operationalisation of individual well-being, named Psychological Well-Being, is the product of a theoretical survey of the psychological components of well-being. The survey identified the essential features of well-being as having purpose in life, autonomy, environmental mastery, positive relationships and achieving personal growth (Ryff, 1989; Ryff and Keyes, 1995; Ryff, 2014). In a later survey of operationalisations of individual well-being, Hone et al. (2014) find that the majority agree upon the following criteria: positive relationships, engagement, purpose/meaning, self-esteem/self-acceptance and competence/accomplishment. Other factors identified are: optimism; social contribution, integration, growth, acceptance and coherence; emotional stability; vitality and resilience. Despite ostensibly aiming to measure the same idea of well-being, the authors find that there is significant variation in the quantity of well-being individuals are determined to have when assessed by these different operationalisations.

Spirituality and religiousness are less frequently considered elements of individual well-being, despite their importance to a large proportion of the world's population (VanderWeele et al., 2020).

1.2.2.2 Subjective Well-Being

A person's subjective well-being depends only on their experiences and their subjective assessment of them; SWB, therefore, does not necessarily reflect the presence of good well-being according to some objective measure such as being in good health or being virtuous (Diener, 1984). Three broad categories of SWB measure exist: of evaluative well-being, of experienced well-being and of 'eudaimonic' well-being (Dolan and Metcalfe, 2012). *Evaluative SWB* measures concern participants' reflective evaluations of their life as a whole (or specific domains of it, e.g., finances, work and relationships). This reflects accounts of well-being as preference satisfaction. *Experienced SWB* measures ask participants to report the presence and intensity of certain mental states they experienced, such as happiness or sadness, at a given time. This reflects mental state accounts of well-being. *'Eudaimonic' SWB* measures ask participants to assess their possession of individual traits and functionings, and whether particular psychological needs are being satisfied, examples of these are meaning, autonomy, control and connectedness. This latter category contains items which also fall under individual-level well-being. However, Dolan and Metcalfe (2012) argue that empirical data for this sort of well-being are essentially measures of SWB if they are measured by asking for a person's own subjective assessment of an aspect of their individual-level well-being. Dolan and Kudrna (2016) argue that 'eudaimonic' SWB measures collapse

into either evaluative or experiential SWB depending on the wording of the measurement used (How meaningful is your life? How meaningful did life feel yesterday?). Nonetheless, this three-category schema has been used to inform the design of surveys which are used throughout this thesis (Dolan and Metcalfe, 2012), is useful for distinguishing categories of SWB that are based on different formulations of personal well-being (Keyes et al., 2002), and for helping to disentangle elements of well-being that have different causes and effects (Trudel-Fitzgerald et al., 2019).

The UK Office for National Statistics (2018) assesses SWB using four measures which capture these distinct domains of SWB. *Life satisfaction*, measured by the question "Overall, how satisfied are you with your life nowadays?", represents evaluative well-being. It aims to elicit an individual's summary assessment of all the aspects of their life. *Worthwhile activities*, measured by, "Overall, to what extent do you feel that the things you do in your life are worthwhile?", represents eudaimonic well-being. It aims to assess the meaning and purpose felt by an individual. *Happiness*, measured by, "Overall, how happy did you feel yesterday?", represents the positive dimension of experienced well-being. *Anxiety*, measured by "Overall, how anxious did you feel yesterday?", represents the negative dimension of experienced well-being. These latter two measures aim to assess the feelings experienced by an individual. Collectively these measures are known as the ONS-4 and have been recommended for use in public policy because they provide a simple way of assessing all the categories of SWB (Dolan and Metcalfe, 2012).

Life satisfaction can also be assessed using multiple items, such as the Satisfaction with Life Scale (Diener et al., 1985), though single item measures perform relatively well (Cheung and Lucas, 2014). The Cantril Self-Anchoring Striving Scale (or Cantril Ladder) is a common alternative measure of evaluative SWB. It presents participants with a picture of a ladder, with the top representing the best possible life for them and the bottom representing the worst possible life for them, and asks them at which rung of the ladder they feel they currently stand (Cantril, 1965). Evaluative SWB also includes satisfaction with domains of life, such as satisfaction with income, with health or with work-life balance. Domain-specific evaluations allow for the assessment of a person's life in a narrower context, and allow for the discovery of relationships that are not detectable at the level of satisfaction with life overall.

Happiness is but one measure of positive experienced SWB, and other positive feelings, such as joy, excitement and engagement can also be assessed. Likewise, negative feelings such as sadness, depression and despair can be measured in addition to anxiety. When these negative mental states are measured in surveys or experiments they represent lay understandings of these feelings, as opposed to professional assessments of symptoms and disorders

that are made by psychiatrists. Another important type of experienced SWB is tranquillity. This type of affect does not fit neatly into the categories of positive or negative, and so has been subject to less research (Haybron, 2005; Siddaway et al., 2018). Evaluative well-being has been demonstrated not to be equivalent to the summation of experienced well-being over time (Kahneman et al., 1997), showing that the well-being reported for a given experience can vary according to the type of measure used (Clark, 2016). Detailed information on experienced well-being can be elicited using the Ecological Momentary Assessment, which assesses SWB at multiple points in a day (Shiffman et al., 2008), and by the Day Reconstruction Method, which asks participants about events and associated feelings of the previous day (Kahneman et al., 2004). Affect can also be assessed by multi-item scales, such as the Positive and Negative Affect Schedule (Watson et al., 1988) and the Center for Epidemiologic Studies-Depression Scale (Radloff, 1977).

High levels of SWB have been linked to good objective well-being outcomes. SWB gains for an individual have positive indirect effects on the SWB of others in the same family (Chopik and O'Brien, 2017; Chi et al., 2019) and social network (Fowler and Christakis, 2008; Knight and Gunatilaka, 2017). Higher SWB has been linked to numerous objective measures of well-being, both via behavioural and biological pathways (Boehm, 2018; Ryff and Boylan, 2016). At the biological level, better SWB is associated with the promotion of restorative processes (e.g., Boehm et al., 2013) but also the attenuation of deteriorative processes (e.g., Zilioli et al., 2015b). Evidence of this is reflected by those with higher SWB having stronger immune systems (Barak, 2006), longer life expectancy (Kageyama, 2012) and lower mortality (Chida and Steptoe, 2008). More generally, SWB has been found to buffer against the harmful effects of poor socio-economic circumstances on health outcomes (Morozink et al., 2010; Zilioli et al., 2015a). Higher SWB is also associated with higher quality social relationships (Diener and Seligman, 2002), career success (Walsh et al., 2018) and a multitude of other positive behaviours and personal outcomes (Lyubomirsky et al., 2005; Luhmann et al., 2012).

1.2.2.3 Hybrid Theories

Several scales commonly used to measure well-being assume that it has a hybrid nature reflecting both individual-level and subjective well-being. Martin Seligman's 'PERMA' theory of well-being incorporates both subjective and individual-level well-being measures (Seligman, 2011, 16-20). It consists of positive emotions, engagement, relationships, meaning and accomplishment (PERMA), though it does not claim to be an exhaustive list (Seligman, 2018). For Seligman, well-being does not merely depend on subjective states or on

objective conditions, but holds both to be essential elements (Seligman, 2011, 25). PERMA is therefore an objective-list theory of well-being but is able to escape the alienation objection due to its inclusion of positive emotions (within which Seligman includes experienced and evaluative SWB) (Seligman, 2011, 16). Similarly, Warwick-Edinburgh Mental Well-being Scale covers both the eudaimonic and positive experienced categories of SWB (Tennant et al., 2007). The General Health Questionnaire-12 covers both the eudaimonic and positive and negative experienced SWB categories (Hu et al., 2007). The Health Survey Short Form-12 Mental Component Summary reflects eudaimonic well-being and both positive and negative experienced SWB (Jenkinson and Layte, 1997). The Kessler-6 Scale reflects eudaimonic and negative experienced SWB (Kessler et al., 2002). Others have argued that the inclusion of non-psychological properties such as physical health ought to be included in hybrid definitions of well-being (VanderWeele, 2017; VanderWeele et al., 2020).

1.2.2.4 The Structure of Well-Being

A key question in the study of well-being is whether its positive and negative aspects are on the same continuum or if they are two distinct continua. Some conceptualise positive and negative well-being as being on the same axis (Huppert, 2009b). This theory is supported by some statistical analyses (Zhao and Tay, 2022; Wood et al., 2010; Siddaway et al., 2017; Russell and Carroll, 1999). Nonetheless, others take the opposite view (Keyes, 2002, 2005). An implication of the two-continua view is that it is possible to have elements of both high positive well-being and high negative well-being simultaneously, a state which seems to be more common in holistic cultures (Bagozzi et al., 1999; Miyamoto and Ryff, 2010; Sims et al., 2015). Allowing for two continua has the practical benefit of allowing people with perfect scores on measures of negative affect to be distinguished from one another (Veit and Ware, 1983). Supporting this argument is evidence suggesting that positive and negative SWB are associated with the activation of different areas of the brain (Urry et al., 2004), and that positive and negative SWB have statistically significant differences in their relationships with several biomarkers, such as cortisol, norepinephrine, dehydroepiandrosterone sulfate levels, waist-hip ratio, systolic blood pressure, total/HDL cholesterol and inflammation (Ryff et al., 2006; Miller et al., 2016; Ong et al., 2018; Slavish et al., 2020). Meta-analytic evidence also indicates that positive and negative affect exist on distinct but correlated continua (Wedderhoff et al., 2021). Technological advancements are associated with increasing happiness but also increasing stress and anger (Graham and Nikolova, 2013). Finally, higher national income is associated with higher life satisfaction, but also with higher levels of worry and anger (Tay et al., 2014).

The conflicting evidence in this debate may be the result of personal well-being in fact being a single construct. Factor analytic studies have demonstrated that PWB and SWB have a very high latent correlation (Disabato et al., 2016), as do PERMA and SWB (Goodman et al., 2017), indicating negligible discriminant validity between these operationalisations of well-being. These high correlations could be due to common method variance, causal connections between elements or common third factor causes (Seligman, 2018). Another explanation is that well-being has a bifactor structure (Longo et al., 2017). The superior fit of bifactor models has been demonstrated for a wide range of SWB indicators including items reflecting eudaimonic, experienced and social well-being together (Longo et al., 2020; Lamborn et al., 2018; Jovanović, 2015b), eudaimonic, experienced and evaluative well-being together (Lui and Fernando, 2018); evaluative and experienced well-being together (Jovanović, 2015a); eudaimonic and experienced well-being together (Longo et al., 2016; Lang and Bachinger, 2017), and eudaimonic measures separately (Fadda et al., 2017). Though this debate is important to the scientific study of well-being, the outcome of this psychometric debate ultimately does not matter much for psychologists and individuals who are concerned with increasing their own or others' well-being because, as Seligman (2018) notes, the elements of SWB, PWB, and PERMA are worth pursuing for their own sake. This remains true regardless of whether self-reported measures of these things are highly correlated or not.

1.2.2.5 Measurement Pluralism

The wide range of measures used in psychology to assess well-being reflects a high degree of measurement pluralism (Mitchell and Alexandrova, 2021). As a consequence, surveys now collect data on a wide range of SWB and other well-being measures.

A significant downside of measurement pluralism is that the range of measures and underlying accounts of SWB can lead to certain words being used to refer to various different, though similar, conceptions of SWB. This has the potential to lead to significant confusion. For example, "happiness" is frequently used as a synonym for well-being as a whole; is used to refer to a specific measure of experienced emotion; and has other meanings in lay contexts (Haybron, 2008b) "Flourishing" is used as the name for several specific operationalisations of eudaimonic well-being (Hone et al., 2014; VanderWeele, 2017) and used as a synonym for the category of eudaimonic well-being (Dolan and Metcalfe, 2012). It is therefore important to be careful when conducting research using measures of SWB and to be precise about the measure used (e.g., life satisfaction) rather than using a less specific term (e.g., well-being or

SWB).

1.2.3 In Clinical Psychology

Clinical psychologists provide non-pharmaceutical treatment to patients suffering from mental disorder. Clinical psychologists and psychiatrists have common aims and similar methods and consequently clinical psychology has traditionally followed psychiatry's conception of well-being (Wood and Tarrier, 2010; Joseph and Wood, 2010). In contrast to the medical training required to become a psychiatrist, clinical psychologists must complete a doctoral degree. Possibly as a consequence, clinical psychology's conception of the nature of well-being has more closely followed that in scientific psychology. An explicit aim of the positive psychology movement is to "broaden the focus of clinical psychology" (Duckworth et al., 2005). The stated reason for this is that even the patients with the lowest levels of functioning want more than just relief from their suffering; they want to function well, as defined by high levels of SWB and the development of their individual-level well-being. The resolution of their suffering will not necessarily bring about positive functioning, but positive functioning may help bring resolution to their suffering. As discussed earlier, positive functioning is indeed associated with preventing and curing disorder. Some advocates for positive clinical psychology make a stronger claim and argue that, because negative functioning and positive functioning are opposite ends of the same continuum, clinical psychologists are morally obliged to place equal emphasis on the increasing of positive functioning and the decreasing of negative functioning (Huppert, 2009a; Wood et al., 2010; Wood and Tarrier, 2010). However, as previously discussed, positive and negative functioning can have different neural correlates and causal effects, which cast doubt on the single continuum hypothesis. However, there is clear evidence that positive and negative functioning are related, even if they exist on separate continua, allowing for the possibility for positive functioning to be used to prevent and treat clinical disorder.

Extending the definition of well-being in clinical psychology beyond the alleviation of negative functioning is subject to the same critiques as for extending its definition in psychiatry. Even though clinical psychology is not a branch of medicine, clinical psychologists are still morally obliged make the well-being of their clients their overriding concern. As such, issues about defining what positive functioning actually is, whether all types of positive functioning are unequivocally desirable things, and if moving away from a disorder-based account of well-being risks the well-being of the seriously ill, still apply. There have been calls for positive psychology to expand beyond helping those who are suffering into also helping those who, though they are not

suffering, wish to improve their positive functioning (Wood and Tarrier, 2010). This area of practice would not be bound by the same ethical obligations due to its users lacking clinical disorder. In such cases it would therefore be more legitimate to assert, with the consent of the user, a professional conception of well-being which includes positive functioning. However, in the absence of clinical levels of dysfunction it is not clear that this practice could be considered clinical psychology.

Nonetheless low levels of SWB have been shown to be risk factors for psychiatric illness (Wood and Joseph, 2010; Ruini and Ryff, 2016), sub-clinical negative functioning (Raes et al., 2012; Kansky et al., 2016) and disruptive life events (Kaiser and Oswald, 2022). Clinical psychologists are therefore justified in increasing these types of positive functioning in patients at risk of developing psychological disorders, though they must be sensitive to contextual, cultural and backfire effects (Wong and Roy, 2022). As discussed previously, measures of SWB have also been shown to be helpful in the screening of patients, measuring of progress and aiding of recovery. Consequently, several interventions informed by positive psychology have been introduced into clinical psychology. Interventions such as savouring, gratitude, kindness, empathy, optimism, reflection and development of strengths, and reflection and enhancing of meaning have been shown to be effective in improving positive functioning in healthy and sub-clinical populations (Parks and Titova, 2016). Meta-analyses confirm that positive psychology interventions can also increase positive functioning and reduce disorder in clinical samples (Chakhssi et al., 2018).

1.2.4 In Economics

Adam Smith, who many consider to be the father of economics, believed in an objective-list theory of well-being consisting of: self-preservation, procreation, order, happiness (defined as tranquillity and enjoyment), perfection and freedom (Alvey, 1998). He believed that a properly functioning economic system would bring about enough material prosperity to secure these ends, but cautioned that the pursuit of material wealth may not lead to greater happiness (Rasmussen, 2006). Jeremy Bentham, in contrast, following in the hedonic tradition, believed a person's well-being ought to be conceived as the balance of pleasure and pain they experience (Rojas, 2019). A process of "felicific calculus" would calculate the balance of pleasure and pain, or "utility", that would result from an action. Based on this, Bentham established the utilitarian principle that the moral goodness of an action consisted in the maximisation of utility among individuals affected by that action.

William Stanley Jevons extended Jeremy Bentham's account of utilitarian moral decision making to economic decision making (Stark, 1946; Jevons, 1871).

To achieve this, and to apply the mathematical reasoning found in physics to the field of economics, Edgeworth argued human beings must be conceived of as "pleasure machines" (1881, 15) and that pleasure must be measurable in units which a person could use to calculate their own and others' utility (1881, 98). These units would be measured on a theoretical machine he labelled a "hedonimeter" (1881, 101). However, Irving Fisher (1891) noted that, in the absence of such a machine, quantifying pleasure is not possible. He proposed the idea of ordinal scales of preferences which are deduced from the choices people make. The choices and preferences of a person are assumed to reflect his desires. The means by which a person arrived at these preferences were declared not to be the subject of economics. Economics would thereby be a value-free science and unquestioningly consider a person's preferences (Robbins, 1932, 83-4). The economic conception of utility therefore changed from a cardinal scale positioning goods according to the balance of pleasure and pain they produce, to an ordinal scale where goods are simply ranked in order of preference (Hicks and Allen, 1934). Despite the severing of the link to the utilitarian conception of well-being, economics retained the terminology of utilitarianism.

From here on most economists were unconcerned with the psychological aspect of well-being and, if asked to advise on public policy, were forced to rely on the unsubstantiated assumption that well-being was highly associated with the consumption of commodities (Rojas, 2019). A corollary of this is that an increase in income, which increases the range of feasible consumption opportunities, increases well-being. This led to individual and national income being taken as proxies for well-being.

Throughout the following period, doubts were raised about the appropriateness of assuming the connection between income and well-being. The chief architect of Gross Domestic Product, Simon Kuznets, argued that to assume such a connection ignores the well-being costs associated with earning income (Kuznets, 1934). The connection between consumer choice and well-being was also challenged by evidence that people's preferences are not exogenous and stable but that they are instead, at least in part, determined by society and by producers whose interests may conflict with those of consumers (Mishan, 1960; Scitovsky, 1973). In 1974, Richard Easterlin demonstrated, using data from the United States, that happiness isn't related to long-run economic growth (Easterlin, 1974). This result was labelled a paradox because the prevailing assumption within view was that growing income should allow for more choice and thereby increase utility, which was assumed to improve well-being. The discovery of the paradox demonstrated that the utilitarian conception of well-being did not align with what economics had come to take well-being to be.

Following Easterlin's work, Tibor Scitovsky (1976), aiming to explain why comfortably well-off people in rich countries could still be unhappy, reconceptualised the relationship between economics and well-being. He argued that well-being is a product of the balance of comfort (absence of distress) and novelty (the product of new, unexpected, exciting, challenging and interesting experiences). Achieving comfort does not require any special skills, but achieving novelty requires the development of 'life skill' such as knowledge, social skills, imagination and the ability to understand the nature of novelty (Pugno, 2017). The well-being that can be derived from life therefore depends upon the ability of individuals to pursue activities of which it is a by-product. For Scitovsky then, well-being is not the selection of commodities that will maximise utility, but the personal ability to enjoy life (Edwards and Pellé, 2011). Scitovsky thus explains the Easterlin paradox by arguing that advanced economies have placed too much emphasis on ensuring comfort and that this has come at the expense of novelty.

A similar related approach is Amartya Sen's 'capability approach'. (Pugno, 2017). He too conceptualises well-being as depending on the ability of people to use the resources available to them. In contrast, however, Sen is critical of the idea of well-being depending on subjective assessments. This is due to the human capacity for emotions and preferences to adapt to negative circumstances. As a consequence, well-being measured according to the presence of positive emotions or satisfaction of preferences may not capture negative objective features of people's lives which are surely relevant to their well-being (Sen, 1984, 309). Sen defines functioning as the things a person achieves given the commodities and abilities available to them and defines capabilities as the set of all functionings that a person could achieve (Sen, 1985). Commodities are converted to functionings according to personal ability and the social and environmental context (Sen, 1999, 40-1). A person's well-being thereby consists in the set of things that they are capable of achieving (Sen, 1985). This set may or may not include subjective well-being (Sen, 1983). Conceiving of well-being in this way escapes issues of adaptation (Sen, 1985). The capability account also respects individual freedom. A person's well-being is not diminished by a choice that diminishes their subjective or objective well-being, as previously defined, because they had the capability to have chosen otherwise (Sen, 1993). The capabilities approach may be the most valid high-level philosophical view, but it is not clear in practical terms what things determine a person's level of capability, how these things should be weighed against each other (Sugden and Sen, 1986) or how individual and societal levels of functioning could be measured (Pugno, 2014). Furthermore, if a list of capabilities is defined then it necessarily becomes an objective-list theory of well-being, within which SWB must be included in order to avoid alienation (Nussbaum, 2012; Fletcher, 2015).

Since the identification of the Easterlin paradox, the field of economics has shown renewed interest in investigating subjective well-being (see MacKerron, 2012; Nikolova and Graham, 2021). This move has been justified because the richer a country becomes the less appropriate it is to measure its well-being by its income, and therefore it becomes more appropriate to measure well-being directly (Diener and Seligman, 2004). In many economic studies, SWB is taken to be a proxy for well-being, represented by the following general function (Blanchflower and Oswald, 2004):

$$r = h(u(y, z)) + e$$

where r is a self-reported number on a scale of subjective well-being, such as life satisfaction, u is the person's true well-being, h is the reporting function which translates true well-being on to the scale, y is income, z is the set of other factors which influence a person's well-being, and e is an error term.

Empirical evidence has shown that things that z contains differ depending on the measure used and by country and culture (Suh and Choi, 2018). In Western countries, several common outcomes have regularly been found to be related to SWB, specifically: age, gender, ethnicity, personality, education, health, employment, hours worked, marital status, being a parent, among others (Dolan et al., 2008). However, some conditions have been found to have substantively different relationships with evaluative well-being compared to experienced well-being (Haybron, 2008a, 84). Measures within the category of eudaimonic SWB have also been shown to have different causes and effects (Trudel-Fitzgerald et al., 2019).

The error term, e, has been shown to include interviewer characteristics (including the interviewer's level of SWB) (Stefkovics and Sik, 2022), panel conditioning (Wooden and Li, 2014), question order (Deaton and Stone, 2016), method of administration (Dolan and Kavetsos, 2016), time of day (Stone et al., 2006), day of week (Csikszentmihalyi and Hunter, 2003), ease of contact (Heffetz and Rabin, 2013) and presence of third parties (Chadi, 2013b). Cultural understandings of SWB and, possibly, language also influence SWB responses (Veenhoven, 2012). Many of these issues can be limited if within-person changes in SWB are considered, though others must be accepted as unavoidable limitations.

The major limitation of SWB data is the issue, as previously discussed, of adaptation to circumstances. Using SWB measures, degrees of adaptation have been demonstrated in response to objective changes in life conditions such as getting married, having a child (Lindqvist et al., 2020), becoming disabled (Oswald and Powdthavee, 2008) and the death of a spouse (Infurna and Luthar, 2017). Despite these limitations, measures of SWB have demonstrated

considerable external validity. Above and beyond the correlations between SWB and objective measures such as health and physiological outcomes, the validity of measures of SWB has been demonstrated by their superior ability to predict future negative life events compared to a set of common socio-economic variables (Kaiser and Oswald, 2022) and their ability to predict voting patterns better than macroeconomic factors (Ward, 2020). The measure of SWB that best predicts an outcome varies depending on the outcome under consideration (Clark, 2016).

1.2.5 Subjective Well-Being and Public Policy

As discussed, in relatively wealthy countries economic growth does not universally result in increases in SWB (Easterlin, 2001; though see Stevenson and Wolfers, 2008). Consequently there have been calls for progress to be measured, and public policy to be assessed, using subjective measures of well-being in addition to objective measures such as GDP, mortality and literacy (Stiglitz et al., 2009). Several countries have made the increasing of their citizens' SWB one goal of many, but none have yet made it their sole aim. In the United Kingdom, the Office for National Statistics uses the ONS-4 for this purpose, and includes these measures in most of their national surveys (Office for National Statistics, 2018). More recently, there have been calls for the maximisation of societal well-being years (WELLBYs), as measured using satisfaction with life, to be made the goal of government (Frijters et al., 2020). WELLBYs are similar to the quality adjusted life years used to measure changes in health, but WELLBYs are claimed to be a global assessment of well-being, and thus capture the wider effects of policy rather than just its impact on health (De Neve et al., 2020).

Critics of evaluating social welfare in this way have argued that a single measure of SWB cannot capture the full extent of SWB or well-being, does not address issues of adaptation or low expectations and aspirations, and can be easily manipulated for political gain (Frey and Stutzer, 2012). Haybron and Tiberius (2015) argue that using any single measure of SWB to estimate social welfare is an imposition over those who might have a different standard of what is ultimately good for a person. Therefore, even if it were somehow proved that life satisfaction is the correct and exhaustive standard of well-being, it would still not be morally justified to assume that all citizens assent to its use, as this would violate their right to autonomy. The authors conclude by arguing that well-being informed policy should promote citizens' well-being as it is conceived of by those citizens. Consequently, the respecting of individual rights prevents the use of any particular single metric of well-being in the making of policy decisions.

Measures of SWB have also been embraced by economists as alternative means of making cost-benefit decisions due to issues with approaches based on individuals' stated or revealed preferences. Behavioural science shows that choices are not necessarily consistent in the sense required by conventional economic approaches to rationality (Kahneman and Thaler, 2006). Consequently, a person's stated and revealed preferences do not always reflect what is best for them. This is demonstrated by the gap between experienced utility (the psychological states which result from a decision) and decision utility (the degree to which the option determined the choice) (Kahneman and Sugden, 2005). Measures of SWB also provide a method of deriving the implicit willingness to pay (Frey et al., 2010) or shadow price (Plug and van Praag, 1995) of non-market goods from equations predicting SWB. This method involves predicting SWB from income and the non-market good and comparing the resultant regression coefficients. This method has been used to put a monetary cost on life events (Oswald and Powdthavee, 2008), disasters (Jones, 2017), externalities (Luechinger, 2009) and non-pecuniary policies (Kuehnle and Wunder, 2015). Measures of SWB have also been used to provide statistical valuation of human life for legal purposes (Adler, 2013).

1.3 Overview of Key Research Areas

1.3.1 Income and Well-Being

The influence of income on individual SWB is well established (Tan et al., 2020) but there is less consensus about the mechanism through which an individual's income influences their SWB. A significant amount of research has indicated that it is the rank position of a person's income within a comparison group that influences their SWB, and that the absolute value of income has no effect. This has been found for several measures of SWB and objective well-being. Specifically it has been found for life satisfaction (Boyce et al., 2010; Brown et al., 2017); for life evaluation and experienced well-being (Macchia et al., 2020); for satisfaction with influence, achievement and respect (Brown et al., 2008); for depressive symptoms (Hounkpatin et al., 2015); for suicidal thoughts and attempts (Wetherall et al., 2015); for psychological distress (Wood et al., 2012) and for health (Daly et al., 2015). The conclusion drawn from this research is that people care more about the social status derived from their income than its actual value. This would also explain why increases in average income have not resulted in increases in average SWB (Easterlin, 1974).

In contrast, several other investigations find that both income rank and income level influence individuals' SWB, concluding that both status and purchasing power matter. This has been found for evaluative well-being

(Budria, 2012; FitzRoy and Nolan, 2021; Acosta-González and Marcenaro-Gutiérrez, 2022; Lakshmanasamy and Maya, 2020); job satisfaction (Kifle, 2014); wage satisfaction (Brown et al., 2008); economic satisfaction (Clark et al., 2009) and psychological distress (Garratt et al., 2016).

A recent study, which controls for growth (or decline) in social capital over time by modelling individual life trajectories, finds that job satisfaction is related to income level but not to income rank (Collischon and Eberl, 2021). This evidence suggests that the prior conclusion, that social rank influences SWB, could be spurious and a consequence of failing to control for growth in social capital.

The outcome of this debate has significant implications for redistributive taxation and benefit policies. If SWB depends on rank alone, then the quantity of SWB that results from income is constant and no net gain can be achieved by redistributive policies (Layard, 1980). Additionally, the SWB of individuals in receipt of benefits would not change unless their income rank position also changed (FitzRoy and Nolan, 2021). Alternatively, if income level improves SWB, it is possible that policies could improve aggregate SWB by redistributing income from the richest to the poorest. This debate is addressed in Chapter 3.

1.3.2 Wealth and Well-Being

The positive impact of total wealth on evaluative well-being is well established (Senik, 2014; Jantsch and Veenhoven, 2019) and wealth has been shown to be more conducive to evaluative well-being than income (Headey and Wooden, 2004; Headey et al., 2007; Brulé and Suter, 2019). However, less research has been conducted into how the composition of wealth relates to life satisfaction. Prior research has looked at aggregated sums of assets and of debts (e.g., Jantsch and Veenhoven, 2019), or of liquid and of illiquid assets (e.g., Ruberton et al., 2016) but less has looked at more granular stores of wealth of which these are composed. Research that has been done with granular components of wealth found some of them to have significant relationships with SWB, but did not test to see whether the sizes of the effects differed (Headey and Wooden, 2005; Wang et al., 2019). Therefore, no existing research has tested to see whether the nonfungibility of wealth, evidenced by differences in the expenditure (Levin, 1998) and perception of wealth (Assenza et al., 2019), is reflected in statistically different relationships with SWB.

Cross-sectional research using aggregate forms of wealth indicates that the size and direction of the wealth-SWB relationship depends, at least in part, upon the domain of SWB under consideration, with wealth having a stronger relationship with evaluative well-being than with experienced well-being (Jantsch and Veenhoven, 2019). This is a parallel result to those found

for both income (Killingsworth, 2021) and consumption (Tsurumi et al., 2021), which have determined different relationships with different dimensions of SWB, but with the strongest relationships being found for evaluative well-being.

Both of these issues are addressed in Chapter 2.

1.3.3 Consumption and Well-Being

Consumption has been found to be positively related to life satisfaction and, like net wealth, been shown to be more conducive to SWB than income (Brown and Gathergood, 2020). Some types of consumption have a disproportionately large impact on SWB. Expenditure on experiences yields more satisfaction than expenditure on material goods (Gilovich et al., 2015). Experiential consumption also yields more experienced happiness and greater need satisfaction than material consumption (Howell and Hill, 2009). Social consumption has a larger effect on experienced happiness than solitary experiential consumption or material consumption, with no significant differences being found between these two forms of consumption (Caprariello and Reis, 2013). In Western countries, conspicuous consumption yields more evaluative well-being than nonconspicuous consumption (Brown and Gathergood, 2020; Wu, 2020). However, conspicuous consumption has been found to be negatively associated with meaning of life for Chinese students (Zhu et al., 2021). Basic consumption, i.e. not conspicuous and not positional consumption, has a negative relationship with life satisfaction for those in the lowest income quartile (Wu, 2020).

1.3.4 Leisure and Well-Being

The direction of the relationship between leisure time and SWB depends upon the country under investigation. The USA is unique in that longer working hours are associated with greater life satisfaction (Valente and Berry, 2016) while the opposite relationship is found for Europe (Okulicz-Kozaryn, 2010) and Latin America (Valente and Berry, 2016). Explanations for this difference include the Protestant work-ethic (van Hoorn and Maseland, 2013), the belief that hard work gets you ahead (i.e., the American Dream) (Graham, 2017) and viewing non-working time as wasteful (Tonietto et al., 2021). Another explanation is that there are differences in how leisure and labour confer status (Bellezza et al., 2017), though there is evidence indicating that conspicuous leisure confers status both in the USA (Frijters and Leigh, 2008) and other countries (Huang and Shi, 2015).

Some have suggested that the well-being derived from free time depends on level of consumption (and vice-versa) (Linder, 1970). However, few studies investigating the well-being effects of free time or consumption model this complementarity. This issue is addressed in Chapter 5.

1.3.5 Alcohol Consumption and Well-Being

Studies into the immediate effect of drinking alcohol on SWB find that it improves mood (Gorka et al., 2017; Baumberg Geiger and MacKerron, 2016). However, if the consumption is sufficiently high, the effect on subsequent SWB is negative, with heavy alcohol use in the past 24 hours being associated with greater psychological distress (Anderson and Fowers, 2020) and lower levels of positive affect (Polak and Conner, 2012). The results from longitudinal studies which use national survey data to study the net impact of alcohol consumption on SWB are few in number and their results are mixed. Evidence from Russia suggests quantity of consumption has an inverse-u relationship with life satisfaction, and that being in the 3rd or 4th quartile of consumption was associated with lower life satisfaction (Massin and Kopp, 2014). A study using UK data found no evidence of a relationship between life satisfaction and quantity or frequency of consumption, but it did find that having a drinking problem was associated with lower life satisfaction (Baumberg Geiger and MacKerron, 2016). A study using U.S. participants found that being a heavy drinker was associated with higher psychological distress but not with lower life satisfaction or eudaimonic well-being (Anderson and Fowers, 2020). A study using a Japanese sample found that drinking on the previous day is associated with detrimental effects on happiness, positive mood, meaning and purpose in life, and loneliness the following day. No effect was found for stress. There is some consistency in these results in that heavy drinking is found to negatively impact SWB, but less consistency in the measures of SWB for which this effect is found. The relationship between alcohol consumption and SWB is addressed in Chapter 4.

1.4 Limitations of Previous Literature

1.4.1 Use of Single Measures of Well-Being

Much of the prior literature on these topics has used a single measure of SWB. Some of the time this is due to data limitations, though some studies deliberately select a single SWB measure from those available. Others go further and take that measure to be a proxy for utility and thus well-being as a whole (e.g., Baumberg Geiger and MacKerron, 2016). Emotional states, evaluative well-being, meaning and broader quality of life are distinct phenomena and are each deserving of investigation (Mitchell and Alexandrova, 2021). Therefore, a single measure cannot adequately represent all the categories of SWB, nor can it be an adeqaute proxy for well-being itself.

There are two pragmatic reasons why a single measure of SWB might be used. Firstly, it might be the only measure of SWB available in the dataset.

Secondly, it makes analysis, interpretation and presentation of results simpler. Current recommendations for research are that if only a single measure of SWB can be used then it should be satisfaction with life (VanderWeele et al., 2020). There are several reasons for this. Life satisfaction is holistic, ranging over the whole of a person's life (Haybron, 2008b). Perhaps unsurprisingly, it is also favoured due to its significant correlations with other domains of SWB (Cheung and Lucas, 2014). Life satisfaction is also democratic, firstly because it permits individuals to assess their lives as they see fit and thus respects individual sovereignty (Haybron, 2008b), and secondly because it is the measure of SWB favoured by participants (Oman, 2016). Life satisfaction already features in many national surveys and so its use allows for comparison across datasets and cultures (VanderWeele et al., 2020) and a single item measure performs well compared to multi-item measures (Cheung and Lucas, 2014).

A significant disadvantage of life satisfaction is that it may have a bias towards an economic frame (White, 2016). For example, income more strongly predicts life satisfaction than measures of experienced well-being (Kahneman and Deaton, 2010; Killingsworth, 2021), as does consumption (Tsurumi et al., 2021) and wealth (Jantsch and Veenhoven, 2019). These results are examples of *cognitive-affective divergence* (Haybron, 2008a, 84).

As a consequence, investigations into economic measures and SWB ought to use measures representing several domains of SWB, as taking life satisfaction as a suitable representation for the whole of SWB will likely lead to unrepresentative conclusions. Failure to do so could result in policy outcomes biased towards economic outcomes at the expense of other concerns. For the same reason, the use of hybrid scales, i.e. those based on several domains of SWB, may obscure the fact that an apparent causal factor only relates to a single domain (Haybron, 2008a, 99-100).

1.4.2 Use of a Single Dataset

Many studies make use of data from a single national survey. This practice leaves open the possibility that the result and conclusions derived from it are a consequence of cultural, demographic or methodological idiosyncrasies. Where possible, multiple datasets should be used to test a hypothesis (e.g., Cheng et al., 2017).

1.5 Contribution and Main Findings

1.5.1 Accounting for Well-Being: The Disproportionate Benefits of Liquid Assets

Chapter 2 examines the relationships between forms of wealth and the ONS-4 and asks whether the composition of wealth matters for SWB. Traditional economic theory assumes the fungibility of money, i.e. that money is perfectly interchangeable, regardless of how it is stored or its intended usage. However, stores of wealth have different objective features, and behavioural biases such as mental accounting, loss aversion and psychological ownership could lead to differences in the relationships between different types of wealth and different dimensions of SWB.

Prior investigations which have examined the wealth-SWB relationship have been limited by their use of a narrow range of SWB and wealth measures. This chapter contributes to the existing literature by using granular components of assets and debts, and by using several measures of SWB, each of which represents a different category of SWB. In particular, this chapter extends the research of Ruberton et al. (2016) into the relationship between liquid wealth and SWB in several ways: firstly, by separating liquid wealth into current account and saving account assets; secondly, by looking at categories of SWB other than evaluative SWB; thirdly, by using longitudinal data, which allows for unobserved heterogeneity to be controlled for and thereby eliminating a potential confounding factor. A novel contribution made by this chapter is the testing of equality of regression coefficients on pairs of wealth components to establish which, if any, have a larger effect than others.

Using data from the Wealth and Assets Survey, a longitudinal household survey representative of the population of Great Britain, this chapter conducts direct tests of whether types of wealth have statistically different effects on the ONS-4 SWB variables: evaluative well-being (satisfaction with life), eudaimonic well-being (worthwhile activities), positive affect (happiness) and negative affect (anxiety). To do this we estimate fixed effects regression models for each SWB variable using 11 categories of assets and debts and demographic and socioeconomic controls. For each model we then conduct Wald-tests of coefficient equality for pairs of assets and debts.

Our first main hypothesis is that a given measure of SWB will not be equally associated with all types of wealth. We present evidence to suggest that wealth's relationship with SWB depends on the category of wealth. We also find that this is true within the subclasses of assets and debts, though differences are more pronounced for assets than debts. Our second main hypothesis is that wealth will have different relationships with different dimensions of SWB

and that this relationship will be strongest for evaluative well-being. We find evaluative well-being is more strongly related to total wealth than positive affect and euadaimonic well-being are, but that this difference is driven by the effect of assets and not debts. A secondary hypothesis is that negative effects of debt are larger than the positive effects of corresponding assets. We find the opposite to be the case, but only for evaluative well-being, where the positive impact of total assets is significantly larger in size than the negative impact of total debts. Another secondary hypothesis is that liquid assets have a larger positive effect than more illiquid assets. In line with this we find that liquid wealth, as measured by current account balances, has a disproportionately large beneficial impact on SWB, and that this is found across all four of the categories of SWB examined here.

1.5.2 Income Rank, Social Status, and Well-being: Does Social Capital Matter?

Chapter 3 examines the relationship between income rank and income level and a range of measures of SWB from several different datasets. Recent research has found that many dimensions of SWB are a function not of a person's income level but instead the relative ranked position of their income within a social comparison group. This debate in the literature has given rise to the 'pure' rank hypothesis where it is only rank that matters. Other recent literature has found income level to matter in addition to rank of income. However, it has been suggested that both of these findings may be due to failing to control for idiosyncratic trajectories through life which are correlated with both income rank and SWB. For example, if both income rank and SWB are correlated with social capital, then failing to control for the trends in social capital could lead to a spurious relationship being identified between rank and SWB. The true relationship between income and SWB has significant implications for policies which redistribute income in society.

Collischon and Eberl (2021), who first investigated the rank hypothesis while controlling for individual life trajectories, used job satisfaction as their measure of SWB. Their analysis of German panel data found that income rank did not predict job satisfaction, thereby rejecting both rank hypotheses. Chapter 3 aims to see if parallel results are found by using this method with other datasets and SWB measures. It contributes to the existing literature on the relationship between income rank and SWB by utilising the same estimation method as Collischon and Eberl (2021) to test the rank hypotheses while controlling for idiosyncratic life trajectories, but uses national panel datasets from multiple countries, and a larger and wider ranging set of SWB variables.

We use four datasets: The German Socio-Economic Panel, the Understanding Society Survey (UK), the Household, Income and Labour Dynamics in Australia and the Panel Study of Income Dynamics (USA). These datasets contain several SWB measures and all are analysed. We use Fixed Effects Individual Slopes models to predict these SWB measures by income rank and income level while controlling for differences in life trajectories. We thereby test to see which SWB variables are predicted by income rank, which are predicted by income level and which are predicted by both. We find that income rank and income level both predict several domains of SWB. Furthermore, in domains of SWB relating to income, pay and finances, rank of income explains more variation than does income level.

1.5.3 Negative Associations Between Alcohol Consumption and Subjective Well-being in the UK: A Longitudinal Analysis

Chapter 4 examines the relationships between several patterns of alcohol consumption and several measures of SWB. The negative effects of alcohol consumption on anxiety, depression and physical health are well known. However, alcohol's association with SWB is less well understood. Understanding this relationship is important because SWB has components which reflect positive mental health as well as the absence of mental illness.

This chapter contributes to the existing literature in two ways: firstly by investigating the SWB effects of alcohol consumption measures, such as intensity, which have not previously been investigated in this literature, despite calls for research into this aspect of consumption (Patrick, 2016), and secondly by using a wider range of SWB measures than have previously been examined in studies of longitudinal and nationally representative survey data.

Data are taken from the Understanding Society Survey (USS), a nationally representative longitudinal household survey conducted in the United Kingdom. The USS includes several measures of SWB: satisfaction with life, psychological distress (measured by the GHQ-12), mental functioning (measured by the mental components of the SF-12) and positive well-being (measured by the Warwick-Edinburgh Mental Well-Being Scale). Collectively, these measures cover the evaluative, experienced and eudaimonic domains of SWB. The USS also includes measures of a person's frequency and intensity of alcohol consumption; binge drinking frequency; risk of dependency; and expenditure on alcohol. These alcohol consumption variables are used to predict each of the SWB measures, using fixed effects analyses.

We find that high frequency binge drinking is associated with increased psychological distress, decreased mental functioning and lower life satisfaction.

The most extreme intensities of alcohol consumption are associated with reduced mental functioning and increased psychological distress. Risk of alcohol dependency is also associated with detrimental effects on life satisfaction, psychological distress and mental functioning. Frequency of normal consumption is however not associated with any of the measures of SWB. In contrast, expenditure on alcohol is associated with beneficial effects for all domains of SWB, indicating that expenditure should not be used as a proxy for alcohol consumption. Overall we find that, in comparison to life satisfaction, mental functioning and psychological distress are associated with a larger number of consumption behaviours. Thus measures of satisfaction with life do not capture the full effects of alcohol consumption on SWB.

1.5.4 Consumption and Leisure Time are Complementary Goods: Evidence from Life Satisfaction Data

Chapter 5 provides evidence of the interdependence of free time and consumption in their respective relationships with life satisfaction. The key observation of Staffan Linder's *The Harried Leisure Class* (1970) is that the well-being which a person can derive from the consumption of goods and services depends on the amount of free time they have. Conversely, Linder argues that the well-being which can be derived from a unit of consumption time is higher when it is combined with more consumption (Linder, 1970, 4). This complementarity is also expressed in the modelling of the labour supply decision as a Cobb-Douglas utility function with time and consumption as inputs. In this model both time and consumption are considered 'goods' and the utility derived from each depends on the level of the other. This chapter contributes to the literature by testing to see if this interdependence is reflected in the relationship between consumption, time and life satisfaction. As far as we know, this is the first study to do so. A secondary aim is to test whether non-working time or leisure time is the better predictor of life satisfaction.

Data are taken from the Panel Study of Income Dynamics, a longitudinal panel survey from the USA. This dataset is used because it contains variables measuring consumption, leisure time and working hours, as well as life satisfaction. We predict life satisfaction from consumption and leisure time, including an interaction. We do the same with consumption and non-working time.

No significant relationships are found in the leisure time model. However, a significant interaction relationship is found for the non-working time model; this model also exhibits the best fit. Non-working time is found to have a negative relationship with life satisfaction for all but the highest levels of consumption. Conversely, consumption has a positive relationship with life satisfaction for all but the lowest levels of non-working time. The chapter concludes that

there is evidence to indicate the interdependence and complementarity between non-working time and consumption in their relationships with life satisfaction.

Chapter 2

Accounting for Well-Being: The Disproportionate Benefits of Liquid Assets

Abstract

Subjective well-being (SWB) is increasingly a target of public policy, and a person's net wealth contributes positively to their SWB. A key question, therefore, is how SWB is influenced by the composition of wealth. We use longitudinal data from the UK Wealth and Assets Survey to show that the relationship between wealth and SWB depends on the form the wealth is held in. We examine four domains of SWB: evaluative SWB (satisfaction with life), eudaimonic SWB (worthwhile activities), positive affect (happiness) and negative affect (anxiety). We first find that beneficial effects of net wealth on life satisfaction and anxiety are over twice as large as its effects on happiness and worthwhile activities. We also show that the composition of wealth matters: the relationship between total asset value and life satisfaction is approximately twice as large as that for any other domain of SWB. In contrast, total debts have approximately the same size relationship with all four SWB domains. We find the size of wealth's relationship with SWB varies different classes and subclasses of assets and debts, though differences are more pronounced within assets than within debts. In particular, we find that the beneficial effects of a percentage point change in liquid current account balances are 2.95 times larger for life satisfaction, 3.29 times larger for happiness, and 9.40 times larger for anxiety compared to savings balances, the next most liquid asset examined here. Our results have implications for the marketing of financial products and for individuals making decisions on how to structure their wealth portfolio.

2.1 Introduction

Well-being is that which is good for a person (Tiberius, 2015). A person's well-being can be measured objectively, or it can be measured subjectively, i.e. from the perspective of that person. Subjective well-being (SWB) measures are grouped into three broad categories: *evaluative well-being* concerns an individual's evaluation of their life; *experienced well-being* is the presence and intensity of mental states they experience; and *eudaimonic well-being* is the subjective assessment of possession of traits, capacities and other objective conditions needed for good psychological functioning (Dolan and Metcalfe, 2012). Each of these categories is valuable in of itself and therefore worthy of investigation (Seligman, 2018). Moreover, there is some suggestion that these categories may have different causes (Haybron, 2008a, 84) and effects (Ryff and Boylan, 2016; Trudel-Fitzgerald et al., 2019).

2.1.1 Wealth and Subjective Well-Being

The positive impact of net wealth has on happiness and satisfaction with life is well established (Senik, 2014; Brulé and Suter, 2019; Jantsch and Veenhoven, 2019) and wealth has been shown to be more conducive to subjective well-being (SWB) than income (Headey and Wooden, 2004; Headey et al., 2007; Brulé and Suter, 2019). However, perhaps reflecting the constraints of available datasets, there have been comparatively few studies of the wealth-SWB relationship compared to the many thousands of papers investigating the income-SWB relationship[1]. In particular, relatively little is known about whether different types of wealth, such as savings and and housing wealth, or credit card and mortgage debt, have different effects on SWB. Moreover, the relationship wealth has with SWB may differ by type of SWB, as has been found to be the case for SWB's relationship with income (Killingsworth, 2021) and consumption (Tsurumi et al., 2021).

In theories of consumer behaviour derived from traditional economics, different sources and forms of money are assumed to be equivalent and interchangeable, regardless of intended use (though perhaps subject to different transaction costs). If money is indeed fungible, a rational agent should take their entire lifetime wealth portfolio into account when making a financial decision or other consumer choice. A corollary is that the form an individual's money takes ought not to influence their utility or their SWB. Moreover, if fungibility applies, the relationship between assets and SWB should be equal and opposite to that of debts.

[1] A topic search on Web of Science for 'income AND well-being' returns 9,419 results while a search for 'wealth AND well-being' returns 1,498 results.

However, empirical evidence suggests that people behave as if money is non-fungible. For example, the composition of a person's wealth influences how they will spend it (Levin, 1998; Heath and Soll, 1996). Observational data suggests individuals create 'pots' of money in their minds associated with distinct purposes and treat the contents of these pots as non-fungible with other income (Hastings and Shapiro, 2013); and when labels are experimentally assigned to parts of an individual's budget, subjects change the composition of their spending according to the label (Abeler and Marklein, 2017).

The non-fungibility of wealth is also revealed in the subjective assessments people make. For example, composition of wealth influences the subjective assessment of one's own wealthiness and the perception of the wealthiness of others (Sussman and Shafir, 2012; Assenza et al., 2019). Similarly, people's evaluations of their financial state are more strongly influenced by the value of liquid assets than by the value of non-liquid financial investments (Ruberton et al., 2016).

Given this evidence, it seems likely that the composition of a person's wealth could also influence the level of SWB they report. Some previous research has investigated whether wealth's composition affects its impact on SWB (Jantsch and Veenhoven, 2019), though direct tests of whether different forms of wealth have statistically different effects on SWB have not yet been undertaken. The aim of this paper is to report such tests. More specifically, we use longitudinal data to provide evidence for the non-fungibility of multiple classes of assets by examining their relationships to four key domains of SWB: evaluative SWB (satisfaction with life), eudaimonic SWB (worthwhile activities), positive affect (happiness) and negative affect (anxiety). Our results have welfare implications both for individuals' personal choices and for the marketing of different types of financial product.

2.1.2 Previous Research

Prior research into the SWB effects of wealth has divided wealth into broad categories such as assets and debts, or into subcategories of these, such as liquid and illiquid assets (Brulé and Ravazzini, 2019). The relationship between total debt and SWB is usually, although not always, found to be negative (for a review of the evidence, see Jantsch and Veenhoven, 2019), with a meta-analysis finding a significant negative relationship between debt and SWB (Tay et al., 2017).

The composition of a person's assets seems to also relate to their SWB. In a cross-sectional field study of UK bank customers, Ruberton et al. (2016) find a significant and positive total association between life satisfaction and both liquid wealth and other financial wealth. The association for other financial

wealth was larger than for liquid wealth. Other studies have decomposed wealth further by looking at the debt counterparts of liquid and illiquid wealth. Brulé and Ravazzini (2019) use cross-sectional data from several countries to investigate the association between life satisfaction and financial assets, financial debts, real assets, and mortgage debts. Overall, they find assets to be associated with higher life satisfaction and debts to be associated with lower life satisfaction. They also find the positive effect of financial assets to be significantly larger than the positive effect of real assets.

Other research has broken down assets and debts into even smaller components. Failure to control for observed heterogeneity in studies of SWB can lead to bias (see Ferrer-i-Carbonell and Frijters, 2004). We therefore limit our discussion to the prior two studies which decomposed wealth in this way, and also used fixed effects to control for individual differences. Firstly, in an early longitudinal study using Australian data, Headey and Wooden (2005) find that higher levels of home value, business values, equity investments, bank accounts balances and value of vehicles improve life satisfaction, while amounts of other property debt, credit card debt and other debt decrease life satisfaction. No statistically significant differences between the effects of different types of assets and debts and SWB were found. Secondly, using Chinese longitudinal data, Wang et al. (2019) find life satisfaction to be positively related to liquid and housing wealth, and negatively related to non-mortgage debt. No significant differences were found in the SWB associations between liquid wealth and housing wealth, but the negative SWB association of non-mortgage debt was significantly different from that of mortgage debt.[2]

Another key concern is the multi-faceted nature of SWB. Although most of the studies cited above examine life satisfaction, SWB is composed of several distinct categories and cannot be adequately represented solely by satisfaction with life (Stiglitz et al., 2009; VanderWeele et al., 2020). Both Headey and Wooden (2005) and Wang et al. (2019) use life satisfaction as their measure of SWB, hence capturing only the evaluative domain of SWB. There are good reasons to believe that different types of SWB might have different relationships with wealth, as is already known to be the case for income (Killingsworth, 2021) and consumption (Tsurumi et al., 2021). Indeed, cross-sectional research suggests that the size and direction of the wealth-SWB relationship may depend on both the type of wealth and the measure of SWB under consideration (Jantsch and Veenhoven, 2019).

[2]These conclusions are based on our calculations of confidence intervals; neither study explicitly reports tests of coefficient equality.

2.1.3 The Importance of Wealth

Why might wealth influence SWB? Wealth facilitates lifetime consumption, which in traditional economic theory improves 'utility', analogous to increasing SWB (Brown and Gathergood, 2020). Wealth also acts as a buffer against financial shocks (Carroll and Samwick, 1998), can be used as collateral and is a signal of social standing (Shah et al., 2012). Even at low-levels, the symbolic value of wealth impacts happiness beyond its ability to satisfy basic needs (Guillen-Royo et al., 2013). Low wealth, financial scarcity, and poverty are associated with greater attentional focus on poverty-related concerns, decreased mental bandwidth and greater trade-off thinking (de Bruijn and Antonides, 2021), lower productivity (Kaur et al., 2021), greater risk aversion (Yesuf and Bluffstone, 2009), delay discounting (Epper et al., 2020), impaired decision making (Shah et al., 2012) and cognitive functioning (Mani et al., 2013) as well as reduced self-esteem and personal agency (Frankham et al., 2020). These factors can lead to worse economic outcomes that in turn increase stress and negative affect, potentially leading to a 'psychological poverty trap' (Haushofer and Fehr, 2014; Schilbach et al., 2016; Ridley et al., 2020).

2.1.4 Types of Wealth

Why might we expect different classes of wealth to have different impacts on SWB? We focus first on objective differences between subtypes of wealth, before examining subjective differences. Different forms of wealth can be thought of as different tools with different natures and uses (Lea and Webley, 2006); these different uses may mean that certain forms of wealth have differing relationships with SWB. Forms of wealth such as money in current and savings accounts are liquid, and require little to no effort to convert them into a spendable form, compared to illiquid assets such as housing wealth or financial investments. Furthermore, the nature of many illiquid assets, such as real estate, may mean that trading opportunities are more infrequent, uncertain and more costly (Ang et al., 2014) and illiquid assets are thus less suited to acting as a buffer in the case of a financial shock.

Moreover, different forms of wealth may be associated with different economic costs and benefits which may in turn impact their relationships with SWB. Fees are accrued if current accounts become overdrawn, and savings accounts typically earn higher interest rates than current accounts (Black et al., 2017). Some forms of wealth typically appreciate in the long-run, which could in turn yield SWB returns (Wang et al., 2019) and the income and other benefits that can be derived from wealth could also impact SWB (Headey and Wooden, 2004). Physical property usually has a use beyond being a mere store of wealth — a house can be lived in, a car can be used for transportation, and

so on. Property has social norm effects and acts as an indicator of a person's position in society (Foye et al., 2018).

Different types of debt can place different levels of strain on financial resources. Higher interest debt must be paid off before it grows too large and the resultant reduction in consumption or increase in working hours may have negative SWB effects. Some forms of debt may operate very differently to others. In the UK, student loan repayments are only paid when earning above a threshold and are forgiven after 40 years, meaning that for most people student loan debt acts as a tax, rather than as debt (Greenberg and Mogilner, 2021). Debts relating to housing can, if not serviced, result in the loss of that housing. Indeed, exogenous changes in housing costs negatively impact the psychological health of those in housing arrears more than those who have equivalent amounts of consumer debt (Gathergood, 2012).

2.1.5 Subjective Differences

2.1.5.1 Transparency

It is well established that the way wealth is represented impacts on how it is spent. The pain of payment associated with a purchase depends on the degree to which the payment method takes physical form and on whether it requires counting. These factors together constitute 'payment transparency'. Lower levels of consumption of non-essential goods result when paying with cash (high transparency) than when paying with a credit card (low transparency) (Soman, 2003). Similarly, people make larger bets with poker chips than they do with cash (Prelec and Simester, 2001; Lapuz and Griffiths, 2010). Consequently, some forms of wealth feel real and others virtual such that forms of wealth can be positioned on a concrete-insubstantial gradient, with more concrete forms of wealth being more emotion-laden and ethereal forms of wealth being less so (Leiser and Shemesh, 2018).

2.1.5.2 Loss Aversion

Wealth is typically composed of a positive dimension, assets, and a negative dimension, debts. Loss aversion, part of prospect theory, is the tendency for the pain of a loss to be greater in size than the pleasure of gaining the same amount i.e losses loom larger than gains (Kahneman and Tversky, 1979). More generally, negativity bias suggests that negative things are more cognitively salient than positive things of the same size or magnitude (Rozin and Royzman, 2001). These biases have been shown to influence well-being: the magnitude of the detrimental well-being effect of an income decrease is larger than the magnitude of the positive well-being effect of an income increase (Boyce et al., 2013).

Consistent with this, Sussman and Shafir (2012) find that when total wealth is positive and held constant, people with lower levels of debt and lower levels of asset wealth feel, and are perceived to be, wealthier than those with more debt and more asset wealth. Aversion to debt deters qualified students from entering higher education (Callender and Jackson, 2005) and explicitly labelling a contract as a loan significantly reduces the probability of its selection compared to an equivalent contract (Caetano et al., 2019). Furthermore, even when a debt is in name only and has no financial consequences, it still causes aversion and results in sub-optimal consumption and borrowing decisions (Meissner, 2016; Martínez-Marquina and Shi, 2021). This evidence suggests that debt is perceived as more than just a negative asset and so we might then expect that the SWB costs of debts are larger in size than the SWB benefits of assets of the same size.

2.1.5.3 Mental Accounting

The main cognitive operation associated with *mental accounting* (Thaler, 1999) is the categorisation and labelling of expenditures by purpose (housing, food, etc.), with each category subject to its own budget constraint (Kahneman and Tversky, 1984; Heath and Soll, 1996) and marginal propensity to consume from (Shefrin and Thaler, 1988). The fact that people use mental accounts is itself a violation of the principle of fungibility of money (Thaler, 1990). It is plausible that wealth allocated to different mental accounts could have different consequences for SWB, even if the values allocated to these accounts are equal. For example, having a high positive balance in a mental account for unforeseen household repairs might reduce anxiety, while the same value in a mental account for holiday savings might be associated with feelings of pleasurable anticipation. There may not be one-to-one matching between mental accounting and real wealth accounts, but there is likely to be a high correlation between, e.g., total liquid wealth and the funds in the mental account for unexpected household expenditure. Therefore it would not be surprising if forms of wealth that differ in the needs they most readily address were also associated with different types of SWB. For example, liquid wealth might have a larger protective effect against anxiety than other assets because it is most associated with mental accounts for immediate essential bills such as for housing, food or other physiological and safety needs (Brouwer, 2009), as well as psychological needs (Weinstein and Stone, 2018).

Shefrin and Thaler (1988) sort different forms of wealth into a hierarchy based on how tempting it is to spend each form, with liquid assets being most tempting and with home equity and pension wealth being least tempting. For example, households may be less likely to withdraw money from a savings

account designated for the deposit payment on a home than they are to withdraw from a checking account, even if the balance in each account is the same. Relatedly, it has been suggested that people construct their mental portfolio such that different accounts correspond to hierarchical levels of aspiration or need (Shefrin and Statman, 2000; Brouwer, 2009). The potential scarcity of liquid assets required to pay for everyday essentials to meet basic needs, compared to scarcity of other assets geared towards more distant or abstract needs, may elicit greater attention and thus lead to stronger SWB effects than other classes of wealth (Shah et al., 2012; de Bruijn and Antonides, 2021).

The source of wealth might influence the mental and objective accounts it is allocated to which may in turn have consequences for SWB. Regular income is more readily spent than income from sales of regular capital, which in turn is more readily spent than income from sales of bequest capital (Statman, 2017). People are less willing to spend inherited money than earned or gifted money on textbooks, and when the object of expenditure is a holiday rather than textbooks people are even less willing to spend their inheritance (Tykocinski and Pittman, 2013). Income framed as coming from a symbolically-meaningful source is more likely to be saved than spent (McGraw et al., 2003). This form of mental accounting violates the economic principle of source independence, which is that the value of something does not depend on how it was obtained (Loewenstein and Issacharoff, 1994). Additionally, emotional events can cause wealth to be categorised and treated differently (Levav and Mcgraw, 2009) and this emotion-tagged wealth could, in turn, induce emotions when it is spent.

Another feature of mental accounting is the frequency with which individuals evaluate changes in their wealth portfolio, or 'count their money'. This has consequences for the risk attitudes of investors (Benartzi and Thaler, 1995), but may also have implications for SWB. It is likely that different classes of assets and debts are evaluated at different frequencies. For example, people will check their current account balance more frequently than the value of their pension or the value of their house. Strength of association increases with how frequently and recently the association has been made in working memory (Barsalou, 1983) and the cognitive accessibility of wealth accounts has been shown to influence subjective evaluations of cost (the accessible account effect) (Morewedge et al., 2007). Classes of wealth which are likely to have been more recently and frequently evaluated may therefore have larger influences on SWB, particularly evaluative SWB.

2.1.5.4 Liquidity, Self Control and Flexibility

A related issue is the liquidity of funds, meaning the ease with which an individual can access them for spending. Individuals might value more liquid

forms of wealth - such as checking account balances, or money available on a credit card - because they increase immediate spending possibilities. This might in part explain why individuals hold liquid balances in checking accounts and debts simultaneously (which cannot be rationalised in a standard model due to the higher interest costs of debt compared with the interest returns on savings) (Gross and Souleles, 2002; Telyukova, 2013; Gorbachev and Luengo-Prado, 2019).

Yet, liquidity also relates to *self control* and the possible negative consequence for short-run SWB of resisting temptation. More illiquid resources require more effort to be turned into a spendable form, and thus less mental effort is required not to use more illiquid resources. For example, some people self-limit their credit through tactics such as cutting up their card, thereby making it difficult or impossible to access the funds associated with it (Bryan et al., 2010). Similarly, transferring wealth to accounts you do not check regularly could aid self-control according to the principle "if you cannot see it you will not spend it". But perhaps if you can't see it, it won't affect your SWB.

Even liquid wealth can be subject to self-control effects. If liquid wealth is allocated to savings, the desire not to spend it can be so strong that some people will not use it to pay off high interest debt (Gathergood and Weber, 2014). Evidence suggests people value freedom of choice and are willing to sacrifice consumption to 'keep their options open' (Shin and Ariely, 2004). Liquid assets facilitate the greatest freedom of choice due to the ease with which things can be purchased with them. This flexibility can sometimes be valued more than the benefits of paying off debt, or the greater appreciation over time yielded by more illiquid forms of wealth. Given this, we might expect people to value liquid assets more than illiquid assets and this may be reflected in the strength of the wealth-SWB relationship for liquid versus illiquid assets.

2.1.5.5 Judgements are Relative

Assets in different accounts may also have different SWB effects if (a) SWB relates, at least in part, to how the asset holder believes their asset amount compares to amounts held by other people, and (b) these social comparisons are asset-specific. Effects of social comparison on the SWB experienced by an individual in connection with their economic circumstances are ubiquitous. For example, a large literature (e.g., Clark and Oswald, 1996) shows that wage satisfaction is determined by relative income, and Boyce et al. (2010) found that people's general satisfaction with life is determined by the relative ranked position of their income within a comparison group. Aldrovandi et al. (2015) found that students' concern about their expected student loan debt

was determined not by the absolute amount of the debt but by how they believed their debt amount ranked amongst that of others. Brown et al. (2017) extended this approach to home values, mortgage debts, and financial assets. In each case, although not for credit card debt, life satisfaction was influenced by the relative ranked position of the level within a social comparison group. Wang et al. (2019) obtain similar findings for rank of cash and savings, housing wealth, and financial wealth using Chinese data.

Relatedly, the typical size of an asset or debt could influence the marginal effect of a unit of wealth of that class. An additional unit of value being added to a lower value asset represents a larger percentage increase than if it were added to a higher value asset. When total values are held constant, people generally prefer higher percentages of a small good to smaller percentages of a larger good (Li and Chapman, 2013). This effect has been shown to influence economic decisions and perceptions of corporate social responsibility (Moreno and Zhang, 2021). Additionally, an extra unit of wealth in a typically smaller asset class is more likely to increase one's rank position in a comparison group than an extra unit of wealth in a typically larger asset class. We might therefore expect wealth in typically higher value forms such as housing and pensions to have a smaller effect on SWB than the same value held in a typically lower value form such as current or savings accounts.

2.1.5.6 Psychological Ownership

Psychological ownership is defined as the degree to which someone feels that something is theirs and belongs to them (Pierce et al., 2001). Sharma et al. (2021) find borrowers can experience psychological ownership of borrowed money, despite it being owned by another party. They also find some evidence that psychological ownership of debt varies by debt type, with money derived from credit being associated with a greater sense of psychological ownership than money taken in loans. Consistent with this, premium credit cards can signal high income, wealth and status (Bursztyn et al., 2017) and higher credit limits are perceived as indications of higher future income (Soman and Cheema, 2002). Given this, it is possible that some forms of debt could potentially even be positively related to SWB.

In summary, there are several reasons to believe that different asset and debt classes could have different relationships with SWB, and that these relationships could also vary by domain of SWB.

2.2 Hypotheses

In line with the literature reviewed here, our main hypotheses are that

H1a Differences exist in the wealth-SWB relationship for different classes of assets and debts.

H1b These relationships also differ for different types of SWB, with evaluative SWB most strongly related to net wealth.

The literature also suggests a secondary set of hypotheses, that

H2a The negative effects of debts are larger than the positive effects of assets.

H2b More liquid assets have a larger positive effect than more illiquid assets.

2.3 Data

This study uses the Wealth and Assets Survey (WAS), a longitudinal household panel survey representative of the population of Great Britain (Office For National Statistics, Social Survey Division, 2020). The WAS is one of the largest surveys of household wealth available internationally. It collects annual data from approximately 20,000 households and 45,000 participants; six waves are currently available for analysis (2006-2016). Four SWB measures were included from wave three (following the recommendations of Dolan and Metcalfe, 2012) and so the analyses in this study use data from waves three to six. The longitudinal nature of the survey allows for unobserved individual differences to be controlled for using fixed effects analyses. Failing to control for fixed effects can have a significant effect on results and the conclusions drawn from them (Ferrer-i-Carbonell and Frijters, 2004).

2.3.1 Measures

2.3.1.1 Subjective Well-Being

WAS includes four separate measures of SWB, each measuring a different category of SWB. Summary statistics for these variables can be found in Table A.3 and Table A.6; correlations for these variables are displayed in Figure A.3.

Satisfaction with life is measured by the question "Overall, how satisfied are you with your life nowadays?" Responses are given on a 0 to 10 scale, where 0 is *not satisfied at all* and 10 is *completely satisfied*. Satisfaction with life measures evaluative SWB; i.e., it is a global evaluation of how their life is going.

Happiness is measured by the question "Overall, how happy did you feel yesterday?" Responses are given on a 0 to 10 scale, where 0 is *not at all happy*

and 10 is *completely happy*. This measure represents positive experienced SWB i.e., the positive feelings which have been felt.

Anxiety is measured by the question "Overall, how anxious did you feel yesterday?" Responses are given on a 0 to 10 scale, where 0 is *not at all anxious* and 10 is *completely anxious*. This measure represents negative experienced SWB, i.e., the negative feelings which have been felt.

Worthwhile activities is measures by the question "Overall, to what extent do you feel that the things you do in your life are worthwhile?" Responses are given on a 0 to 10 scale, where 0 is *not at all worthwhile* and 10 is *completely worthwhile*. This measure is from the eudaimonic category of SWB (Dolan and Metcalfe, 2012). It is intended to represent the whole dimension, though we note that measures within the eudaimonic category can have different causes and effects (Trudel-Fitzgerald et al., 2019).

2.3.1.2 Wealth

WAS collects information on participants' assets and debts. This includes information on their property, mortgages, financial assets and debts, possession wealth and private pension wealth (Office for National Statistics, 2019). The measures we use in this study are: current account assets and debts, savings accounts, student loans, other financial assets and debts, main residence asset and mortgage, other real estate assets and debts, and pension wealth. *Total assets* is the sum of asset classes and *total debts* is the sum of debt classes. *Total wealth* is the sum of total assets minus total debts. An estimate of possession wealth is also included as a control variable.

Those who reported values of wealth in the top 1% for any of the wealth measures (not possessions) were excluded prior to analysis. If an individual does not hold a particular type of wealth, their value for it is coded as £0.

Summary statistics for these variables can be found in Table A.1; correlations for these variables are displayed in Figure A.4.

2.4 Data Analysis

The analyses estimate the following general model:

$$W_{i,t} = \beta_1 F_{i,t} + \beta_2 X_{i,t} + \theta_i + \phi_t + \epsilon_{i,t} \tag{2.1}$$

where individual i is in time period t, W is the SWB measure, X is a vector of time-varying demographic and socioeconomic controls, θ represents the individual fixed-effects and ϕ the time fixed-effects. In this model F is a vector of natural log variables for each form of asset and debt. For some models F will be log net wealth, for others it will contain log total assets and

log total debts, and for others it will contain the full set of log transformed components of assets and debts. Three different analyses will be run where F contains all the components of assets and debts. Firstly, all individuals will be considered. Secondly, for each class of asset and debt a separate model is estimated on those participants who reported a value of greater than £0 for that class. For example, for current account debt, a subset is taken of individuals who have some current account debt, then the above model is estimated and the coefficient on log(current account debt) is reported. This is done so that individuals who do not hold that component of wealth do not influence the coefficient on that component. Thirdly, a model is estimated for each pairwise combination of asset/debt class, using a subset of those who hold both classes of asset/debt simultaneously for at least one time period. The estimated coefficients for the respective classes are reported, as is the test statistic for coefficient equality. If the estimated coefficients are found to be significantly different, then we can conclude that the relevant classes are non-fungible with respect to their relationship to the relevant measure of SWB.

Following previous literature, we include the following as control variables: age group, sex, marital status, subjective health status, number of children, highest qualification, social class, household size, main activity, year of interview, household income (log transformed) (Dolan et al., 2008). We also control for possession wealth (log transformed). For each model, analysis is restricted to those who responded in three or more waves. All analyses were conducted using R version 4.0.3 (R Core Team, 2020) and the *plm* package (Croissant and Millo, 2008). Individual-clustered standard errors are used throughout (Millo, 2017).

2.5 Results

In the first analyses, the components of assets and debts were summed to calculate each participant's net wealth. This was then linearly transformed so that its smallest value in the dataset was equal to 1. The resulting value was then log transformed. Figure 2.1 presents the results for net wealth for each of the four SWB measures. It suggests that net wealth has a beneficial influence on life satisfaction, anxiety and happiness. Among these, the relationship for life satisfaction and net wealth was found to be significantly larger than those between net wealth and the other SWB measures.

In the second analysis, the asset and debt components were separately aggregated to calculate the value of each participant's total assets and total debts, respectively. These values were then log transformed. Figure 2.2 presents the results for these values for each of the four SWB measures. It shows a significant beneficial relationship with each of the SWB measures. The

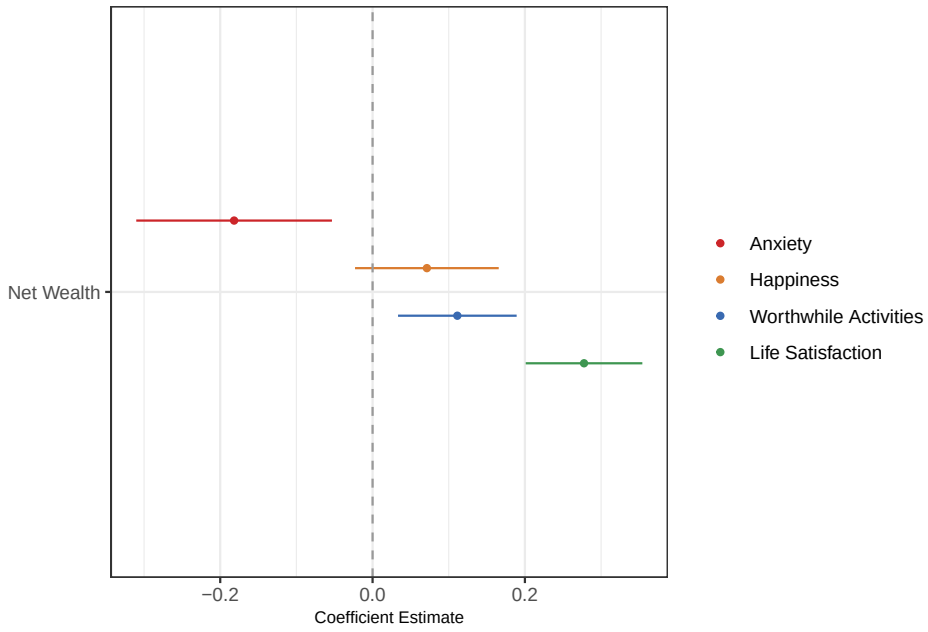

Figure 2.1: Effect of net wealth on different measures of SWB

relationship between assets and life satisfaction was largest, being approximately double in size compared to assets' relationship with the other SWB measures, as well as with the relationship between debts and life satisfaction. This time, both wealth variables were found to be significantly related to worthwhile activities. No significant differences in sizes of associations were found for happiness and worthwhile activities, for both assets and debts. The protective effect of assets on anxiety was approximately the same size as for happiness and worthwhile activities, and the deleterious effect of debts on anxiety is approximately the same as the other SWB variables.

The effect of debts on anxiety is approximately equal and opposite to that of total assets. For life satisfaction, the positive effect of total assets was larger in size than the negative effect of total debts. This indicates that the total protective effect (for SWB) of a given level of assets is larger than the total harmful effects of a debt of the same size.

2.5.1 All Classes of Assets and Debts

2.5.1.1 All Participants

In the third analysis, each class of asset and debt is log transformed and included in the specification together. Figure 2.3 presents the results for each of the four SWB measures. Individuals who did not hold a particular asset or debt class are coded as having a balance of £0 for the relevant class. Figure 2.4 presents the percentage change in SWB scores implied from increasing the

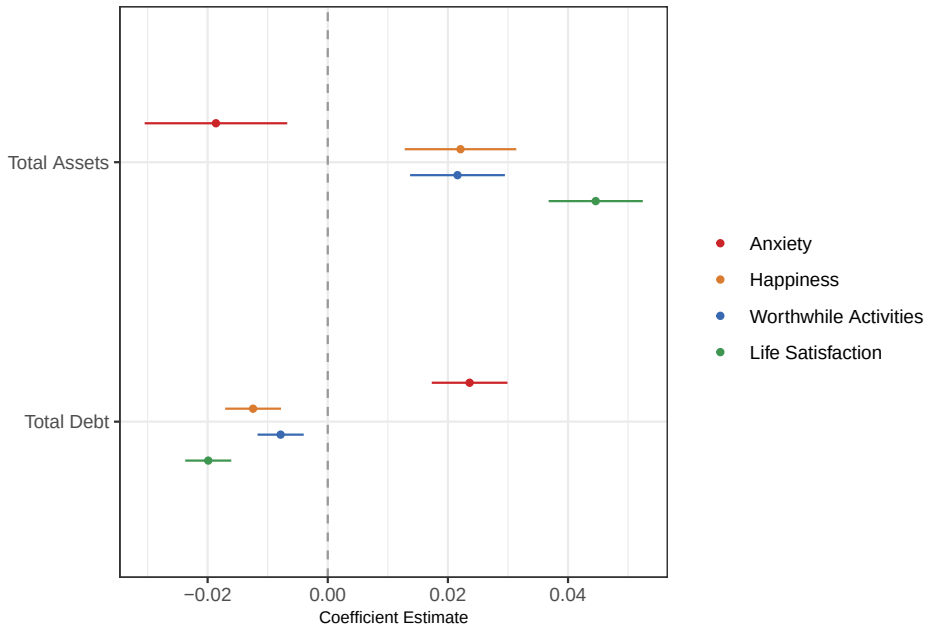

Figure 2.2: Effect of net assets and net debts on different measures of SWB

balance of an asset or debt from £0 to £1000, evaluated at the mean value for each SWB measure. Red bars indicate a significant detrimental effect, green bars a significant beneficial effect and grey bars indicate no significant effect; as determined by coefficient significance in Figure 2.3.

For life satisfaction, four asset classes had a positive effect and three debt classes had a negative effect. Four other classes had no significant relationship with life satisfaction. Current account assets had a significantly larger positive relationship than any other type of asset.

Worthwhile activities were positively related to savings account balances and pension wealth. Residence asset value had a negative effect, as did current account debt.

Happiness was positively associated with current account assets and savings account balances. Worthwhile activities were negatively associated with residence asset value and other financial debt.

Higher levels of anxiety were associated with greater financial debt and current account debt, and surprisingly, with other financial assets. The percentage change in anxiety associated with £1000 of other financial or current account debt is much larger than those for other SWB measures; this is likely because the mean level of anxiety is relatively low (2.8) compared to life satisfaction (7.5), worthwhile activities (7.7) and happiness (7.4), where 0 is 'not at all' and 10 is 'completely'.

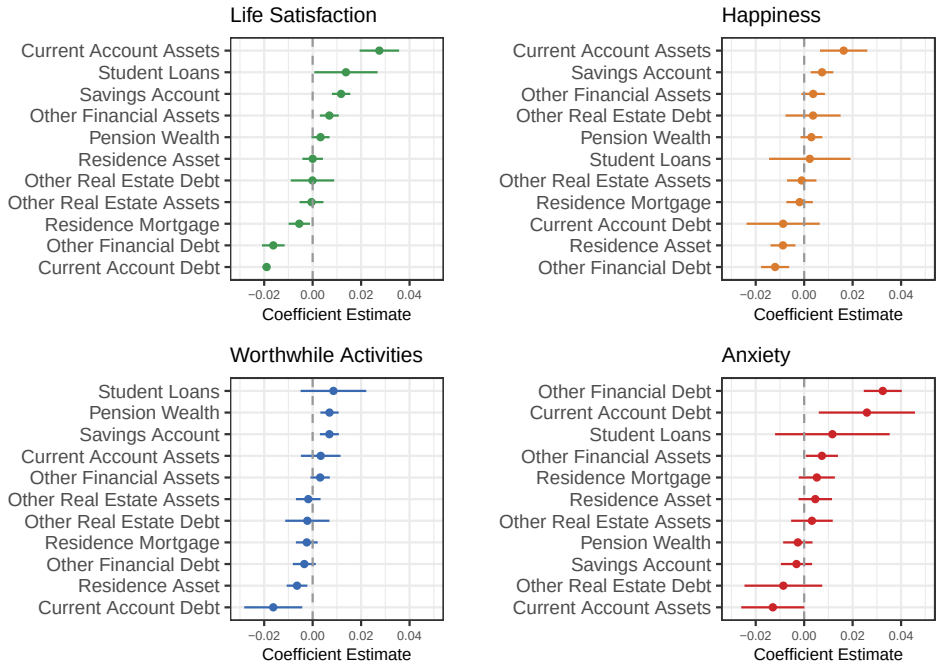

Figure 2.3: Plot for all forms of assets and debts, based on whole sample.

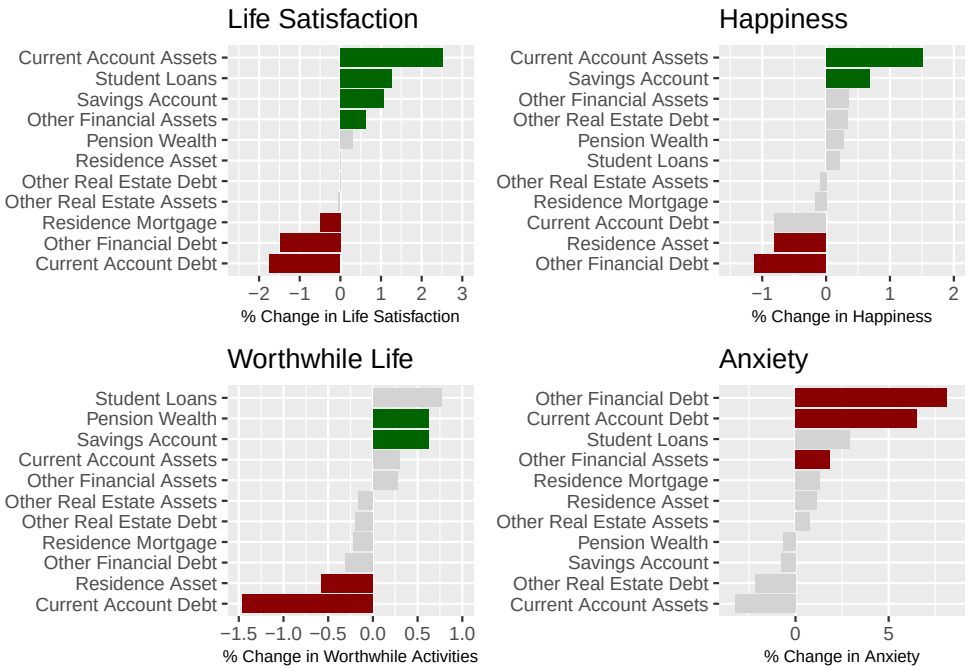

Figure 2.4: Bar plot of implied change in SWB resulting in a £0 to £1000 change in asset/debt balance.

2.5.1.2 Holders Only

In the fourth analysis the same specification as for the third analysis is used, but prior to analysis a specific subsample is taken for each form of asset. Each subsample is made up of those who hold that form of asset in at least one period; in other words, those who report a value of zero in every wave for this form of asset are excluded. This allows us to exclude the effect of holding a particular type of asset or debt, and therefore only consider how the value of an asset or debt influences SWB. A separate model for each form of asset is computed, with the coefficient for that form of asset being shown in Figure 2.5. Figure 2.6 presents the percentage change in SWB scores implied from increasing the balance of an asset or debt from £0 to £1000.

Subsetting the data in this way changes the results significantly. Relationships that were identified in the previous analysis are generally present, but are larger in size. There are two important exceptions. Firstly, residence asset value goes from having a negative association with happiness and worthwhile activities, to having a positive association with all four SWB measures. Secondly, current account debt is no longer associated with any of the four measures.

Several classes of wealth which were found not to be associated with SWB in the previous analysis now have significant associations. Notably, residence mortgage is now associated with a detrimental effect on life satisfaction, happiness and anxiety. Pension wealth is associated with small beneficial effects for all SWB measures. Current account assets are associated with the largest beneficial effects for all four measures; savings account balances and other financial assets are both associated with higher levels of life satisfaction, happiness and worthwhile activities. Higher student loan debt is now associated with higher levels of anxiety, though, paradoxically, it was also found to positively influence life satisfaction, where previously no significant relationships were identified. This may be capturing a cohort effect as the price of university education increased substantially from the 2012/3 academic year.

2.5.1.3 Testing Differences

In the fifth analysis the same specification as for the third and fourth analyses is used, but prior to analysis a specific subsample is taken for each pairwise combination of asset and debt class. Each subsample is made up of those who, in at least one wave, hold both forms of asset or debt simultaneously. A model for each combination is computed. A Wald test for coefficient equality is conducted between the coefficients of the asset/debt class the subsample is based on. The null hypothesis is that the coefficients are identical. Tables 2.1 to 2.4 display the asset and debt class pairs, the coefficient estimate for each

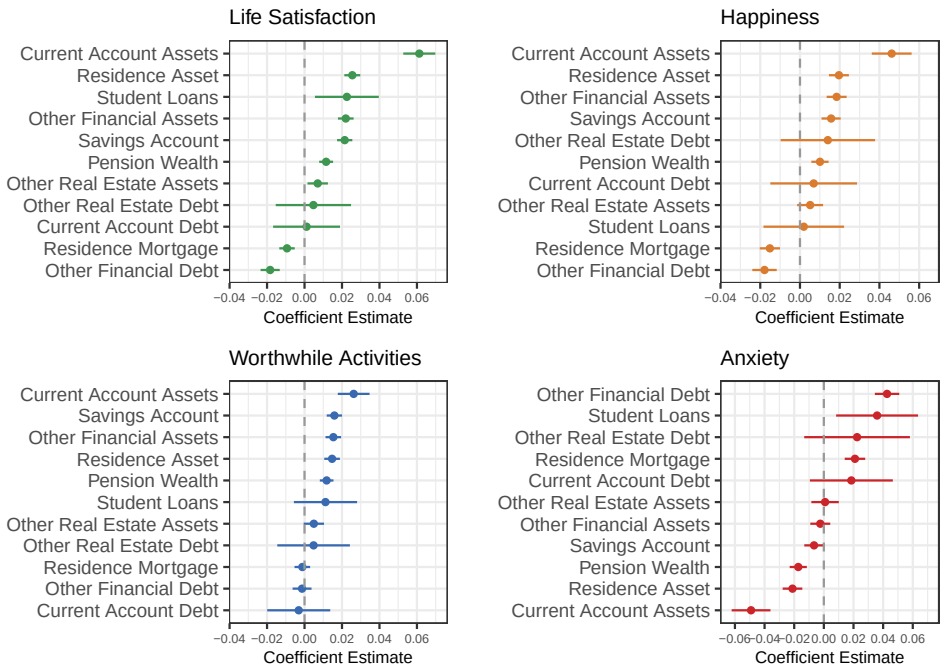

Figure 2.5: Plot for all forms of assets and debts, subsample of holders for each asset/debt.

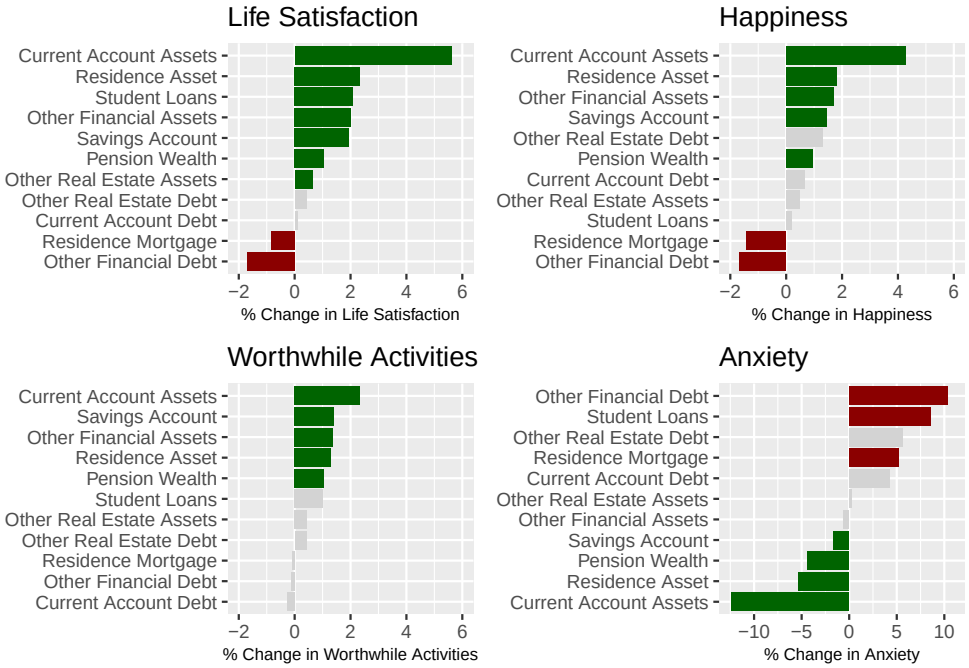

Figure 2.6: Bar plot of implied change in SWB resulting in a £0 to £1000 change in asset/debt balance.

class, and the Wald test statistic.

Table 2.5 summarises the results for pairwise comparisons between asset classes. The presence of a letter in a cell indicates that the row asset has a larger SWB effect than the column asset, for that type of SWB, i.e., that there is evidence that the two assets are non-fungible as a consequence of their differing effects on this type of SWB. Current account assets have a significantly larger SWB effect than all other asset classes for at least three of the four SWB measures, indicating that SWB is more strongly associated with current account balance than any other asset class. Compared to a percentage change in savings account balances, the most functionally similar class of wealth, the beneficial effects of a percentage change in current account balances are 2.95 times larger for life satisfaction, 3.29 times larger for happiness, and 9.4 times larger for anxiety.

Residence asset value has a significantly larger SWB effect than all other asset classes, excluding current account assets, for at least one SWB type. Other financial assets has a significantly larger effect on life satisfaction than does pension wealth. Pension wealth is associated with a significantly larger protective effect on anxiety than savings account balances. Other real estate assets had a significantly smaller SWB effect compared to all other asset classes, for at least one SWB measure.

Table 2.6 summarises the results for pairwise comparisons between debt classes. Fewer statistically significant differences were identified. Other financial debt was associated with greater detrimental effects on anxiety, compared to those for current account debt and residence mortgage value. Student loans were found to have a positive influence on life satisfaction and worthwhile activities in the student loan-other financial debt pair subset. It seems unlikely that greater student loan debt would actually improve SWB and so this relationship may reflect failure to control for some relevant factor.

2.6 Discussion

2.6.1 Support of Initial Hypotheses

In this paper we have provided evidence of heterogeneity in the wealth-SWB relationship. We find the size of wealth's relationship with SWB is different for different classes of assets and debts. We also find that this is true within the subclasses of assets and debts, though differences are more common for assets than for debts. We find that liquid wealth, as measured by current account balances, has a disproportionately large beneficial impact on SWB, and that this is found across all four of the SWB dimensions investigated here. Moreover, the benefits of current account assets are significantly larger than

Table 2.1: Testing differences using Wald tests of coefficient equality: Life Satisfaction

Wealth Form 1		**Wealth Form 2**		
Account	**Estimate**	**Account**	**Estimate**	**Wald Test**
Current Account Assets	0.06 *** (0.00)	Residence Asset	0.026 *** (0.00)	χ^2 (1, N = 44,555) = 42.97, p = 0.00) ***
Current Account Assets	0.061 *** (0.00)	Pension Wealth	0.011 *** (0.00)	χ^2 (1, N = 44,432) = 96.13, p = 0.00) ***
Current Account Assets	0.06 *** (0.00)	Other Financial Assets	0.021 *** (0.00)	χ^2 (1, N = 42,926) = 48.13, p = 0.00) ***
Residence Asset	0.025 *** (0.00)	Pension Wealth	0.01 *** (0.00)	χ^2 (1, N = 42,475) = 19.61, p = 0.00) ***
Current Account Assets	0.059 *** (0.00)	Savings Account	0.02 *** (0.00)	χ^2 (1, N = 40,604) = 55.33, p = 0.00) ***
Residence Asset	0.026 *** (0.00)	Other Financial Assets	0.022 *** (0.00)	χ^2 (1, N = 40,964) = 1.5, p = 0.22)
Other Financial Assets	0.021 *** (0.00)	Pension Wealth	0.012 *** (0.00)	χ^2 (1, N = 40,486) = 6.98, p = 0.01) **
Residence Asset	0.025 *** (0.00)	Savings Account	0.019 *** (0.00)	χ^2 (1, N = 37,815) = 3.3, p = 0.07) .
Savings Account	0.019 *** (0.00)	Pension Wealth	0.013 *** (0.00)	χ^2 (1, N = 37,751) = 2.9, p = 0.09) .
Other Financial Assets	0.023 *** (0.00)	Savings Account	0.018 *** (0.00)	χ^2 (1, N = 35,949) = 1.68, p = 0.20)
Other Financial Debt	-0.013 ** (0.00)	Residence Mortgage	-0.005 (0.00)	χ^2 (1, N = 15,669) = 1.33, p = 0.25)
Current Account Assets	0.066 *** (0.01)	Other Real Estate Assets	0.007 * (0.00)	χ^2 (1, N = 12,143) = 40.24, p = 0.00) ***
Residence Asset	0.025 *** (0.00)	Other Real Estate Assets	0.004 (0.00)	χ^2 (1, N = 10,980) = 10.87, p = 0.00) ***
Pension Wealth	0.015 *** (0.00)	Other Real Estate Assets	0.005 . (0.00)	χ^2 (1, N = 10,883) = 2.59, p = 0.11)
Other Financial Assets	0.02 *** (0.00)	Other Real Estate Assets	0.005 (0.00)	χ^2 (1, N = 10,441) = 5.11, p = 0.02) *
Savings Account	0.022 *** (0.01)	Other Real Estate Assets	0.004 (0.00)	χ^2 (1, N = 9,254) = 6.06, p = 0.01) *
Other Financial Debt	-0.028 *** (0.01)	Current Account Debt	0.004 (0.01)	χ^2 (1, N = 7,129) = 3.79, p = 0.05) .
Current Account Debt	-0.018 (0.01)	Residence Mortgage	-0.002 (0.01)	χ^2 (1, N = 5,062) = 0.9, p = 0.34)
Residence Mortgage	-0.009 (0.01)	Other Real Estate Debt	-0.009 (0.02)	χ^2 (1, N = 2,152) = 0, p = 1.00)
Other Real Estate Debt	0.006 (0.02)	Other Financial Debt	-0.006 (0.01)	χ^2 (1, N = 1,669) = 0.22, p = 0.64)
Student Loans	0.049 *** (0.01)	Other Financial Debt	-0.025 (0.02)	χ^2 (1, N = 1,105) = 6.74, p = 0.01) **
Student Loans	0.021 (0.01)	Residence Mortgage	-0.011 (0.01)	χ^2 (1, N = 1,024) = 1.65, p = 0.20)
Student Loans	0.038 (0.03)	Current Account Debt	0.015 (0.06)	χ^2 (1, N = 431) = 0.07, p = 0.79)
Current Account Debt	-0.094 . (0.05)	Other Real Estate Debt	0.036 (0.04)	χ^2 (1, N = 395) = 2.67, p = 0.10)
Student Loans	-0.135 (0.10)	Other Real Estate Debt	0.117 (0.09)	χ^2 (1, N = 84) = 2.29, p = 0.13)

Significance: *** p $\leq$ 0.001; **p $\leq$ 0.01; * p $\leq$ 0.05; . p $\leq$ 0.10.
Standard errors in parentheses.

Table 2.2: Testing differences using Wald tests of coefficient equality: Worthwhile Activities

Wealth Form 1		**Wealth Form 2**		
Account	**Estimate**	**Account**	**Estimate**	**Wald Test**
Current Account Assets	0.026 *** (0.00)	Residence Asset	0.015 *** (0.00)	χ^2 (1, N = 44,417) = 4.76, p = 0.03) *
Current Account Assets	0.025 *** (0.00)	Pension Wealth	0.012 *** (0.00)	χ^2 (1, N = 44,303) = 6.61, p = 0.01) *
Current Account Assets	0.026 *** (0.00)	Other Financial Assets	0.015 *** (0.00)	χ^2 (1, N = 42,798) = 4.15, p = 0.04) *
Residence Asset	0.015 *** (0.00)	Pension Wealth	0.011 *** (0.00)	χ^2 (1, N = 42,352) = 1.51, p = 0.22)
Current Account Assets	0.025 *** (0.00)	Savings Account	0.015 *** (0.00)	χ^2 (1, N = 40,484) = 3.61, p = 0.06) .
Residence Asset	0.016 *** (0.00)	Other Financial Assets	0.013 *** (0.00)	χ^2 (1, N = 40,846) = 0.69, p = 0.41)
Other Financial Assets	0.013 *** (0.00)	Pension Wealth	0.013 *** (0.00)	χ^2 (1, N = 40,370) = 0.02, p = 0.89)
Residence Asset	0.014 *** (0.00)	Savings Account	0.014 *** (0.00)	χ^2 (1, N = 37,711) = 0.01, p = 0.91)
Pension Wealth	0.014 *** (0.00)	Savings Account	0.013 *** (0.00)	χ^2 (1, N = 37,648) = 0.06, p = 0.81)
Savings Account	0.014 *** (0.00)	Other Financial Assets	0.014 *** (0.00)	χ^2 (1, N = 35,843) = 0.01, p = 0.93)
Current Account Assets	0.027 ** (0.01)	Other Real Estate Assets	0.004 (0.00)	χ^2 (1, N = 12,118) = 6.04, p = 0.01) *
Residence Asset	0.02 *** (0.01)	Other Real Estate Assets	0.002 (0.00)	χ^2 (1, N = 10,955) = 7.71, p = 0.01) **
Pension Wealth	0.02 *** (0.00)	Other Real Estate Assets	0.002 (0.00)	χ^2 (1, N = 10,860) = 8.81, p = 0.00) **
Other Financial Assets	0.016 ** (0.00)	Other Real Estate Assets	0.003 (0.00)	χ^2 (1, N = 10,423) = 3.71, p = 0.05) .
Savings Account	0.016 ** (0.01)	Other Real Estate Assets	0.001 (0.00)	χ^2 (1, N = 9,238) = 4.4, p = 0.04) *
Current Account Debt	-0.01 (0.01)	Other Financial Debt	-0.001 (0.01)	χ^2 (1, N = 7,103) = 0.3, p = 0.58)
Current Account Debt	-0.016 (0.01)	Residence Mortgage	0.003 (0.01)	χ^2 (1, N = 5,052) = 1.24, p = 0.27)
Other Real Estate Debt	0.016 (0.02)	Other Financial Debt	-0.01 (0.01)	χ^2 (1, N = 1,668) = 1.15, p = 0.28)
Student Loans	0.036 * (0.02)	Other Financial Debt	-0.026 (0.02)	χ^2 (1, N = 1,102) = 4.04, p = 0.04) *
Student Loans	0.017 (0.01)	Residence Mortgage	-0.007 (0.01)	χ^2 (1, N = 1,023) = 0.91, p = 0.34)
Student Loans	0.05 (0.03)	Current Account Debt	-0.004 (0.05)	χ^2 (1, N = 431) = 0.46, p = 0.50)
Current Account Debt	-0.123 * (0.06)	Other Real Estate Debt	0.034 (0.04)	χ^2 (1, N = 395) = 3.23, p = 0.07) .
Student Loans	0.096 (0.15)	Other Real Estate Debt	-0.062 (0.14)	χ^2 (1, N = 84) = 0.34, p = 0.56)

Significance: *** p $\leq$ 0.001; **p $\leq$ 0.01; * p $\leq$ 0.05; . p $\leq$ 0.10.
Standard errors in parentheses.

Table 2.3: Testing differences using Wald tests of coefficient equality: Happiness

Wealth Form 1		**Wealth Form 2**		
Account	**Estimate**	**Account**	**Estimate**	**Wald Test**
Current Account Assets	0.043 *** (0.01)	Residence Asset	0.02 *** (0.00)	χ^2 (1, N = 44,558) = 14.4, p = 0.00) ***
Current Account Assets	0.045 *** (0.01)	Pension Wealth	0.01 *** (0.00)	χ^2 (1, N = 44,438) = 34.08, p = 0.00) ***
Current Account Assets	0.046 *** (0.01)	Other Financial Assets	0.018 *** (0.00)	χ^2 (1, N = 42,925) = 18.71, p = 0.00) ***
Residence Asset	0.019 *** (0.00)	Pension Wealth	0.009 *** (0.00)	χ^2 (1, N = 42,480) = 6.23, p = 0.01) *
Current Account Assets	0.046 *** (0.01)	Savings Account	0.014 *** (0.00)	χ^2 (1, N = 40,610) = 26.68, p = 0.00) ***
Residence Asset	0.02 *** (0.00)	Other Financial Assets	0.018 *** (0.00)	χ^2 (1, N = 40,965) = 0.23, p = 0.63)
Other Financial Assets	0.018 *** (0.00)	Pension Wealth	0.009 *** (0.00)	χ^2 (1, N = 40,487) = 5.03, p = 0.02) *
Residence Asset	0.018 *** (0.00)	Savings Account	0.015 *** (0.00)	χ^2 (1, N = 37,819) = 0.52, p = 0.47)
Savings Account	0.014 *** (0.00)	Pension Wealth	0.011 *** (0.00)	χ^2 (1, N = 37,759) = 0.54, p = 0.46)
Other Financial Assets	0.017 *** (0.00)	Savings Account	0.013 *** (0.00)	χ^2 (1, N = 35,952) = 0.44, p = 0.51)
Residence Mortgage	-0.01 * (0.00)	Other Financial Debt	-0.016 ** (0.01)	χ^2 (1, N = 15,670) = 0.66, p = 0.42)
Current Account Assets	0.047 *** (0.01)	Other Real Estate Assets	0.005 (0.00)	χ^2 (1, N = 12,143) = 14.08, p = 0.00) ***
Residence Asset	0.018 ** (0.01)	Other Real Estate Assets	0.004 (0.00)	χ^2 (1, N = 10,979) = 3.69, p = 0.05) .
Pension Wealth	0.008 . (0.01)	Other Real Estate Assets	0.003 (0.00)	χ^2 (1, N = 10,884) = 0.58, p = 0.44)
Other Financial Assets	0.019 ** (0.01)	Other Real Estate Assets	0.003 (0.00)	χ^2 (1, N = 10,441) = 4.2, p = 0.04) *
Other Financial Debt	-0.021 * (0.01)	Current Account Debt	0.005 (0.01)	χ^2 (1, N = 7,131) = 1.62, p = 0.20)
Residence Mortgage	-0.014 . (0.01)	Current Account Debt	-0.006 (0.02)	χ^2 (1, N = 5,063) = 0.17, p = 0.68)
Residence Mortgage	-0.011 (0.01)	Other Real Estate Debt	-0.006 (0.02)	χ^2 (1, N = 2,153) = 0.04, p = 0.85)
Other Financial Debt	-0.02 (0.02)	Other Real Estate Debt	0.008 (0.02)	χ^2 (1, N = 1,669) = 0.9, p = 0.34)
Student Loans	0.025 (0.02)	Other Financial Debt	-0.022 (0.02)	χ^2 (1, N = 1,105) = 1.75, p = 0.19)
Residence Mortgage	-0.009 (0.02)	Student Loans	-0.006 (0.02)	χ^2 (1, N = 1,024) = 0.01, p = 0.93)
Student Loans	0.068 (0.05)	Current Account Debt	-0.065 (0.07)	χ^2 (1, N = 431) = 1.46, p = 0.23)
Current Account Debt	-0.107 (0.07)	Other Real Estate Debt	0.076 (0.05)	χ^2 (1, N = 395) = 2.9, p = 0.09) .
Other Real Estate Debt	0.193 (0.15)	Student Loans	-0.199 (0.15)	χ^2 (1, N = 84) = 2.02, p = 0.15)

Significance: *** p $\leq$ 0.001; **p $\leq$ 0.01; * p $\leq$ 0.05; . p $\leq$ 0.10.
Standard errors in parentheses.

Table 2.4: Testing differences using Wald tests of coefficient equality: Anxiety

Wealth Form 1		**Wealth Form 2**		
Account	**Estimate**	**Account**	**Estimate**	**Wald Test**
Current Account Assets	-0.045 *** (0.01)	Residence Asset	-0.022 *** (0.00)	χ^2 (1, N = 44,538) = 8.33, p = 0.00) **
Current Account Assets	-0.049 *** (0.01)	Pension Wealth	-0.017 *** (0.00)	χ^2 (1, N = 44,417) = 16.08, p = 0.00) ***
Current Account Assets	-0.05 *** (0.01)	Other Financial Assets	-0.003 (0.00)	χ^2 (1, N = 42,905) = 29.88, p = 0.00) ***
Residence Asset	-0.023 *** (0.00)	Pension Wealth	-0.015 *** (0.00)	χ^2 (1, N = 42,460) = 2.39, p = 0.12)
Current Account Assets	-0.047 *** (0.01)	Savings Account	-0.005 (0.00)	χ^2 (1, N = 40,597) = 24.29, p = 0.00) ***
Residence Asset	-0.02 *** (0.00)	Other Financial Assets	-0.002 (0.00)	χ^2 (1, N = 40,945) = 9.46, p = 0.00) **
Pension Wealth	-0.016 *** (0.00)	Other Financial Assets	-0.002 (0.00)	χ^2 (1, N = 40,469) = 6.17, p = 0.01) *
Residence Asset	-0.02 *** (0.00)	Savings Account	-0.006 (0.00)	χ^2 (1, N = 37,808) = 6.22, p = 0.01) *
Pension Wealth	-0.016 *** (0.00)	Savings Account	-0.006 . (0.00)	χ^2 (1, N = 37,747) = 3.34, p = 0.07) .
Savings Account	-0.003 (0.00)	Other Financial Assets	-0.006 (0.00)	χ^2 (1, N = 35,938) = 0.14, p = 0.71)
Other Financial Debt	0.04 *** (0.01)	Residence Mortgage	0.006 (0.01)	χ^2 (1, N = 15,662) = 9.61, p = 0.00) **
Current Account Assets	-0.076 *** (0.01)	Other Real Estate Assets	0.002 (0.00)	χ^2 (1, N = 12,143) = 26.1, p = 0.00) ***
Residence Asset	-0.027 *** (0.01)	Other Real Estate Assets	0.004 (0.01)	χ^2 (1, N = 10,978) = 10.1, p = 0.00) **
Other Real Estate Assets	-0.001 (0.01)	Pension Wealth	-0.004 (0.01)	χ^2 (1, N = 10,882) = 0.09, p = 0.76)
Other Real Estate Assets	0.003 (0.01)	Other Financial Assets	-0.004 (0.01)	χ^2 (1, N = 10,441) = 0.46, p = 0.50)
Savings Account	-0.015 . (0.01)	Other Real Estate Assets	0.004 (0.01)	χ^2 (1, N = 9,255) = 2.59, p = 0.11)
Other Financial Debt	0.066 *** (0.01)	Current Account Debt	-0.007 (0.02)	χ^2 (1, N = 7,124) = 7.92, p = 0.00) **
Current Account Debt	0.045 * (0.02)	Residence Mortgage	0.011 (0.01)	χ^2 (1, N = 5,061) = 1.5, p = 0.22)
Residence Mortgage	0.05 ** (0.02)	Other Real Estate Debt	0.035 (0.03)	χ^2 (1, N = 2,153) = 0.18, p = 0.67)
Other Financial Debt	0.052 * (0.02)	Other Real Estate Debt	0.017 (0.03)	χ^2 (1, N = 1,669) = 0.61, p = 0.43)
Other Financial Debt	0.048 . (0.03)	Student Loans	0.02 (0.02)	χ^2 (1, N = 1,103) = 0.39, p = 0.53)
Student Loans	0.024 (0.02)	Residence Mortgage	-0.001 (0.02)	χ^2 (1, N = 1,024) = 0.37, p = 0.55)
Current Account Debt	0.077 (0.10)	Student Loans	-0.032 (0.07)	χ^2 (1, N = 430) = 0.49, p = 0.48)
Current Account Debt	0.105 (0.09)	Other Real Estate Debt	-0.009 (0.07)	χ^2 (1, N = 395) = 0.64, p = 0.42)
Other Real Estate Debt	0.133 (0.18)	Student Loans	0.061 (0.17)	χ^2 (1, N = 84) = 0.05, p = 0.82)

Significance: *** p $\leq$ 0.001; **p $\leq$ 0.01; * p $\leq$ 0.05; . p $\leq$ 0.10.
Standard errors in parentheses.

Table 2.5: Summary of differences between asset types. Presence of a letter indicates that the row asset has a larger effect than the column asset for that type of well-being.

	Current Account Assets	Savings Account	Other Financial Assets	Residence Asset	Other Real Estate Assets	Pension Weath
Current Account Assets	-	SHA	SWHA	SWHA	SWHA	SWHA
Savings Account		-			S	
Other Financial Assets			-		SH	SH
Residence Asset		A	A	-	SWA	SH
Other Real Estate Assets					-	
Pension Weath			A		W	-

Table 2.6: Debts: Summary of coefficient equality tests. Presence of a letter indicates that the row debt has a larger effect than the column debt for that type of well-being i.e. that these assets are nonfungible with respect to this type of well-being.

	Current Account Debt	Other Financial Debt	Residence Mortgage	Other Real Estate Debt	Students Loans
Current Account Debt	-				
Other Financial Debt	A	-	A		
Residence Mortgage			-		
Other Real Estate Debt				-	
Students Loans		S† W†			-

† Coefficients are opposite signs.

the next most liquid asset, savings account balances, for the evaluative and experienced SWB measures examined here.

Loss aversion would suggest that debts should have a larger detrimental effect on SWB than the beneficial impact of assets. Here we find the opposite to be the case, but only for life satisfaction, where the positive impact of total assets is significantly larger in size than the negative impact of total debts. For all other domains of SWB the effects of assets and debts are approximately equal and opposite.

We find that wealth's relationship with SWB also depends on the dimension of SWB being investigated. Evaluative SWB is more strongly related to total wealth than positive affect and euadaimonic SWB are, but this difference is driven by the effect of assets and not debts.

2.6.2 Relation to Previous Research

The key finding that emerges from the research reported here is that money held in current account assets has a uniquely large impact on SWB. The present study supports the findings of Ruberton et al. (2016) and Wang et al. (2019) in that we find liquid wealth (current account assets and savings account assets) has a positive association with life satisfaction. Our findings build on those of their study by showing that the effect of current account assets is significantly larger than the effect of savings account balances. This is consistent with the suggestion that moving money from a current account to a savings account

might result in pain of payment due to reduced financial slack, despite the total amount of liquid wealth not changing (Pomerance, 2020). Further, we show that current account assets have a stronger overall relationship with SWB than all the other asset classes examined here, but this is not true for savings account balances. Both of these prior studies group current account assets and savings account balances together to form liquid wealth. Therefore, our results suggest that these prior findings are likely to be mostly driven by the effect of current account balances. Consequently, we can conclude that it is not only the liquidity of assets that matters; it also matters where that liquidity is being kept.

Another conclusion of these results is that the positive relationship between life satisfaction and total assets is larger than the negative relationship between life satisfaction and total debt. This is the opposite of what we might expect given behavioural effects of loss aversion and debt aversion. Perhaps this is due to framing debts not as debts but 'mortgages' or 'overdrafts', or because student loan debts act more as a tax than as a debt, and as such partially subdues the impact of these debts on SWB.

When assets and debts are divided into smaller constituent components, further differences in SWB-wealth relationships are identified. Life satisfaction is found to be related to a larger number of asset and debt classes than the other SWB measures. In the only prior study to take a similar approach to the present research, Headey and Wooden (2005) find that home value, business value and bank accounts are positively associated with life satisfaction, while credit card debt and other debt are negatively related. These results are broadly in line with our findings, however, we also find that other financial assets and pension wealth are also positively related to life satisfaction. Unsecured debt (other financial debt) had a detrimental effect on life satisfaction, happiness and anxiety, but contrary to previous research, greater secured debt (mortgage debt) was also associated with detrimental effects for these three SWB measures. In line with Wang et al. (2019), we find that housing wealth is related to life satisfaction, and also that it is associated with lower levels of anxiety. However, this effect is limited to the value of the house that is lived in; the value of other real estate assets had no significant effect on any dimension of SWB, and its estimated relationships with SWB were dominated by every other asset class examined here for at least one of the SWB measures.

Other financial debt had a larger detrimental association with anxiety than did current account debt. This result is surprising as current account debt is the negative counterpart to current account assets, the asset class with the largest SWB effect. It is even more surprising given that debt aversion suggests that the negative effect of debt should be larger than the positive effect of its asset counterpart. However, in the UK current account debt is typically

framed as an 'overdraft'. Perhaps this framing diminishes the debt aversion effect, as occurs when a loan is framed as a contract (Caetano et al., 2019). Other financial debt might have higher interest rates than current account debt, which sometimes is interest free up to a limit, and thereby must be paid off more urgently, resulting in greater reductions in consumption expenditure.

Our evidence also suggests that net wealth is more strongly related to life satisfaction than to happiness and worthwhile activities, and that this relationship is driven by SWB's relationship with total asset value. When net wealth is divided into assets and debts, the beneficial effect of total assets on life satisfaction is also larger than their effect on anxiety. This is evidence of what has been called the "cognitive-affective divergence", where associations between a certain outcome (here, wealth) and evaluative well-being (here measured by life satisfaction) are different to the associations between that outcome and experienced SWB (here measured by experienced happiness or anxiety) Haybron (2008a, 84). Studies using longitudinal data have produced similar results for income (Kahneman and Deaton, 2010; Killingsworth, 2021) and consumption (Tsurumi et al., 2021); while some cross-sectional evidence has indicated this divergence also applies to wealth (Jantsch and Veenhoven, 2019). This study confirms the existence of divergence using longitudinal data and controlling for observed heterogeneity. These findings highlight the importance of investigating the relationships between objective outcomes and several categories of SWB. They also support the suggestion that evaluative well-being may have a bias towards an economic frame (White, 2016) and that taking life satisfaction to adequately reflect SWB as a whole may lead to policy outcomes biased towards economic outcomes at the expense of other concerns.

2.6.3 Limitations

Though the majority of WAS wealth measures are collected at an individual level, a limitation is that some wealth classes are collected at the household level and apportioned equally among the relevant household members (residence asset, residence mortgage, possession wealth, endowment policies). An implication of this is that our analysis assumes that household members' SWB is equally benefited by these shared assets and debts, when this may not be the case (Brulé and Suter, 2019). Additionally, where the exact value of a form of wealth is not known, the WAS asks participants to provided a bounded estimate (e.g., £0 to £100, £101 to £500, and so on). Imputation is used to estimate missing data in the WAS, details of which can be found in the WAS User Guide (Office for National Statistics, 2019).

A further limitation of the WAS is that it did not collect information on the amount of money held in physical cash. We might expect the SWB effect

of physical cash to be the largest as it is the most liquid possible asset.

There is a range of evidence which suggests poverty causes mental ill-health, and also that mental ill-health has a causal impact on poverty (Ridley et al., 2020). A similar bidirectional relationship has been posited for wealth and SWB (Jantsch and Veenhoven, 2019), and emotions have been shown to influence economic decisions (Lerner et al., 2004) and how money is perceived and used (Levav and Mcgraw, 2009; Tykocinski and Pittman, 2013). Though we have not established a direction of casuality, here we show that the wealth-SWB relationship depends both on the form of wealth and the type of SWB.

2.6.4 Implications for Research and Policy

Our findings have implications for designers of financial products. Current account assets and savings accounts are similar products, so much so that they are typically grouped together in many empirical investigations. Nonetheless, a statistically significant difference in their associations is found for evaluative and experienced well-being. This may be due to current account balances being more liquid, being checked more frequently and more recently, being associated with different mental accounts, or typically being smaller. Further research will be required to determine which of these are the relevant factors. However, we tentatively suggest the SWB impact of savings and investment values might be increased by making the checking of their current value as easy and as simple as checking the balance of a current account. An application which tracks the value of all of one's assets and debts could increase the connection between some forms of wealth and SWB. This could incentivise investment, as well as provide additional disincentive to take on debt, though care should be taken to avoid unintended consequences due to debt aversion. Making forms of wealth more liquid might also increase their SWB impact, though this could reduce amount saved/invested as expenditure from them could become more tempting. Alternatively, financial products could be designed to help more illiquid accounts be taken into account when consumers estimate their financial slack.

Companies which advertise loans are required to detail a representative example of the offer, including rate of interest, fees, amount in credit, the representative annual percentage rate (APR) and so on (Department for Business and Skills, 2010). However, our results show that the costs to taking on debt are not just financial. To ensure that consumers are fully informed, policy makers may wish to consider legislating such that loan providers have to provide an estimated increase in anxiety associated with their product.

Finally these results have implications for individuals who want to act rationally. Consumers should be informed of the disproportionate weight

current account balances have on their SWB, and take this into account when arranging their finances.

Chapter 3

Income Rank, Social Status, and Well-being

Abstract

Recent research has claimed that subjective well-being (SWB) is related not to income level but instead to the social status derived from the relative rank position of income level within a comparison group. These claims have significant implications for income redistribution policies. However, apparent effects of income rank could reflect a failure to control for unobserved individual differences (e.g. in social and/or human capital) that drive trends in both income and SWB. Moreover, it is unclear whether absolute level of income influences SWB above the effects of income rank. We use data from longitudinal surveys from four countries to estimate how income rank and income level relate to several measures of SWB, while modelling unobserved trends using fixed effects individual slopes. We find that income rank and income level both predict several measures of SWB and that a smaller number of SWB measures are predicted by income rank but not by income level. In contrast, emotional well-being, psychological distress and mental functioning are not related to income rank. We also find that for domains of SWB relating to income, pay and finances, using income rank rather than income level substantially improves model fit.

3.1 Introduction

Well-being is that which is good for a person (Tiberius, 2015). Subjective well-being (SWB) is how well a person's life is going from his or her own perspective. SWB measures can be grouped into three broad categories: *evaluative SWB* concerns an individual's evaluation of their life, or of a specific part of it; *experienced SWB* is the presence and intensity of mental states they experience; and *eudaimonic SWB* is the subjective assessment of possession of traits, capacities and other objective conditions needed for good psychological functioning (Dolan and Metcalfe, 2012). Each of these categories is valuable in of itself and therefore worthy of investigation (Seligman, 2018).

The possession of more material resources is associated with greater SWB (Tan et al., 2020). Income is also associated with SWB, but there is a lack of consensus about the mechanism by which a person's income affects their SWB. On one hand, as assumed by conventional economic approaches, higher incomes allow people to purchase more and higher quality goods and services, which should better satisfy their preferences and thereby increase their SWB. On the other hand, research in sociology and psychology has shown that people care about their social status, which also relates to SWB (Anderson et al., 2015).

A common measure of a person's status is the relative ranked position of his or her income compared to the incomes of a reference group. This indicates how many individuals are paid more than them and how many paid less. Consistent with a social status account, SWB is predicted better by income rank than by income level (Boyce et al., 2010) and people sometimes prefer to have higher incomes even if that means having a lower income in absolute terms (Tversky and Griffin, 2000). Some empirical studies have suggested that both rank of income and income level affect SWB - this is the *impure income rank hypothesis*, while the suggestion that only rank of income matters is known as the *pure income rank hypothesis* (FitzRoy and Nolan, 2021).

However, recent work by Collischon and Eberl (2021) has suggested that both variants of the income rank hypothesis may be incorrect. Among their important contributions is the first application of fixed effects individual slope (FEIS) models, that allow individual life trajectories to be estimated, to investigate the income rank hypothesis. Using work satisfaction as their measure of SWB, they find that once these trajectories are controlled for it is income level alone which relates to SWB. They explain this by suggesting the social capital possessed by a person drives both their future income and their future level of work satisfaction. Crucially, this explanation could also apply to other measures of SWB. Collischon and Eberl's work therefore challenges the validity of existing investigations into the income rank hypothesis that have not

controlled for individual differences in life trajectories. If previously reported rank effects are indeed spurious, our current understanding of the relationship between social status, relative deprivation and SWB will need to be revised. The present paper builds on Collischon and Eberl's work by applying and extending their rigorous methodological approach to test both the pure and impure income rank hypotheses using data from multiple countries and using multiple measures of SWB.

To foreshadow our results: as did Collischon and Eberl (2021), we find that the coefficients on income rank variables in FEIS models are typically smaller than those from FE models. However, we find that when FEIS are modelled, coefficients on income rank remain significant for several measures of SWB, with coefficients on both rank and income level being significant for some. Additionally, we find that choice of comparison group has little effect on model fit. We conclude that several measures of SWB are improved by both absolute value and rank position of personal income, and that, in the vast majority of cases, if a measure of SWB is influenced by an attribute of income, then it is influenced by rank. The measures of SWB that are predicted by income rank typically belong to the category of evaluative SWB, i.e. people's judgements of how satisfied they are with their lives or aspects of their lives. Evaluative SWB measures specifically concerning income, pay and finances exhibit the largest improvements in model fit when income rank is used instead of income level.

3.2 Theoretical Considerations

Money is a tool that allows for the purchasing of goods and services that satisfy basic human needs (Lea and Webley, 2006; Maslow, 1943). The degree to which a person's needs are satisfied affects their SWB (Tay and Diener, 2011). Moreover, the inability to meet basic needs gives rise to conditions of poverty. Being in poverty can reduce SWB and impair decision making which in turn reduces the ability to earn money, potentially leading to worsening conditions (Haushofer and Fehr, 2014; de Bruijn and Antonides, 2021). This reinforcing process has been called the 'psychological poverty trap' (Haushofer, 2019). However, income level may have only a small effect on SWB once basic needs are satisfied (Diener and Seligman, 2004; Di Tella and MacCulloch, 2010; Boyce et al., 2017). Furthermore, there is little evidence that income level has an effect on an individual's SWB once need satisfaction is controlled for (Tay and Diener, 2011) perhaps due to adaptation over time (Wolbring et al., 2013).

Some have theorised that relative income, not income level, is the relevant factor for economic decision making, self-evaluation and SWB. Veblen (1899) argued that the purpose of conspicuous consumption is not to acquire goods of

intrinsic value, but instead to demonstrate the possession of greater economic power than one's peers and thereby signal greater social status. Duesenberry (1949, 3) proposed the relative income hypothesis, that the percentage of income saved or spent by a family depends on the family's percentile position in a relative income distribution and not on their actual level of income. Hyman (1942) introduced the idea that when individual makes a self-evaluation they compare themselves against a 'reference group'; Stouffer (1949) extended this with his concept of relative deprivation, that a person's satisfaction will depend on the discrepancy between their social status and that of individuals in their reference group (Merton and Kitt, 1950). More recently, social rank theory has suggested that depression and anxiety may be the product of an evolved submissive strategy historically employed by those of low status to reduce within-group conflict for resources (Wetherall et al., 2015).

The pure rank hypothesis, proposed by Boyce et al. (2010), contends that the mechanism by which income influences SWB is limited to the effect of its relative rank position within a comparison group. In contrast, the impure income rank hypothesis also acknowledges a role for income level in determining a person's SWB. Under the pure rank hypothesis the pursuit of SWB through higher income is a zero sum, with any individual's gain in rank necessarily coming at the expense of another person (Layard, 1980). This helps account for the lack of evidence of a relationship between national SWB and national income over time, despite income being positively related to SWB at both the individual and national levels at a given time (Easterlin, 1974) (although see Stevenson and Wolfers, 2008). Another implication of the pure income rank hypothesis is that individuals with very low incomes would not experience any increase in their SWB from income gains from redistributive taxation and benefit policies, provided income rank positions are unchanged (FitzRoy and Nolan, 2021). In contrast, the impure rank hypothesis recognises the role of income level in determining SWB. Under this account the SWB that can be derived from income is not zero-sum, and it is therefore possible for public policy to improve aggregate SWB by redistributing income from the richest to the poorest.

3.3 Related Empirical Literature

Studies that investigate the role of income rank in determining SWB have typically analysed longitudinal data from national survey datasets. Some of these studies have concluded that only income rank, and not income level, determines SWB. This result has been found for measures reflecting several measures of SWB and well-being as more widely conceived. Specifically, the effect has been found for life satisfaction (Boyce et al., 2010; Brown et al.,

2017); for life evaluation and experienced well-being (Macchia et al., 2020); for satisfaction with influence, achievement and respect (Brown et al., 2008); for depressive symptoms (Hounkpatin et al., 2015); for suicidal thoughts and attempts (Wetherall et al., 2015); for psychological distress (Wood et al., 2012); and for self-rated health (Daly et al., 2015). These results are consistent with the pure income rank hypothesis.

Other research rejects the pure rank hypothesis, finding instead that both income rank and income level influence SWB. This too has been found for several measures of SWB, namely: global evaluative well-being (e.g., Budria, 2012; FitzRoy and Nolan, 2021; Acosta-González and Marcenaro-Gutiérrez, 2022; Lakshmanasamy and Maya, 2020); job satisfaction (Kifle, 2014); wage satisfaction (Brown et al., 2008); economic satisfaction (Clark et al., 2009) and psychological distress (Garratt et al., 2016). These findings are supported by results from choice experiments. When participants are asked to select between income levels within hypothetical distributions, their choices are influenced both by rank position and income level (Mujcic and Frijters, 2013). If, as this evidence indicates, the pure rank hypothesis is incorrect, then the implications depend upon the direction of the relationship between income level and SWB. Studies that reject the pure rank hypothesis typically find that income level has a beneficial effect on SWB over and above that of income rank (FitzRoy and Nolan, 2021; Acosta-González and Marcenaro-Gutiérrez, 2022; Clark et al., 2009; Kifle, 2014; Garratt et al., 2016).

Many of these longitudinal studies control for time-invariant unobserved heterogeneity using fixed effects (FE) analyses. In contrast to cross-sectional analyses, FE analyses exclude the possibility that results could be due to stable but unobserved factors, such as personality, that influence both SWB and income (Boyce, 2010). However, FE models cannot identify causal effects. This is partly because not all unobserved heterogeneity is stable over time. For example, if an individual's life trajectory influences both their income and their SWB, then a spurious relationship between these variables might be found. Therefore, the assumption of FE models that all individuals have identical life courses is, depending on the context, a potentially unrealistic assumption.

In contrast to FE, Fixed Effects Individual Slopes (FEIS) analyses allow for the modelling of a unique life course for each person (Wooldridge, 2010; Rüttenauer and Ludwig, 2020). Though FEIS models are also unable to identify causality, they allow for the exclusion of a larger number of alternative explanations that could potentially lead to spurious relationships being identified. For example, Ludwig and Brüderl (2018) use FEIS modelling to show that the earnings premium men apparently receive as a consequence of getting married is a statistical artefact produced by failing to control for idiosyncratic differences in slopes, and thereby not taking into account the fact that men on

steeper wage trajectories are also more likely to get married. FEIS modelling has also been used to control for trends in motivation, effort and human capital, which coincide with and influence wage growth (Polachek and Kim, 1994).

The problem of idiosyncratic life trajectories is relevant to the testing of the income rank hypotheses. Collischon and Eberl (2021) is the first study which employs FEIS techniques to test the income rank hypotheses using. They find that upon adapting their traditional FE models to account for individual slopes, the previously significant relationship between wage rank and job satisfaction[1] becomes insignificant, while the relationship between wage level (log-transformed) and job satisfaction remains significant. The authors argue that by failing to control for individual-specific trajectories, previous studies have overestimated the size and statistical significance of wage rank. They suggest several reasons why a life trajectory might have this effect. Firstly, individuals who have access to their parents' social network may find jobs that better match their characteristics, personality, skills and experience. Secondly, individuals who find jobs in these ways are more likely to view their job as a long-term investment and not just a way to earn money (Franzen, 2006). The authors contend that individuals endowed with social capital in this way are more likely to find jobs where income and job satisfaction are likely to increase in tandem. In addition to social capital, other forms of capital might influence the growth of both a person's income and their SWB (Polachek and Kim, 1994). For example, human capital, such as cognitive intelligence, intellectual knowledge, personality traits, skills and psychological capital, could also influence the jobs people have. Collischon and Eberl conclude that apparent rank effects are spurious, at least in the case of job satisfaction. It is plausible that this or other similar mechanisms could have driven results of prior studies which have affirmed the income rank hypotheses. For example, high levels of social, human and psychological capital might lead to a steep income trajectory as well as drive increasing levels of satisfaction with life.

This possibility is difficult to reconcile with a considerable range of studies which have found evidence of income rank effects using other methodologies. For example, rank of income is a significant factor in choice experiments (Mujcic and Frijters, 2013; Tversky and Griffin, 2000) and meta-analyses have concluded that socio-economic position contributes to SWB (Tan et al., 2020). Finally, numerous theories of subjective assessment, such as relative rank theory (Ronayne and Brown, 2017), decision by sampling (Stewart et al., 2006) and range-frequency theory (Parducci, 1965) accord a central role to the relative ranked position of the relevant quantity. Given the potentially significant

[1] Collischon and Eberl (2021) refer to job satisfaction, but this variable is listed as work satisfaction in the English SOEP documentation. The SOEP questionnaire uses the word 'arbeit'. This paper will also refer to this variable as job satisfaction, so as to distinguish it from satisfaction with the work *itself* (i.e. what they do), a variable from the HILDA.

and wide-ranging implications of the findings of Collischon and Eberl (2021), the present paper reports further investigations into the relationship between income and SWB using FEIS models.

3.4 Data

This study uses four longitudinal datasets: the German Socio-Economic Panel (GSOEP) (1994-2019), the Understanding Society Survey (USS) (2009-2019), the Household, Income and Labour Dynamics in Australia (HILDA) survey (2001-2019), and the Panel Study of Income Dynamics (PSID) (United States of America) (2001-2019). Testing the hypothesis in all of these countries is therefore better than doing so in just one, as consistency in results across countries indicates they are not the product of geographical or cultural idiosyncrasies.

Following the suggestion of FitzRoy and Nolan (2021), we investigate several domains of SWB. However, FEIS requires a number of time periods greater than the number of slope variables + 1. Consequently, only measures collected in five or more waves are considered; these are presented in Table 3.2. Individuals who respond to fewer than five survey waves are dropped for the FEIS analyses, resulting in a smaller sample than can be used in FE analyses. We restrict the sample to observations from waves where the participant is both over 18 and in employment. If an observation is missing data for income, tenure or age, it is not included in any analysis.

Rank transformations of variables reduce the impact of outliers and can thereby improve model fit (Hounkpatin et al., 2020). If outliers are not excluded then the significance of coefficient estimates for income rank may be artificially inflated by their presence, and consequently it would not be possible to determine whether the relationships identified reflected psychological phenomena or a methodological artefact. To account for this, zero and negative incomes are excluded, and following these exclusions the top and bottom percentiles are also excluded. Each analysis makes use of the waves where each SWB variable was included in the survey. Short summaries of the samples available for each SWB measure can be found in Appendix B. Correlations between income variables and between SWB variables can also be found in Appendix B.

Table 3.1 presents the number of waves, number of working adults, non-proxy observations and suitable SWB variables for each of the datasets. Most SWB variables were not included in all of a survey's waves (see Appendix B for which variables were available for each wave, and for a full description of each SWB measure). As Pfaff (2013) notes, the income measures used to estimate relative ranked position can influence results. Results for labour income may be different to those that would be found if household income were used instead.

Equivalising income by household size, and the choice of time period used as a reference point, can also change conclusions. To allow for comparison across datasets, this study uses participants' own gross labour income as their income level and to calculate their relative ranked position, though we note that there are differences between surveys in the time periods the participants are asked to consider.

Table 3.1: Summary of each dataset.

Dataset	Waves	Working Adults	Observations	WB Measures	Income Measure
GSOEP	36	65,233	393,108	6	Own gross labour income from the previous month (euros).
USS	9	54,561	228,219	5	Own gross monthly labour income (British pounds).
HILDA	19	24,043	175,948	10	Financial year gross wages & salary (Australian dollars).
PSID	6	7,579	29,163	2	Own gross labour income from previous year (US dollars).

Standard errors in parentheses.

3.5 Analytical Strategy

3.5.1 Main Analysis: Do rank effects survive FEIS?

In this section of the analysis we follow Collischon and Eberl (2021) and estimate a FE model for each measure of SWB, controlling for age, age squared, tenure and other demographic variables. The functional form of these FE models is given in Equation 3.1. Rank of income and log-transformed income level enter the equation together. Here, and for all subsequent analyses, all SWB variables are standardised to mean 0 and variance 1 to aid comparison between SWB variables on different scales.

$$W_{it} = \alpha_i + \beta_1 IncomeRank_{it} + \beta_2 ln(IncomeLevel_{it}) + \beta_3 age_{it} + \beta_4 age_{it}^2 + \beta_5 tenure_{it} + \delta X'_{it} + \epsilon_{it} \quad (3.1)$$

W represents the SWB variable, β_1 is the effect of income rank and β_2 is the effect of log-transformed income level. α represents time-invariant FE. Following Collischon and Eberl (2021), we include age, age squared and tenure as control variables in the FE models, and as individual specific slopes in the FEIS models. Relative rank of income is estimated as in Brown et al. (2008):

$$IncomeRank_{i,t} = \frac{(k-1)}{N-1} \quad (3.2)$$

where k is the number of other respondents in wave t who report an income less than that of respondent i, and N is the total number of respondents in wave t. X is a vector of control variables, consisting of: sex, marital status, health, education, ethnicity/nationality, number of children, main activity,

Table 3.2: Well-Being Variable Descriptions

Dataset	Description	Responses	Category
GSOEP	Satisfaction with work	Completely dissatisfied 0 - Completely satisfied 10	Evaluative
GSOEP	Satisfaction with household income	Completely dissatisfied 0 - Completely satisfied 10	Evaluative
GSOEP	Satisfaction with personal income	Completely dissatisfied 0 - Completely satisfied 10	Evaluative
GSOEP	How satisfied are you with your life, all things considered?	Completely dissatisfied 0 - Completely satisfied 10	Evaluative
GSOEP	How often you experienced this feeling in the last four weeks. How often have you felt angry?	Very rarely 1 - Very often 5	Experienced
GSOEP	How often have you felt worried?	Very rarely 1 - Very often 5	Experienced
GSOEP	How often have you felt sad?	Very rarely 1 - Very often 5	Experienced
GSOEP	How often have you felt happy?	Very rarely 1 - Very often 5	Experienced
USS	Satisfaction with life overall.	Completely dissatisfied 1 - Completely satisfied 7	Evaluative
USS	Satisfaction with income of your household.	Completely dissatisfied 1 - Completely satisfied 7	Evaluative
USS	Satisfaction with job	Completely dissatisfied 1 - Completely satisfied 7	Evaluative
USS	Psychological Distress	The General Health Questionnaire-12 (GHQ-12). Least distressed 0 - Most distressed 36	Experienced and Eudaimonic
USS	Mental Functioning	Mental component summary of the Short-Form 12 Health Survey. Low functioning 0 - High functioning 100	Experienced and Eudaimonic
HILDA	Mental Functioning	Mental component summary of the Short-Form 36 Health Survey. Least distressed 0 - Most distressed 100	Experienced and Eudaimonic
HILDA	Satisfaction with life	Totally dissatisfied 1 - Totally satisfied 10	Evaluative
HILDA	Satisfaction with employment opportunities	Totally dissatisfied 1 - Totally satisfied 10	Evaluative
HILDA	Satisfaction with financial situation	Totally dissatisfied 1 - Totally satisfied 10	Evaluative
HILDA	Satisfaction with total pay	Totally dissatisfied 1 - Totally satisfied 10	Evaluative
HILDA	Satisfaction with job security	Totally dissatisfied 1 - Totally satisfied 10	Evaluative
HILDA	Satisfaction with the work itself	Totally dissatisfied 1 - Totally satisfied 10	Evaluative
HILDA	Satisfaction with hours worked	Totally dissatisfied 1 - Totally satisfied 10	Evaluative
HILDA	Satisfaction with flexibility to balance work and non-work commitments	Totally dissatisfied 1 - Totally satisfied 10	Evaluative
HILDA	Satisfaction with job overall	Totally dissatisfied 1 - Totally satisfied 10	Evaluative
PSID	Satisfaction with life	Completely satisfied 1 - Not at all satisfied 5 (Reversed)	Evaluative
PSID	Psychological Distress	Kessler-6 Scale. Least distressed 0 - Most distressed 24	Experienced

occupation, industry and region. Question and response levels vary for each dataset. Summary statistics for all variables used in these analyses, for each dataset, can be found in Appendix B. Here, and for all subsequent analyses, all SWB variables are standardised to mean 0 and variance 1 to aid comparison between SWB variables on different scales. Robust standard errors are used in all analyses.

We also estimate a FEIS model for each measure of SWB. This model is as specified by Equation 3.1, except that the coefficients on age, age squared and tenure are estimated for each participant so as to control for the idiosyncratic effects of these variables.

$$W_{it} = \alpha_{1i} + \alpha_{2i} age_{it} + \alpha_{3i} age_{it}^2 + \alpha_{4i} tenure_{it} + \beta_1 IncomeRank_{it} + \beta_2 ln(income_{it}) + \delta X'_{it} + \epsilon_{it} \quad (3.3)$$

3.5.2 How much does rank of income improve model fit?

A problem that has been frequently identified by prior research is the high degree of correlation between income level and income rank (Gravelle and Sutton, 2009). Hounkpatin et al. (2015) suggest assessing whether there is an income rank effect above and beyond that of income level by comparing the model fit of rival specifications. Therefore, in this second analysis, relative rank of income and income level enter the above regression specifications one at a time. Specifically, FE and FEIS models are estimated where β_1 is set to 0 and another is estimated where β_2 is set to 0. The R^2 is recorded for each SWB measure and rank measure pair to determine whether rank of income or income level provides the best model fit.

3.5.3 Does choice of comparison group influence model fit?

In the final part of the analysis, rank of income is computed using the comparison groups used by Boyce et al. (2010). These are: region; gender and education; and age group. Relative rank of income is calculated as in Equation 3.2, but k and N are calculated using respondents in the same comparison group as the respondent in wave t, rather than all respondents in t. R^2 values are compared for each to determine whether the use of comparison groups is warranted when estimating the relationship between a SWB measure and rank of income. Missing values in comparison group variables and small numbers in groups result in some observations being dropped. The number of dropped observations for each comparison group for each dataset can be found in Appendix B. A common sample is required in order to compare R^2 values and so the analysis is restricted to observations where it is possible to calculate a rank variable for all the comparison groups used in Boyce et al. (2010).

3.6 Results

3.6.1 Main Analysis: Do rank effects survive FEIS?

Table 3.3 presents the results for our main analysis. Each row of the table details the results from a separate model. The second column indicates the SWB variable (i.e., the dependent measure for that model). The third and fourth columns present the coefficients for income level and income rank obtained from the FE models. The sixth and seventh columns present the coefficients obtained from the FEIS models. The fifth column displays the number of observations and participants used in the FE analyses and the eighth column displays the corresponding figures for the FEIS analyses. In this section we summarise results relevant to the first key question outlined in the introduction: does relative rank of income affect SWB even when FEIS are accounted for? Evidence from three of the four datasets suggests that rank effects do indeed survive FEIS for many of the SWB variables examined here, including most of those concerned with evaluation of life as a whole and evaluation of personal economic and financial situations. Thus in the FEIS analyses of the GSOEP, income rank was found to significantly predict all the satisfaction variables, but none of the experienced emotion variables. In the FEIS analyses of the USS, rank of income only predicted income satisfaction. In the FEIS analyses of the HILDA data, rank of income was significantly and positively associated with satisfaction with pay, finances and life. The FEIS coefficient on rank of income for satisfaction with hours worked was negative and statistically significant. In the FEIS models for the PSID, income rank predicted neither life satisfaction nor psychological distress.

All the measures of SWB that were predicted by income rank in the FEIS models were also predicted by income rank in the FE models. However, reflecting the more conservative and data-demanding nature of FEIS modelling, some other measures of SWB were only predicted by income rank in the FE analyses. These were sadness in the GSOEP; job satisfaction and psychological distress in the USS data; satisfaction with job, work, job security and employment opportunity in the HILDA data. Again, income rank did not predict either of the SWB variables in the PSID data.

We now consider the second key question: does income level also influence the measures of SWB predicted by income rank once FEIS are modelled? Here the pattern of results is mixed. Evidence from two of the four datasets indicates that income level, in addition to income rank, is related to SWB, for at least three measures of SWB. In the FEIS analyses of the GSOEP, income level was positively and significantly related to satisfaction with own income, household income and work and life overall. In the FEIS analyses of the USS

data, income level predicted only psychological distress. In both the FE and FEIS models for the PSID, however, income level did not predict any SWB measures.

We also examined whether any aspects of SWB were influenced only by income level (i.e., not by rank of income). Strikingly, this pattern occurred with only two variables when FEIS were accounted for (satisfaction with employment opportunities in the HILDA data and psychological distress in the USS). This pattern occurred once in the FE models - for worry in the GSOEP data.

Finally, we examined whether any SWB variables were influenced by neither income rank nor income level. In the more conservative FEIS models this was the case for all the experienced emotion variables in the GSOEP; mental functioning and job and life satisfaction in the USS; mental functioning and satisfaction with job, job security, worklife balance and employment opportunities in the HILDA data; and psychological distress and life satisfaction in the PSID. Unsurprisingly, this pattern occurred fewer times in the FE models. Specifically, it was only seen for anger and happiness in the GSOEP; mental functioning in the USS and HILDA datasets; satisfaction with worklife balance in the HILDA data; and psychological distress and life satisfaction in the PSID.

3.6.2 How much does rank of income improve model fit?

Table 3.4 presents the results from the second analysis. R^2 values are typically significantly lower for FEIS models compared to FE models, due to the discarding of the variance explained by the slope parameters, in addition to that explained by intercepts (Rüttenauer and Ludwig, 2020). For the majority of measures the changes in model fit from using Income Rank instead of Log Income are small, i.e. less then 1% in size for the FEIS models, and less than 2% in size for the FE models. The notable exception to this is for SWB measures which concern Income, Pay or Finances, where Income Rank yielded larger increases in model fit. This pattern was found for both the FE and FEIS models, with the improvements found to be larger in the FE models than the FEIS models. The largest improvements in model fit are seen for Pay Satisfaction in the HILDA, with a 21% improvement in the FE specification and a 13% improvement in the FEIS specification.

3.6.3 Does choice of comparison group influence model fit?

Table 3.5 presents the results from the third analysis. Calculating Rank of Income based on a comparison group, rather than within survey wave, resulted in less than a 1.6% increase in model fit for all measures across all datasets and specifications. The largest increases in model fit was for satisfaction with income in the USS data, which was yielded by using Wave and Region as the

Table 3.3: Regression results for specification including both income level and income rank.

		Fixed Effects			FEIS		
Data	**Model**	**Income Level**	**Income Rank**	**Observations**	**Income Level**	**Income Rank**	**Observations**
GSOEP	Own Income Satisfaction	0.119 ***	0.929 ***	n = 196,014	0.136 ***	0.602 ***	n = 141,986
		(0.01)	(0.03)	i = 42,859	(0.03)	(0.07)	i = 16,139
GSOEP	Household Income Satisfaction	0.009	0.781 ***	n = 286,671	0.058 ***	0.553 ***	n = 227,075
		(0.01)	(0.02)	i = 51,088	(0.02)	(0.05)	i = 21,611
GSOEP	Work Satisfaction	0.025 *	0.318 ***	n = 282,290	0.073 ***	0.178 ***	n = 223,230
		(0.01)	(0.03)	i = 50,437	(0.02)	(0.05)	i = 21,327
GSOEP	Life Satisfaction	0.020 *	0.240 ***	n = 293,543	0.043 **	0.132 **	n = 230,104
		(0.01)	(0.03)	i = 53,935	(0.02)	(0.04)	i = 21,956
GSOEP	Happiness (Last 4 Weeks)	0.017	0.083 .	n = 160,198	0.021	0.029	n = 111,961
		(0.01)	(0.05)	i = 37,096	(0.03)	(0.09)	i = 13,816
GSOEP	Worry (Last 4 Weeks)	-0.031 *	-0.067	n = 160,106	-0.016	0.004	n = 111,888
		(0.02)	(0.05)	i = 37,092	(0.03)	(0.09)	i = 13,812
GSOEP	Anger (Last 4 Weeks)	-0.015	-0.007	n = 160,263	0.008	0.002	n = 112,037
		(0.02)	(0.05)	i = 37,100	(0.03)	(0.09)	i = 13,823
GSOEP	Sadness (Last 4 Weeks)	0.000	-0.102 *	n = 160,174	-0.012	-0.034	n = 111,939
		(0.02)	(0.05)	i = 37,095	(0.03)	(0.10)	i = 13,813
USS	Satisfaction with Income	-0.124 ***	0.928 ***	n = 218,429	-0.063 .	0.655 ***	n = 161,549
		(0.02)	(0.06)	i = 48,458	(0.03)	(0.09)	i = 20,427
USS	Psychological Distress	-0.213 ***	0.483 **	n = 219,931	-0.226 *	0.500 .	n = 162,463
		(0.06)	(0.19)	i = 49,046	(0.10)	(0.29)	i = 20,615
USS	Life Satisfaction	-0.001	0.130 *	n = 218,473	0.005	0.101	n = 161,584
		(0.02)	(0.05)	i = 48,483	(0.03)	(0.09)	i = 20,435
USS	Satisfaction with Present Job	-0.059 **	0.246 ***	n = 222,269	0.016	0.046	n = 163,940
		(0.02)	(0.06)	i = 49,862	(0.03)	(0.08)	i = 20,688
USS	Mental Functioning	0.106	-0.227	n = 219,855	0.146	-0.319	n = 161,683
		(0.12)	(0.33)	i = 49,686	(0.17)	(0.49)	i = 20,463
HILDA	Pay Satisfaction	-0.135 ***	0.933 ***	n = 155,445	-0.055 **	0.462 ***	n = 134,141
		(0.01)	(0.04)	i = 22,729	(0.02)	(0.05)	i = 12,274
HILDA	Finances Satisfaction	-0.030 **	0.433 ***	n = 155,533	-0.008	0.266 ***	n = 134,226
		(0.01)	(0.03)	i = 22,736	(0.01)	(0.04)	i = 12,279
HILDA	Life Satisfaction	-0.030 **	0.165 ***	n = 155,524	-0.013	0.088 *	n = 134,200
		(0.01)	(0.03)	i = 22,735	(0.01)	(0.04)	i = 12,275
HILDA	Work Satisfaction	-0.074 ***	0.127 ***	n = 155,534	-0.048 **	0.084 .	n = 134,212
		(0.01)	(0.03)	i = 22,738	(0.02)	(0.05)	i = 12,276
HILDA	Job Satisfaction	-0.069 ***	0.199 ***	n = 155,516	-0.016	0.026	n = 134,220
		(0.01)	(0.03)	i = 22,737	(0.02)	(0.05)	i = 12,280
HILDA	Job Security Satisfaction	-0.011	0.224 ***	n = 155,400	0.020	0.025	n = 134,114
		(0.01)	(0.04)	i = 22,722	(0.02)	(0.05)	i = 12,275
HILDA	Employment Opps Satisfaction	0.006	0.078 *	n = 153,556	0.026 .	-0.003	n = 132,263
		(0.01)	(0.03)	i = 22,609	(0.02)	(0.04)	i = 12,169
HILDA	Mental Functioning	-0.004	0.014	n = 139,506	0.025 .	-0.046	n = 118,416
		(0.01)	(0.03)	i = 21,528	(0.01)	(0.04)	i = 11,163
HILDA	Worklife Balance Satisfaction	0.005	-0.062 .	n = 155,435	0.008	-0.058	n = 134,137
		(0.01)	(0.03)	i = 22,732	(0.01)	(0.05)	i = 12,277
HILDA	Hours Worked Satisfaction	0.119 ***	-0.348 ***	n = 155,518	0.084 ***	-0.250 ***	n = 134,215
		(0.01)	(0.04)	i = 22,737	(0.02)	(0.05)	i = 12,280
PSID	Psychological Distress	-0.044	0.066	n = 27,343	-0.036	0.157	n = 16,924
		(0.03)	(0.09)	i = 7,334	(0.07)	(0.22)	i = 3,004
PSID	Life Satisfaction	-0.011	0.172 .	n = 27,349	0.009	0.116	n = 16,947
		(0.03)	(0.09)	i = 7,341	(0.08)	(0.24)	i = 3,010

Significance: *** $p \leq 0.001$; **$p \leq 0.01$; * $p \leq 0.05$; . $p \leq 0.10$.
Robust standard errors in parentheses.

Table 3.4: Model fit improvements for models using rank of income instead of income level.

		Fixed Effects			FEIS		
Data	**Model**	**Within R^2**	**Improvement**	**Coefficient**	**Within R^2**	**Improvement**	**Coefficient**
GSOEP	Household Income Satisfaction	0.0549	7.02%	0.811 *** (0.01)	0.0302	4.58%	0.693 *** (0.02)
GSOEP	Own Income Satisfaction	0.0761	4.75%	1.242 *** (0.02)	0.0356	1.97%	0.951 *** (0.03)
GSOEP	Life Satisfaction	0.0796	0.4%	0.294 *** (0.01)	0.0583	0%	0.234 *** (0.02)
GSOEP	Anger (Last 4 Weeks)	0.0267	-0.07%	-0.056 * (0.02)	0.0180	0%	0.023 (0.04)
GSOEP	Sadness (Last 4 Weeks)	0.0337	0.1%	-0.106 *** (0.02)	0.0293	-0.02%	-0.068 (0.04)
GSOEP	Happiness (Last 4 Weeks)	0.0300	0.08%	0.120 *** (0.02)	0.0262	-0.04%	0.084 * (0.04)
GSOEP	Worry (Last 4 Weeks)	0.0323	-0.05%	-0.150 *** (0.02)	0.0303	-0.05%	-0.038 (0.04)
GSOEP	Work Satisfaction	0.0496	0.85%	0.388 *** (0.01)	0.0252	-0.12%	0.347 *** (0.03)
USS	Satisfaction with Income	0.0395	3.76%	0.619 *** (0.03)	0.0112	5.5%	0.510 *** (0.04)
USS	Life Satisfaction	0.0272	0.23%	0.149 *** (0.02)	0.0138	0.17%	0.135 *** (0.03)
USS	Mental Functioning	0.0439	-0.01%	0.094 (0.14)	0.0186	-0.01%	0.029 (0.20)
USS	Satisfaction with Present Job	0.0221	0.33%	0.099 *** (0.02)	0.0137	-0.03%	0.095 ** (0.03)
USS	Psychological Distress	0.0487	-0.06%	-0.098 (0.08)	0.0325	-0.06%	-0.132 (0.11)
HILDA	Pay Satisfaction	0.0298	21.16%	0.580 *** (0.02)	0.0101	13.02%	0.320 *** (0.03)
HILDA	Finances Satisfaction	0.0564	3.5%	0.353 *** (0.02)	0.0271	2.25%	0.244 *** (0.02)
HILDA	Life Satisfaction	0.0400	0.55%	0.087 *** (0.02)	0.0230	0.23%	0.054 * (0.02)
HILDA	Worklife Balance Satisfaction	0.0483	0.07%	-0.049 ** (0.02)	0.0318	0.06%	-0.038 (0.02)
HILDA	Mental Functioning	0.0570	0%	0.004 (0.02)	0.0402	-0.08%	0.019 (0.02)
HILDA	Hours Worked Satisfaction	0.0348	-0.44%	-0.035 . (0.02)	0.0217	-0.13%	-0.028 (0.03)
HILDA	Job Security Satisfaction	0.0189	2.3%	0.194 *** (0.02)	0.0138	-0.13%	0.075 ** (0.03)
HILDA	Job Satisfaction	0.0177	-0.33%	0.019 (0.02)	0.0093	-0.14%	-0.016 (0.03)
HILDA	Employment Opps Satisfaction	0.0257	0.23%	0.093 *** (0.02)	0.0164	-0.3%	0.064 ** (0.02)
HILDA	Work Satisfaction	0.0257	-1.33%	-0.067 *** (0.02)	0.0125	-0.82%	-0.041 . (0.02)
PSID	Psychological Distress	0.0308	-0.37%	-0.055 (0.04)	0.0428	0.19%	0.068 (0.10)
PSID	Life Satisfaction	0.0342	0.57%	0.143 ** (0.04)	0.0378	-0.01%	0.143 (0.11)

The Within R^2 given is for Income Rank models.
The coefficient given is that on Income Rank.
Significance: *** p ≤ 0.001; **p ≤ 0.01; * p ≤ 0.05; . p ≤ 0.10.
Robust standard errors in parentheses.

reference group.

3.6.4 Robustness

In order to test the robustness, we repeated the main analysis with some modifications. Firstly, we repeated the analysis without dropping zeros and outliers, though any observations with negative incomes were still excluded in order to enable the log transform of the income variables.

When outliers were included, the pattern of results was similar for the GSOEP, HILDA and PSID datasets. For the FEIS models for these datasets, the omission or inclusion of outliers does not influence whether income rank is found to be a statistically significant predictor of the measures of SWB examined here. However, there were some measures of SWB for which the statistical significance of the coefficient on income level changed. Consequently, support for the pure or impure rank hypotheses can depend on the treatment of outliers. Inclusion of outliers influenced the results from FEIS USS models more substantially, with income rank being found to have a statistically significant association with life and job satisfaction. In these cases, the way outliers were handled determined whether the rank hypothesis was supported at all.

We repeated the analysis limiting the individual slope variables to participant age only. FEIS requires a number of time periods greater than the number of slope variables + 1. Therefore, the use of fewer individual slope variables allows more observations and participants to be included. In this case we find that income rank affects an even greater number of SWB variables for the USS and HILDA. This raises the possibility that the discarding of data required in order to include additional individual slope variables may be responsible for the prior finding that income rank does not predict job satisfaction in FEIS models (Collischon and Eberl, 2021). Similarly, for the USS and HILDA a greater number of SWB measures were predicted by income level, indicating that the use of more slope variables could also influence the type of income rank hypothesis supported.

We repeated our analysis of the GSOEP with the controls used by Collischon and Eberl (2021), specifically: whether the individual works for the public sector; the individual's experience of full and part time employment; and their experience of unemployment. Inclusion of these controls does not affect our conclusions.

Our analysis differs from that of Collischon and Eberl (2021) in that they constructed highly circumscribed comparison groups using industry, occupation and a variable for being in East or West Germany, dropping all observations from individuals who were allocated to groups smaller than 10. We found that the GSOEP industry and occupation variables had much larger proportions of

Table 3.5: Model fit improvements for comparison group rank instead of overall rank.

		Fixed Effects				FEIS			
Data	**Model**	**Comparison Group**	**Within R^2**	**Improvement**	**Income Rank**	**Comparison Group**	**Within R^2**	**Improvement**	**Income Rank**
GSOEP	Household Income Satisfaction	Wave and Region	0.0550	0.21%	0.801 *** (0.01)	Wave and Region	0.0305	0.93%	0.686 *** (0.02)
GSOEP	Own Income Satisfaction	Wave and Region	0.0763	0.32%	1.230 *** (0.02)	Wave and Region	0.0359	0.81%	0.941 *** (0.03)
GSOEP	Work Satisfaction	Wave and Region	0.0497	0.31%	0.392 *** (0.01)	Wave and Region	0.0253	0.37%	0.347 *** (0.03)
GSOEP	Happiness (Last 4 Weeks)	Wave	0.0300	0%	0.120 *** (0.02)	Wave, Gender and Education	0.0262	0.16%	0.086 ** (0.03)
GSOEP	Life Satisfaction	Wave	0.0796	0%	0.294 *** (0.01)	Wave and Region	0.0584	0.1%	0.235 *** (0.02)
GSOEP	Anger (Last 4 Weeks)	Wave and Region	0.0267	0.01%	-0.056 * (0.02)	Wave, Gender, Age and Education	0.0180	0.03%	0.024 (0.03)
GSOEP	Worry (Last 4 Weeks)	Wave	0.0323	0%	-0.150 *** (0.02)	Wave, Gender, Age and Education	0.0303	0.01%	-0.030 (0.03)
GSOEP	Sadness (Last 4 Weeks)	Wave	0.0337	0%	-0.106 *** (0.02)	Wave	0.0293	0%	-0.068 (0.04)
USS	Satisfaction with Income	Wave and Age	0.0397	0.32%	0.583 *** (0.03)	Wave and Region	0.0113	1.33%	0.522 *** (0.04)
USS	Satisfaction with Present Job	Wave and Age	0.0222	0.52%	0.128 *** (0.02)	Wave and Age	0.0138	0.59%	0.119 *** (0.03)
USS	Life Satisfaction	Wave and Region	0.0272	0.04%	0.151 *** (0.02)	Wave and Region	0.0138	0.21%	0.143 *** (0.03)
USS	Psychological Distress	Wave and Age	0.0487	0.07%	-0.185 * (0.07)	Wave and Age	0.0326	0.03%	-0.155 (0.11)
USS	Mental Functioning	Wave, Gender, Age and Education	0.0439	0.03%	0.168 (0.12)	Wave, Gender, Age and Education	0.0186	0.02%	0.100 (0.17)
HILDA	Pay Satisfaction	Wave and Region	0.0299	0.32%	0.576 *** (0.02)	Wave and Region	0.0102	0.64%	0.319 *** (0.03)
HILDA	Work Satisfaction	Wave, Gender and Education	0.0257	0.21%	-0.071 *** (0.02)	Wave, Gender, Age and Education	0.0125	0.16%	-0.038 * (0.02)
HILDA	Finances Satisfaction	Wave and Age	0.0565	0.16%	0.315 *** (0.02)	Wave and Region	0.0272	0.15%	0.243 *** (0.02)
HILDA	Employment Opps Satisfaction	Wave	0.0257	0%	0.093 *** (0.02)	Wave, Gender and Education	0.0164	0.08%	0.061 ** (0.02)
HILDA	Job Security Satisfaction	Wave	0.0189	0%	0.194 *** (0.02)	Wave and Region	0.0138	0.06%	0.076 ** (0.02)
HILDA	Hours Worked Satisfaction	Wave, Gender and Education	0.0349	0.07%	-0.041 * (0.02)	Wave, Gender and Education	0.0217	0.03%	-0.029 (0.02)
HILDA	Worklife Balance Satisfaction	Wave, Gender, Age and Education	0.0484	0.08%	-0.048 ** (0.01)	Wave and Region	0.0318	0.01%	-0.040 . (0.02)
HILDA	Job Satisfaction	Wave and Age	0.0177	0.08%	0.025 (0.02)	Wave, Gender, Age and Education	0.0093	0.01%	-0.013 (0.02)
HILDA	Mental Functioning	Wave and Age	0.0570	0%	0.006 (0.01)	Wave and Age	0.0402	0%	0.017 (0.02)
HILDA	Life Satisfaction	Wave and Age	0.0400	0%	0.077 *** (0.01)	Wave	0.0230	0%	0.054 * (0.02)
PSID	Psychological Distress	Wave, Gender and Education	0.0308	0.05%	-0.053 (0.04)	Wave, Gender, Age and Education	0.0433	1.19%	0.117 . (0.07)
PSID	Life Satisfaction	Wave	0.0342	0%	0.143 ** (0.04)	Wave, Gender and Education	0.0379	0.17%	0.138 (0.10)

The listed comparison group is that which yields the largest increase in Within R^2.
The Within R^2 given is for the listed comparison group.
Percentage improvement is compared to the Within R^2 for the Wave comparison group.
The coefficient given is that on Income Rank.
Significance: *** p $\leq$ 0.001; **p $\leq$ 0.01; * p $\leq$ 0.05; . p $\leq$ 0.10.
Robust standard errors in parentheses.

missing data than the variables used to form the Boyce et al. (2010) comparison groups, and so the creation of the former comparison groups necessitated the dropping of many tens of thousands of observations. In contrast, our main analysis used a minimally restricted comparison group (survey wave) and therefore we preserve more observations. Possibly as a consequence, we find that both income level and income rank predict job satisfaction. Collischon and Eberl's (2021) finding that income rank does not influence job satisfaction, could therefore reflect a reduction in statistical power resulting from the use of highly circumscribed comparison groups.

3.7 Discussion

Our analysis of four longitudinal datasets from four countries showed that the relationship between income rank and SWB is robust to the modelling of individual slopes. Our first aim was to test the income rank hypothesis. Our first hypothesis, that SWB is influenced by rank of income even when individual trajectories are controlled for, was supported for some categories of SWB measure.

In contrast to Collischon and Eberl (2021), we found some evidence for the income rank hypothesis. We found that income rank improved many measures of SWB even in the more conservative FEIS analyses. These measures reflected global evaluative well-being (life satisfaction) and domains of evaluative well-being relating to income, pay, finances and, less consistently, employment. When we consider the FE models, rank of income predicted every measure of evaluative SWB. Generally, the coefficient estimates for income rank were smaller for the FEIS models, indicating, as suggested by Collischon and Eberl (2021), that failure to model individual slopes, and therefore to control for factors such as improving motivation, social skills and cultural capital, may lead to the inflation of coefficient estimates.

Psychological Distress (as measured by the GHQ-12 and Kessler-6) and Mental Functioning (as measured by the mental component summary of the SF-12/36) are hybrid measures of SWB because they consist of items which reflect both experienced and eudaimonic well-being (Jenkinson and Layte, 1997; Hu et al., 2007). In both the FE and FEIS models, income rank did not predict mental functioning, and, in the FEIS models, did not predict psychological distress. This result differs from prior findings that income rank is a significant predictor of psychological distress as measured by the Kessler-6 scale (Garratt et al., 2016) and the GHQ-12 (Wood et al., 2012).

We found that using rank of income instead of income level improved model fit most for the SWB measures most relevant to income or money. However, similarly to Pfaff (2013); Wetherall et al. (2015), we found that for most of

the other SWB variables the improvements in model fit from using rank rather than income level are close to zero.

Taken together, these results suggest that the income rank hypothesis is more applicable to evaluative well-being than to the eudaimonic and experienced dimensions of SWB. This result is similar to that of other studies which show personal economic variables are more strongly related to evaluative well-being than hedonic well-being (e.g., Kahneman and Deaton, 2010; Killingsworth, 2021; Tsurumi et al., 2021). It supports the notion that evaluative well-being may be biased towards an economic frame (White, 2016).

Another way to understand this pattern of results is in terms of the comparative nature of the judgement process. It is well established that judgements are typically relative (Stewart et al., 2005). The precise nature of the comparators that come to mind when a judgement must be made is therefore crucial (Stewart et al., 2006). For example, in judging one's current or recent emotions, psychological distress or mental functioning, the natural comparison sample will include one's own recent emotional experiences of affect and psychological need satisfaction. The affective states or incomes of other individuals seem less likely to enter the comparison sample. In contrast, asking people to judge their own lives as a whole invites a comparison to other whole lives, rather than to previous occasions where they have evaluated their life in the same way.

Our second key question was whether, when individual slopes are modelled, there would be effects of income level over and above the effects of income rank. The impure income hypothesis of FitzRoy and Nolan (2021), which is that both income rank and income level are important to SWB, was supported for some measures of SWB, though not consistently across the datasets. This may be due to the different number of participants and observations that were available for different analyses. For example, the pure income hypothesis was rejected for life satisfaction in the FEIS specification in the GSOEP, but not for the HILDA data. The GSOEP has approximately 100,000 more FEIS-compatible observations for life satisfaction than HILDA; this additional statistical power may have made it possible to statistically identify a relationship between life satisfaction and income level. Regardless, there is some consistency across the GSOEP and HILDA results in that both income level and rank of income were found to predict income/pay satisfaction and work satisfaction. Notably, however, the sign on income level was positive for the relevant GSOEP models and negative for the relevant HILDA models (excluding satisfaction with hours). The negative coefficients on income level indicate that higher incomes have a negative impact on satisfaction with pay and work, holding income rank constant. This is perhaps not surprising, as additional sacrifices typically have to be made for higher incomes, but if these sacrifices do not result in higher

rank, then, under the pure rank hypothesis, the sacrifices yield no benefit (Layard, 1980). The different signs on income level may be due to differences between Germany and Australia in the marginal utility of money or in attitude towards income and the sacrifices required to achieve it. Alternatively these different signs may be due to differences in country-level factors known to moderate the income-SWB relationship, such as wealth and population density (Tan et al., 2020) and income inequality (Macchia et al., 2020).

The use of different comparison groups largely did not improve model fit above that achieved from constructing rank from within time and country, and in some cases model fit worsened. The construction of comparison groups can sometimes involve the dropping of a large number of observations, as is the case for Collischon and Eberl (2021). We did not find improvements in model fit that were sufficient to justify the reductions in sample size.

3.7.1 Limitations

Use of FE modelling requires omitting participants who only respond in a single wave. However, use of FEIS can involve the omission of many more observations due to the requirement that each participant must have responded in more waves than the number of slope variables + 1. Following Collischon and Eberl (2021), we use three slope variables (age, age squared and tenure) and so participants who have responded to fewer than five waves are dropped. The nature of large national surveys is such that some participants drop out after a few waves, or are first interviewed during a wave less than 5 rounds prior to the most recent available round. As a result, it is very common for participants to have responded to fewer than 5 waves. It is possible to take these individuals into account in the FE analyses, but not for the data demanding FEIS analyses. The resulting loss of observations may go some of the way to explain why, when individual slopes are introduced, some regression coefficients become statistically insignificant. In addition to loss of power, the demands of FEIS also mean the sample that it is possible to estimate a model for is unrepresentative of the full dataset, though Rüttenauer and Ludwig (2020) suggest this is less likely to be an issue for long-run panel studies.

Some prior studies indicate that the income-SWB relationship may not be as simple as is typically assumed in analyses such as those reported here. There is some evidence to suggest the marginal effects of income level and income rank on SWB vary depending on a person's position in the SWB distribution. Using data from India, Lakshmanasamy and Maya (2020) find that income level is more important for people with lower global evaluative well-being, while rank is more important for those with higher global evaluative well-being. However, using German data, Budria (2012) finds the opposite, i.e., that people with

lower global evaluative well-being care more about rank than income level. Differences across countries such as these may explain why the coefficients on income level found in the present study were positive for some datasets and negative for others. Similarly, some evidence suggests that the impact of income rank on income satisfaction depends on position within the income distribution (Senik, 2014). Furthermore, rank positions from prior time periods may also influence SWB and have been shown to predict job satisfaction (Naguib, 2020). There is also some evidence to suggest that rank effects may be larger relative to income level effects for males, the wealthy, and foreign students (Mujcic and Frijters, 2013) as well as particular age groups (FitzRoy and Nolan, 2021). The relationship between income rank and SWB may also be moderated by numerical ability and verbal intelligence (Bjälkebring and Peters, 2021) and whether a person considers their position in the income distribution to be deserved (Smith et al., 2012).

3.7.2 Implications

FitzRoy and Nolan (2021) suggest the rejection of the pure rank hypothesis means that policy makers should consider implementing measures that redistribute income from households with the highest incomes to those with the lowest incomes, provided that rank position is not affected, thereby increasing societal SWB. Here we use own labour income rather than household income, and therefore our results specifically have implications for redistribution of wages rather than household incomes. Our results for the GSOEP and USS (FE only) provide support for redistribution, as the significant coefficients on income level are all positive.

However, for the HILDA (and for the USS in robustness checks) some significant coefficients on income level are negative, which would imply that in order to maximise societal SWB in Australia, income would need to be redistributed from the lowest paid to the highest paid. If these findings are replicated, it may indicate the sacrifices required for higher incomes result in greater cost to SWB than the additional income yields benefit. These relationships would require re-evaluation after the implementation of new redistributive measures. Should these not change, this may indicate that greater improvements in societal SWB could be achieved from using higher taxation to better fund public services and goods from which all citizens benefit.

In the FEIS models, experienced emotional SWB and mental functioning are not predicted by income rank or income level. Therefore, a further implication of our results is that the use of life satisfaction alone to represent SWB for policy purposes may lead to an over-emphasis on increasing citizens' incomes at the expense of other objectives which might better improve experienced

emotional SWB or mental functioning.

Chapter 4

Negative Associations Between Alcohol Consumption and Subjective Well-being in the UK: A Longitudinal Analysis

Abstract

The adverse effects of alcohol consumption on anxiety and depressive disorders are well established. Alcohol's associations with subjective well-being (SWB) are however less well understood. Moreover, existing research has typically focused on the immediate impact of alcohol consumption on SWB, rather than on how longer-term patterns of consumption influence a person's normal SWB, and has used only a narrow range of both SWB and alcohol consumption measures. Here we use Understanding Society, a British longitudinal survey, to examine how long-term patterns of alcohol consumption are linked to satisfaction with life, psychological distress, mental functioning and positive mental well-being. High drinking intensities are found to be associated with higher psychological distress and lower mental functioning. High frequency binge drinking is associated with detrimental effects on psychological distress, mental functioning and life satisfaction. Frequency of moderate consumption is however not associated with any measure of SWB. Risk of alcohol dependency is also associated with detrimental effects on life satisfaction, psychological distress and mental functioning. In contrast, expenditure on alcohol is associated with beneficial effects for all aspects of SWB examined here, indicating that expenditure should not be used as a proxy for alcohol consumption. Overall we find that, in comparison to life satisfaction, mental functioning and psychological distress are associated with a larger number of consumption behaviours. Taking life satisfaction to be representative of SWB as a whole may therefore miss, or underestimate, the SWB costs of alcohol consumption. Implications for public policy and future research are discussed.

4.1 Introduction

Well-being is that which is good for a person (Tiberius, 2015). Alcohol consumption has a negative impact on several objective measures of well-being. Alcohol use is the tenth largest risk factor to health globally and is estimated to cause 2.4 million deaths annually (Murray et al., 2020). Alcohol use also has significant economic costs, incurred both directly through increased burden on medical, welfare and judicial services, and indirectly through decreased work productivity and premature mortality (Gutjahr and Gmel, 2001; Baumberg, 2006). In disciplines such as psychiatry, well-being is treated as the absence of mental disorder. However, well-being is more than the absence of disorder, it is also the presence of positive functioning (Seligman and Csikszentmihalyi, 2000).

Positive functioning occurs at the subjective level (from a person's own perspective) and at the individual level. Examples of subjective well-being (SWB) are feelings or assessments of things such as satisfaction, happiness, anxiety or meaningfulness. Individual level well-being comprises the possession of desirable traits and capacities (Seligman and Csikszentmihalyi, 2000). Philosophically, an individual's possession of these traits and capacities are claimed to contribute to well-being independently of any self-assessment or mental states that they engender. However, when empirical data are collected with the aim of assessing a person's level of individual well-being, this typically involves asking that person for their own assessment of their traits or functionings. Their response is thereby a measure of SWB because it necessitates an evaluation from that person's own perspective (Dolan and Metcalfe, 2012).

In recent years there have been calls for SWB to be made a target of public policy (Frijters et al., 2020) and several governments have made explicit commitments to improve societal SWB (Musikanski, 2013). The improvement of SWB across society is a worthwhile goal in and of itself, but higher levels of SWB are causally linked to several desirable outcomes, such as physical health (Ryff et al., 2021), through both behavioural and biological pathways (Boehm, 2018; Ryff and Boylan, 2016). Higher SWB also has positive indirect effects on others in the same local community (Knight and Gunatilaka, 2017).

Dolan and Metcalfe (2012) distinguish three types of SWB: evaluative well-being, experienced well-being and eudaimonic well-being. Evaluative SWB measures concern participants' reflective evaluations of their life as a whole. Experienced SWB measures ask participants to report the presence and intensity of a mental state they may have experienced. Eudaimonic SWB measures are subjective assessments of one's own individual level well-being. These different types of SWB can have different causes and effects. For example, economic outcomes are more strongly related to evaluative well-being

than to experienced well-being e.g. income (Kahneman and Deaton, 2010); consumption (Tsurumi et al., 2021); and wealth (Jantsch and Veenhoven, 2019). Recent research has shown that these different types of SWB have high latent correlations (Disabato et al., 2016; Goodman et al., 2017), indicating low discriminant validity. However, this may be because SWB exhibits a bifactor structure, where all measures of SWB share a high degree of common variance, but also have variance unique to their type (e.g. Jovanović, 2015a; Iasiello et al., 2022). Despite their similarity, each type of SWB is worth investigating because they are all valuable for their own sake (Seligman, 2018) and because individuals may wish to prioritise one type of SWB over another (Haybron and Tiberius, 2015).

4.1.0.1 Alcohol Use and Subjective Well-Being

There is a well established link between psychiatric disorders, such as anxiety and depression, and the use of alcohol (Lai et al., 2015; Li et al., 2020), though the direction, or possible bidirectionality, of this relationship has not been established (Boden and Fergusson, 2011). Moreover, the relationship between alcohol consumption and SWB of all types has been subject to even less research.

There are several plausible pathways by which alcohol use could affect SWB. Alcohol consumption is associated with changes in behavioural and biological functioning which could in turn influence SWB. Different changes are associated with the ascending and or descending limbs of the blood-alcohol curve. Chronic alcohol use is also associated with different effects from acute usage. The sizes of these effects often depend on the amount and frequency of alcohol consumption.

The ascending limb is associated with stimulant effects (Martin et al., 1993). In this phase, changes to behaviour such as increased sociability (Dunbar et al., 2017), greater feelings of social connectedness, meaning and sense of identity (Thurnell-Read, 2021), increased moral and altruistic behaviour (Karlsson et al., 2022) and lower social anxiety (Abrams et al., 2001; Goodman et al., 2018) could plausibly improve SWB. Changes to behaviour such as greater risk taking (Jones et al., 2020), aggression (Giancola and Zeichner, 1997) or injury (Rehm et al., 2017) could worsen SWB. Other changes, such as reduced inhibitions (Monahan and Lannutti, 2000), could plausibly be positive or negative. At a biological level, the ascending limb is associated with changes in neurotransmitters (Chastain, 2006) and intestinal damage (de Jong et al., 2015). An immediate effect of alcohol consumption on experienced SWB has been established, with several studies finding improved mood while drinking (Gorka et al., 2017; Sayette et al., 2019; Ito et al., 2018; Baumberg Geiger and

MacKerron, 2016; Schrieks et al., 2014; Merrill and Read, 2010).

The descending limb is associated with sedative effects (Martin et al., 1993). Behaviour such as feelings of regret (Jones et al., 2020) may negatively impact SWB. Biological effects such as hangovers (Jones et al., 2020), disrupted sleep quality and reduced sleep quantity (Rohsenow et al., 2010; van Schrojenstein Lantman et al., 2017), immune system disruption (Sarkar et al., 2015), changes in inflammation (Barr et al., 2016) and intestinal damage (Sturm et al., 2021) could also negatively affect SWB. Heavy alcohol use in the past 24 hours is associated with greater psychological distress (Anderson and Fowers, 2020) and lower levels of positive affect (Polak and Conner, 2012). Drinking on the previous day is associated with lower happiness, positive mood, feeling the meaning and purpose of life, and greater feelings of loneliness and isolation (Lee et al., 2022).

Chronic moderate alcohol use is associated with cognitive impairment (Lao et al., 2020) and lower female fertility (Fan et al., 2017) but has been found to have beneficial impact on the immune system (Romeo et al., 2007) and to have protective effects for certain health conditions (Rehm et al., 2017). In contrast, chronic high-level alcohol usage is associated with addiction and withdrawal (Heilig et al., 2010), health problems (Rehm et al., 2017), disability (Samokhvalov et al., 2010), compromised decision making (Field and Cox, 2008), neuroadaptations (Breese et al., 2011) and endocrine dysregulation (Kiefer and Wiedemann, 2004), all of which could negatively affect SWB. Excessive alcohol consumption is linked to decreased marital quality (Leonard and Rothbard, 1999) and academic attainment (Williams et al., 2003) and is detrimental for finding employment (Bamberger et al., 2018). In contrast, modest alcohol consumption has been linked to improved social cohesion, having a higher number of friends, and greater social trust (Dunbar et al., 2017).

The different outcomes associated with moderate use compared to high-level use suggest that different levels of alcohol consumption may have different relationships with SWB. It may be that evaluative, experienced and eudaimonic SWB are not uniformly related to alcohol use. For example, alcohol use could plausibly hamper aspects of psychological capacity by impairing cognitive ability and lowering sleep quality and quantity, while also increasing social connectedness, meaning and identity sufficiently that the resultant net effect of alcohol on life satisfaction is nil or even positive.

4.1.1 Prior Research

Most people do not consistently drink alcohol and so their mood while drinking, or immediately after drinking, alcohol is unlikely to be representative of their day-to-day SWB. Nonetheless, alcohol use can negatively impact a person's life

and affect their day-to-day SWB. Determining the effect of alcohol consumption on day-to-day SWB requires the analysis of SWB data that are collected in non-consumption contexts, where SWB responses are more likely to reflect a typical day in the respondent's life. Therefore for the relationship between alcohol consumption and SWB to be determined, longer-term alcohol consumption data are required. These would be collected by asking participants to report on their behaviour over recent time periods (i.e., the past week, month or year). One or more measures of SWB, ideally reflecting as wide a range of categories of SWB as possible, must have been collected at the same time. Data collection of this kind is achieved by certain large-scale nationally representative surveys which typically include many thousands of people from thousands of different households.

Existing research on the relationship between alcohol consumption and day-to-day SWB is limited in three key ways. Firstly, most studies focus on a limited range of alcohol consumption measures, typically frequency, quantity and indications of alcohol abuse or dependency, with few investigating the relationship between SWB and intensity of alcohol consumption (Patrick, 2016), frequency of binge drinking, or expenditure on alcohol. A second limitation of this literature is the use of measures reflecting a single category of SWB. It is now well established that SWB is composed of several distinct domains and therefore cannot be fully characterised by the measurement of a single domain (VanderWeele et al., 2020). Research with a single indicator is therefore unable to determine if alcohol consumption has different relationships with different domains of SWB. Thirdly, many studies have used cross-sectional data. In such studies there may be confounding arising from correlations between unobserved properties of individuals (such as personality, health and demographic characteristics) and the outcomes of interest (Ferrer-i-Carbonell and Frijters, 2004). Longitudinal data can be used to estimate within-person effects and thereby control for the influence of individual differences. In regression analyses this is done through the modelling of individual fixed effects. This technique is regularly used to control for unobserved heterogeneity when investigating alcohol consumption (e.g. Tekin, 2004; Saffer and Dave, 2006; Ha and Smith, 2019).

Few studies have used longitudinal data to examine the relationship between alcohol consumption and SWB. Nikolaou (2019) used the 1997 National Longitudinal Survey of Youth (USA) to investigate the relationship between having consumed alcohol in the past year and positive affect, as measured by the question "How much of the time in the last month have you been a happy person?" Results from a fixed effects model indicated that being a drinker is associated with lower levels of happiness, for both men (3 percentage points) and women (3.8 percentage points). Massin and Kopp (2014), using fixed ef-

fects analyses of Russian data, found a quadratic (inverse-u shape) relationship between quantity of alcohol consumed in the past 30 days and satisfaction with life. They also found that being in the third or fourth quartile of alcohol consumption was associated with significantly lower life satisfaction, compared to being in the first quartile. Both of these relationships were found for men but no significant relationships were found for women. Baumberg Geiger and MacKerron (2016) used the British Cohort Study 1970 to investigate the relationship between life satisfaction and frequency of alcohol consumption in the past week. A fixed effects model produced no evidence of a relationship between frequency of drinking or quantity of consumption and life satisfaction. Having a drinking problem, as measured by the CAGE questionnaire (Bush et al., 1987), was associated with lower satisfaction with life. A second study used smartphone data and investigated the relationship between drinking and happiness at the time of drinking. Results from a fixed effects model suggested that drinking alcohol is associated with a 4 point gain in happiness (on a 0 to 100 scale) during the drinking episode compared to when not drinking. Anderson and Fowers (2020), using data from a relatively small sample of participants ($n = 76$), examined the relationship between being a heavy drinker (compared to moderate or zero consumption) and life satisfaction, eudaimonic well-being (measured by the Flourishing Scale: Diener et al., 2009) and psychological distress/negative affect (measured by the Kessler-6 scale: Kessler et al., 2002).[1] The results from their fixed effects models indicated that being a heavy drinker is significantly associated with higher psychological distress. No significant relationships were found for the other domains of SWB. Lee et al. (2022), using a sample of employees from a Korean research firm ($n = 478$), examined the relationship between several measures of SWB and having consumed alcohol on the previous day. The results from their fixed effects models show that drinking the previous day is associated with detrimental effects on happiness, positive mood, meaning and purpose in life, and loneliness the following day. They found no effect on stress.

Although the above studies have the advantage of being longitudinal in nature, only one of them examined the non-immediate effects of consumption using multiple measures of SWB, and that study used a relatively small sample. Moreover, the above studies typically use a limited set of alcohol consumption measures. It is plausible that different patterns of alcohol consumption could relate differently to SWB (and to different components of SWB). Furthermore, some measures of consumption, such as binge drinking and intensity of consumption, are absent from the existing longitudinal research. These patterns of

[1] Both the Kessler-6 scale and General Health Questionnaire-12 (GHQ-12) measure 'psychological distress'. However the domains of SWB measured by the scales differ. The Kessler-6 scale only assesses negative affect, while the GHQ-12 assesses positive and negative experienced well-being, and eudaimonic well-being.

consumption are used by some clinical questionnaires to identify the presence of problem drinking. Problem drinking is associated with lower SWB (Baumberg Geiger and MacKerron, 2016), but no research has yet looked at which patterns of consumption drive this.

The present study investigates the relationship between patterns of consumption and SWB in a way that addresses all three of the limitations identified above. First, we examine the effects of both consumption intensity and consumption frequency, as well as other more conventional measures of alcohol consumption. Second, we use several measures of SWB: satisfaction with life, mental functioning, psychological distress and mental well-being. Third, we use a longitudinal dataset which allows us to control for unobserved individual differences using fixed effects regression analyses.

On the basis of the existing literature, we predict that higher levels of alcohol consumption (i.e., more frequent, more intense etc.) will be associated with worse levels of SWB, and that life satisfaction will be less sensitive to alcohol consumption compared to other SWB measures.

4.2 Methods

4.2.1 Participants

This study uses the Understanding Society Survey (USS) (formerly known as the British Household Panel Survey), a nationally representative longitudinal household survey conducted in the United Kingdom. The USS began in 2009 and includes annual data from 40,000 households and 100,000 participants; nine waves are currently available for analysis (2009-2019). We restrict our analysis to those aged 18 and above. The analyses in this study use data from waves where both SWB measures and alcohol consumption measures were collected in the same wave, and from participants who responded to all the relevant waves. As a result, the sample size for each analysis is smaller than these total figures.

4.2.2 Measures

4.2.2.1 Alcohol

An advantage of the USS data set is that it includes several measures of alcohol use, each concerning a different pattern of consumption. All but one of the measures used here are components in the short form Alcohol Use Disorders Identification Test (AUDIT-C), which is widely used in clinical practice to identify potentially problematic alcohol consumption (World Health Organisation, 2001). The alcohol measures collected are as follows:

Drinking intensity is measured through the question "How many drinks do you have on a typical day when you are drinking?" This question is only asked of those who have consumed an alcoholic drink in the past 12 months.

Drinking frequency is measured by the question "Thinking about the past 12 months, how often do you have a drink containing alcohol?". This question is only asked of those who have drunk an alcoholic drink in the past 12 months.

Binge drinking frequency is measured by the question "How often have you had 8/6 (male/female) or more units, on a single occasion in the last year?" A unit is equivalent to 7.9 grams of alcohol. These amounts correspond to the UK government's definition of binge drinking, see Office for National Statistics (2018). This question is only asked of those who have consumed an alcoholic drink in the past 12 months.

From these responses, an AUDIT-C score can be calculated for each survey respondent. Those who have not drunk alcohol in the past 12 months score zero and therefore we do not include these individuals in the AUDIT-C analysis. In line with World Health Organisation guidance (World Health Organisation, 2001), respondents are allocated into risk categories based on their scores: scoring 1-5 is classified as low risk, 5-7 as increasing risk, 8-10 as higher risk and 11-12 indicates possible dependence.

Household expenditure on alcohol is measured by the item "About how much have you and other members of your household spent in total on alcohol in the last four weeks? Please include alcohol purchased from a supermarket or off licence and from pubs, restaurants or other venues." This question is asked of all households. For our analysis we divide total expenditure on alcohol by the number of adults in the household to derive alcohol expenditure per adult. This value is log transformed for analyses where expenditure is treated as a continuous variable.

Summary statistics and further details for the alcohol variables, including the code used to derive them, can be found in Appendix C.

4.2.2.2 Subjective Well-Being

USS includes four separate measures of SWB:

Satisfaction with life is measured on a single-item 7-point Likert scale by the question "Overall, how satisfied are you with your life nowadays?". Responses range from 0, *completely dissatisfied* to 7, *completely satisfied*. Life satisfaction is a measure of evaluative SWB in that it asks the respondent to provide a global assessment of his or her life (Dolan and Metcalfe, 2012). Single-item measures of life satisfaction perform similarly to multi-item measures (Cheung and Lucas, 2014).

The General Health Questionnaire-12 (GHQ-12) measures *psychological*

distress in a multifactorial way. It assesses positive and negative experienced well-being, and eudaimonic well-being (Headey et al., 1993). Specifically, it asks people to consider their recent sleep, level of stress, resilience, positive and negative affect, self worth, confidence, decision-making and ability to enjoy life (Goldberg, 1972). Answers are given on a four-point scale from *not at all* to *much more than usual*. The GHQ SWB score converts valid answers to 12 questions of the GHQ to a score by recoding such that the scale for individual variables runs from 0 to 3 instead of 1 to 4, and then summing, giving a scale running from 0 (the least distressed) to 36 (the most distressed). To aid interpretation, we refer to this measure as 'psychological distress' throughout. Internal consistency was $\alpha = 0.9$. Test-retest reliability of the GHQ-12 is 0.84 (Piccinelli et al., 1993).

The the Short-Form 12 Health Survey (SF-12) asks people to consider the last four weeks and report their general, physical and mental health. Its mental component summary (MCS-12) measures *mental functioning* and is calculated by applying weights to responses to the SF-12 (Ware et al., 1995). Like the GHQ-12, the MCS-12 incorporates positive and negative experienced well-being, and eudaimonic well-being indicators (Hu et al., 2007). The MCS-12 is most heavily weighted on participants' responses to questions about frequency of feeling downhearted and depressed, feeling calm and peaceful, accomplishing less than usual due to mental health, if health problems interfering with social life, having a lot of energy and performing activities less carefully due to mental health (Ware et al., 1996). Answers are give on a five-point scale from *all of the time* to *none of the time*. The MCS-12 converts valid answers into a single mental functioning score, resulting in a continuous scale with a range of 0 (low functioning) to 100 (high functioning). Higher functioning is indicative of better mental health and well-being. To aid interpretation, we refer to the MCS-12 as mental functioning throughout. Test-retest reliability of the MCS-12 is 0.77 in the United Kingdom (Ware et al., 1996).

The short version of the Warwick-Edinburgh Mental Well-Being Scale (SWEMWBS) is a 7-item scale which measures positive experienced and eudaimonic SWB (Tennant et al., 2007). It asks people to consider the frequency of certain feelings and behaviours. More specifically, these include feeling optimistic, useful, relaxed, close to others, dealing with problems well, thinking clearly and being able to make up their own mind (Stewart-Brown et al., 2009). Each item is scored on a 5-point scale from *none of the time* to *all of the time* and summed to give a score of between 7 and 35. Higher scores indicate higher levels of well-being. SWEMWBS was only collected for waves one, four and seven; the other measures were collected in all nine waves. Due to lack of overlap of years where SWEMWBS and alcohol measures were collected, alcohol expenditure was the only measure which coincided with SWEMWBS

more than once. Internal consistency was $\alpha = 0.87$. Test-retest reliability of the MCS-12 is 0.77 in the United Kingdom (Ware et al., 1996). Test-retest reliability of the MCS-12 is 0.83 in the United Kingdom (Ware et al., 1996).

Summary statistics for these SWB measures can be found in Table C.1.

4.3 Data Analysis

The analyses estimate the following general underlying model for different combinations of SWB and alcohol consumption measures:

$$W_{i,t} = \beta_1 A_{i,t} + \beta_2 X_{i,t} + \theta_i + \phi_t + \epsilon_{i,t} \tag{4.1}$$

where individual i is in time period t, W is the SWB measure, A is the alcohol consumption measure, X is a vector of time-varying demographic and socioeconomic controls, θ represents the individual fixed effects and ϕ the time fixed effects. Observations are excluded if the response to the alcohol question is missing. Following previous literature (Dolan et al., 2008), we include the following as control variables that are known to influence SWB: age, age squared, sex, marital status, subjective health status, highest qualification, social class, labour force status, country of residence, ethnicity, number of children in household and rank of household income within survey wave (Boyce et al., 2010). Summary statistics for these control variables can be found in Table C.3.

Alcohol measures were included less frequently than the SWB measures in USS, and the relevant waves and sample sizes are provided in the results tables. Table 4.1 presents the waves for which alcohol and SWB measures intersect with the number of participants per wave by sex and their mean age. The lack of waves where both SWEMWBS and alcohol consumption were measured means that fixed effects analyses could not be conducted for any consumption-related measures other than expenditure.

To account for the comparison of large number of alcohol variables, and the consequent need to reduce the chance of making Type I errors, we use the 0.01 level of significance throughout, with all confidence intervals calculated accordingly.

All analyses were conducted using R version 4.0.3 (R Core Team, 2020) and the *plm* package (Millo, 2017).

Table 4.1: Summary statistics for intersections between alcohol and SWB measures.

		Frequency	Intensity	Binge Drinking Frequency	Risk Category	Expenditure
Life Satisfaction	Waves	7,9,11	7,9,11	7,9,11	7,9,11	1-11
	N Males	16,220	16,188	16,199	15,998	33,509
	Obs Males	35,228	35,120	35,132	34,325	165,759
	N Females	18,431	18,395	18,421	18,329	39,568
	Obs Females	40,656	40,516	40,595	40,172	208,915
	Age	49.95	49.93	49.96	49.99	49.14
Psychological Distress	Waves	7,9,11	7,9,11	7,9,11	7,9,11	1-11
	N Males	16,249	16,218	16,230	16,025	33,740
	Obs Males	35,334	35,226	35,241	34,421	168,096
	N Females	18,483	18,447	18,474	18,382	39,858
	Obs Females	40,791	40,653	40,738	40,310	212,280
	Age	49.96	49.94	49.97	50	49.15
Mental Functioning	Waves	7,9,11	7,9,11	7,9,11	7,9,11	1-11
	N Males	16,199	16,171	16,179	15,978	34,959
	Obs Males	35,102	35,002	35,013	34,209	169,736
	N Females	18,443	18,409	18,435	18,346	41,283
	Obs Females	40,553	40,420	40,500	40,082	213,891
	Age	49.93	49.91	49.94	49.97	49.03
SWEMWBS	Waves	7	7	7	7	1,4,7,10
	N Males	13,094	13,056	13,085	12,779	28,951
	Obs Males	13,094	13,056	13,085	12,779	61,098
	N Females	15,021	14,978	15,012	14,864	35,087
	Obs Females	15,021	14,978	15,012	14,864	77,401
	Age	48.97	48.95	48.98	49.02	48.65

4.4 Results

The correlations between the SWB measures can be found in Table 4.2 and a summary of all results is shown in Figure 4.1. It can be seen that several measures of alcohol consumption are significantly and negatively associated with psychological distress and mental functioning, with effects on life satisfaction being more limited. Initial inspection suggests that most of the negative effects of alcohol consumption on psychological distress and mental functioning are associated with measures of intensity of consumption. We discuss these figures in more detail below.

Table 4.2: Correlation matrix for well-being measures (Wave 7).

Variable	Life Satisfaction	Psychological Distress	Mental Functioning	SWEMWBS
Life Satisfaction	-	-0.55	0.5	0.56
Psychological Distress	-0.55	-	-0.72	-0.67
Mental Functioning	0.5	-0.72	-	0.62
SWEMWBS	0.56	-0.67	0.62	-

Figure 4.1 displays the regression coefficients side-by-side. Coefficients are taken from fixed effects models for all plots, apart from SWEMWBS where they are taken from the pooling models. The effects are relative to the reference

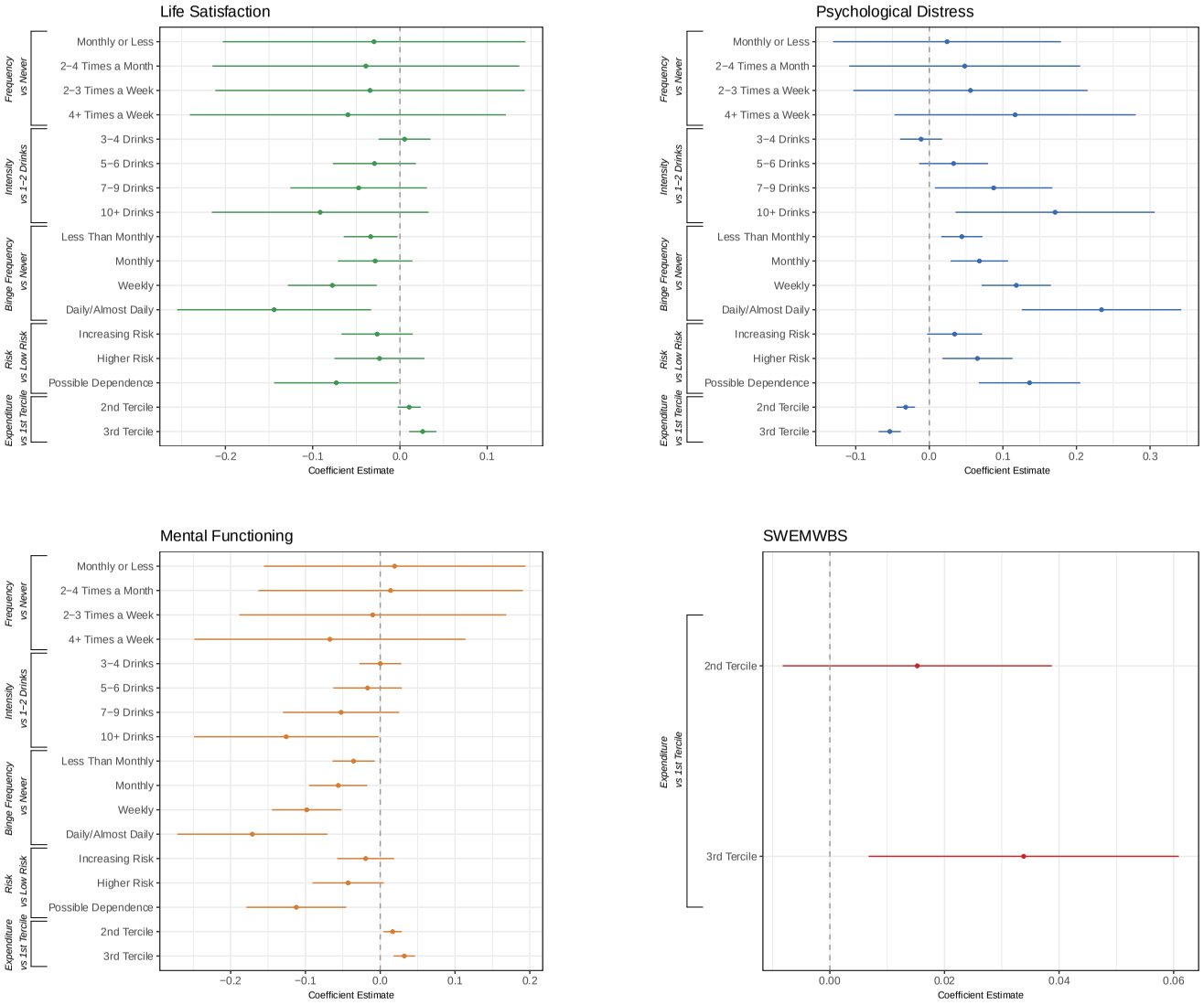

Figure 4.1: Plot of regression coefficients for standardised continuous alcohol variables on standardised SWB variables.

categories detailed in the tables. The SWB variables have been standardised to mean zero, variance one. Being in the alcohol category, compared to its reference category, has the effect of an increase in the SWB variable equal to the coefficient times by the standard deviation of the SWB variable.

Possible dependence, as identified by AUDIT-C score is associated with an increase in psychological distress of 0.14 standard deviations and decreases of 0.1 and 0.07 in mental functioning and life satisfaction, respectively, compared to low risk of dependence.

Being identified as at higher risk was associated with detrimental effects on psychological distress and mental functioning of 0.07 and 0.04 standard deviations, respectively, compared to low risk. The association between higher risk and life satisfaction was not statistically significant. Being identified as increasing risk of dependence, compared to being low risk, was not found to have any statistically different relationships with any of the SWB measures.

Having a drinking intensity of 10+ drinks was associated with detrimental effects on psychological distress and mental functioning, of 0.17 and 0.13 standard deviations, respectively, compared to an intensity of 1-2 drinks. Intensities of 7-9 drinks were associated with an increase in psychological distress of 0.09 standard deviations. Intensities of 5-6 drinks and below were not associated with any significant changes in SWB for any of the three applicable SWB measures. No levels of intensity were found to have statistically significant relationships with life satisfaction.

Binge drinking daily/almost daily yielded the largest coefficients for all three applicable measures. It was associated with increased psychological distress of 0.23 standard deviations, compared to never binge drinking; and was associated with decreased mental functioning and life satisfaction of 0.17 and 0.14 standard deviations, respectively. Binge drinking weekly was associated with increased psychological distress of 0.12 standard deviations and decreased mental functioning and life satisfaction of 0.1 and 0.08 standard deviations, respectively. Binge drinking monthly was associated with increased psychological distress of 0.07 standard deviations and decreased mental functioning of 0.06 standard deviations. Binge drinking less than monthly, was also associated with increased psychological distress of 0.04 standard deviations and decreased mental functioning and life satisfaction of 0.04 and 0.03 standard deviations, respectively.

No measures of moderate drinking frequency were significantly associated with any changes in SWB.

Being in the second or third tercile of alcohol expenditure (higher expenditure), was associated with lower levels of psychological distress and higher levels of mental functioning, compared to the default of the first tercile (lowest expenditure). Being in the third tercile was also associated with higher life

satisfaction and SWEMWBS scores.

4.5 Discussion

Our findings show that intensity, frequency of binge drinking, and risk of dependency are all associated with detrimental effects for at least one of the SWB measures. The most extreme drinking intensities, binge drinking frequencies and risks of dependence had the largest negative associations. Frequency of consumption was not associated with any SWB measure.

These results, particularly those for AUDIT-C risk category, are consistent with the findings of Baumberg Geiger and MacKerron (2016), who identified a 0.18 point decrease in life satisfaction for those with a drinking problem (defined by CAGE scale score), compared to those without such a problem. Our results are also consistent with their finding that frequency of alcohol consumption is not associated with changes in life satisfaction.

Our findings are also in line with Massin and Kopp (2014), who found that being in the top quartile of quantity of alcohol consumption was associated with lower life satisfaction (0.38 points on a five-point scale, compared to the first quartile), but found no significant relationship for the second or third quartiles. Here we find that frequency of consumption is not associated with SWB, but frequency of high consumption (binge drinking frequency) and intensity of consumption are associated with detrimental effects on both psychological distress and mental functioning. This suggests that the salient component of alcohol consumption is quantity consumed, rather than frequency. It is possible that there are interaction effects between quantity and frequency, but the range of alcohol variables available did not allow for these to be separated.

Psychological distress and mental functioning appear to be more sensitive than life satisfaction to the effects of alcohol consumption. For example, life satisfaction was found to be associated with fewer alcohol consumption variables than was psychological distress or mental functioning. In 4.1, we can see that whereas life satisfaction was found to be significantly related to three alcohol measures, psychological distress was significantly related to eight measures, and mental function to six (excluding expenditure on alcohol). This is consistent with the findings of Anderson and Fowers (2020) that being a heavy drinker is associated with worse psychological distress, but is not associated with life satisfaction or eudaimonic well-being. If here we only considered satisfaction with life, then we would find few statistically significant relationships. However, when we consider psychological distress and mental functioning we find that more forms of consumption are associated with costs to SWB. The GHQ-12 (psychological distress) and MCS-12 (mental functioning) scores are aggregates of a wide range of SWB indicators which include measures of experienced and

eudaimonic well-being. These domains of SWB are distinct from the evaluative domain measured by life satisfaction. The sensitivity of these scores to these other categories of SWB may explain why these SWB measures were found to significantly relate to a greater number of alcohol consumption variables than satisfaction with life. Ultimately, life satisfaction is not "an adequate measure of well-being" (Baumberg Geiger and MacKerron, 2016) for assessing the SWB impact of alcohol consumption.

Our results also show that higher levels of expenditure on alcohol are associated with lower psychological distress and greater mental functioning. This apparently counter-intuitive finding has several possible explanations. It could be a result of inadequate measurement of income and/or socioeconomic standing. Alternatively, it may reflect the 'Alcohol Harm Paradox' whereby lower socioeconomic groups suffer greater levels of alcohol-related harm in spite of drinking less, on average (Smith and Foster, 2014), or the possibility that higher levels of expenditure may not be translating into higher levels of consumption.

If high levels of alcohol consumption are harmful for SWB, why do people engage in these levels of consumption? In the short run, alcohol improves mood by enhancing experiences and by increasing the ability to cope with negative emotions (Merrill and Read, 2010). Alcohol use disorders have been linked to greater delay discounting (i.e., greater preferences for a smaller amount today than a larger amount tomorrow: Petry, 2001). An additional consequence of excessive drinking is the loss of ability to appreciate the long-run consequences of decision-making and this may cause drinkers to become 'slaves to the present moment' (Lac and Berger, 2013) as they seek the pleasant immediate effects of drinking (Gorka et al., 2017). Moreover, alcohol consumption may crowd out other activities that do not involve alcohol but would benefit SWB, leading to reinforcement of alcohol consumption (MacKillop, 2016). In these ways alcohol consumption may reinforce the perceived value of (and therefore the demand for) more alcohol consumption. The result can be a vicious cycle of alcohol consumption and diminishing concern for longer-run SWB.

4.5.1 Limitations

4.5.1.1 Causality

Granger-Causality could not be tested for due to the intermittency and lack of consistency of alcohol and SWB measures in the USS because at least five waves of panel data would be required (Dumitrescu and Hurlin, 2012). We were therefore unable to use this approach to help determine the direction of causality behind the associations we have identified. It is also possible that the relationship between alcohol consumption and SWB is driven by a third

factor which influences both. Personal traits such as lower inhibitory control and greater impulsivity could impact both alcohol consumption and SWB, though controlling for unobserved heterogeneity should have accounted for the impact of stable traits on the relationship between alcohol and SWB. Another possibility is the influence of life events impacting on both alcohol consumption and SWB. For example, drinking behaviours worsen following unemployment (Popovici and French, 2013) and SWB is also negatively impacted by becoming unemployed (Andersen, 2009; Krueger and Mueller, 2012; Hetschko, 2016).

Another possibility is that lower SWB can result in higher levels of alcohol consumption. Low levels of SWB can be temporarily alleviated by self-medicating with alcohol consumption. As previously discussed, the alcohol-SWB relationship could be bidirectional: alcohol consumption worsens SWB which in turn leads to greater alcohol consumption to cope with this reduction. Some researchers have suggested that a large proportion of alcohol abuse is initiated by negative emotional states induced by other factors, which leads to a cycle of addiction as alcohol is used to self-medicate to suppress these emotions as well as the negative emotions induced by the alcohol abuse (Koob et al., 2020; Enos, 2020). These induced emotions are termed *hyperkatifeia* and result from the withdrawal from alcohol (or other drugs) (Shurman et al., 2010). This is consistent with our finding that possible alcohol dependence is associated with worse psychological distress, mental functioning, and life satisfaction.

4.5.1.2 Measurement

This study was limited in that USS does not include explicit information on the quantity of alcohol consumed by participants. We were therefore not able to make direct comparisons with some of the findings of Massin and Kopp (2014) and Baumberg Geiger and MacKerron (2016).

We were also unable to identify 'sick-quitters', former drinkers who have reduced their alcohol consumption, or abstained entirely, due to serious health reasons. The sick-quitter effect can lead to underestimation of the differences alcohol consumption has on health outcomes (e.g. Shaper et al., 1988). This effect could also lead to the underestimation of the negative associations between alcohol consumption and SWB.

The SWB measures used were limited to those included in the USS. Factors which some psychologists and philosophers consider to be essential for well-being do not feature in the GHQ-12, MCS-12 or SWEMWBS scales. For example, Seligman and Csikszentmihalyi (2000) list capacity for love and vocation, courage, interpersonal skill, aesthetic sensibility, perseverance, forgiveness, originality, future mindedness, spirituality, high talent and wisdom as examples

of positive functioning. None of these feature in the well-being instruments used here. It is therefore important to note the possibility that the relationship between alcohol consumption and alternative operationalisations of SWB may differ from those found here (Trudel-Fitzgerald et al., 2019; VanderWeele et al., 2020). Similarly, these scales are composed of multiple measures, which reflect both positive and negative experienced well-being and eudaimonic well-being. It is possible that the results found here for these measures are being driven by just one of the domains which these domains comprise (Haybron, 2008b, 99-100). Future research should decompose these hybrid measures into the constituent items and recombine them according to the category of SWB they represent.

It is also possible that the relationship between alcohol consumption and different domains of satisfaction may be different. The facilitation and enhancement of social interaction are significant motivations driving alcohol consumption (Lac and Donaldson, 2016), and alcohol consumption has been shown to improve social bonding in experimental settings (Sayette, 2017); it is therefore plausible that alcohol consumption could increase satisfaction with social life. Future research should aim to include as wide a range of SWB measures as possible to investigate the consumption-SWB relationship for these and identify any trade-offs between domains of SWB.

4.5.1.3 Sample

These results use a UK dataset. Cross-cultural differences may exist such that the alcohol-SWB relationship for other countries is different.

4.5.2 Implications

SWB is increasingly a target for public policy (Stiglitz et al., 2009) and there have been calls for policy to be evaluated in terms of its net impact on 'well-being years' (WELLBYs) (De Neve et al., 2020). These are similar to the quality adjusted life years (QALYs) used to measure changes in health, but WELLBYs make a global assessment of well-being, and thus would capture all the effects of policy rather than just its impact on health. Frijters et al. (2020) go further and advocate for well-being, measured by WELLBYs, to be made the goal of government. Advocates of WELLBYs typically suggest that well-being should be measured by life satisfaction alone, but as we show here, alcohol's negative relationship with SWB is not fully captured when life satisfaction is the sole measure of SWB.

Our findings also have potential implications for health messaging. The term "well-being" is not associated with the same degree of stigma as mental disorder and thus focusing on SWB in public health communication could make people

more receptive to messaging (Dalingwater, 2019). Future health messaging could focus on the potential adverse SWB effects of excessive drinking, in addition to the negative physical and mental health consequences.

4.6 Conclusion

This study builds on the existing literature by assessing the relationship between several dimensions of alcohol consumption with a range of measures of SWB while controlling for unobserved heterogeneity. The results show that higher levels of alcohol consumption are consistently associated with lower levels of SWB, and that the most extreme patterns of consumption are associated with the largest detrimental effects. The majority of these associations are found for composite measures reflecting the experienced and eudaimonic domains of SWB, while fewer are found for its evaluative domain.

Chapter 5

Consumption and Leisure Time are Complementary Goods: Evidence from Life Satisfaction Data

Abstract

In *The Harried Leisure Class*, Staffan Linder observes that deriving utility from consumption requires free time in which to enjoy that consumption. However, recent studies investigating the well-being effects of consumption and leisure do not model this dependency. This study tests Linder's observation using subjective well-being. We use longitudinal data from the Panel Study of Income Dynamics to determine whether consumption and time interact to influence workers' life satisfaction. We also examine whether leisure time or non-working time is the better predictor of life satisfaction. We find non-working hours are the better predictor of life satisfaction, and also find evidence of an interaction effect between non-working hours and consumption. Non-working time has a negative relationship with life satisfaction for all but those with the highest levels of consumption; and consumption has a positive relationship with life satisfaction for all but those with the least non-working time.

5.1 Introduction

The central observation of Staffan Linder's *The Harried Leisure Class* (1970) is that deriving well-being from consumption of goods and services requires time in which to do so. Linder also argues that the well-being yielded from a unit of consumption time is higher when combined with more consumption (1970, 4). The idea that time and consumption are complementary is also reflected in the Cobb-Douglas economic model of individual utility and labour supply, a foundational component of economic theory (Samuelson, 1947). The model characterises the utility of a worker as a function of the hours that they work and the quantity of goods and services they consume. Workers are assumed to maximise their utility by supplying a quantity of labour time in order to earn income to use for consumption. Workers thereby sacrifice one good, non-working time, for another, consumption, though at least some amount of each is required to derive any utility.

The labour supply utility function is typically represented as:

$$U = C^{\alpha} L^{\beta}$$

where U is utility, C is consumption and L is non-working hours. Some take L to be leisure time (Balestrino, 2011). Leisure time is not simply the residual time spent not working, i.e. free time, as leisure time does not include time spent on activities required to meet subsistence needs (e.g., sleeping and eating) or to meet social and contractual obligations. α and β are the elasticities of consumption and non-working time/leisure time, respectively.

The implication of this functional form is that consumption and non-working time provide no benefit at all in the absence of the other, and diminishing marginal benefit if the other is held fixed. Therefore in order for a person to gain utility from their non-working time they need to incur at least some expenditure, and conversely, to gain utility from consumption they need to have at least some free time in which to appreciate it. Additionally, greater consumption makes a given level of non-working time more enjoyable, and vice-versa. The benefits of a large amount of additional consumption, or a large amount of additional hours of less, are less than the benefit of a modest increase in both.

Intuitively, it seems reasonable that consumption and time are complementary goods. For example, greater expenditure can enhance non-working time by paying for higher quality, more frequent and more diverse activities; it can pay for better equipment with which to participate in an activity; and it can facilitate the experience of novel activities. Conversely, more non-working time can enhance consumption by allowing more opportunities to appreciate

material purchases, to engage in experiential consumption, to allow social visibility with which to signal status via conspicuous consumption and conspicuous leisure, and to enable more opportunities to spend time with others and to make pro-social expenditure. Having more time to fill may also be a reason to make a wider range of purchases as a well as more novel purchases. Nonetheless, it is important to note that not all leisure requires consumption, and that consumption can take place during working hours (Stebbins, 2009).

There is some empirical evidence consistent with consumption and time being complementary goods. Experiential consumption has been consistently shown to have a larger positive impact on satisfaction as compared to material consumption (Gilovich et al., 2015). Social consumption has a greater impact on experienced happiness than has solitary experiential consumption (Caprariello and Reis, 2013) and expenditure on leisure predicts both happiness (Zhang and Xiong, 2015) and life satisfaction (DeLeire and Kalil, 2010). Spending money on time-saving goods and services improves social relationships and happiness, and reduces stress and attenuates its negative effects (Dunn et al., 2020). There is some evidence that higher incomes are associated with higher leisure satisfaction (Ardahan and Lapa, 2010; Lapa, 2013; Kaya, 2016) and that the positive relationship between leisure involvement and leisure satisfaction is moderated by income (Matte et al., 2021). Indeed, if income is low, then the amount of it that can be allocated towards leisure consumption is likely to be small, thus restricting participation in many leisure activities (Searle and Jackson, 1985; Shaw et al., 1991; Shores et al., 2007). Conversely, extremely wealthy individuals are more likely to engage in active leisure than passive leisure (Smeets et al., 2020). Active leisure is conducive to life satisfaction and experienced well-being (Hu et al., 2021; Giurge et al., 2020) and has a larger positive effect than passive leisure (Kuykendall et al., 2020) (though not across all cultures; Wei et al., 2015). More generally, participating in a greater variety of activities is associated with greater happiness, provided the activities are not packed into a short time period (Etkin and Mogilner, 2016), and novel experiences are associated with higher life satisfaction (González-Cutre et al., 2016).

Some prior studies have taken life satisfaction as a proxy for economic utility and find it to be positively related to both income and non-working hours (van der Meer and Wielers, 2013; Dockery, 2012), and to both income and overtime (Lisi, 2018), but as far as we are aware, prior research into the determinants of well-being has not taken into account the complementary nature of leisure and consumption by including an interaction term for the two. Research into the relationship between consumption and life satisfaction typically does not include leisure or non-working time as control variables (Wu, 2020; Brown and Gathergood, 2020). These studies are, therefore, subject

to the criticism Linder (1970, 7) levelled at contemporary economists: they "regard consumption as an instantaneous act without temporal consequences."

This paper reports the first empirical test of the existence of an interaction effect between leisure/non-working time and consumption on well-being. Empirical research into leisure satisfaction has suggested that it depends on more than just the amount of non-working time available (Ateca-Amestoy et al., 2008), but as far as we are aware, no study has directly tested whether non-working time or leisure time is more important in determining subjective well-being. Therefore, a second aim is to test whether leisure hours or non-working hours are better at predicting life satisfaction.

5.2 Hypotheses

In line with the findings of the prior literature, we test the following hypotheses:

H1: There is a positive relationship between life satisfaction and consumption.

H2: There is a positive relationship between life satisfaction and leisure/non-working hours.

H3: These relationships do not depend upon the level of leisure or consumption, respectively.

H4: Life satisfaction is better predicted by leisure hours compared to non-working hours.

5.3 Data

We use the 2017 and 2019 waves of the Panel Study of Income Dynamics (PSID), a longitudinal panel set in the United States. These waves included measures of respondents' use of time in a "typical" week, including leisure and working time. Leisure time is measured by "In a typical week, how many hours do you spend doing leisure activities for enjoyment, for example, watching TV, doing physical activities that you enjoy, going online, or spending time with friends?". The PSID also collects information on time spent doing housework, on personal care, shopping, caring for children and adults, volunteering and on education. It does not, however, distinguish between whether the time spent doing these other activities is necessary. We therefore cannot construct a measure of discretionary time according to the operationalisation of Eriksson et al. (2006), who define it as the residual time left after that which people strictly need to use for paid labour, housework and personal care.

The PSID surveys family units' annual expenditure over several domains of consumption. These are summed to give total annual consumption expenditure.

These figures therefore exclude consumption of goods produced at home or received as gifts from other households.

The PSID includes a measure of *satisfaction with life*: "Please think about your life as a whole. How satisfied are you with it? Are you completely satisfied, very satisfied, somewhat satisfied, not very satisfied, or not at all satisfied?" Responses are given from 1, *'completely satisfied'* to 5, *'not at all satisfied'*. In order to aid interpretation, this scale is reversed so that higher satisfaction with life is reflected by positive regression coefficients. It is important to note that subjective well-being is multidimensional and cannot be fully represented by a single measure of well-being, but in cases where one measure is to be used, it has been argued that the measure should be satisfaction with life (VanderWeele et al., 2020). Notwithstanding, the conclusions from the present study are limited to life satisfaction and should not be assumed to apply to other domains of subjective well-being or to subjective well-being as a whole.

The sample was restricted to participants who were employed and aged 18 years or older, leaving 6,561 individuals and 11,233 observations. The mean age of the remaining sample is 40.8. 57% of the sample is female and 43% is male. Summary statistics for all variables used in these analyses can be found in Appendix D.

5.4 Analytical Strategy

We estimate two fixed effects regression models for life satisfaction, one using leisure hours, and another using non-working hours. Consumption is calculated by summing the variables for each category of consumption, then equivalised by dividing by the square-root of the number of persons in the family unit. Both equivalised consumption and leisure/non-working hours are log transformed. In each case, an interaction effect between consumption and leisure/non-working hours is included.

$$LS_{i,t} = \beta_5 log(L_{i,t}+1) + \beta_6 log(C_{i,t}+1) + \beta_7 log(L_{i,t}+1) * log(C_{i,t}+1) + \beta_8 X_{i,t} + \theta_i + \phi_t + \epsilon_{i,t} \quad (5.1)$$

where LS is life satisfaction, L is leisure hours or non-working hours and C is equivalised consumption. α represents time-invariant fixed effects and X is a vector of control variables containing: log income of family unit, log wealth of family unit, log working hours, employment status, employment industry, occupation, marital status, children, sex, age, age squared, education, health, state, race, ethnicity and nationality (Dolan et al., 2008).

5.5 Results

Table 5.1 details the results from each of the regression specifications. The second column contains the coefficients, standard errors and fit statistics from the model for leisure hours without the interaction term. The third column contains the same value for the model with the interaction term. The fourth and fifth contain the same information but for non-working hours. No statistically significant effects were found for any model except the interaction model for non-working hours. This specification also exhibited the best model fit across all statistics.

Interpretation of interaction relationships from coefficients alone can be difficult so Figure 5.1 shows the relationships implied by this specification. The first plot presents the relationship between non-working hours and life satisfaction, evaluated at the 1st to 9th deciles of consumption. Non-working hours is found to be negatively associated with life satisfaction for all consumption deciles, aside from the highest (9th) decile where the association is positive. Higher levels of consumption offset the size of the negative effect of non-working hours. The second plot displays the relationship between consumption and non-working hours, evaluated at the 1st to 9th deciles of leisure. Fewer than nine lines are presented on the graph as the 4th to the 7th deciles were all equal to 128 hours. Consumption was positively related to life satisfaction for all non-working time deciles, aside from the lowest (1st) decile, where the association is slightly negative. At $0 of consumption, those with larger amounts of non-working hours are predicted lower life satisfaction than those with smaller amounts of non-working hours, and the predicted values for life satisfaction for the 9th to the 2nd deciles of non-working time are less than that of the 1st decile for values of consumption less than $46,000. However, the marginal effect of consumption is larger for those with more non-working hours.

	Leisure Hours		Non-Working Hours	
	No Interaction	**Interaction**	**No Interaction**	**Interaction**
Log Consumption	0.05 (0.03)	0.05 (0.07)	0.05 (0.03)	-2.36** (0.94)
Log Leisure Hours	0.01 (0.01)	0.01 (0.26)	-	-
Log Non-Working Hours	-	-	-0.23 (0.12)	-5.33** (1.99)
Interaction	-	-0.0006 (0.03)	-	0.5** (0.19)
AIC	8842.547	8844.546	8793.069	8778.995
BIC	9406.697	9416.022	9357.019	9350.269
Within R^2	0.037664	0.037207	0.037784	0.039163

Significance: *** p $\leq$ 0.001; **p $\leq$ 0.01; * p $\leq$ 0.05; . p $\leq$ 0.10.
Standard errors in parentheses.

Table 5.1: Results from regression models.

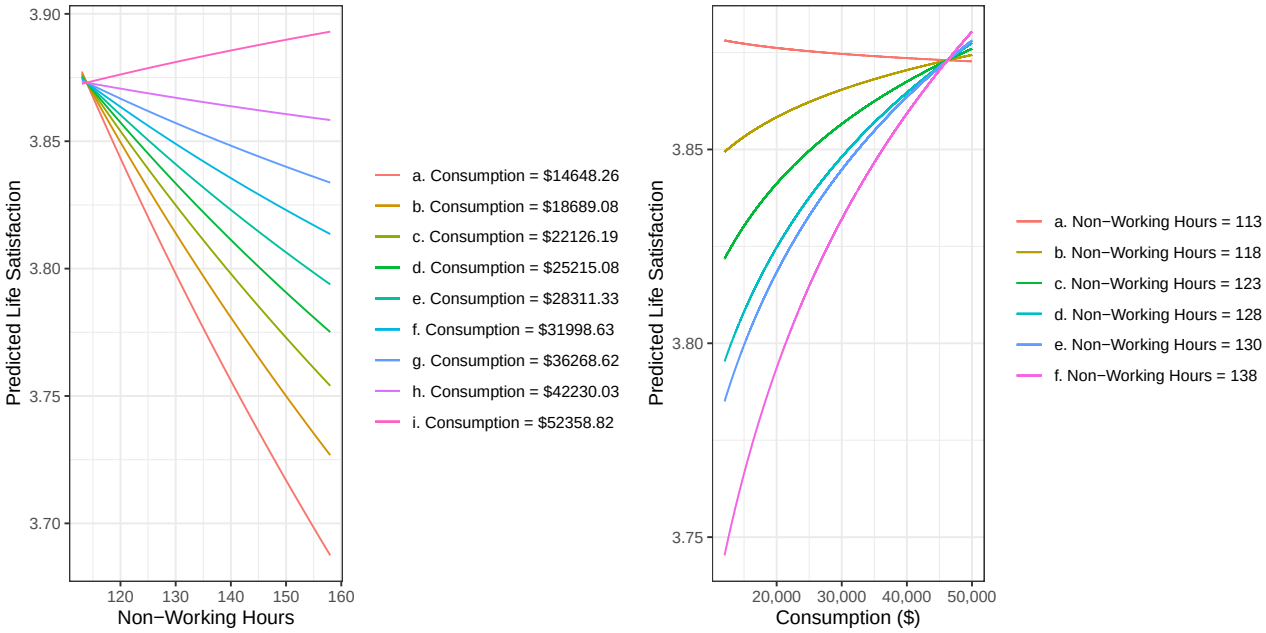

Figure 5.1: Plot of the implied relationships from the interaction model for non-working hours.

5.6 Discussion

This analysis of two waves of the Panel Study of Income Dynamics provides evidence that consumption and non-working hours positively interact in their relationships with life satisfaction, thereby indicting that the marginal benefit of either consumption and non-working time is higher given a larger amount of the other. This finding supports Linder's observation: consumption requires time with which to enjoy it. The analysis also showed that life satisfaction is better explained when non-working time rather than leisure time is used, further supporting the assumptions of the traditional economic model. Both consumption and non-working time are usually assumed to be goods, and therefore to have positive monotonic relationships with utility. Our findings show that this is not the case. Consumption is positively related to life satisfaction for most levels of non-working hours, but is negatively related to life satisfaction for those with the lowest amounts of non-working time. Non-working time however is *negatively* related to life satisfaction for all but the highest levels of consumption, where it is positive.

Prior research into the relationship between working time and well-being in the USA has found that longer working hours are associated with better well-being (Valente and Berry, 2016). Possible explanations for this are the Protestant work-ethic (Scitovsky, 1976; van Hoorn and Maseland, 2013), the belief that hard work gets you ahead (i.e., the American Dream) (Graham, 2017), viewing non-working time as wasteful (Tonietto et al., 2021) and the privileging of positive emotions (Held, 2002); all of which may be a product of the Calvinism of early European settlers (Ehrenreich, 2010). Furthermore, status may be conferred due to conspicuous work (Collewet et al., 2017) and busyness (Bellezza et al., 2017). Our findings partially support this as for most levels of consumption non-working hours are negatively associated with life satisfaction. In contrast however, non-working hours are positively associated with life satisfaction among those with the highest levels of consumption. Perhaps this is due to the enhancing effects of consumption on leisure outweighing the countervailing effects of the Protestant work-ethic and American Dream. Alternatively, this is a reflection of Veblen's notion that among the upper classes, conspicuous leisure is a signal of wealth and status (Scott, 2017) and there is indeed some evidence to suggest that conspicuous leisure confers status in the USA (Frijters and Leigh, 2008) and in other countries (Huang and Shi, 2015).

A prior study using the PSID has found consumption to be positively related to life satisfaction (Brown and Gathergood, 2020). Our findings are consistent with this finding, but suggest that those with lower levels of non-working time receive smaller marginal benefit for each unit of consumption — to the point

where if non-working time is low enough, additional consumption incurs a cost to life satisfaction. However, those with high levels of non-working time are predicted to have much lower life satisfaction at lower levels of consumption. This may be because greater consumption is required to offset the low-status signal of not being busy with work, but having extra free time allows for each unit of consumption to be better appreciated.

5.6.1 Limitations

The PSID's measure of leisure time is defined as time used for *enjoyment*. This is not necessarily the same as leisure time as defined as discretionary time, which may have a different relationship with life satisfaction. Similarly, though enjoyment of discretionary time is a good discriminator between leisure and non-leisure uses of time (Shaw, 1985), leisure activities need not induce enjoyment (Esteve et al., 1999), and indeed some leisure activities can worsen some measures of subjective well-being (Schmiedeberg and Schröder, 2017). The number of leisure activities in a given unit of time, simultaneously or otherwise, is likely to affect the satisfaction derived from it (Etkin and Mogilner, 2016; Linder, 1970).

Prior studies have also found active and passive leisure to have different, and sometimes opposite, relationships with well-being (e.g., Giurge et al., 2020). Due to the PSID's definition of leisure time, we could not decompose total leisure time into active and passive leisure time. An additional limitation was that we could not control for non-work uses of time which are nonetheless necessary for work, such as commuting, which has been found to have a negative impact on life satisfaction (Stutzer and Frey, 2008). Nor could we control for over- or under-employment, which have both been found to negatively affect several measures of subjective well-being (Wooden et al., 2009; Angrave and Charlwood, 2015; Bell and Blanchflower, 2019).

Some define leisure as discretionary time, "time in which freedom of choice prevails when choosing what to do, when and with whom." (Ateca-Amestoy, 2011). Under this view, leisure time is not just time spent doing activities such as rock climbing, playing a musical instrument or watching television, but also time spent choosing to work longer hours than necessary, cleaning one's house to above the minimal societal standard and sleeping more than required to function adequately (Eriksson et al., 2006). Due to data limitations, the effects of leisure time, working time and discretionary time could not be disentangled.

Due to the small number of waves available, it was not possible to conduct more detailed analyses which break down the key variables into smaller components. Different categories of consumption have different impacts on subjective well-being (e.g., Gokdemir, 2015, see also Linder, 1970; Scitovsky, 1976)

and may have different interaction effects with non-working time. Conversely, different categories of time use have different relationships with subjective well-being (Zuzanek and Zuzanek, 2015) and may have different interaction effects with consumption. Finally, the well-being that can be derived from leisure time and consumption may be moderated by a person's human capital (or 'consumption/leisure/life skill'; Scitovsky, 1976, 333), which, beyond using fixed-effects, is not easily controlled for.

Prior research has identified different relationships between leisure and well-being for the United States compared to Europe (Okulicz-Kozaryn, 2010) and Latin America (Valente and Berry, 2016). Americans spend a smaller proportion of total expenditure on leisure; take fewer vacation days and spend less time on recreational activities (Scitovsky, 1976, 190–195). These differences may be driven in part by differences in how leisure and business confer or diminish social status (Bellezza et al., 2017) and by variation in the belief that hard work gets you ahead (Graham, 2017). Future research should repeat this analysis using datasets from other countries when they become available.

5.6.2 Implications

The findings of the present study support the observations made by Linder in *The Harried Leisure Class* (1970): there is evidence to suggest that the satisfaction derived from consumption is a function of the free time a person has, and concomitantly, the satisfaction derived from free time is higher given a larger amount of consumption. Consequently, future studies aiming to investigate the well-being effects of consumption or free time should include an interaction effect.

Basic economic models of labour supply consider non-working time to be a good, though we note more sophisticated economic models of labour supply incorporate the positive and negative features of working hours. In contrast, the present findings show that, for all but the highest levels of consumption, non-working hours are associated with lower life satisfaction. We therefore suggest that the default assumption should be, for the USA, that non-working hours are a bad, unless consumption is sufficiently high.

These findings also have implications for the derivation of monetary equivalents for non-market outcomes. The "Life Satisfaction Approach" (LSA) makes use of regression analyses which include variables for both the non-market outcome and for income. Assuming life satisfaction is a proxy for utility, the coefficients estimated for the non-market outcome and for income allow for the calculation of the amount of money that would be required to compensate for that presence or lack of that outcome (Clark and Oswald, 2002). This monetary value is termed the 'implicit willingness to pay' (Frey et al., 2010)

or ‘shadow price’ (Plug and van Praag, 1995). A key issue is that a failure to control for working hours in effect ignores the fact that income has to be earned, leading to biased estimates (Pouwels et al., 2008). A second issue for this approach is that consumption predicts life satisfaction better than income (Brown and Gathergood, 2020) and arguably ought to be used rather than income. Thirdly, as shown in the present study, the life satisfaction derived from consumption depends on the amount of non-working hours a person has. This interaction term means that the LSA’s comparison of coefficients does not produce a single implicit willingness to pay. Instead, the implicit willingness to pay depends on the level of non-working time an individual has.

Chapter 6

Conclusion

This thesis comprises four chapters, each of which contributes to the existing literature through empirical analysis of large survey datasets. Specifically, this thesis has found that: (a) net wealth is more strongly related to evaluative SWB than to experienced or eudaimonic SWB; (b) current account assets have a disproportionately large positive effect on all categories of SWB for which data were available; (c) the positive effect of total assets on life satisfaction is larger in size than the negative effect of total debts; (d) global evaluative SWB and its subdomains relating to pay and finances are better predicted by income rank than by absolute income; (e) some domains of SWB are predicted by both income rank and absolute income even when individual life trajectories are modelled; (f) some relationships between alcohol consumption and SWB are not found for life satisfaction but are for psychological distress and mental functioning; (g) in the USA, non-working hours have a negative association with life satisfaction unless consumption is very high. This conclusion briefly summarises the findings of each chapter before discussing their limitations, as well as their implications for research and policy.

6.1 Summary

Chapter 2 investigated the relationships between forms of wealth and several domains of SWB. It presented evidence to show that different forms of wealth have statistically different relationships with SWB. A key result was that current account assets have a disproportionately large beneficial effect for measures of evaluative, experienced and eudaimonic SWB. This chapter therefore provides support for the finding that liquid wealth has a uniquely large effect on SWB (Ruberton et al., 2016), but suggests that this effect is driven mostly by current account assets rather than savings account balances, and shows that the effect is present across all categories of SWB. This chapter also found that wealth is more strongly related to evaluative SWB than to positive experienced SWB and eudaimonic SWB, though this relationship is driven by the SWB effect of assets,

not debts. This result supports prior findings that economic outcomes, such as income (Kahneman and Deaton, 2010; Killingsworth, 2021), consumption (Tsurumi et al., 2021), and wealth (Jantsch and Veenhoven, 2019), are more strongly related to evaluative SWB than to other domains of SWB. Contrary to what loss aversion might predict, this chapter finds that the positive effect of total assets on evaluative well-being is larger in size than the negative effect of total debts on evaluative well-being.

Chapter 3 examined whether SWB is influenced by income rank, absolute income or both. In contrast to a recent investigation, which suggested that rank effects are the spurious result of failing to control for individual life trajectories (Collischon and Eberl, 2021), this chapter found that income rank improved many measures of SWB. These measures reflected global evaluative SWB and domains of evaluative SWB relating to income, pay, finances and, less consistently, employment. In domains of SWB relating to income, pay and finances, income rank explained more variation than did absolute income. Effects of absolute income, over and above effects of income rank, were found for some measures of SWB, but not consistently. Measures of positive and negative experienced SWB, and mental functioning, were not predicted by either income rank or absolute income.

Chapter 4 examined the relationships between several patterns of alcohol consumption and several measures of SWB. It presented evidence to show that frequent binge drinking is associated with worse life satisfaction, mental functioning and psychological distress, and that high intensities of consumption are associated with worsened psychological distress and mental functioning. Being identified as at risk of alcohol dependency was associated with lower life satisfaction, in addition to worsened psychological distress and mental functioning. Frequency of moderate consumption was not associated with any measure of SWB. Surprisingly, expenditure on alcohol was associated with better SWB. Overall the results from this chapter show that, in comparison to life satisfaction, mental functioning and psychological distress were associated with a larger number of alcohol consumption behaviours.

Chapter 5 provided evidence of an interaction effect between free time and consumption in their respective relationships with life satisfaction. It also suggested that, for the United States, non-working time is a better predictor of life satisfaction than leisure time. Contrary to what is typically assumed, but consistent with other studies using data from the United States (Valente and Berry, 2016), longer non-working hours are associated with lower life satisfaction, except for those who consume the most.

6.2 Limitations

The hypotheses tested in this thesis are constrained by the contents of the survey datasets available. For example in Chapter 4, the Understanding Society Survey does not include a measure of quantity of alcohol consumed and consequently we could not investigate how this measure of consumption influences SWB. Similarly, in Chapter 2, the Wealth and Assets Survey does not include a measure of the most liquid form of wealth: physical cash held by the participant. Finally, Chapter 5 did not contain a variable for discretionary time or whether leisure time was active or passive.

The SWB variables included in the survey datasets were also a constraint. Though SWB is composed of several categories, each of which contains multiple psychological constructs, surveys typically include, at best, a handful of SWB indicators across all their waves.

Some key measures used here are not included in every survey wave, leading to a small number of waves over which analyses can be conducted. For example, Chapter 5 could make use of only two waves. These analyses are better than cross-sectional equivalents due to controlling for some degree of individual heterogeneity, but are inferior to analyses which utilise many waves of survey data. Conversely, Chapter 3 uses the data-demanding Fixed-Effects Individual Slopes analyses which requires large numbers of waves per SWB measure; some measures of SWB, while available for several waves in the surveys used, did not meet the number required and so could not be analysed using this method.

An issue specific to SWB responses in longitudinal surveys is that participants who are in the sample for multiple waves are subject to panel conditioning. Specifically, participants may report significantly lower SWB scores the longer they are in a survey, controlling for age and time period (Van Landeghem, 2014) (though see Wooden and Li, 2014), possibly due to lower motivation (Chadi, 2019) or changes in interactions with interviewers (Chadi, 2013a). Panel conditioning can also lead to participants reporting higher incomes (Fisher, 2019) or to be more likely to refuse to answer income related questions (Halpern-Manners et al., 2017). Participation in surveys can also lead to changes in behaviour, such as saving more money (Crossley et al., 2017) or taking a greater interest in or thinking more about the topics under investigation (Sturgis et al., 2009). Controlling for panel conditioning is difficult as the apparently obvious solution of controlling for length of time in panel leads to the same multicollinearity issues as the age-period-cohort problem. One solution is to investigate separate cohorts to see if estimated effects differ for more experienced survey participants (Van Landeghem, 2012). This approach requires surveys to have had several refreshment samples, all of which include variables of interest. Of the survey data used here, this approach could only

have been used for a few SWB variables in Chapter 3.

More generally, self-report data can suffer from measurement error. For example, frequency and quantity of alcohol consumption are typically under-reported in surveys (Stockwell et al., 2016) but not consistently enough such that an assumption of under-reporting can be assumed and responses adjusted for all participants (Gilligan et al., 2019). Indeed measurement errors are frequently non-random, but instead endogenous and could influence the conclusions drawn. For example, people who are more satisfied with their wage over-report their income, and those who are less satisfied with it under report it (Prati, 2017). In the absence of income data from other sources we must acknowledge the possibility that the strength of the relationships between SWB and income may be inflated as a result of this hedonic recall bias.

Some degree of assumption must be made about household-level variables influencing the SWB of people in the household. This applies to some wealth variables in Chapter 2; household expenditure on alcohol in Chapter 4; and household consumption in Chapter 5. Here we must assume that these things affect those in the household equally. This is simply an assumption that must be made in the absence of extremely detailed data.

6.3 Implications

6.3.1 Dimensions of Well-Being

Dolan and Metcalfe (2012) distinguish three categories of SWB: evaluative, experienced and eudaimonic. All chapters of this thesis, except Chapter 5, use multiple measures of SWB and represent at least two of these three categories. Chapters 2, 3 and 4 find that the conclusions reached depend upon the category of SWB under investigation. Chapters 2 and 4 identify what Haybron (2008a, 84) refers to as a cognitive-affective divergence where associations identified for evaluative SWB are different to those identified for experienced SWB. These chapters also find some degree of cognitive-eudaimonic divergence.

It is now well established that SWB is multidimensional and should not be represented by a single measure, such as life satisfaction, unless constrained to (VanderWeele et al., 2020). This thesis attempted to represent SWB as well as possible by using all the measures available within a dataset, or at least as many as was practical. However, Chapters 3 and 4 use hybrid measures of SWB which include items belonging to more than one category of SWB. This initially seems like an advantage as such measures would be more sensitive to capturing the sum SWB impact on a person. However, it does not allow for the disentangling of which categories of SWB, or items reflecting them, are actually related to the subject of interest. Hybrid measures thus function

as an index, rather than a single psychological phenomenon (Haybron, 2008a, 99–100). It would therefore be preferable to break these hybrid indicators into their constituent components and reconstitute them by category of SWB (e.g., Nikolaev, 2018) or to investigate each item in turn as a separate construct. The latter is perhaps preferable as grouping SWB into categories leads to loss of valuable information (Kashdan et al., 2008), though grouping may allow for greater precision (Haybron, 2008a, 17). Ultimately there is a moral imperative to measure and investigate all the types of SWB that people could reasonably care about. Once an individual has determined the domains of SWB that concern them, they should be able to use the findings of prudential psychology to allow them to pursue their chosen domains as well as possible (Tiberius and Hall, 2010).

6.3.2 Subjective Well-Being and Policy

Those making the case for using SWB to inform policy design and to measure societal progress typically recognise the importance of representing several, or all, of its constituent categories (Stiglitz et al., 2009; Dolan and Metcalfe, 2012). More recently, however, there have been calls to move towards evaluating policy in terms of its net impact on the length and quality of human lives, i.e., its impact on well-being years (WELLBYs) (De Neve et al., 2020). This approach extends the notion of quality adjusted life years (QALYs), used by health economists to measure the impact of a medical intervention on a typical person's lifespan and quality of life during that time, but rather than measuring health state it measures satisfaction with life as a whole. The use of life satisfaction is justified by the need for a 'common currency' with which to measure the total effects of a policy. Frijters et al. (2020) advocate for the maximisation of WELLBYs, as measured by satisfaction with life, to be the primary aim of government. Opting for a high-precision but low-fidelity account of SWB is understandable (Haybron, 2008a, 17), but there are significant dangers with underestimating the complexity and variability of SWB (Mitchell and Alexandrova, 2021). This is illustrated in Chapter 4, where associations between SWB and alcohol consumption are not found for life satisfaction, but are found for psychological distress and mental functioning. Chapter 2 shows that net wealth has a larger relationship with life satisfaction than with other measures of SWB, and supports the claim that life satisfaction may be biased towards an economic frame (White, 2016). Nuances such as this will not be recognised by policy aiming towards maximising life satisfaction alone. For example, Chapter 3 finds income to be associated with higher life satisfaction, but unrelated to experienced SWB and mental functioning. A policy maker guided by WELLBYs might therefore conclude that policies which

increase income are societally desirable, and allocate resources to that effect, which could otherwise have been spent on policies targeting the improvement of experienced SWB or mental functioning. Consequently, policy designed in this way risks ignoring or compromising other domains of SWB.

6.3.3 Rank Based Comparisons

Several theories of judgement and decision making, such as relative rank theory (Ronayne and Brown, 2017), decision by sampling (Stewart et al., 2006) and range-frequency theory (Parducci, 1965), suggest that the rank positions of relevant quantities play a central role in subjective assessments of them. These theories are at odds with a recent study which argued prior results identifying a link between income rank and SWB are spurious and a consequence of failing to model individual trajectories through life (Collischon and Eberl, 2021). In contrast, Chapter 3 found that income rank has a significant relationship with most, but not all, measures of SWB examined even when individual trajectories are modelled.

6.3.4 Income and Redistribution

The mechanism by which income influences SWB has implications for policy makers. If the pure rank hypothesis is correct (i.e., that income rank is the only salient factor), then redistributive policies cannot change the amount of societal SWB derived from income (Layard, 1980). Furthermore, this hypothesis helps account for the Easterlin Paradox. Though individuals' rank positions may move over time, the total amount of societal SWB that can be derived from income does not. This may explain the lack of a relationship between national SWB and income over time (Easterlin, 1974).

If, however, this hypothesis is rejected, as it is in Chapter 3 for several measures of SWB, then the policy implications depend on the direction of the relationship been absolute income and SWB. If the relationship is positive, then policy makers can increase societal SWB by redistributing income from high earners to the lowest earners (FitzRoy and Nolan, 2021). If the relationship is negative, then this suggests, somewhat absurdly, that societal SWB would be increased by redistributing income from the poorest to the richest. A negative relationship seems to indicate that the additional benefit of a unit of income does not outweigh the costs required to earn it. Should such results be replicated, they may be indicative of a society where gains in SWB can be better achieved through outcomes other than the improvement of income.

An additional possibility, not explored in Chapter 3, is that the pure and impure hypotheses might apply to particular positions in the SWB distribution. Indeed, the sign on absolute income might also be different across the SWB

distribution (Lakshmanasamy and Maya, 2020; Budria, 2012). A further possibility is that the effect of rank of income on SWB might also vary depending on position in the income distribution (Senik, 2014). Modelling these effects adds considerable complexity but the findings derived from them could have significant implications for distributive policies.

6.3.5 The Link Between Current Account Balances and SWB

Chapter 2 identifies, for the first time, a disproportionately large beneficial association between SWB and current account assets, compared to other types of asset. Most significantly, it identifies a statistically significant difference in the SWB effect of current and savings accounts. These types of accounts are very similar and are typically summed together to give an estimate of a person's liquid assets (e.g., Ruberton et al., 2016; Wang et al., 2019). This difference may be being driven by the fact that expenditures are typically made from current accounts, or alternatively may be due to the mental accounts normally constructed from funds in current accounts. These suggestions are tentative and further research is required to determine the precise reason for this difference. Identifying this reason may allow designers of financial products to increase the SWB response of other forms of assets with the aim of increasing customers' saving or investment.

6.3.6 Life Satisfaction Approach

Chapter 5 finds that consumption has a larger positive effect on life satisfaction if a person has more free time in which to enjoy it. Conversely, free time needs a lot of consumption in order to turn its effect on life satisfaction from negative to positive. A limitation of these results is that they are based only on data from the USA. Prior studies have found longer non-working hours to be negatively associated with SWB in the USA (Valente and Berry, 2016) but positively associated with SWB in Europe (Okulicz-Kozaryn, 2010) and Latin America (Valente and Berry, 2016). Nonetheless, the findings here have implications for using coefficients from SWB equations to derive monetary equivalents for non-market outcomes, i.e. the Life Satisfaction Approach (LSA). The LSA divides the coefficient on the non-market outcome by the coefficient on income to calculate the amount of money that would yield a SWB effect of the same size (Plug and van Praag, 1995; Clark and Oswald, 2002). The LSA has been used to value personal events such as the death of a loved one (Oswald and Powdthavee, 2008) and changes in health (Powdthavee and van den Berg, 2011); external events such as crime (Powdthavee, 2005), terrorism (Frey et al., 2008), floods (Luechinger and Raschky, 2009), wild fire smoke (Jones, 2017), and droughts (Carroll et al., 2007); externalities such as airport noise (Praag

and Baarsma, 2004) and air pollution (Luechinger, 2009); and policies such as Daylight Saving Time (Kuehnle and Wunder, 2015).

However, there are several problems with the LSA. Firstly, consumption predicts life satisfaction better than income (Brown and Gathergood, 2020) and coefficients on consumption arguably ought to be used rather than those on income. Secondly, as shown in Chapter 5, the life satisfaction that is derived from consumption depends on the amount on non-working time a person has. Thirdly, as already discussed, using only life satisfaction to represent SWB fails to take into account its complexity (Mitchell and Alexandrova, 2021), and due to the cognitive-affective divergence (Haybron, 2008a, 84), the LSA could fail to capture important psychological costs or benefits of non-market outcomes. Applying the LSA to the results of Chapter 4 would find no statistically significant association between life satisfaction and high risk alcohol consumption. However, this chapter also finds that high risk alcohol consumption is associated with greater psychological distress and lower mental functioning. These costs simply would not be identified by the LSA and would not be accounted for by any monetary equivalent derived by it.

6.4 Conclusion

Subjective well-being, how well a person's life is going from their own perspective, is a powerful tool for determining the things in life that are good and bad for people. Investigation of its relationships with objective circumstances provides insight into the ways that humans make subjective assessments. The main finding of this thesis is that different categories of SWB can have different relationships with life outcomes such as income, wealth and alcohol consumption. Taking a single measure of SWB to be representative of well-being as a whole is therefore problematic. Consequently, public policy designed to maximise one particular aspect of SWB could, in the process, end up ignoring or actively harming others aspects of SWB.

Appendix A

Accounting for Well-Being

A.1 Summary Statistics

A.1.1 Wealth Variables With Zero Values

Table A.1: Summary statistics for wealth variables, including zeros.

Variable	Stats	Frequencies
residence_asset [numeric]	Mean (sd) : 108690.2 (111473.5) min < med < max: 0 < 90000 < 7e+05 IQR (CV) : 160000 (1)	1064 distinct values
residence_mortgage [numeric]	Mean (sd) : 13989.6 (29987.6) min < med < max: 0 < 0 < 179000 IQR (CV) : 7500 (2.1)	1976 distinct values
other_real_estate_assets [integer]	Mean (sd) : 12449.1 (50046.7) min < med < max: 0 < 0 < 5e+05 IQR (CV) : 0 (4)	443 distinct values
other_real_estate_debt [integer]	Mean (sd) : 1535.9 (10455.6) min < med < max: 0 < 0 < 128000 IQR (CV) : 0 (6.8)	320 distinct values
possessions [numeric]	Mean (sd) : 28244.8 (31841) min < med < max: 416.7 < 22550 < 5154500 IQR (CV) : 22900 (1.1)	7633 distinct values

current_account_assets [numeric]	Mean (sd) : 2743.2 (5212.1) min < med < max: 0 < 800.2 < 41685 IQR (CV) : 2365.8 (1.9)	5224 distinct values
current_account_debt [numeric]	Mean (sd) : 33.6 (160.1) min < med < max: 0 < 0 < 1600 IQR (CV) : 0 (4.8)	508 distinct values
savings_account [numeric]	Mean (sd) : 6938.3 (18671.5) min < med < max: 0 < 42.5 < 175500 IQR (CV) : 4000 (2.7)	3797 distinct values
student_loans [numeric]	Mean (sd) : 102.1 (922.1) min < med < max: 0 < 0 < 12500 IQR (CV) : 0 (9)	208 distinct values
other_financial_assets [numeric]	Mean (sd) : 27494.6 (63733) min < med < max: 0 < 1500 < 570500 IQR (CV) : 23750 (2.3)	10926 distinct values
other_financial_debt [numeric]	Mean (sd) : 1095.4 (2937.6) min < med < max: 0 < 0 < 21453 IQR (CV) : 267 (2.7)	7291 distinct values
pension_wealth [numeric]	Mean (sd) : 128496.6 (215287.7) min < med < max: 0 < 31247.7 < 1363145 IQR (CV) : 156921 (1.7)	52629 distinct values

A.1.2 Wealth Variables Without Zero Values

Table A.2: Summary statistics for wealth variables, excluding zeros.

Variable	Stats	Frequencies
residence_asset [numeric]	Mean (sd) : 157112 (101757.7) min < med < max: 187.5 < 130000 < 7e+05 IQR (CV) : 112500 (0.6)	1063 distinct values

residence_mortgage [numeric]	Mean (sd) : 51533.2 (37119.3) min < med < max: 0.5 < 45000 < 179000 IQR (CV) : 50500 (0.7)	1975 distinct values
other_real_estate_assets [integer]	Mean (sd) : 126096.3 (105072.2) min < med < max: 1 < 1e+05 < 5e+05 IQR (CV) : 120000 (0.8)	442 distinct values
other_real_estate_debt [integer]	Mean (sd) : 50389.2 (33542.8) min < med < max: 1 < 49000 < 128000 IQR (CV) : 50000 (0.7)	319 distinct values
possessions [numeric]	Mean (sd) : 28244.8 (31841) min < med < max: 416.7 < 22550 < 5154500 IQR (CV) : 22900 (1.1)	7633 distinct values
current_account_assets [numeric]	Mean (sd) : 3027.1 (5396.1) min < med < max: 0.5 < 1000 < 41685 IQR (CV) : 2700 (1.8)	5223 distinct values
current_account_debt [numeric]	Mean (sd) : 426.5 (397.4) min < med < max: 0.5 < 300 < 1600 IQR (CV) : 500 (0.9)	507 distinct values
savings_account [numeric]	Mean (sd) : 12931.6 (23922.3) min < med < max: 0.5 < 3500 < 175500 IQR (CV) : 12350 (1.8)	3796 distinct values
student_loans [numeric]	Mean (sd) : 6369.6 (3622.2) min < med < max: 8 < 6175 < 12500 IQR (CV) : 7000 (0.6)	207 distinct values
other_financial_assets [numeric]	Mean (sd) : 45210 (76669.3) min < med < max: 1 < 15000 < 570500 IQR (CV) : 47055 (1.7)	10925 distinct values
other_financial_debt [numeric]	Mean (sd) : 3648.6 (4407.7) min < med < max: 1 < 1793 < 21453 IQR (CV) : 4875 (1.2)	7290 distinct values

pension_wealth [numeric]	Mean (sd) : 182740.3 (236647.8) min < med < max: 0.2 < 86841.9 < 1363145 IQR (CV) : 220125.7 (1.3)	52628 distinct values

A.1.3 Well-Being Variables

Table A.3: Summary statistics for well-being variables

Variable	Stats / Values	Freqs (% of Valid)
satisw	Mean (sd) : 7.5 (1.8)	0 : 539 (0.6%)
[integer]	min < med < max:	1 : 365 (0.4%)
	0 < 8 < 10	2 : 798 (0.9%)
	IQR (CV) : 2 (0.2)	3 : 1202 (1.4%)
		4 : 2051 (2.4%)
		5 : 7011 (8.1%)
		6 : 6657 (7.7%)
		7 : 15755 (18.1%)
		8 : 27988 (32.2%)
		9 : 13965 (16.1%)
		10 : 10626 (12.2%)
worthw	Mean (sd) : 7.7 (1.8)	0 : 425 (0.5%)
[integer]	min < med < max:	1 : 250 (0.3%)
	0 < 8 < 10	2 : 681 (0.8%)
	IQR (CV) : 2 (0.2)	3 : 1059 (1.2%)
		4 : 1565 (1.8%)
		5 : 5965 (6.9%)
		6 : 6223 (7.2%)
		7 : 14962 (17.2%)
		8 : 27123 (31.3%)
		9 : 15269 (17.6%)
		10 : 13271 (15.3%)

Variable	Stats / Values	Freqs (% of Valid)
happyw	Mean (sd) : 7.4 (2.1)	0 : 795 (0.9%)
[integer]	min < med < max:	1 : 692 (0.8%)
	0 < 8 < 10	2 : 1547 (1.8%)
	IQR (CV) : 3 (0.3)	3 : 2086 (2.4%)
		4 : 2832 (3.3%)
		5 : 7372 (8.5%)
		6 : 7105 (8.2%)
		7 : 13443 (15.5%)
		8 : 22420 (25.8%)
		9 : 14844 (17.1%)
		10 : 13828 (15.9%)
anxiousw	Mean (sd) : 2.8 (2.8)	0 : 28769 (33.1%)
[integer]	min < med < max:	1 : 8694 (10.0%)
	0 < 2 < 10	2 : 11962 (13.8%)
	IQR (CV) : 5 (1)	3 : 7591 (8.7%)
		4 : 5343 (6.1%)
		5 : 8580 (9.9%)
		6 : 4398 (5.1%)
		7 : 4405 (5.1%)
		8 : 4035 (4.6%)
		9 : 1588 (1.8%)
		10 : 1561 (1.8%)

A.1.4 Control Variables

Table A.4: Summary statistics for control variables

Variable	Stats / Values	Freqs (% of Valid)
age_group	1. 65-69	10194 (11.7%)
[factor]	2. 60-64	8782 (10.1%)
	3. 70-74	8673 (9.9%)
	4. 50-54	7879 (9.0%)
	5. 55-59	7792 (8.9%)
	6. 45-49	7646 (8.8%)
	7. 80+	7158 (8.2%)
	8. 40-44	6646 (7.6%)
	9. 75-79	6512 (7.5%)
	10. 35-39	5448 (6.2%)
	[3 others]	10470 (12.0%)
sexw	1. Female	47395 (54.4%)
[factor]	2. Male	39805 (45.6%)
marital_status	1. Married	51700 (59.3%)
[factor]	2. Single	11065 (12.7%)
	3. Cohabiting	7921 (9.1%)
	4. Widowed	7521 (8.6%)
	5. Divorced	7026 (8.1%)
	6. Separated	1744 (2.0%)
	7. Civil Partner	201 (0.2%)
	8. FormerSeparated Civil Par	11 (0.0%)
	9. Same sex couple	6 (0.0%)
	10. Former / separated Civil	3 (0.0%)
	11. Former, separated same se	2 (0.0%)
n_children	Mean (sd) : 0.5 (0.9)	0 : 64122 (73.5%)
[integer]	min < med < max:	1 : 9897 (11.3%)
	0 < 0 < 7	2 : 9493 (10.9%)
	IQR (CV) : 1 (1.9)	3 : 2789 (3.2%)
		4 : 692 (0.8%)
		5 : 157 (0.2%)
		6 : 38 (0.0%)
		7 : 12 (0.0%)

Variable	Stats / Values	Freqs (% of Valid)
health_status	1. Good	36212 (41.5%)
[factor]	2. Very Good	24811 (28.5%)
	3. Fair	18567 (21.3%)
	4. Bad	5840 (6.7%)
	5. Very Bad	1631 (1.9%)
	6. Don't Know	97 (0.1%)
	7. No Answer	23 (0.0%)
	8. Error / Partial	19 (0.0%)
educational_level	1. Other level qualification	48100 (55.2%)
[factor]	2. Degree level or above	22057 (25.3%)
	3. No qualifications	17020 (19.5%)
	4. Refusal	9 (0.0%)
	5. Qualifications but DK lev	6 (0.0%)
	6. Don't know	5 (0.0%)
	7. Not asked / applicable	3 (0.0%)
social_class	1. Managerial & prof. occupa	35308 (40.5%)
[factor]	2. Routine & manual occupati	27677 (31.7%)
	3. Intervediate occupations	16467 (18.9%)
	4. Does not apply	5239 (6.0%)
	5. Never worked/long term un	1662 (1.9%)
	6. Not classified	795 (0.9%)
	7. Not asked / applicable	52 (0.1%)
main_act	1. Employee	36332 (41.7%)
[factor]	2. Inactive Retired from pai	33781 (38.7%)
	3. Self-Employed	5907 (6.8%)
	4. Inactive Long-term sick o	3803 (4.4%)
	5. Inactive Looking after th	3478 (4.0%)
	6. ILO Unemployed	1997 (2.3%)
	7. Inactive Other or no reas	1055 (1.2%)
	8. Inactive Student	602 (0.7%)
	9. Inactive Temporarily sick	245 (0.3%)

Variable	Stats / Values	Freqs (% of Valid)
gorw	1. South East	11855 (13.6%)
[factor]	2. North West	10352 (11.9%)
	3. East of England	8928 (10.2%)
	4. Scotland	8264 (9.5%)
	5. South West	8078 (9.3%)
	6. West Midlands	7846 (9.0%)
	7. East Midlands	7766 (8.9%)
	8. London	6589 (7.6%)
	9. Yorkshire and The Humber	4704 (5.4%)
	10. Wales	4683 (5.4%)
	[2 others]	8135 (9.3%)
income_rank	Mean (sd) : 0.5 (0.3)	87141 distinct values
[numeric]	min < med < max:	
	0 < 0.5 < 1	
	IQR (CV) : 0.5 (0.6)	

Table A.5: Variable Descriptions

Variable Name	Description	Responses
satisw	Overall, how satisfied are you with your life nowadays?	Not satisfied at all 0 - Completely satisfied 10
worthw	Overall, how worthwhile are the things that you do in your life?	Not at all 0 - Completely 10
happyw	Overall, how happy did you feel yesterday?	Not at all 0 - Completely 10
anxiousw	Overall, how anxious did you feel yesterday?	Not at all 0 - Completely 10

Figure A.1 displays the missingness rate for well-being variables. Well-being questions were not asked when participants were acting as proxies for others. Wave 3 had a much higher proportion of proxy-competitions than Waves 4 to 6 (34,668 compared to 16,127, 14,644 and 11,997 respectively).

Table A.6: Summary statistics for each well-being variable.

		Males			**Females**		
WB Variable	**Waves**	**N**	**Observations**	**Approximate Mean Age**	**N**	**Observations**	**Approximate Mean Age**
satisw	4	25,302	39,707	57.55	31,312	47,240	55.62
worthw	4	25,283	39,626	57.55	31,290	47,157	55.61
happyw	4	25,305	39,710	57.55	31,319	47,244	55.62
anxiousw	4	25,291	39,693	57.55	31,303	47,223	55.62

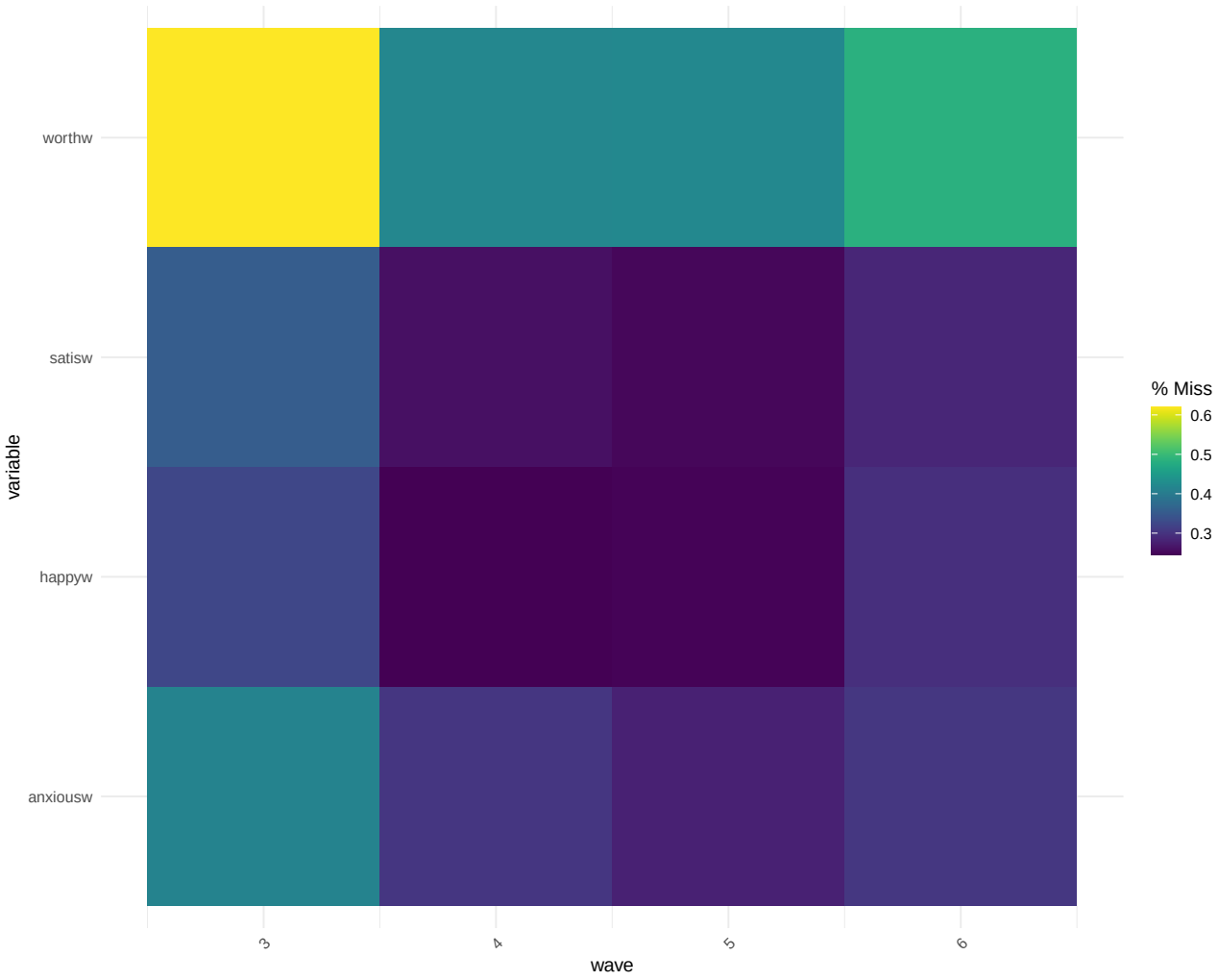

Figure A.1: Missingness plot for well-being variables.

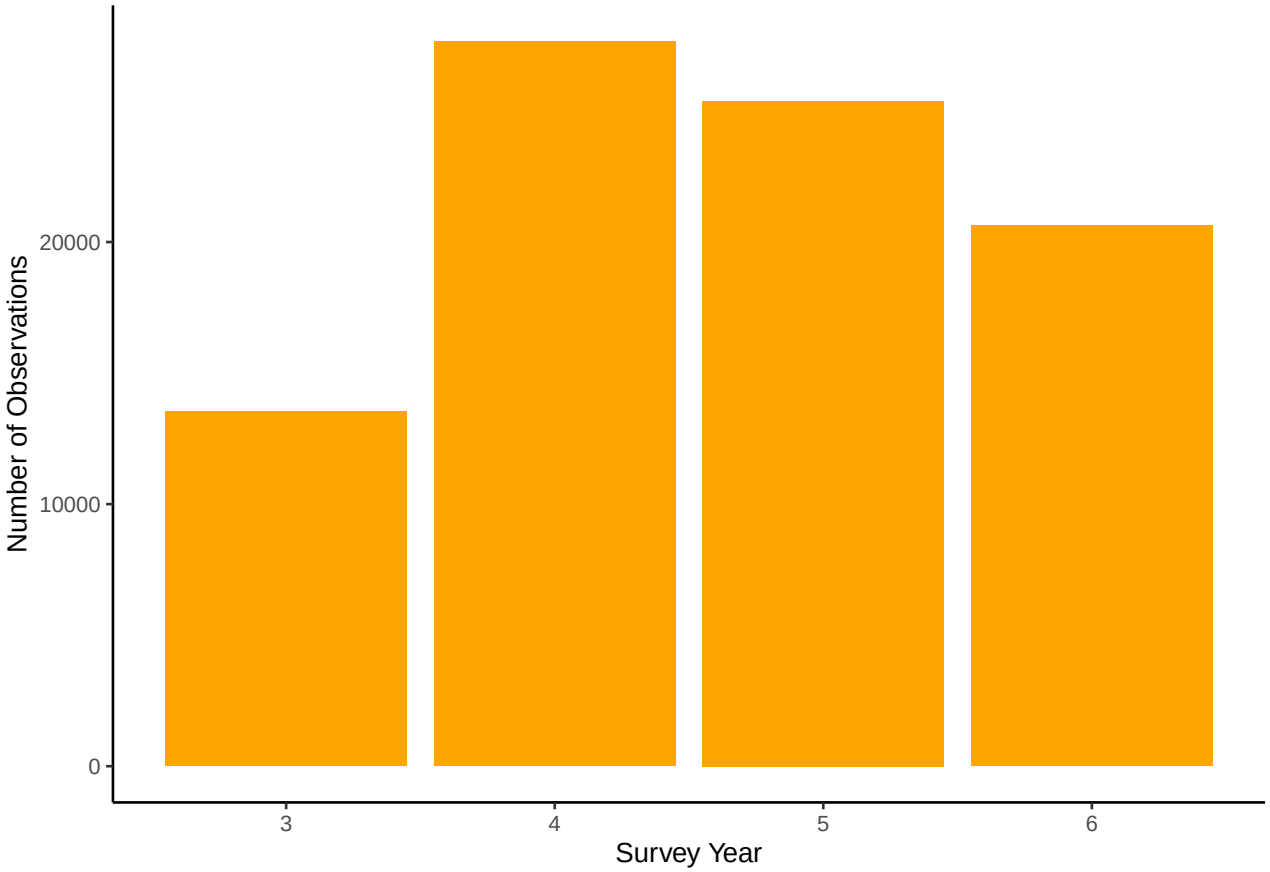

Figure A.2: Observations by wave.

Table A.7: Number of participants and observations for pairs of wealth variables.

Wealth Variable	Residence Asset	Residence Mortgage	Other Real Estate Assets	Other Real Estate Debt	Possessions	Current Account Assets	Current Account Debt	Savings Account	Student Loans	Other Financial Assets	Other Financial Debt	Pension Wealth
Residence Asset	33,691 (79,026)	18,786 (47,494)	6,704 (17,730)	2,053 (5,421)	33,691 (79,026)	32,829 (77,574)	3,845 (10,140)	26,136 (64,111)	708 (1,846)	28,675 (69,809)	13,886 (37,055)	29,828 (72,481)
Residence Mortgage	18,786 (47,494)	18,786 (47,494)	2,564 (6,861)	1,299 (3,474)	18,786 (47,494)	17,301 (43,941)	3,131 (8,227)	12,137 (31,230)	645 (1,688)	12,463 (32,221)	9,415 (25,163)	16,080 (41,237)
Other Real Estate Assets	6,704 (17,730)	2,564 (6,861)	7,930 (20,668)	2,580 (6,714)	7,930 (20,668)	7,608 (19,804)	481 (1,271)	5,762 (15,061)	92 (243)	6,505 (16,994)	2,284 (6,209)	6,661 (17,591)
Other Real Estate Debt	2,053 (5,421)	1,299 (3,474)	2,580 (6,714)	2,592 (6,741)	2,592 (6,741)	2,438 (6,315)	239 (649)	1,745 (4,557)	59 (157)	1,891 (4,900)	998 (2,690)	2,203 (5,789)
Possessions	33,691 (79,026)	18,786 (47,494)	7,930 (20,668)	2,592 (6,741)	40,210 (87,200)	38,819 (85,714)	6,426 (16,765)	30,454 (72,213)	1,376 (3,452)	32,129 (75,796)	19,718 (51,007)	33,722 (78,953)
Current Account Assets	32,829 (77,574)	17,301 (43,941)	7,608 (19,804)	2,438 (6,315)	38,819 (85,714)	38,819 (85,714)	2,007 (5,194)	29,420 (70,195)	1,197 (3,011)	31,403 (74,506)	17,457 (45,591)	32,741 (77,363)
Current Account Debt	3,845 (10,140)	3,131 (8,227)	481 (1,271)	239 (649)	6,426 (16,765)	2,007 (5,194)	6,426 (16,765)	2,758 (7,188)	288 (735)	2,603 (6,855)	4,230 (11,401)	4,257 (11,265)
Savings Account	26,136 (64,111)	12,137 (31,230)	5,762 (15,061)	1,745 (4,557)	30,454 (72,213)	29,420 (70,195)	2,758 (7,188)	30,454 (72,213)	784 (1,973)	24,835 (60,930)	11,561 (30,644)	26,002 (63,917)
Student Loans	708 (1,846)	645 (1,688)	92 (243)	59 (157)	1,376 (3,452)	1,197 (3,011)	288 (735)	784 (1,973)	1,376 (3,452)	794 (2,021)	679 (1,804)	988 (2,520)
Other Financial Assets	28,675 (69,809)	12,463 (32,221)	6,505 (16,994)	1,891 (4,900)	32,129 (75,796)	31,403 (74,506)	2,603 (6,855)	24,835 (60,930)	794 (2,021)	32,129 (75,796)	11,899 (31,684)	28,133 (68,782)
Other Financial Debt	13,886 (37,055)	9,415 (25,163)	2,284 (6,209)	998 (2,690)	19,718 (51,007)	17,457 (45,591)	4,230 (11,401)	11,561 (30,644)	679 (1,804)	11,899 (31,684)	19,718 (51,007)	15,442 (40,837)
Pension Wealth	29,828 (72,481)	16,080 (41,237)	6,661 (17,591)	2,203 (5,789)	33,722 (78,953)	32,741 (77,363)	4,257 (11,265)	26,002 (63,917)	988 (2,520)	28,133 (68,782)	15,442 (40,837)	33,722 (78,953)

Number of observations in parentheses.

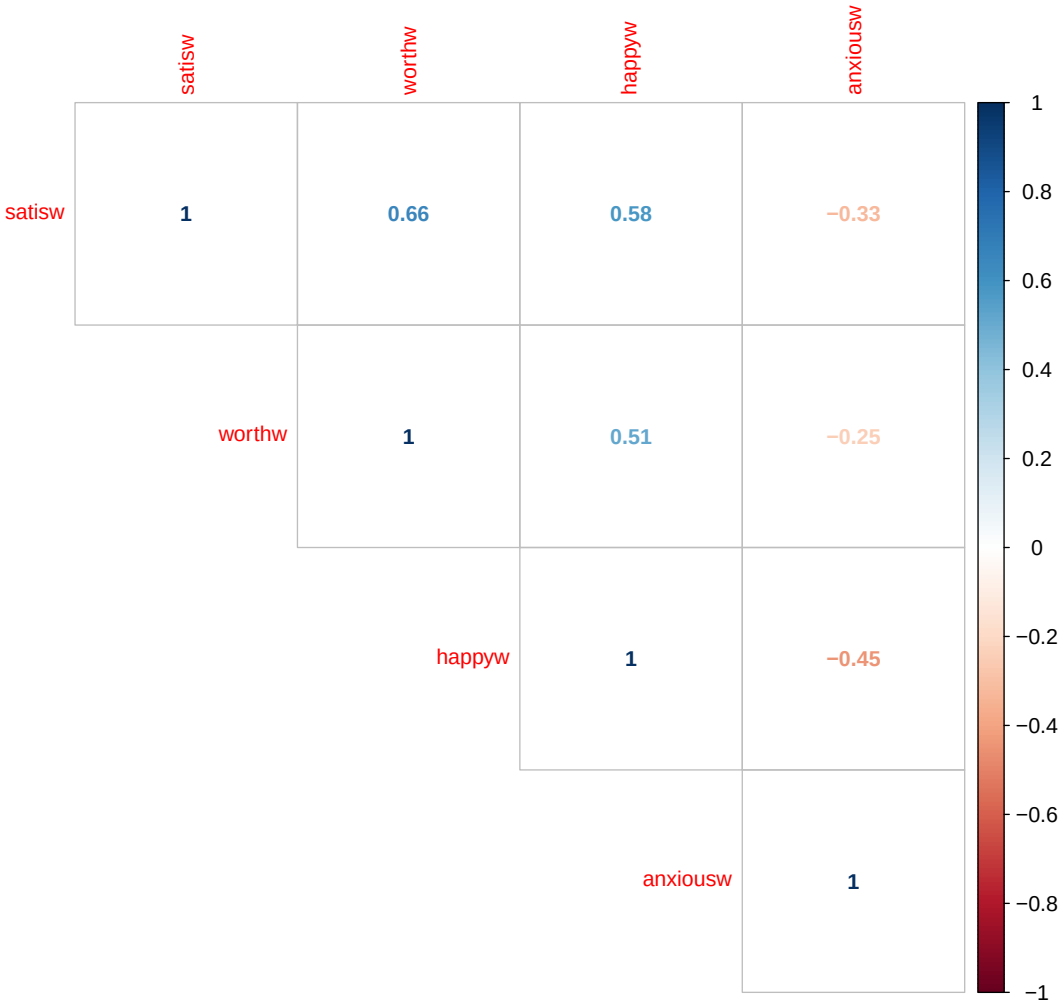

Figure A.3: Correlation plot of well-being variables. Mean values for each participant are calculated prior to correlation.

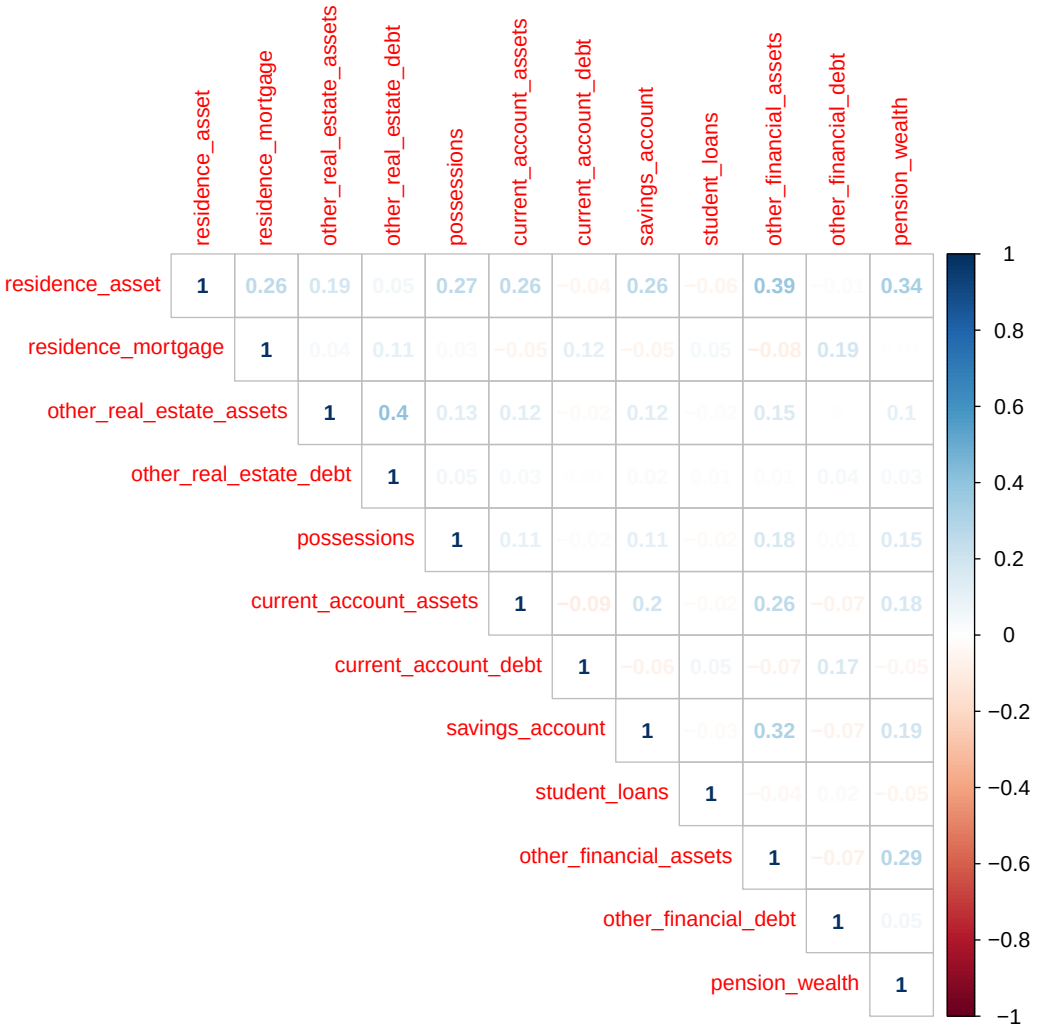

Figure A.4: Correlation plot of wealth variables. Mean values for each participant are calculated prior to correlation.

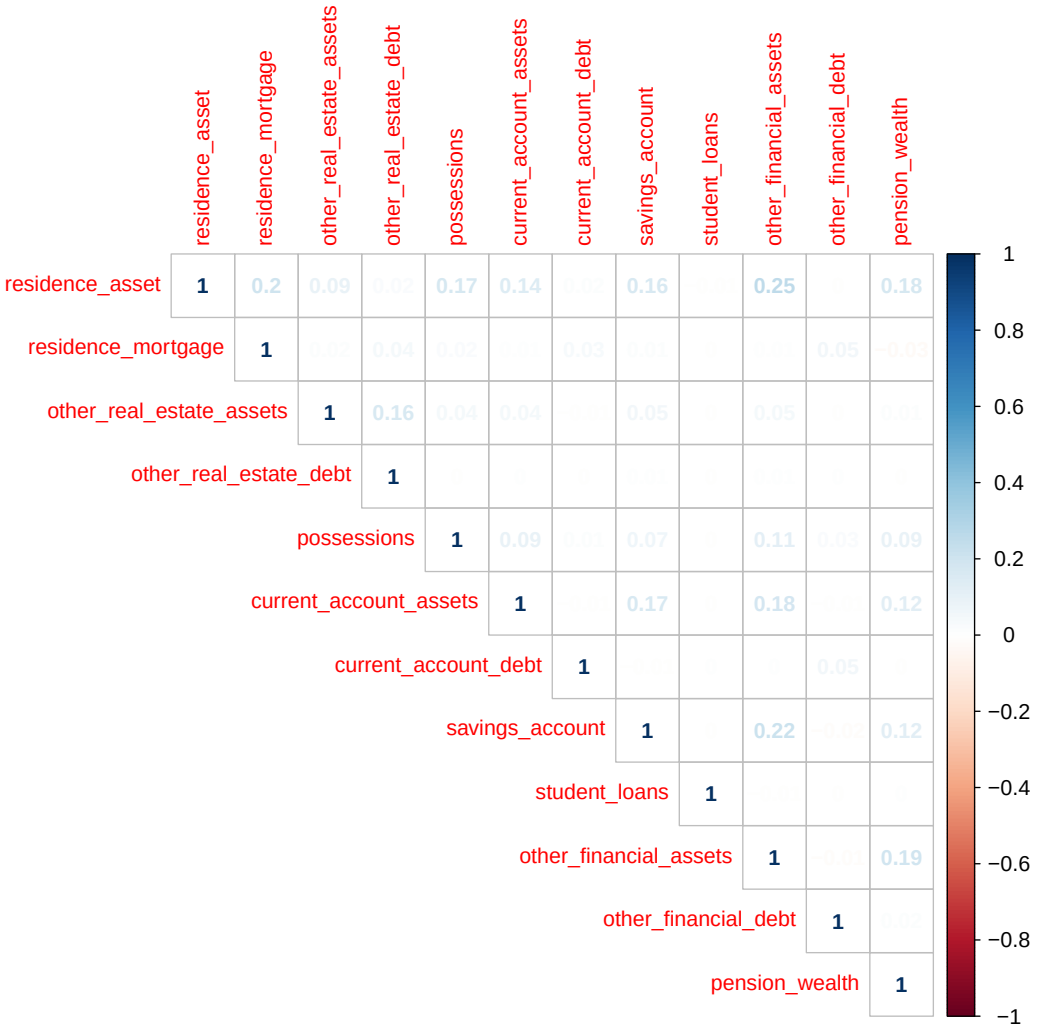

Figure A.5: Correlation plot of wealth variables, excluding zeros. Mean values for each participant are calculated prior to correlation.

Appendix B

Income Rank, Social Status, and Well-being

B.1 German Socio-Economic Panel (GSOEP)

Table B.2: SOEP: Summary statistics for slope variables.

Variable	**Stats**	**Frequencies**
age [numeric]	Mean (sd) : 42.2 (12.2) min < med < max: 18 < 43 < 91 IQR (CV) : 18 (0.3)	74 distinct values
tenure [numeric]	Mean (sd) : 10.2 (10.1) min < med < max: 0 < 6.6 < 67.8 IQR (CV) : 13.7 (1)	701 distinct values

Table B.3: SOEP: Summary statistics for control variables.

Variable	Stats / Values	Freqs (% of Valid)
sex	1. Male	156000 (52.4%)
[factor]	2. Female	141939 (47.6%)
marital_status	1. Married	180289 (60.4%)
[factor]	2. Single	79560 (26.7%)
	3. Divorced	24800 (8.3%)
	4. Separated	7494 (2.5%)
	5. Widowed	4758 (1.6%)
	6. Missing	868 (0.3%)
	7. RegisteredPartnership	515 (0.2%)

Variable	Stats / Values	Freqs (% of Valid)
health	1. [de] Gut	140492 (47.1%)
[factor]	2. [de] Zufriedenstellend	90057 (30.2%)
	3. [de] Sehr gut	35438 (11.9%)
	4. [de] Weniger gut	28029 (9.4%)
	5. [de] Schlecht	3883 (1.3%)
	6. [de] keine Angabe	385 (0.1%)
main_activity	1. Working	294725 (98.8%)
[factor]	2. Working, but inactive wit	3559 (1.2%)
ethnicity	1. Germany	267098 (89.5%)
[factor]	2. Turkey	6156 (2.1%)
	3. Italy	4051 (1.4%)
	4. Greece	2430 (0.8%)
	5. Syria	1754 (0.6%)
	6. Ex-Yugoslavia	1638 (0.5%)
	7. Poland	1328 (0.4%)
	8. Spain	1241 (0.4%)
	9. Croatia	1158 (0.4%)
	10. Romania	960 (0.3%)
	[122 others]	10470 (3.5%)
children	1. Couple With Children LE 1	78871 (26.4%)
[factor]	2. Couple Without Children	78618 (26.4%)
	3. Couple With Children GT 1	50568 (17.0%)
	4. 1-Pers.-HH	35485 (11.9%)
	5. Couple With Children LE A	26647 (8.9%)
	6. Single Parent	19523 (6.5%)
	7. Other Combination	4389 (1.5%)
	8. Multiple Generation-HH	4183 (1.4%)
education	1. middle vocational	143412 (48.1%)
[factor]	2. higher education	73390 (24.6%)
	3. general elementary	26596 (8.9%)
	4. higher vocational	22930 (7.7%)
	5. vocational + Abi	21979 (7.4%)
	6. No answer	4979 (1.7%)
	7. inadequately	4273 (1.4%)
	8. in school	725 (0.2%)

Variable	Stats / Values	Freqs (% of Valid)
occupation	1. Question not part of the	32665 (11.0%)
[factor]	2. Shop, Stall and Market Sa	10163 (3.4%)
	3. Does not apply	8725 (2.9%)
	4. Other Office Clerk	8502 (2.9%)
	5. Secondary Education Teach	6763 (2.3%)
	6. Institution Based Pers. C	5638 (1.9%)
	7. Helpers and cleaners in o	5625 (1.9%)
	8. Nursing Associate Profess	5554 (1.9%)
	9. Finance and Sales Associa	5514 (1.8%)
	10. Public Service Administra	4692 (1.6%)
	[321 others]	204443 (68.5%)
industry	1. Question not part of the	32665 (11.0%)
[factor]	2. Health And Social Work	30320 (10.2%)
	3. Retail trade, except of m	23247 (7.8%)
	4. Does not apply	21724 (7.3%)
	5. Public Administration And	19533 (6.5%)
	6. Education	18458 (6.2%)
	7. Construction	15772 (5.3%)
	8. Other Business Activities	14388 (4.8%)
	9. Manuf Fabricated Metal Pr	9897 (3.3%)
	10. Manuf Motor Vehicles, Tra	7559 (2.5%)
	[52 others]	104721 (35.1%)
hours_worked	Mean (sd) : 37.7 (12.7)	442 distinct values
[numeric]	min < med < max:	
	0.4 < 40 < 80	
	IQR (CV) : 11 (0.3)	
public_sector	1. [de] Nein	153338 (51.4%)
[factor]	2. [de] trifft nicht zu	90729 (30.4%)
	3. [de] Ja	50739 (17.0%)
	4. [de] keine Angabe	2994 (1.0%)
	5. [de] Fragebogenversion mi	356 (0.1%)
	6. [de] Weiss nicht	128 (0.0%)

Variable	Stats / Values	Freqs (% of Valid)
experience_ft_2	1. 0-10	101249 (33.9%)
[factor]	2. 10-20	71047 (23.8%)
	3. 20-30	56669 (19.0%)
	4. 30-40	36405 (12.2%)
	5. 0	21666 (7.3%)
	6. 40-50	7904 (2.6%)
	7. Missing	3138 (1.1%)
	8. 50+	206 (0.1%)
experience_pt_2	1. 0	152767 (51.2%)
[factor]	2. 0-10	110978 (37.2%)
	3. 10-20	23474 (7.9%)
	4. 20-30	6412 (2.1%)
	5. Missing	3138 (1.1%)
	6. 30-40	1317 (0.4%)
	7. 40+	198 (0.1%)
experience_u_2	1. 0	195959 (65.7%)
[factor]	2. 0-10	97245 (32.6%)
	3. Missing	3138 (1.1%)
	4. 10-20	1766 (0.6%)
	5. 20-30	174 (0.1%)
	6. 30+	2 (0.0%)
region	1. West-Germany	225899 (75.7%)
[factor]	2. East-Germany	72385 (24.3%)
syear	Mean (sd) : 2008 (7.4)	
[numeric]	min < med < max:	
	1994 < 2008 < 2019	
	IQR (CV) : 13 (0)	

Table B.4: SOEP: Variable Descriptions

SOEP Variable	Variable Name	Description	Responses
plh0175	work_sat	How satisfied are you today with the following areas of your life? Work	Completely dissatisfied 0 - Completely satisfied 10
plh0176	income_house_sat	How satisfied are you today with the following areas of your life? Household Income	Completely dissatisfied 0 - Completely satisfied 10
plh0173	income_own_sat	How satisfied are you today with the following areas of your life? Personal Income	Completely dissatisfied 0 - Completely satisfied 10
plh0182	life_sat	How satisfied are you with your life, all things considered?	Completely dissatisfied 0 - Completely satisfied 10
plh0184	angry	How often you experienced this feeling in the last four weeks? Angry	Very Rareley 1 - Very Often 5
plh0185	worried	How often you experienced this feeling in the last four weeks? Worried	Very Rareley 1 - Very Often 5
plh0186	happiness	How often you experienced this feeling in the last four weeks? Happy	Very Rareley 1 - Very Often 5
plh0187	sadness	How often you experienced this feeling in the last four weeks? Sad	Very Rareley 1 - Very Often 5

Table B.1: SOEP: Summary statistics for income variables.

Variable	Stats	Frequencies
income [haven_labelled, vctrs_vctr, double]	Mean (sd) : 2351.8 (1618) min < med < max: 131 < 2045 < 9999 IQR (CV) : 1868 (0.7)	7232 distinct values
income_rank [numeric]	Mean (sd) : 0.5 (0.3) min < med < max: 0 < 0.5 < 1 IQR (CV) : 0.5 (0.6)	297183 distinct values
income_rank_region [numeric]	Mean (sd) : 0.5 (0.3) min < med < max: 0 < 0.5 < 1 IQR (CV) : 0.5 (0.6)	296107 distinct values
income_rank_gender_education [numeric]	Mean (sd) : 0.5 (0.3) min < med < max: 0 < 0.5 < 1 IQR (CV) : 0.5 (0.6)	245727 distinct values
income_rank_age [numeric]	Mean (sd) : 0.5 (0.3) min < med < max: 0 < 0.5 < 1 IQR (CV) : 0.5 (0.6)	238713 distinct values
income_rank_gender_education_age [numeric]	Mean (sd) : 0.5 (0.3) min < med < max: 0 < 0.5 < 1 IQR (CV) : 0.5 (0.6)	62911 distinct values
income_rank_industry_occupation [numeric]	Mean (sd) : 0.5 (0.3) min < med < max: 0 < 0.5 < 1 IQR (CV) : 0.5 (0.6)	22157 distinct values

Table B.5: SOEP: Summary statistics for well-being variables.

Variable	Stats / Values	Freqs (% of Valid)
work_sat	Mean (sd) : 7.1 (2)	11 distinct values
[numeric]	min < med < max:	
	0 < 8 < 10	
	IQR (CV) : 2 (0.3)	
income_house_sat	Mean (sd) : 6.6 (2.1)	11 distinct values
[numeric]	min < med < max:	
	0 < 7 < 10	
	IQR (CV) : 3 (0.3)	
income_own_sat	Mean (sd) : 6.5 (2.2)	11 distinct values
[numeric]	min < med < max:	
	0 < 7 < 10	
	IQR (CV) : 3 (0.3)	
life_sat	Mean (sd) : 7.2 (1.6)	11 distinct values
[numeric]	min < med < max:	
	0 < 8 < 10	
	IQR (CV) : 1 (0.2)	
angry	Mean (sd) : 2.9 (1)	1 : 13769 (8.5%)
[numeric]	min < med < max:	2 : 39402 (24.4%)
	1 < 3 < 5	3 : 69117 (42.7%)
	IQR (CV) : 1 (0.3)	4 : 31975 (19.8%)
		5 : 7422 (4.6%)
worried	Mean (sd) : 1.9 (0.9)	1 : 67804 (42.0%)
[numeric]	min < med < max:	2 : 58509 (36.2%)
	1 < 2 < 5	3 : 25749 (15.9%)
	IQR (CV) : 1 (0.5)	4 : 7706 (4.8%)
		5 : 1758 (1.1%)
happiness	Mean (sd) : 3.6 (0.8)	1 : 2178 (1.3%)
[numeric]	min < med < max:	2 : 10250 (6.3%)
	1 < 4 < 5	3 : 47998 (29.7%)
	IQR (CV) : 1 (0.2)	4 : 85272 (52.8%)
		5 : 15922 (9.9%)
sadness	Mean (sd) : 2.3 (1)	1 : 38731 (24.0%)
[numeric]	min < med < max:	2 : 60128 (37.2%)
	1 < 2 < 5	3 : 46074 (28.5%)
	IQR (CV) : 1 (0.4)	4 : 13273 (8.2%)
		5 : 3389 (2.1%)

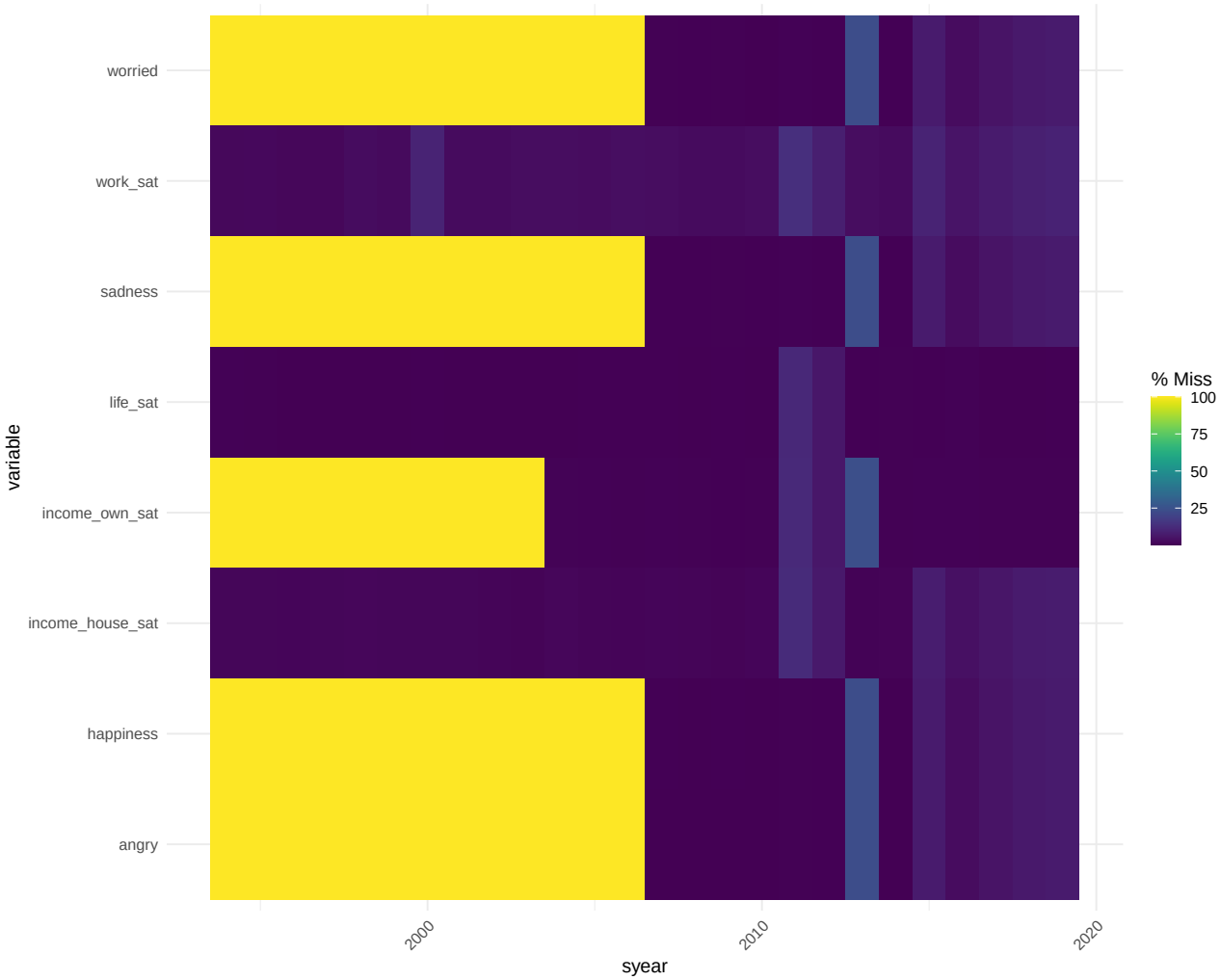

Figure B.1: SOEP: Missingness plot.

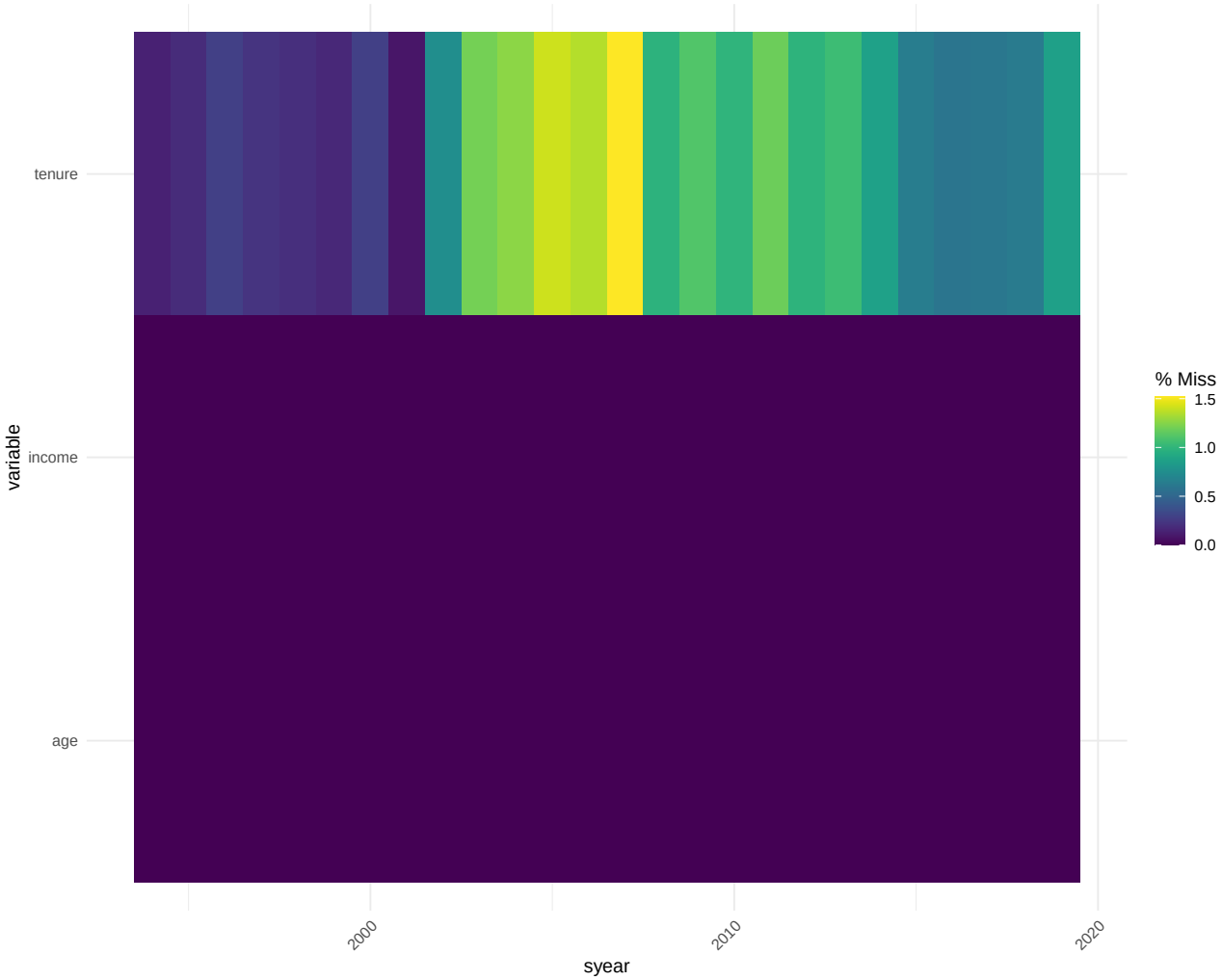

Figure B.2: SOEP: Missingness plot.

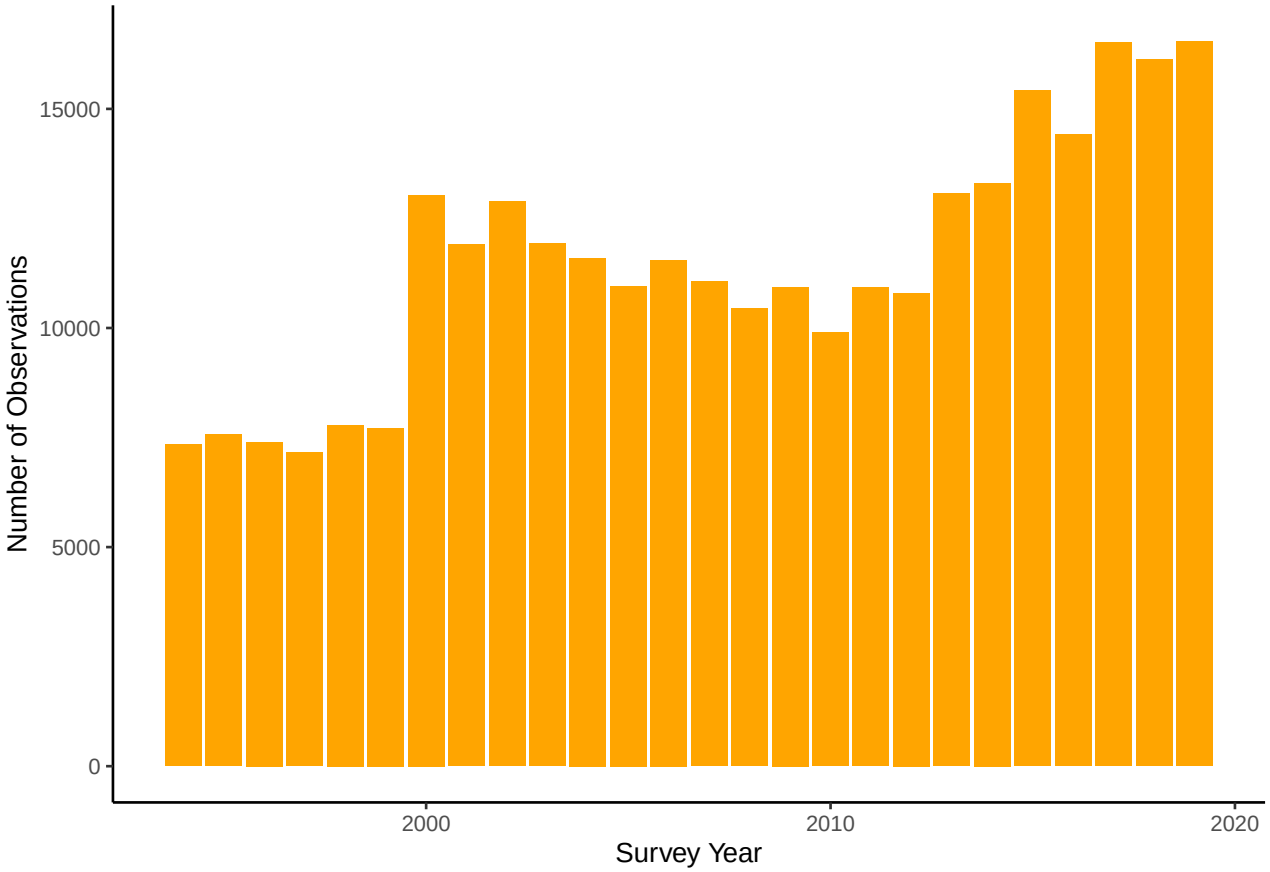

Figure B.3: SOEP: Observations by wave.

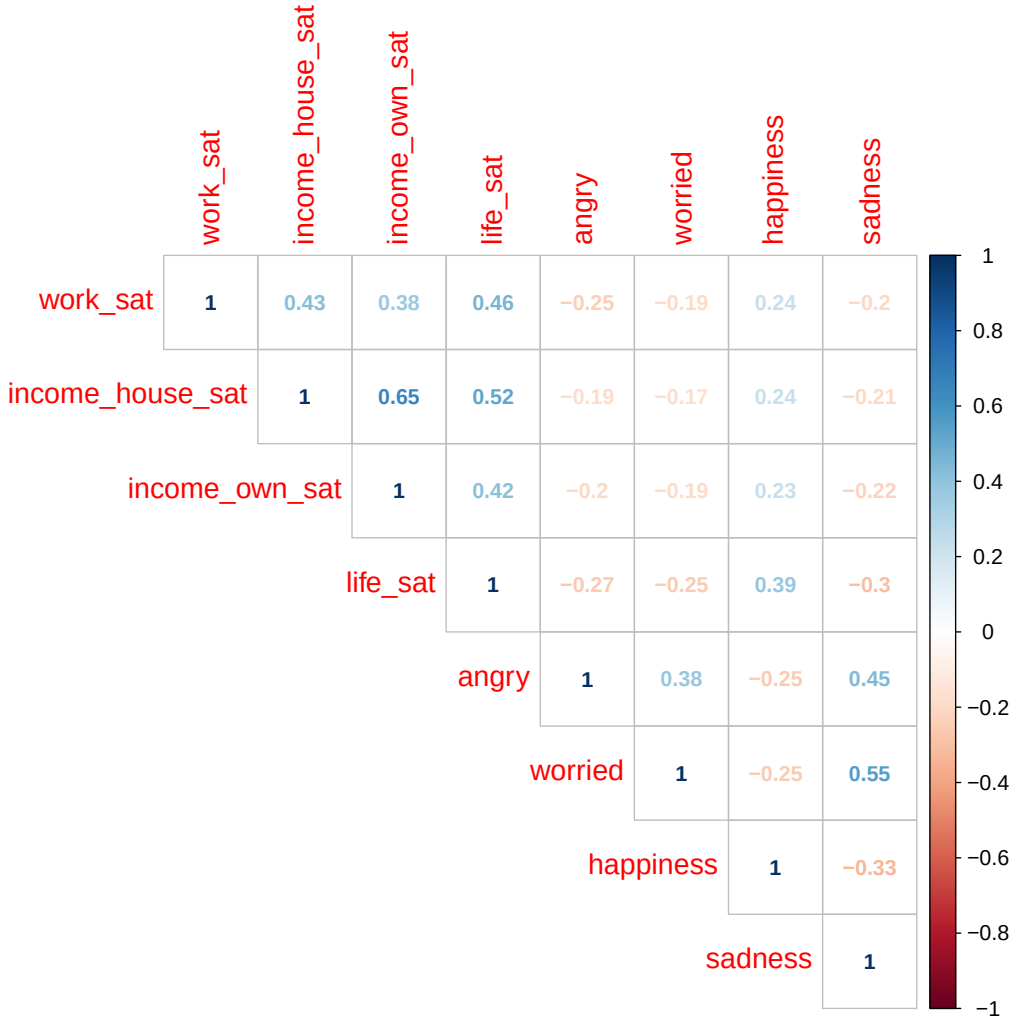

Figure B.4: SOEP: Correlation plot of well-being variables. Mean values for each participant are calculated prior to correlation.

Table B.6: SOEP: Sample for waves where well-being measure included.

		Males			Females		
WB Variable	**Waves**	**N**	**Observations**	**Mean Age**	**N**	**Observations**	**Mean Age**
Work Sat	26	25,785	146,812	42.26	24,334	135,150	42.09
Income House Sat	26	26,071	148,716	42.42	24,691	137,619	42.16
Life Sat	26	28,248	153,507	42.11	25,361	139,699	42.01
Income Own Sat	16	22,113	99,305	43.25	20,413	96,372	43.28
Angry	13	18,352	79,134	43.93	18,415	80,793	43.73
Worried	13	18,346	79,042	43.93	18,413	80,728	43.73
Happiness	13	18,349	79,096	43.93	18,413	80,765	43.73
Sadness	13	18,347	79,077	43.93	18,414	80,760	43.73

B.1.1 Do rank effects survive FEIS?

B.1.1.1 With Collischon and Eberl Controls

Table B.7: SOEP with Collischon and Eberl Controls: Regression results for specification including both log(income) and rank of income.

	Fixed Effects			FEIS		
Model	**log(income)**	**Income Rank**	**Observations**	**log(income)**	**Income Rank**	**Observations**
Own Income Sat	0.118 ***	0.940 ***	n = 196,014	0.133 ***	0.606 ***	n = 141,986
	(0.01)	(0.03)	i = 42,859	(0.03)	(0.07)	i = 16,139
Household Income Sat	0.011	0.789 ***	n = 286,671	0.056 ***	0.552 ***	n = 227,075
	(0.01)	(0.03)	i = 51,088	(0.02)	(0.05)	i = 21,611
Work Sat	0.037 ***	0.318 ***	n = 282,290	0.079 ***	0.174 **	n = 223,230
	(0.01)	(0.03)	i = 50,437	(0.02)	(0.05)	i = 21,327
Life Satisfaction	0.022 *	0.241 ***	n = 293,543	0.041 **	0.134 **	n = 230,104
	(0.01)	(0.03)	i = 53,935	(0.02)	(0.04)	i = 21,956
Happiness (Last 4 Weeks)	0.015	0.090 .	n = 160,198	0.026	0.027	n = 111,961
	(0.02)	(0.05)	i = 37,096	(0.03)	(0.09)	i = 13,816
Worry (Last 4 Weeks)	-0.026 .	-0.080 .	n = 160,106	-0.018	0.004	n = 111,888
	(0.02)	(0.05)	i = 37,092	(0.03)	(0.09)	i = 13,812
Angery (Last 4 Weeks)	-0.014	-0.005	n = 160,263	0.009	0.003	n = 112,037
	(0.02)	(0.05)	i = 37,100	(0.03)	(0.09)	i = 13,823
Sadness (Last 4 Weeks)	0.003	-0.106 *	n = 160,174	-0.013	-0.031	n = 111,939
	(0.02)	(0.05)	i = 37,095	(0.03)	(0.10)	i = 13,813

Significance: *** p ≤ 0.001; **p ≤ 0.01; * p ≤ 0.05; . p ≤ 0.10.
Standard errors in parentheses.

B.1.1.2 With Outliers

Table B.8: SOEP with Outliers: Regression results for specification including both log(income) and rank of income.

	Fixed Effects			FEIS		
Model	**log(income)**	**Income Rank**	**Observations**	**log(income)**	**Income Rank**	**Observations**
Own Income Sat	0.028 ***	1.191 ***	n = 202,477	0.019 *	0.910 ***	n = 147,286
	(0.00)	(0.02)	i = 44,237	(0.01)	(0.04)	i = 16,684
Household Income Sat	0.006 .	0.833 ***	n = 294,258	0.010 .	0.693 ***	n = 233,672
	(0.00)	(0.02)	i = 52,399	(0.01)	(0.03)	i = 22,183
Work Sat	0.021 ***	0.347 ***	n = 288,817	0.034 ***	0.288 ***	n = 228,869
	(0.00)	(0.02)	i = 51,579	(0.01)	(0.04)	i = 21,805
Life Satisfaction	0.012 ***	0.279 ***	n = 301,568	0.021 **	0.198 ***	n = 236,845
	(0.00)	(0.02)	i = 55,453	(0.01)	(0.03)	i = 22,547
Happiness (Last 4 Weeks)	0.006	0.121 ***	n = 165,599	0.018 *	0.026	n = 116,368
	(0.00)	(0.03)	i = 38,292	(0.01)	(0.05)	i = 14,307
Anger (Last 4 Weeks)	0.003	-0.058 .	n = 165,665	-0.003	0.009	n = 116,446
	(0.01)	(0.03)	i = 38,295	(0.01)	(0.06)	i = 14,314
Worry (Last 4 Weeks)	-0.003	-0.155 ***	n = 165,500	-0.012	-0.028	n = 116,298
	(0.00)	(0.03)	i = 38,284	(0.01)	(0.05)	i = 14,304
Sadness (Last 4 Weeks)	0.000	-0.114 ***	n = 165,575	-0.003	-0.068	n = 116,356
	(0.01)	(0.03)	i = 38,290	(0.01)	(0.05)	i = 14,306

Significance: *** p ≤ 0.001; **p ≤ 0.01; * p ≤ 0.05; . p ≤ 0.10.
Standard errors in parentheses.

B.1.1.3 Age Only

Table B.9: SOEP Age Slope Only: Regression results for specification including both log(income) and rank of income.

	Fixed Effects			FEIS		
Model	**log(income)**	**Income Rank**	**Observations**	**log(income)**	**Income Rank**	**Observations**
Own Income Sat	0.119 ***	0.929 ***	n = 196,014	0.127 ***	0.823 ***	n = 171,034
	(0.01)	(0.03)	i = 42,859	(0.02)	(0.06)	i = 24,718
Household Income Sat	0.009	0.781 ***	n = 286,671	0.033 *	0.685 ***	n = 259,702
	(0.01)	(0.02)	i = 51,088	(0.01)	(0.04)	i = 31,208
Work Sat	0.025 *	0.318 ***	n = 282,290	0.071 ***	0.198 ***	n = 255,824
	(0.01)	(0.03)	i = 50,437	(0.02)	(0.04)	i = 30,914
Life Satisfaction	0.020 *	0.240 ***	n = 293,543	0.043 ***	0.166 ***	n = 263,743
	(0.01)	(0.03)	i = 53,935	(0.01)	(0.04)	i = 31,873
Happiness (Last 4 Weeks)	0.017	0.083 .	n = 160,198	0.003	0.083	n = 138,935
	(0.01)	(0.05)	i = 37,096	(0.02)	(0.06)	i = 21,791
Anger (Last 4 Weeks)	-0.015	-0.007	n = 160,263	0.004	-0.058	n = 139,007
	(0.02)	(0.05)	i = 37,100	(0.02)	(0.06)	i = 21,797
Worry (Last 4 Weeks)	-0.031 *	-0.067	n = 160,106	-0.013	-0.067	n = 138,833
	(0.02)	(0.05)	i = 37,092	(0.02)	(0.06)	i = 21,779
Sadness (Last 4 Weeks)	0.000	-0.102 *	n = 160,174	0.015	-0.119 .	n = 138,909
	(0.02)	(0.05)	i = 37,095	(0.02)	(0.07)	i = 21,787

Significance: *** p ≤ 0.001; **p ≤ 0.01; * p ≤ 0.05; . p ≤ 0.10.
Standard errors in parentheses.

B.1.2 Does comparison group matter?

Table B.10: SOEP: Average Comparison Group Size

Comparison Group	Variable Name	Average Group Size	Observations Dropped
Wave	income_rank	11,472	0
Wave and Region	income_rank_region	5,736	0
Wave, Gender and Education	income_rank_gender_education	805	5,323
Wave and Age	income_rank_age	956	0
Wave, Gender, Age and Education	income_rank_gender_education_age	87	5,527
Wave, Industry and Occupation*	income_rank_industry_occupation	33	145,552

* 145,552 observations dropped due to missingness or comparison group size is less than 10.

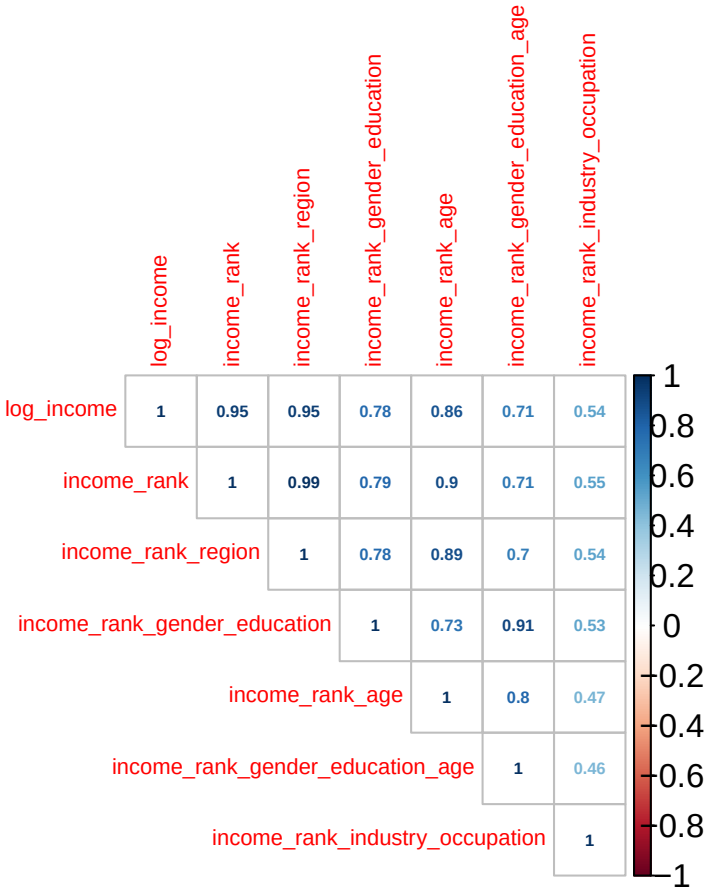

Figure B.5: SOEP: Correlation plot of income measures for different comparison groups. Mean values for each participant are calculated prior to correlation.

B.1.2.1 Collischon and Eberl Comparison Groups

Table B.11: SOEP: Model fit improvements for comparison group rank instead of overall rank. Using subset required to form Wave, Industry and Occupation comparison group.

	Fixed Effects				FEIS			
Model	**Comparison Group**	**Within R^2**	**Improvement**	**Income Rank**	**Comparison Group**	**Within R^2**	**Improvement**	**Income Rank**
Happiness (Last 4 Weeks)	Wave, Industry and Occupation	0.0333	0.27%	0.086 *** (0.02)	Wave, Gender and Education	0.0314	0.7%	0.158 ** (0.06)
Household Income Sat	Wave and Region	0.0531	0.29%	0.761 *** (0.02)	Wave and Region	0.0284	0.67%	0.622 *** (0.04)
Anger (Last 4 Weeks)	Wave, Gender and Education	0.0286	0.19%	-0.073 * (0.03)	Wave, Industry and Occupation	0.0254	0.34%	0.062 (0.05)
Work Sat	Wave and Region	0.0511	0.21%	0.381 *** (0.02)	Wave and Region	0.0276	0.28%	0.306 *** (0.04)
Own Income Sat	Wave and Region	0.0711	0.42%	1.163 *** (0.02)	Wave and Region	0.0373	0.26%	0.895 *** (0.05)
Life Satisfaction	Wave	0.0797	0%	0.300 *** (0.02)	Wave and Region	0.0610	0.09%	0.238 *** (0.03)
Worry (Last 4 Weeks)	Wave	0.0339	0%	-0.142 *** (0.03)	Wave and Region	0.0374	0.01%	-0.081 (0.07)
Sadness (Last 4 Weeks)	Wave	0.0355	0%	-0.127 *** (0.04)	Wave	0.0359	0%	-0.089 (0.08)

The Within R^2 given is for the listed comparison group. Percentage improvement is compared to the Within R^2 for the Wave comparison group.
Significance: *** p $\leq$ 0.001; **p $\leq$ 0.01; * p $\leq$ 0.05; . p $\leq$ 0.10.
Standard errors in parentheses.

B.2 Understanding Society Survey (USS)

Table B.12: USS: Summary statistics for income variables.

Variable	Stats	Frequencies
income [numeric]	Mean (sd) : 1949.1 (1370.9) min < med < max: 86.7 < 1646.7 < 8332.2 IQR (CV) : 1624.8 (0.7)	48744 distinct values
income_rank [numeric]	Mean (sd) : 0.5 (0.3) min < med < max: 0 < 0.5 < 1 IQR (CV) : 0.5 (0.6)	227527 distinct values
income_rank_region [numeric]	Mean (sd) : 0.5 (0.3) min < med < max: 0 < 0.5 < 1 IQR (CV) : 0.5 (0.6)	196289 distinct values
income_rank_gender_education [numeric]	Mean (sd) : 0.5 (0.3) min < med < max: 0 < 0.5 < 1 IQR (CV) : 0.5 (0.6)	166321 distinct values
income_rank_age [numeric]	Mean (sd) : 0.5 (0.3) min < med < max: 0 < 0.5 < 1 IQR (CV) : 0.5 (0.6)	200751 distinct values
income_rank_gender_education_age [numeric]	Mean (sd) : 0.5 (0.3) min < med < max: 0 < 0.5 < 1 IQR (CV) : 0.5 (0.6)	29421 distinct values
income_rank_industry_occupation [numeric]	Mean (sd) : 0.5 (0.3) min < med < max: 0 < 0.5 < 1 IQR (CV) : 0.5 (0.6)	76685 distinct values

Table B.13: USS: Summary statistics for slope variables.

Variable	Stats	Frequencies
dvage [integer]	Mean (sd) : 42.5 (12.9) min < med < max: 18 < 43 < 91 IQR (CV) : 20 (0.3)	74 distinct values
tenure [integer]	Mean (sd) : 7.6 (7.8) min < med < max: 0 < 5 < 75 IQR (CV) : 8 (1)	70 distinct values

Table B.14: USS: Summary statistics for control variables.

Variable	Stats / Values	Freqs (% of Valid)
sex	1. Female	121407 (53.4%)
[factor]	2. Male	106156 (46.6%)
	3. Missing	3 (0.0%)
marstat_dv	1. Married/Civil Partner	125986 (55.4%)
[factor]	2. Never Married	47565 (20.9%)
	3. Living As Couple	33251 (14.6%)
	4. Divorced/Dissolved Civil	13397 (5.9%)
	5. Separated (Incl. From Civ	4254 (1.9%)
	6. Widowed/Surviving Civil P	2687 (1.2%)
	7. Missing	426 (0.2%)
health	1. Very Good	88940 (39.1%)
[factor]	2. Good	69972 (30.7%)
	3. Excellent	41299 (18.1%)
	4. Fair	23188 (10.2%)
	5. Poor	3859 (1.7%)
	6. Missing	308 (0.1%)
qfhigh_dv	1. Gcse/O Level	42320 (18.6%)
[factor]	2. 1st Degree Or Equivalent	37618 (16.5%)
	3. None Of The Above	30552 (13.4%)
	4. Inapplicable	28184 (12.4%)
	5. Higher Degree	27321 (12.0%)
	6. A Level	18726 (8.2%)
	7. Diploma In He	16621 (7.3%)
	8. Cse	8434 (3.7%)
	9. Nursing/Other Med Qual	4068 (1.8%)
	10. As Level	2898 (1.3%)
	[9 others]	10824 (4.8%)
jbstat	1. Paid Employment(Ft/Pt)	191635 (84.2%)
[factor]	2. Self Employed	25493 (11.2%)
	3. Full-Time Student	4795 (2.1%)
	4. On Maternity Leave	1947 (0.9%)
	5. Retired	1496 (0.7%)
	6. Unemployed	576 (0.3%)
	7. Doing Something Else	468 (0.2%)
	8. Family Care Or Home	408 (0.2%)
	9. Lt Sick Or Disabled	338 (0.1%)
	10. On Apprenticeship	290 (0.1%)
	[5 others]	120 (0.1%)

Variable	Stats / Values	Freqs (% of Valid)
gor_dv	1. South East	28365 (12.5%)
[factor]	2. London	28097 (12.3%)
	3. North West	22919 (10.1%)
	4. Scotland	20032 (8.8%)
	5. East Of England	19896 (8.7%)
	6. South West	18835 (8.3%)
	7. West Midlands	18418 (8.1%)
	8. Yorkshire And The Humber	17987 (7.9%)
	9. East Midlands	16849 (7.4%)
	10. Wales	14597 (6.4%)
	[3 others]	21571 (9.5%)
nchild_dv	Mean (sd) : 0.6 (0.9)	0 : 145165 (63.8%)
[integer]	min < med < max:	1 : 36802 (16.2%)
	0 < 0 < 10	2 : 34705 (15.3%)
	IQR (CV) : 1 (1.5)	3 : 8813 (3.9%)
		4 : 1697 (0.7%)
		5 : 299 (0.1%)
		6 : 66 (0.0%)
		7 : 16 (0.0%)
		8 : 2 (0.0%)
		10 : 1 (0.0%)
jbsoc00_cc	1. Teaching Professionals	13114 (5.8%)
[factor]	2. Sales Assistants And Reta	11458 (5.0%)
	3. Healthcare And Related Pe	11269 (5.0%)
	4. Functional Managers	9347 (4.1%)
	5. Childcare And Related Per	7850 (3.4%)
	6. Health Associate Professi	7731 (3.4%)
	7. Transport Drivers And Ope	6788 (3.0%)
	8. Elementary Personal Servi	6525 (2.9%)
	9. Administrative Occupation	6315 (2.8%)
	10. Administrative Occupation	5859 (2.6%)
	[76 others]	141310 (62.1%)
hours_worked	Mean (sd) : 32.9 (11.9)	428 distinct values
[numeric]	min < med < max:	
	0 < 37 < 120	
	IQR (CV) : 15 (0.4)	

Variable	Stats / Values	Freqs (% of Valid)
jbiindb_dv	1. Educ./Sport 27	31591 (13.9%)
[factor]	2. Retail 18	23010 (10.1%)
	3. Health Service 28	20825 (9.2%)
	4. Other Services 30	20570 (9.0%)
	5. Volunt./Church 31	20468 (9.0%)
	6. Public Admin. 33	16069 (7.1%)
	7. Restaurants 24	10200 (4.5%)
	8. Other Trans. 21	8732 (3.8%)
	9. Mechanical Eng. 9	7925 (3.5%)
	10. Communication/Entertainme	7073 (3.1%)
	[26 others]	61103 (26.9%)

Table B.15: USS: Variable Descriptions

USS Variable	Description	Responses
sclfsato	How dissatisfied or satisfied you are with the following aspects of your current situation? Your life overall.	Completely dissatisfied 1 - Completely satisfied 7
sclfsat2	The income of your household.	Completely dissatisfied 1 - Completely satisfied 7
jbsat	How dissatisfied or satisfied are you with your present job overall?	Completely dissatisfied 1 - Completely satisfied 7
scghq1_dv	Subjective wellbeing (GHQ): Likert	The General Health Questionnaire-12 (GHQ-12) measures *psychological distress.*
sf12mcs_dv	SF-12 Mental Component Summary (PCS)	The mental component summary of the Short-Form 12 Health Survey Mental (SF-12) measures *mental functioning.* Valid answers are converted into a single mental functioning score, resulting in a continuous scale with a range of 0 (low functioning) to 100 (high functioning). Higher functioning is indicative of better mental health and well-being.

Table B.16: USS: Summary statistics for well-being variables.

Variable	Stats / Values	Freqs (% of Valid)
sclfsato	Mean (sd) : 5.2 (1.4)	1 : 3339 (1.5%)
[numeric]	min < med < max:	2 : 10642 (4.8%)
	1 < 6 < 7	3 : 17433 (7.9%)
	IQR (CV) : 1 (0.3)	4 : 21045 (9.5%)
		5 : 43776 (19.8%)
		6 : 104615 (47.3%)
		7 : 20349 (9.2%)

Variable	Stats / Values	Freqs (% of Valid)
sclfsat2	Mean (sd) : 4.6 (1.6)	1 : 8112 (3.7%)
[numeric]	min < med < max:	2 : 18912 (8.6%)
	1 < 5 < 7	3 : 33988 (15.4%)
	IQR (CV) : 3 (0.3)	4 : 26995 (12.2%)
		5 : 48125 (21.8%)
		6 : 68496 (31.0%)
		7 : 16527 (7.5%)
jbsat	Mean (sd) : 5.3 (1.4)	1 : 4361 (1.9%)
[numeric]	min < med < max:	2 : 7126 (3.2%)
	1 < 6 < 7	3 : 16549 (7.4%)
	IQR (CV) : 1 (0.3)	4 : 18974 (8.4%)
		5 : 50873 (22.6%)
		6 : 88183 (39.2%)
		7 : 38901 (17.3%)
scghq1_dv	Mean (sd) : 10.7 (5)	37 distinct values
[numeric]	min < med < max:	
	0 < 10 < 36	
	IQR (CV) : 5 (0.5)	
sf12mcs_dv	Mean (sd) : 49.5 (9.3)	5732 distinct values
[numeric]	min < med < max:	
	0 < 51.7 < 77.7	
	IQR (CV) : 12.6 (0.2)	

Table B.17: USS: Sample for waves where well-being measure included.

		Males			**Females**		
WB Variable	**Waves**	**N**	**Observations**	**Mean Age**	**N**	**Observations**	**Mean Age**
sclfsato	11	23,227	101,583	43.01	25,275	116,887	42.23
sclfsat2	11	23,218	101,563	43.01	25,259	116,863	42.23
jbsat	11	23,992	103,542	42.96	25,890	118,724	42.20
scghq1_dv	11	23,559	102,394	42.97	25,510	117,534	42.20
sf12mcs_dv	11	23,894	102,378	42.95	25,812	117,474	42.18

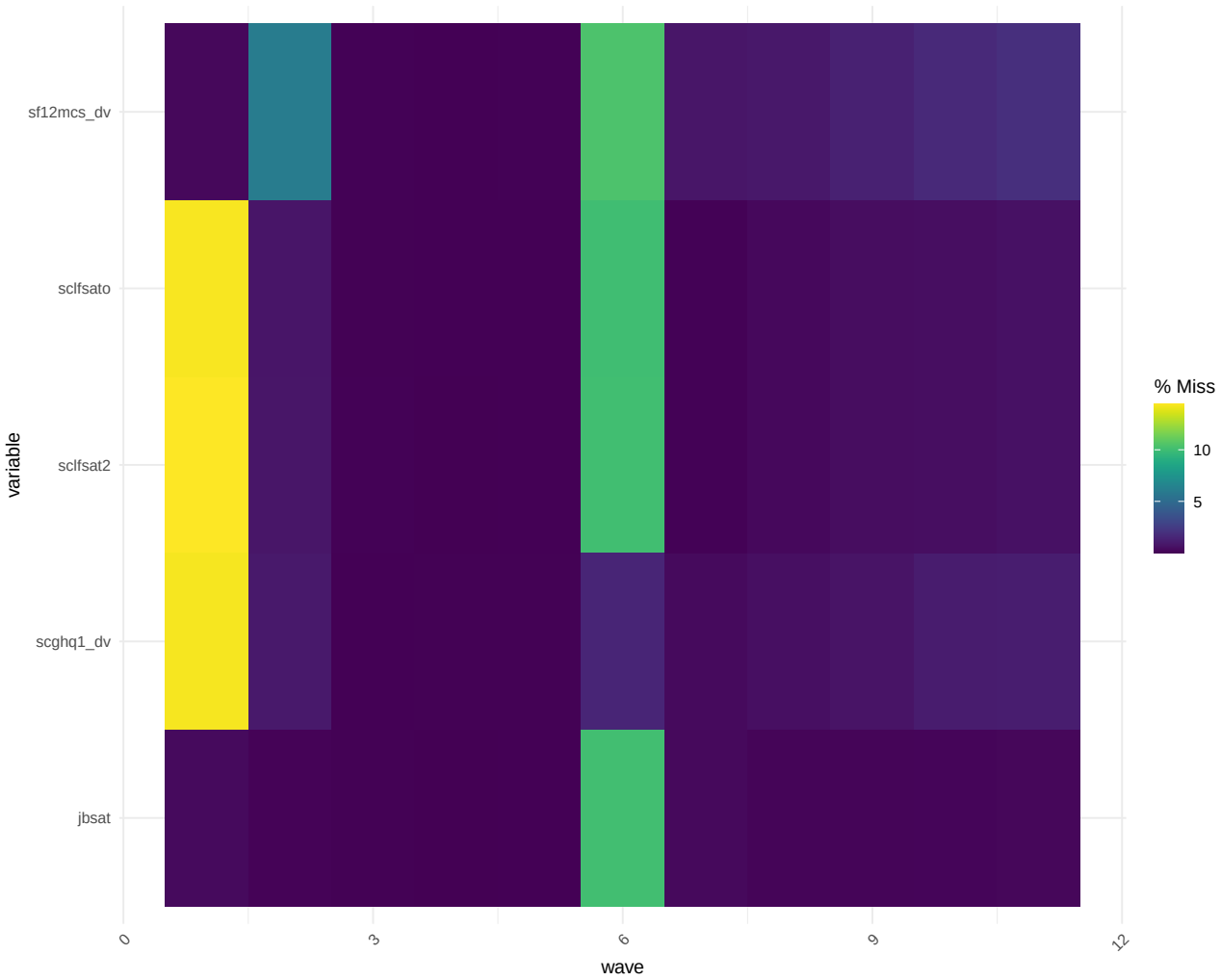

Figure B.6: USS: Missingness plot.

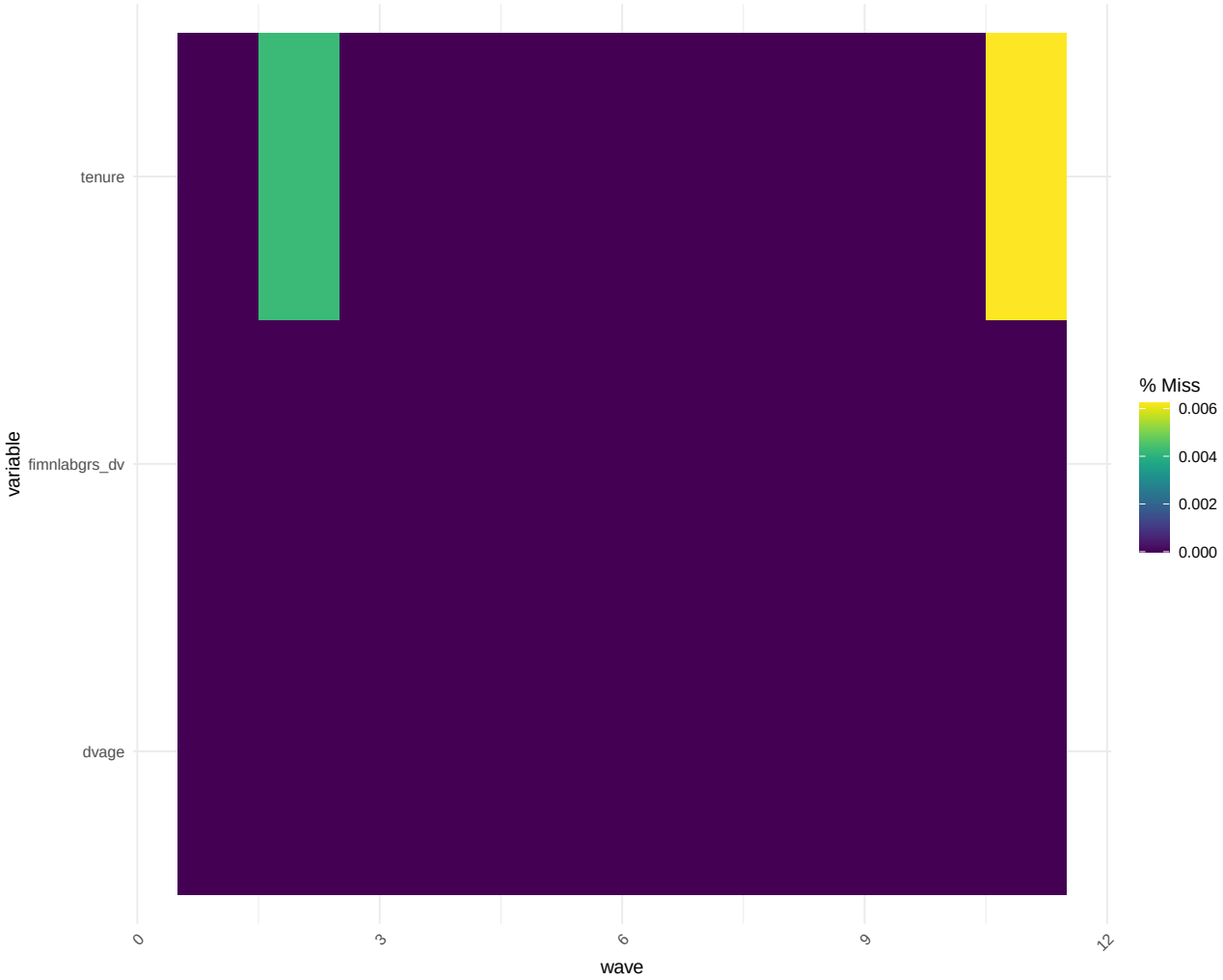

Figure B.7: USS: Missingness plot.

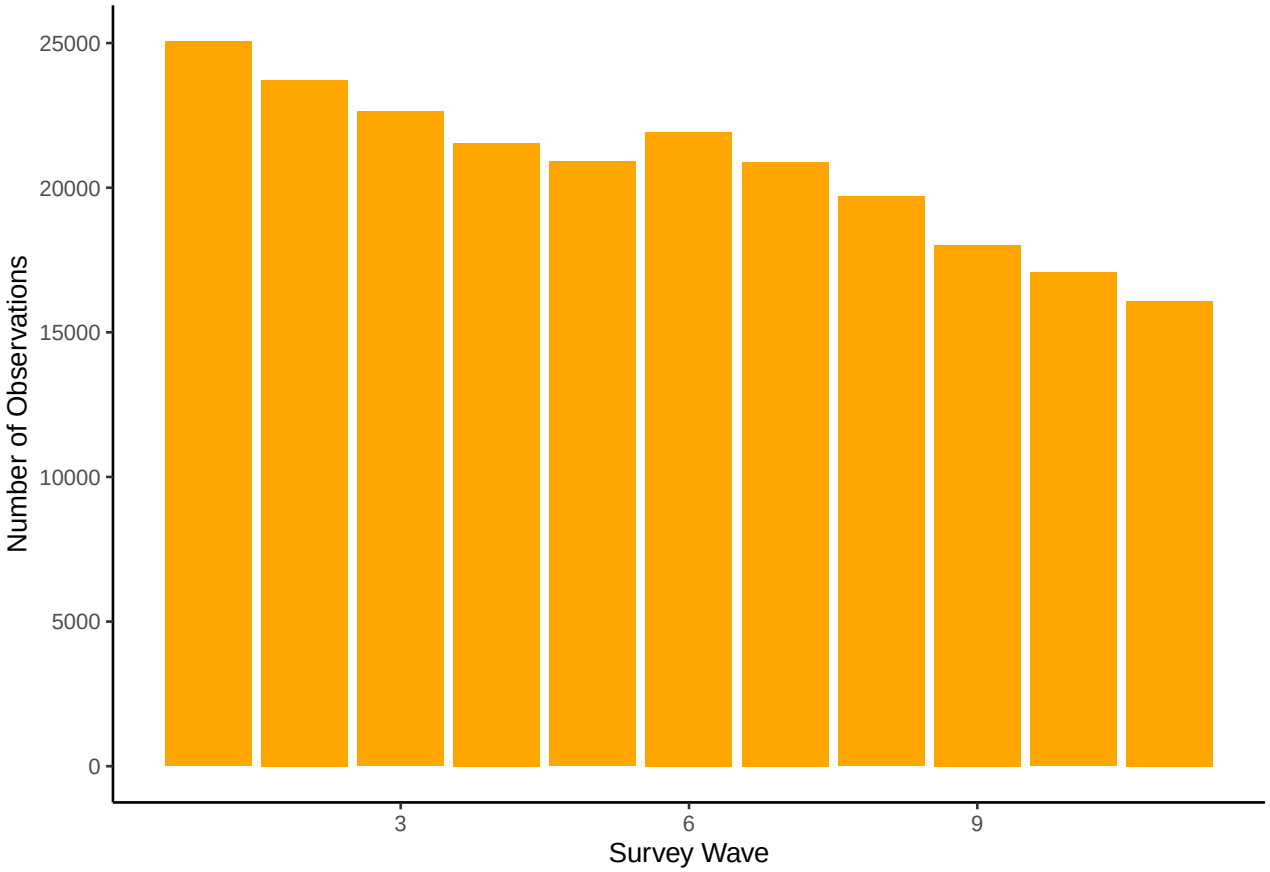

Figure B.8: USS: Observations by wave.

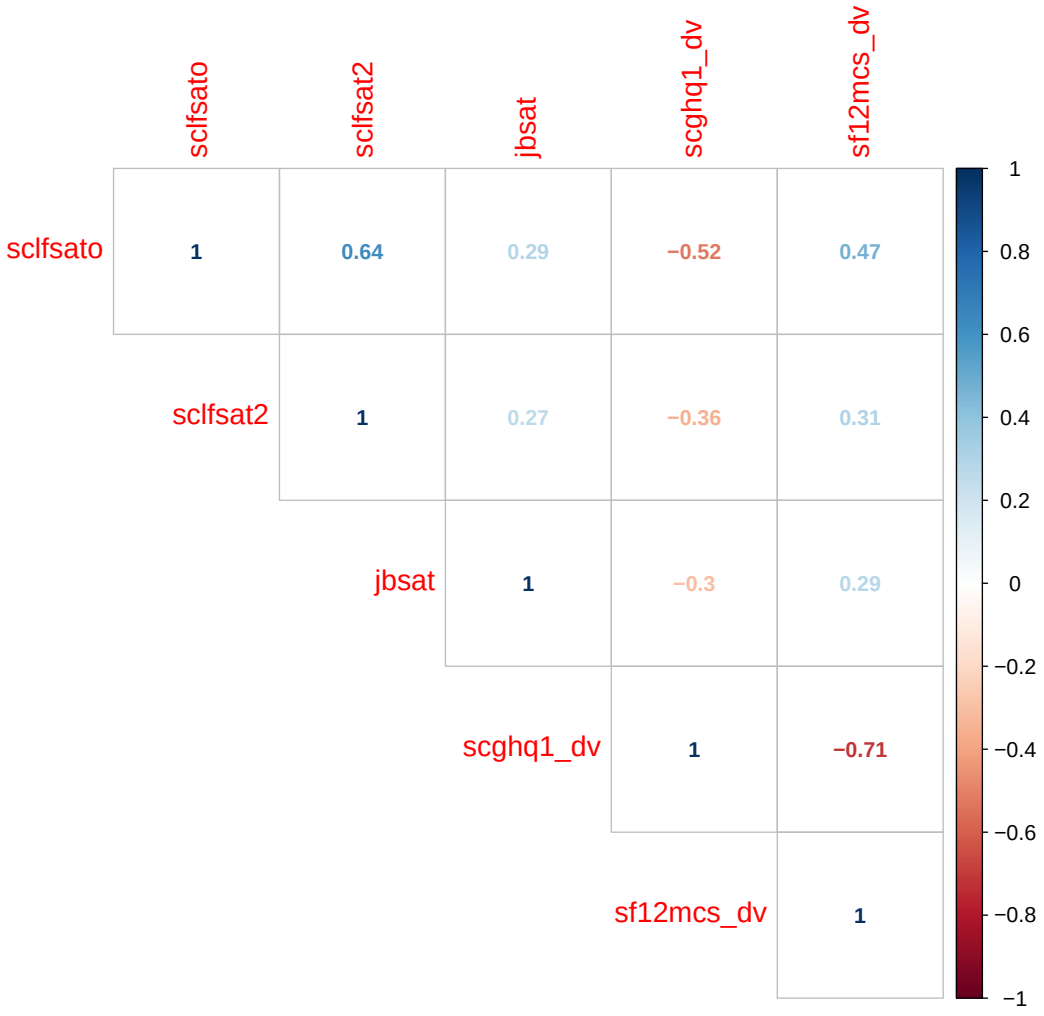

Figure B.9: USS: Correlation plot of well-being variables. Mean values for each participant are calculated prior to correlation.

B.2.1 Do rank effects survive FEIS?

B.2.1.1 With Outliers

Table B.18: USS with Outliers: Regression results for specification including both log(income) and rank of income.

	Fixed Effects			FEIS		
Model	**log(income)**	**Income Rank**	**Observations**	**log(income)**	**Income Rank**	**Observations**
Satisfaction with Income	-0.019 ***	0.432 ***	n = 225,261	-0.010 .	0.323 ***	n = 168,485
	(0.00)	(0.02)	i = 49,090	(0.01)	(0.03)	i = 21,087
Life Satisfaction	-0.003	0.105 ***	n = 225,313	0.001	0.088 **	n = 168,521
	(0.00)	(0.02)	i = 49,120	(0.01)	(0.03)	i = 21,095
Satisfsction with Present Job	-0.007 .	0.084 ***	n = 229,238	-0.007	0.077 **	n = 170,992
	(0.00)	(0.02)	i = 50,539	(0.00)	(0.03)	i = 21,357
SF-12 MCS	0.004	-0.004	n = 226,743	0.008 .	-0.008	n = 168,628
	(0.00)	(0.02)	i = 50,365	(0.00)	(0.03)	i = 21,124
GHQ SWB	-0.007 *	0.002	n = 226,821	-0.007	-0.014	n = 169,476
	(0.00)	(0.02)	i = 49,691	(0.00)	(0.03)	i = 21,286

Significance: *** p ≤ 0.001; **p ≤ 0.01; * p ≤ 0.05; . p ≤ 0.10.
Standard errors in parentheses.

B.2.1.2 Age Only

Table B.19: USS with Age Slope Only: Regression results for specification including both log(income) and rank of income.

	Fixed Effects			FEIS		
Model	**log(income)**	**Income Rank**	**Observations**	**log(income)**	**Income Rank**	**Observations**
Satisfaction with Income	-0.124 ***	0.928 ***	n = 218,429	-0.073 **	0.748 ***	n = 192,194
	(0.02)	(0.06)	i = 48,458	(0.03)	(0.07)	i = 29,309
GHQ SWB	-0.213 ***	0.483 **	n = 219,931	-0.257 **	0.612 **	n = 193,227
	(0.06)	(0.19)	i = 49,046	(0.08)	(0.23)	i = 29,531
Satisfsction with Present Job	-0.059 **	0.246 ***	n = 222,269	-0.018	0.136 *	n = 194,787
	(0.02)	(0.06)	i = 49,862	(0.02)	(0.07)	i = 29,639
Life Satisfaction	-0.001	0.130 *	n = 218,473	0.022	0.065	n = 192,189
	(0.02)	(0.05)	i = 48,483	(0.02)	(0.07)	i = 29,304
SF-12 MCS	0.106	-0.227	n = 219,855	0.220	-0.707 .	n = 192,410
	(0.12)	(0.33)	i = 49,686	(0.14)	(0.40)	i = 29,378

Significance: *** p ≤ 0.001; **p ≤ 0.01; * p ≤ 0.05; . p ≤ 0.10.
Standard errors in parentheses.

B.2.2 Does comparison group matter?

Table B.20: USS: Average Comparison Group Size

Comparison Group	Variable Name	Average Group Size	Observations Dropped
Wave	income_rank	20,688	0
Wave and Region	income_rank_region	1,603	0
Wave, Gender and Education	income_rank_gender_education	543	28,238
Wave and Age	income_rank_age	1,724	0
Wave, Gender, Age and Education	income_rank_gender_education_age	62	454
Wave, Industry and Occupation*	income_rank_industry_occupation	33	38,853

* 10,992 observations dropped due to missingness or comparison group size is less than 10.

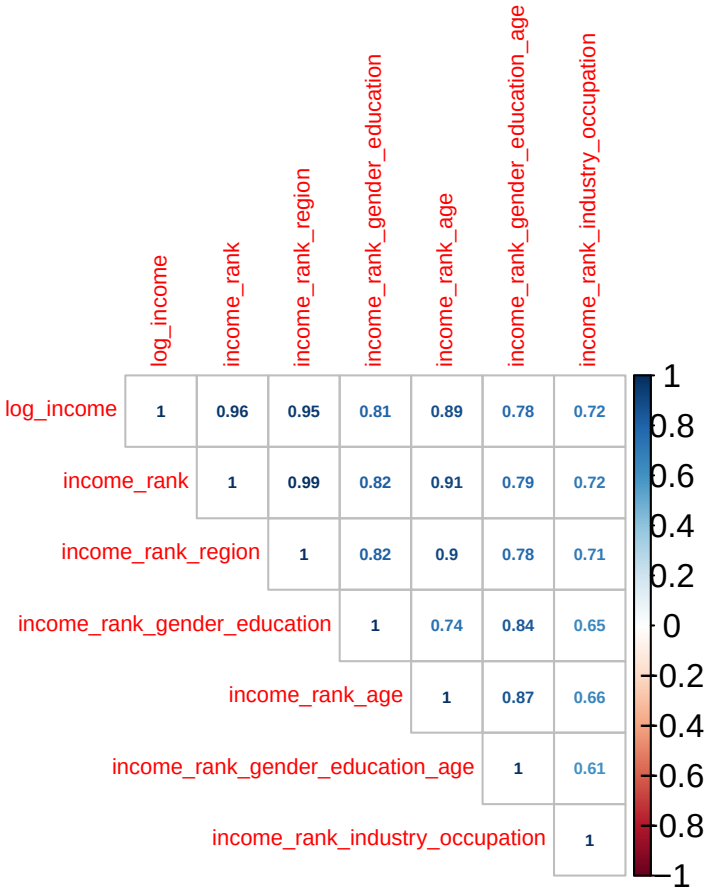

Figure B.10: USS: Correlation plot of income measures for different comparison groups. Mean values for each participant are calculated prior to correlation.

B.2.2.1 Collischon and Eberl Comparison Groups

Table B.21: USS: Model fit improvements for comparison group rank instead of overall rank. Using subset required to form Wave, Industry and Occupation comparison group.

	Fixed Effects				FEIS			
Model	**Comparison Group**	**Within R^2**	**Improvement**	**Income Rank**	**Comparison Group**	**Within R^2**	**Improvement**	**Income Rank**
Satisfaction with Income	Wave and Age	0.0389	0.38%	0.542 *** (0.03)	Wave and Region	0.0107	1.44%	0.480 *** (0.04)
Satisfaction with Present Job	Wave and Age	0.0218	0.33%	0.088 *** (0.03)	Wave and Age	0.0135	0.47%	0.105 ** (0.04)
Life Satisfaction	Wave and Region	0.0260	0.05%	0.137 *** (0.03)	Wave and Region	0.0130	0.2%	0.138 *** (0.04)
GHQ SWB	Wave and Age	0.0494	0.03%	-0.118 (0.08)	Wave and Age	0.0341	0.03%	-0.176 (0.12)
SF-12 MCS	Wave and Age	0.0430	0.02%	0.155 (0.15)	Wave and Age	0.0182	0.02%	0.094 (0.22)

The Within R^2 given is for the listed comparison group. Percentage improvement is compared to the Within R^2 for the Wave comparison group.
Significance: *** p $\leq$ 0.001; **p $\leq$ 0.01; * p $\leq$ 0.05; . p $\leq$ 0.10.
Standard errors in parentheses.

B.3 Household, Income and Labour Dynamics in Australia (HILDA)

Table B.22: HILDA: Summary statistics for income variables.

Variable	Stats	Frequencies
income [haven_labelled, vctrs_vctr, double]	Mean (sd) : 54053.4 (37206.5) min < med < max: 1501 < 47000 < 227000 IQR (CV) : 43000 (0.7)	22271 distinct values
income_rank [numeric]	Mean (sd) : 0.5 (0.3) min < med < max: 0 < 0.5 < 1 IQR (CV) : 0.5 (0.6)	155173 distinct values
income_rank_region [numeric]	Mean (sd) : 0.5 (0.3) min < med < max: 0 < 0.5 < 1 IQR (CV) : 0.5 (0.6)	118955 distinct values
income_rank_gender_education [numeric]	Mean (sd) : 0.5 (0.3) min < med < max: 0 < 0.5 < 1 IQR (CV) : 0.5 (0.6)	108319 distinct values
income_rank_age [numeric]	Mean (sd) : 0.5 (0.3) min < med < max: 0 < 0.5 < 1 IQR (CV) : 0.5 (0.6)	121001 distinct values
income_rank_gender_education_age [numeric]	Mean (sd) : 0.5 (0.3) min < med < max: 0 < 0.5 < 1 IQR (CV) : 0.5 (0.6)	14263 distinct values
income_rank_industry_occupation [numeric]	Mean (sd) : 0.5 (0.3) min < med < max: 0 < 0.5 < 1 IQR (CV) : 0.5 (0.6)	82608 distinct values

Table B.23: HILDA: Summary statistics for slope variables.

Variable	Stats	Frequencies
age [haven_labelled, vctrs_vctr, double]	Mean (sd) : 39.4 (13.1) min < med < max: 18 < 39 < 89 IQR (CV) : 22 (0.3)	72 distinct values
tenure [haven_labelled, vctrs_vctr, double]	Mean (sd) : 6.8 (8.1) min < med < max: 0 < 4 < 70 IQR (CV) : 9 (1.2)	118 distinct values

Table B.24: HILDA: Summary statistics for control variables.

Variable	Stats / Values	Freqs (% of Valid)
sex	1. Male	79668 (51.2%)
[factor]	2. Female	76010 (48.8%)
marital_status	1. Legally Married	76653 (49.2%)
[factor]	2. Never Married And Not De	35743 (23.0%)
	3. De Facto	29057 (18.7%)
	4. Divorced	8536 (5.5%)
	5. Separated	4243 (2.7%)
	6. Widowed	1429 (0.9%)
	7. Refused/Not Stated	13 (0.0%)
	8. Dont Know	4 (0.0%)
total_children	Mean (sd) : 1.4 (1.4)	14 distinct values
[haven_labelled,	min < med < max:	
vctrs_vctr, double]	0 < 1 < 13	
	IQR (CV) : 2 (1)	
health	1. Very Good	56719 (36.4%)
[factor]	2. Good	49640 (31.9%)
	3. Excellent	18617 (12.0%)
	4. No Scq	15458 (9.9%)
	5. Fair	12294 (7.9%)
	6. Refused/Not Stated	1662 (1.1%)
	7. Poor	1283 (0.8%)
	8. Multiple Response Scq	5 (0.0%)
education	1. Cert Iii Or Iv	36652 (23.5%)
[factor]	2. Year 11 And Below	28614 (18.4%)
	3. Bachelor Or Honours	27597 (17.7%)
	4. Year 12	27555 (17.7%)
	5. Adv Diploma, Diploma	15678 (10.1%)
	6. Grad Diploma, Grad Certif	10563 (6.8%)
	7. Postgrad - Masters Or Doc	8980 (5.8%)
	8. Undetermined	39 (0.0%)
main_activity	1. Employed Ft	109659 (70.4%)
[factor]	2. Employed Pt	45839 (29.4%)
	3. Employed, But Usual Hours	180 (0.1%)

Variable	Stats / Values	Freqs (% of Valid)
region	1. Melbourne	29981 (19.3%)
[factor]	2. Sydney	27267 (17.5%)
	3. Balance Of Nsw	18049 (11.6%)
	4. Balance Of Qld	16916 (10.9%)
	5. Brisbane	15537 (10.0%)
	6. Perth	10699 (6.9%)
	7. Balance Of Victoria	10502 (6.7%)
	8. Adelaide	9849 (6.3%)
	9. Tasmania	4620 (3.0%)
	10. Act	3678 (2.4%)
	[4 others]	8580 (5.5%)
country_of_birth	1. Australia	124949 (80.3%)
[factor]	2. United Kingdom	7417 (4.8%)
	3. New Zealand	3960 (2.5%)
	4. Philippines	1544 (1.0%)
	5. India	1470 (0.9%)
	6. South Africa	1182 (0.8%)
	7. China (Excludes Sars And	1045 (0.7%)
	8. Vietnam	909 (0.6%)
	9. Germany	628 (0.4%)
	10. Sri Lanka	606 (0.4%)
	[126 others]	11968 (7.7%)
aboriginal	1. Not Of Indigenous Origin	121872 (78.3%)
[factor]	2. Not Asked	30718 (19.7%)
	3. Aboriginal	2821 (1.8%)
	4. Both Aboriginal And Torre	128 (0.1%)
	5. Torres Strait Islander	101 (0.1%)
	6. Dont Know	25 (0.0%)
	7. Refused/Not Stated	13 (0.0%)
hours_worked	Mean (sd) : 37.5 (14.1)	190 distinct values
[numeric]	min < med < max:	
	0 < 40 < 150	
	IQR (CV) : 15 (0.4)	

Variable	Stats / Values	Freqs (% of Valid)
industry	1. Health And Social Work	22478 (14.4%)
[factor]	2. Education	16243 (10.4%)
	3. Retail Trade, Except Of M	12954 (8.3%)
	4. Other Business Activities	12021 (7.7%)
	5. Public Administration And	11131 (7.2%)
	6. Construction	10989 (7.1%)
	7. Hotels And Restaurants	8281 (5.3%)
	8. Wholesale Trade And Commi	4763 (3.1%)
	9. Recreational, Cultural An	4158 (2.7%)
	10. Sale, Maintenance And Rep	3759 (2.4%)
	[53 others]	48901 (31.4%)
occupation	1. Office Clerks	14323 (9.2%)
[factor]	2. Other Associate Professio	13810 (8.9%)
	3. Personal And Protective S	12112 (7.8%)
	4. Other Professionals	10881 (7.0%)
	5. Corporate Managers	10538 (6.8%)
	6. Teaching Professionals	9791 (6.3%)
	7. Models, Salespersons And	8273 (5.3%)
	8. Metal, Machinery And Rela	7651 (4.9%)
	9. General Managers	7290 (4.7%)
	10. Customer Service Clerks	6314 (4.1%)
	[27 others]	54695 (35.1%)

Table B.25: HILDA: Variable Descriptions

HILDA Variable	Variable Name	Description	Responses
ghmh	sf36	SF-36 mental component summary	The mental component summary of the Short-Form 36 Health Survey Mental (SF-36) measures *mental functioning*. Valid answers are converted into a single mental functioning score, resulting in a continuous scale with a range of 0 (low functioning) to 100 (high functioning). Higher functioning is indicative of better mental health and well-being.
losat	life_sat	Satisfaction - How satisfied are you with your life	Totally dissatisfied 1 - Totally satisfied 10
losateo	emp_opp_sat	Satisfaction - Your employment opportunities	Totally dissatisfied 1 - Totally satisfied 10
losatfs	finances_sat	Satisfaction - Your financial situation	Totally dissatisfied 1 - Totally satisfied 10
jbmspay	pay_sat	Total pay satisfaction	Totally dissatisfied 1 - Totally satisfied 10
jbmssec	job_sec_sat	Job security satisfaction	Totally dissatisfied 1 - Totally satisfied 10
jbmswrk	work_sat	The work itself satisfaction	Totally dissatisfied 1 - Totally satisfied 10
jbmshrs	hours_sat	The hours you work satisfaction	Totally dissatisfied 1 - Totally satisfied 10
jbmsflx	worklife_sat	The flexibility to balance work and non-work commitments satisfaction	Totally dissatisfied 1 - Totally satisfied 10
jbmsall	job_sat	Overall job satisfaction	Totally dissatisfied 1 - Totally satisfied 10

Table B.26: HILDA: Summary statistics for well-being variables.

Variable	Stats / Values	Freqs (% of Valid)
sf36	Mean (sd) : 75.1 (15.9)	50 distinct values
[numeric]	min < med < max:	
	0 < 80 < 100	
	IQR (CV) : 20 (0.2)	
life_sat	Mean (sd) : 7.9 (1.3)	11 distinct values
[numeric]	min < med < max:	
	0 < 8 < 10	
	IQR (CV) : 2 (0.2)	
emp_opp_sat	Mean (sd) : 7.5 (1.9)	11 distinct values
[numeric]	min < med < max:	
	0 < 8 < 10	
	IQR (CV) : 2 (0.3)	
finances_sat	Mean (sd) : 6.6 (2)	11 distinct values
[numeric]	min < med < max:	
	0 < 7 < 10	
	IQR (CV) : 2 (0.3)	
pay_sat	Mean (sd) : 7.1 (2)	11 distinct values
[numeric]	min < med < max:	
	0 < 7 < 10	
	IQR (CV) : 2 (0.3)	

Variable	Stats / Values	Freqs (% of Valid)
job_sec_sat	Mean (sd) : 7.9 (2.1)	11 distinct values
[numeric]	min < med < max:	
	0 < 8 < 10	
	IQR (CV) : 2 (0.3)	
work_sat	Mean (sd) : 7.6 (1.8)	11 distinct values
[numeric]	min < med < max:	
	0 < 8 < 10	
	IQR (CV) : 2 (0.2)	
hours_sat	Mean (sd) : 7.2 (2)	11 distinct values
[numeric]	min < med < max:	
	0 < 8 < 10	
	IQR (CV) : 3 (0.3)	
worklife_sat	Mean (sd) : 7.5 (2.3)	11 distinct values
[numeric]	min < med < max:	
	0 < 8 < 10	
	IQR (CV) : 3 (0.3)	
job_sat	Mean (sd) : 7.6 (1.7)	11 distinct values
[numeric]	min < med < max:	
	0 < 8 < 10	
	IQR (CV) : 2 (0.2)	

Table B.27: HILDA: Sample for waves where well-being measure included.

		Males			**Females**		
WB Variable	**Waves**	**N**	**Observations**	**Mean Age**	**N**	**Observations**	**Mean Age**
Sf36	19	10,842	70,293	40.02	10,688	69,213	39.80
Life Sat	19	11,560	79,580	39.38	11,177	75,944	39.46
Emp Opp Sat	19	11,489	78,519	39.20	11,122	75,037	39.31
Finances Sat	19	11,561	79,587	39.38	11,177	75,946	39.46
Pay Sat	19	11,558	79,555	39.38	11,173	75,890	39.46
Job Sec Sat	19	11,553	79,520	39.37	11,171	75,880	39.45
Work Sat	19	11,561	79,596	39.38	11,179	75,938	39.46
Hours Sat	19	11,560	79,589	39.38	11,179	75,929	39.46
Worklife Sat	19	11,556	79,540	39.38	11,178	75,895	39.46
Job Sat	19	11,561	79,588	39.38	11,178	75,928	39.46

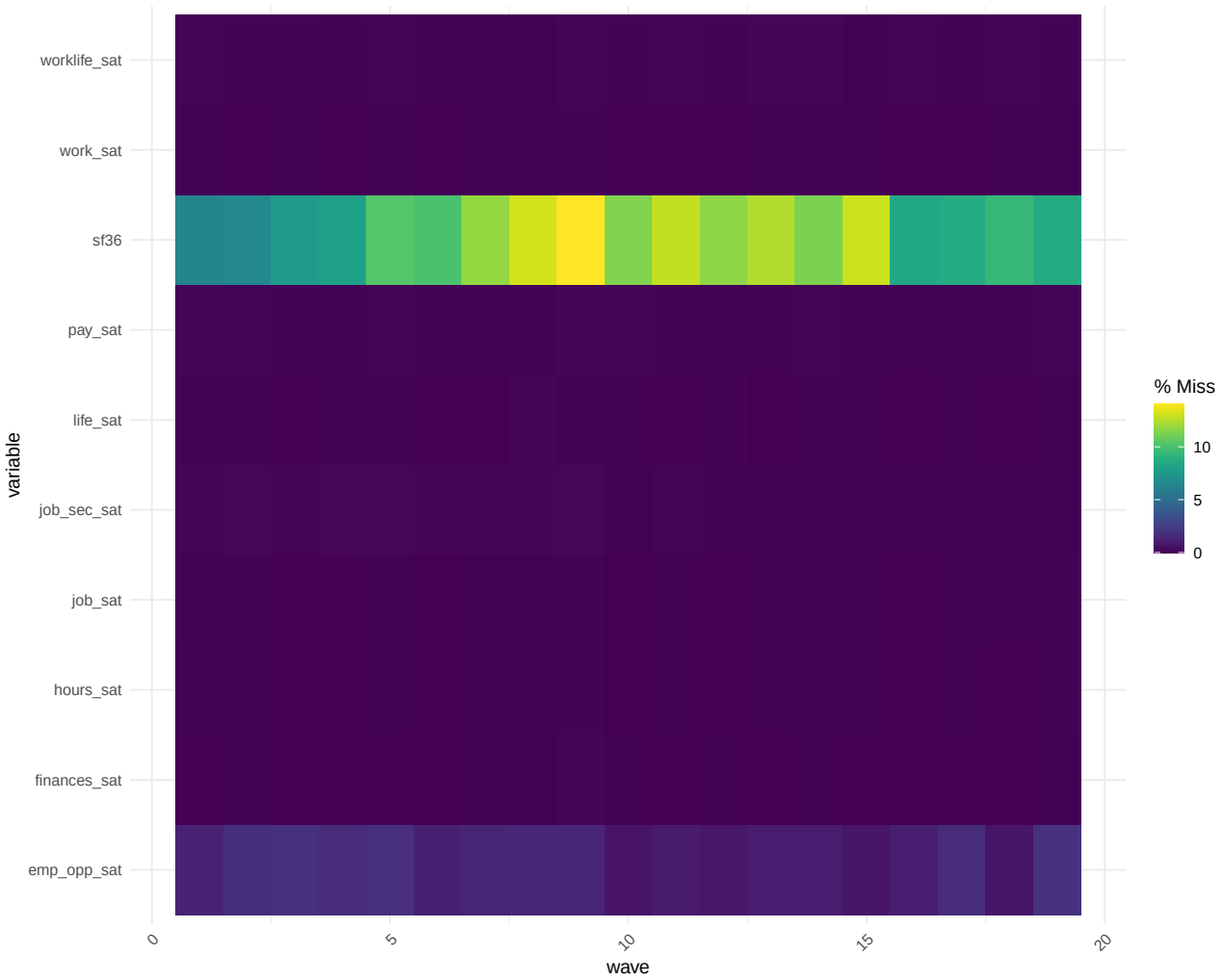

Figure B.11: HILDA: Missingness plot.

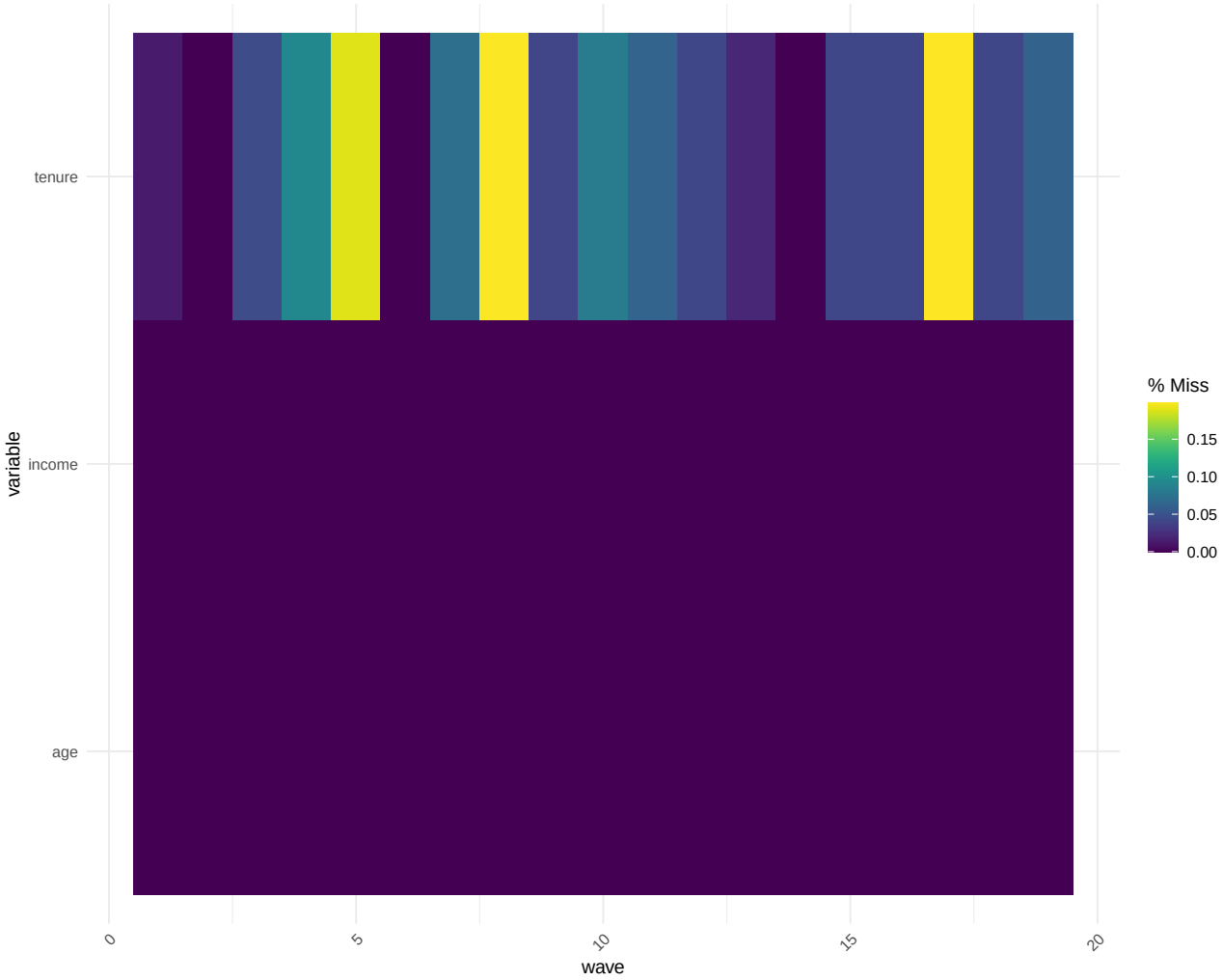

Figure B.12: HILDA: Missingness plot.

Figure B.13: HILDA: Observations by wave.

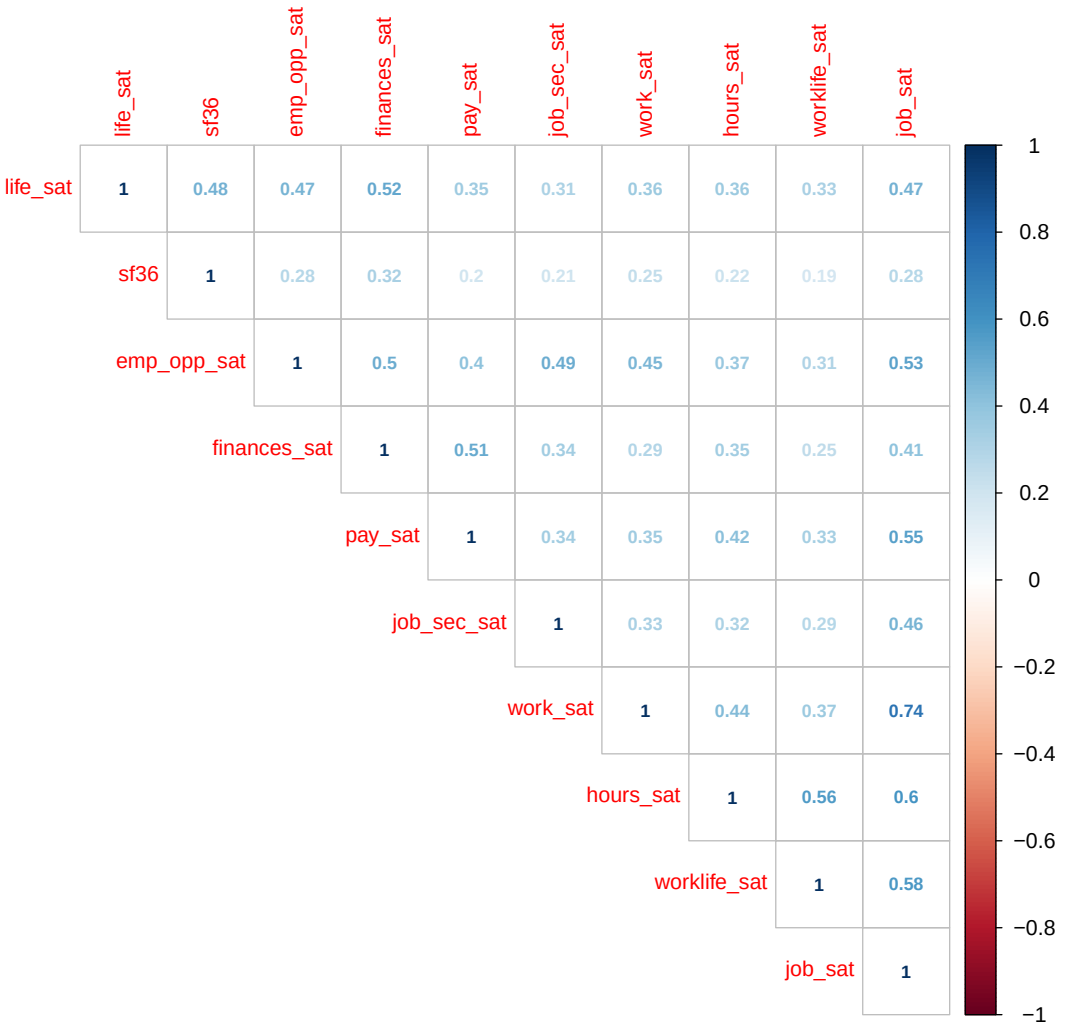

Figure B.14: HILDA: Correlation plot of well-being variables. Mean values for each participant are calculated prior to correlation.

B.3.1 Do rank effects survive FEIS?

B.3.1.1 With Outliers

Table B.28: HILDA with Outliers: Regression results for specification including both log(income) and rank of income.

	Fixed Effects			FEIS		
Model	**log(income)**	**Income Rank**	**Observations**	**log(income)**	**Income Rank**	**Observations**
Pay Sat	-0.019 ***	0.636 ***	n = 175,518	-0.009 ***	0.324 ***	n = 154,341
	(0.00)	(0.02)	i = 24,013	(0.00)	(0.03)	i = 13,540
Finances Sat	-0.010 ***	0.387 ***	n = 175,750	-0.007 ***	0.250 ***	n = 154,551
	(0.00)	(0.02)	i = 24,033	(0.00)	(0.02)	i = 13,552
Life Satisfaction	-0.004 **	0.110 ***	n = 175,744	-0.004 *	0.072 **	n = 154,530
	(0.00)	(0.02)	i = 24,034	(0.00)	(0.02)	i = 13,549
Job Security Sat	0.004 *	0.171 ***	n = 175,475	0.004 *	0.045	n = 154,298
	(0.00)	(0.02)	i = 24,009	(0.00)	(0.03)	i = 13,536
Employment Opps Sat	-0.001	0.084 ***	n = 172,480	0.001	0.038	n = 151,258
	(0.00)	(0.02)	i = 23,861	(0.00)	(0.03)	i = 13,375
SF-36	0.000	-0.005	n = 157,518	-0.001	0.018	n = 136,365
	(0.00)	(0.02)	i = 22,778	(0.00)	(0.02)	i = 12,357
Job Sat	-0.008 ***	0.068 **	n = 175,720	0.000	-0.008	n = 154,520
	(0.00)	(0.02)	i = 24,034	(0.00)	(0.03)	i = 13,549
Work Sat	-0.007 ***	-0.021	n = 175,738	-0.001	-0.037	n = 154,527
	(0.00)	(0.02)	i = 24,034	(0.00)	(0.03)	i = 13,548
Worklife Sat	-0.003 *	-0.055 *	n = 175,616	-0.001	-0.050 .	n = 154,438
	(0.00)	(0.02)	i = 24,026	(0.00)	(0.03)	i = 13,549
Hours Sat	0.007 ***	-0.068 **	n = 175,721	0.007 ***	-0.060 *	n = 154,524
	(0.00)	(0.02)	i = 24,033	(0.00)	(0.03)	i = 13,551

Significance: *** $p \leq 0.001$; **$p \leq 0.01$; * $p \leq 0.05$; . $p \leq 0.10$.

Standard errors in parentheses.

B.3.1.2 Age Only

Table B.29: HILDA with Age Slope Only: Regression results for specification including both log(income) and rank of income.

	Fixed Effects			FEIS		
Model	**log(income)**	**Income Rank**	**Observations**	**log(income)**	**Income Rank**	**Observations**
Pay Sat	-0.135 ***	0.933 ***	n = 155,445	-0.110 ***	0.709 ***	n = 145,795
	(0.01)	(0.04)	i = 22,729	(0.01)	(0.04)	i = 15,634
Finances Sat	-0.030 **	0.433 ***	n = 155,533	-0.010	0.322 ***	n = 145,885
	(0.01)	(0.03)	i = 22,736	(0.01)	(0.03)	i = 15,640
Life Satisfaction	-0.030 **	0.165 ***	n = 155,524	-0.027 *	0.139 ***	n = 145,882
	(0.01)	(0.03)	i = 22,735	(0.01)	(0.03)	i = 15,642
Job Sat	-0.069 ***	0.199 ***	n = 155,516	-0.060 ***	0.121 **	n = 145,863
	(0.01)	(0.03)	i = 22,737	(0.01)	(0.04)	i = 15,638
Work Sat	-0.074 ***	0.127 ***	n = 155,534	-0.071 ***	0.105 **	n = 145,879
	(0.01)	(0.03)	i = 22,738	(0.01)	(0.04)	i = 15,639
Job Security Sat	-0.011	0.224 ***	n = 155,400	0.005	0.098 *	n = 145,759
	(0.01)	(0.04)	i = 22,722	(0.01)	(0.04)	i = 15,632
Employment Opps Sat	0.006	0.078 *	n = 153,556	0.009	0.024	n = 143,918
	(0.01)	(0.03)	i = 22,609	(0.01)	(0.04)	i = 15,532
SF-36	-0.004	0.014	n = 139,506	-0.007	0.005	n = 129,992
	(0.01)	(0.03)	i = 21,528	(0.01)	(0.03)	i = 14,506
Worklife Sat	0.005	-0.062 .	n = 155,435	-0.001	-0.074 *	n = 145,782
	(0.01)	(0.03)	i = 22,732	(0.01)	(0.04)	i = 15,635
Hours Sat	0.119 ***	-0.348 ***	n = 155,518	0.091 ***	-0.289 ***	n = 145,865
	(0.01)	(0.04)	i = 22,737	(0.01)	(0.04)	i = 15,639

Significance: *** p ≤ 0.001; **p ≤ 0.01; * p ≤ 0.05; . p ≤ 0.10.
Standard errors in parentheses.

B.3.2 Does comparison group matter?

Table B.30: HILDA: Average Comparison Group Size

Comparison Group	Variable Name	Average Group Size	Observations Dropped
Wave	income_rank	8,194	0
Wave and Region	income_rank_region	628	0
Wave, Gender and Education	income_rank_gender_education	562	16
Wave and Age	income_rank_age	683	0
Wave, Gender, Age and Education	income_rank_gender_education_age	53	121
Wave, Industry and Occupation*	income_rank_industry_occupation	13	4,315

* 4,315 observations dropped due to missingness or comparison group size is less than 10.

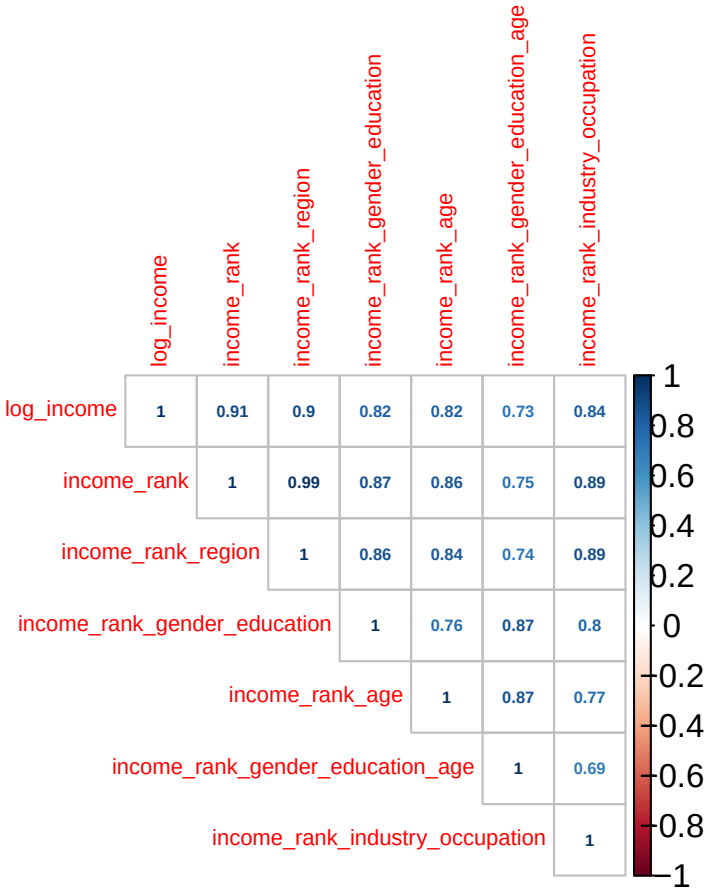

Figure B.15: HILDA: Correlation plot of income measures for different comparison groups. Mean values for each participant are calculated prior to correlation.

B.3.2.1 Collischon and Eberl Comparison Groups

Table B.31: SOEP: Model fit improvements for comparison group rank instead of overall rank. Using subset required to form Wave, Industry and Occupation comparison group.

	Fixed Effects				FEIS			
Model	**Comparison Group**	**Within R^2**	**Improvement**	**Income Rank**	**Comparison Group**	**Within R^2**	**Improvement**	**Income Rank**
Pay Sat	Wave and Region	0.0298	0.31%	0.573 *** (0.02)	Wave and Region	0.0101	0.66%	0.324 *** (0.03)
Finances Sat	Wave and Age	0.0566	0.21%	0.318 *** (0.02)	Wave and Region	0.0277	0.2%	0.248 *** (0.02)
Work Sat	Wave, Gender and Education	0.0261	0.21%	-0.076 *** (0.02)	Wave, Gender, Age and Education	0.0127	0.16%	-0.043 * (0.02)
Employment Opps Sat	Wave	0.0259	0%	0.096 *** (0.02)	Wave, Gender and Education	0.0163	0.16%	0.066 ** (0.02)
Job Sec Sat	Wave	0.0190	0%	0.189 *** (0.02)	Wave, Industry and Occupation	0.0140	0.15%	0.068 ** (0.02)
SF-36	Wave, Industry and Occupation	0.0574	0.01%	0.012 (0.01)	Wave, Industry and Occupation	0.0409	0.04%	0.022 (0.02)
Hours Sat	Wave, Gender and Education	0.0347	0.08%	-0.044 * (0.02)	Wave, Gender and Education	0.0212	0.03%	-0.026 (0.02)
Job Sat	Wave and Age	0.0179	0.07%	0.021 (0.02)	Wave, Industry and Occupation	0.0096	0.02%	-0.022 (0.02)
Worklife Sat	Wave, Gender, Age and Education	0.0484	0.09%	-0.048 ** (0.01)	Wave, Industry and Occupation	0.0322	0.02%	-0.036 (0.02)
Life Satisfaction	Wave and Age	0.0404	0.02%	0.079 *** (0.01)	Wave and Region	0.0235	0%	0.058 ** (0.02)

The Within R^2 given is for the listed comparison group. Percentage improvement is compared to the Within R^2 for the Wave comparison group.
Significance: *** p $\leq$ 0.001; **p $\leq$ 0.01; * p $\leq$ 0.05; . p $\leq$ 0.10.
Standard errors in parentheses.

B.4 Panel Study of Income Dynamics (PSID)

Table B.32: PSID: Summary statistics for slope variables.

Variable	Stats	Frequencies
income [numeric]	Mean (sd) : 44171.8 (34297.7) min < med < max: 1220 < 35569 < 228000 IQR (CV) : 36759 (0.8)	3922 distinct values
income_rank [numeric]	Mean (sd) : 0.5 (0.3) min < med < max: 0 < 0.5 < 1 IQR (CV) : 0.5 (0.6)	27447 distinct values
income_rank_region [numeric]	Mean (sd) : 0.5 (0.3) min < med < max: 0 < 0.5 < 1 IQR (CV) : 0.5 (0.6)	12969 distinct values
income_rank_gender_education [numeric]	Mean (sd) : 0.5 (0.3) min < med < max: 0 < 0.5 < 1 IQR (CV) : 0.5 (0.6)	25059 distinct values
income_rank_age [numeric]	Mean (sd) : 0.5 (0.3) min < med < max: 0 < 0.5 < 1 IQR (CV) : 0.5 (0.6)	23651 distinct values
income_rank_gender_education_age [numeric]	Mean (sd) : 0.5 (0.3) min < med < max: 0 < 0.5 < 1 IQR (CV) : 0.5 (0.6)	5063 distinct values
income_rank_industry_occupation [numeric]	Mean (sd) : 0.5 (0.3) min < med < max: 0 < 0.5 < 1 IQR (CV) : 0.5 (0.6)	5993 distinct values

Table B.33: PSID: Summary statistics for slope variables.

Variable	Stats	Frequencies
age [numeric]	Mean (sd) : 41 (12.9) min < med < max: 18 < 39 < 88 IQR (CV) : 21 (0.3)	70 distinct values
tenure [numeric]	Mean (sd) : 7 (8.3) min < med < max: 0 < 4 < 54 IQR (CV) : 9 (1.2)	55 distinct values

Table B.34: PSID: Summary statistics for control variables.

Variable	Stats / Values	Freqs (% of Valid)
marital_status	1. Married/Perm Cohabiting	14763 (53.8%)
[factor]	2. Single	7631 (27.8%)
	3. Divorced	3442 (12.5%)
	4. Separated	1140 (4.2%)
	5. Widowed	483 (1.8%)
	6. Missing	2 (0.0%)
sex	1. Female	16422 (59.8%)
[factor]	2. Male	11039 (40.2%)
education	1. Some College	8337 (30.4%)
[factor]	2. High School	7628 (27.8%)
	3. College Graduate	5413 (19.7%)
	4. Postgraduate	4484 (16.3%)
	5. Less Than High School	1477 (5.4%)
	6. Dk; Na	122 (0.4%)
health	1. Very Good	10788 (39.3%)
[factor]	2. Good	9027 (32.9%)
	3. Excellent	4747 (17.3%)
	4. Fair	2561 (9.3%)
	5. Poor	314 (1.1%)
	6. Na/Refused	21 (0.1%)
	7. Don't Known	3 (0.0%)
state	1. California	2360 (8.6%)
[factor]	2. Texas	1785 (6.5%)
	3. North Carolina	1624 (5.9%)
	4. Michigan	1329 (4.8%)
	5. South Carolina	1266 (4.6%)
	6. Ohio	1230 (4.5%)
	7. Mississippi	1100 (4.0%)
	8. Pennsylvania	1068 (3.9%)
	9. New York	1053 (3.8%)
	10. Florida	1036 (3.8%)
	[42 others]	13610 (49.6%)
hours_worked	Mean (sd) : 40.8 (12.3)	102 distinct values
[numeric]	min < med < max:	
	0 < 40 < 112	
	IQR (CV) : 7 (0.3)	

Variable	Stats / Values	Freqs (% of Valid)
children	Mean (sd) : 0.8 (1.1)	12 distinct values
[numeric]	min < med < max:	
	0 < 0 < 11	
	IQR (CV) : 2 (1.4)	
industry	1. Inappropriate	5037 (18.3%)
[factor]	2. Health Care And Social As	3699 (13.5%)
	3. Manufacturing	2561 (9.3%)
	4. Retail Trade	2035 (7.4%)
	5. Educational Services	1879 (6.8%)
	6. Accommodations And Food S	1601 (5.8%)
	7. Public Administration And	1601 (5.8%)
	8. Professional, Scientific,	1273 (4.6%)
	9. Transportation And Wareho	1212 (4.4%)
	10. Construction	1079 (3.9%)
	[12 others]	5484 (20.0%)
occupation	1. Office And Administrative	3685 (13.4%)
[factor]	2. Chief Executives	2699 (9.8%)
	3. Management Occupations	1859 (6.8%)
	4. Transportation And Materi	1674 (6.1%)
	5. Education, Training, And	1587 (5.8%)
	6. Food Preparation And Serv	1500 (5.5%)
	7. Sales Occupations	1497 (5.5%)
	8. Production Occupations	1474 (5.4%)
	9. Healthcare Practitioners	1226 (4.5%)
	10. Healthcare Support Occupa	1021 (3.7%)
	[23 others]	9239 (33.6%)
race	1. White	15857 (57.8%)
[factor]	2. Black	10241 (37.3%)
	3. Other	729 (2.7%)
	4. Asian	293 (1.1%)
	5. Native	164 (0.6%)
	6. Dk/Na/Refused	152 (0.6%)

Variable	Stats / Values	Freqs (% of Valid)
ethnicity	1. National Origin (E.g., Fr	16389 (59.7%)
[factor]	2. Racial (E.g., White Or Ca	3696 (13.5%)
	3. Hyphenated American (E.g.	2917 (10.6%)
	4. Dk; Na	2766 (10.1%)
	5. American	935 (3.4%)
	6. Nonspecific Hispanic Iden	366 (1.3%)
	7. Other	227 (0.8%)
	8. Religious (E.g., Jewish,	165 (0.6%)
nationality	1. Ethnic Identity Not Natio	8155 (29.7%)
[factor]	2. African	5512 (20.1%)
	3. Western European	5268 (19.2%)
	4. British	3525 (12.8%)
	5. Central American	1191 (4.3%)
	6. Eastern European	1026 (3.7%)
	7. American (Meaning U.s.)	842 (3.1%)
	8. Northern European/Scandin	520 (1.9%)
	9. American Indian, Eskimo,	411 (1.5%)
	10. Caribbean	296 (1.1%)
	[7 others]	715 (2.6%)

Table B.35: PSID: Variable Descriptions

PSID 2009 Variable	Variable Name	Description
ER42024	life_sat	Please think about your life as a whole. How satisfied are you with it?
ER46375	kessler	Kessler-6 Non-Specific Psychological Distress Scale

Table B.36: PSID: Summary statistics for well-being variables.

Variable	Stats / Values	Freqs (% of Valid)
life_sat	Mean (sd) : 3.8 (0.8)	1 : 168 (0.6%)
[numeric]	min < med < max:	2 : 719 (2.6%)
	1 < 4 < 5	3 : 7986 (29.2%)
	IQR (CV) : 1 (0.2)	4 : 12918 (47.2%)
		5 : 5591 (20.4%)
kessler	Mean (sd) : 3 (3.5)	25 distinct values
[numeric]	min < med < max:	
	0 < 2 < 24	
	IQR (CV) : 4 (1.1)	

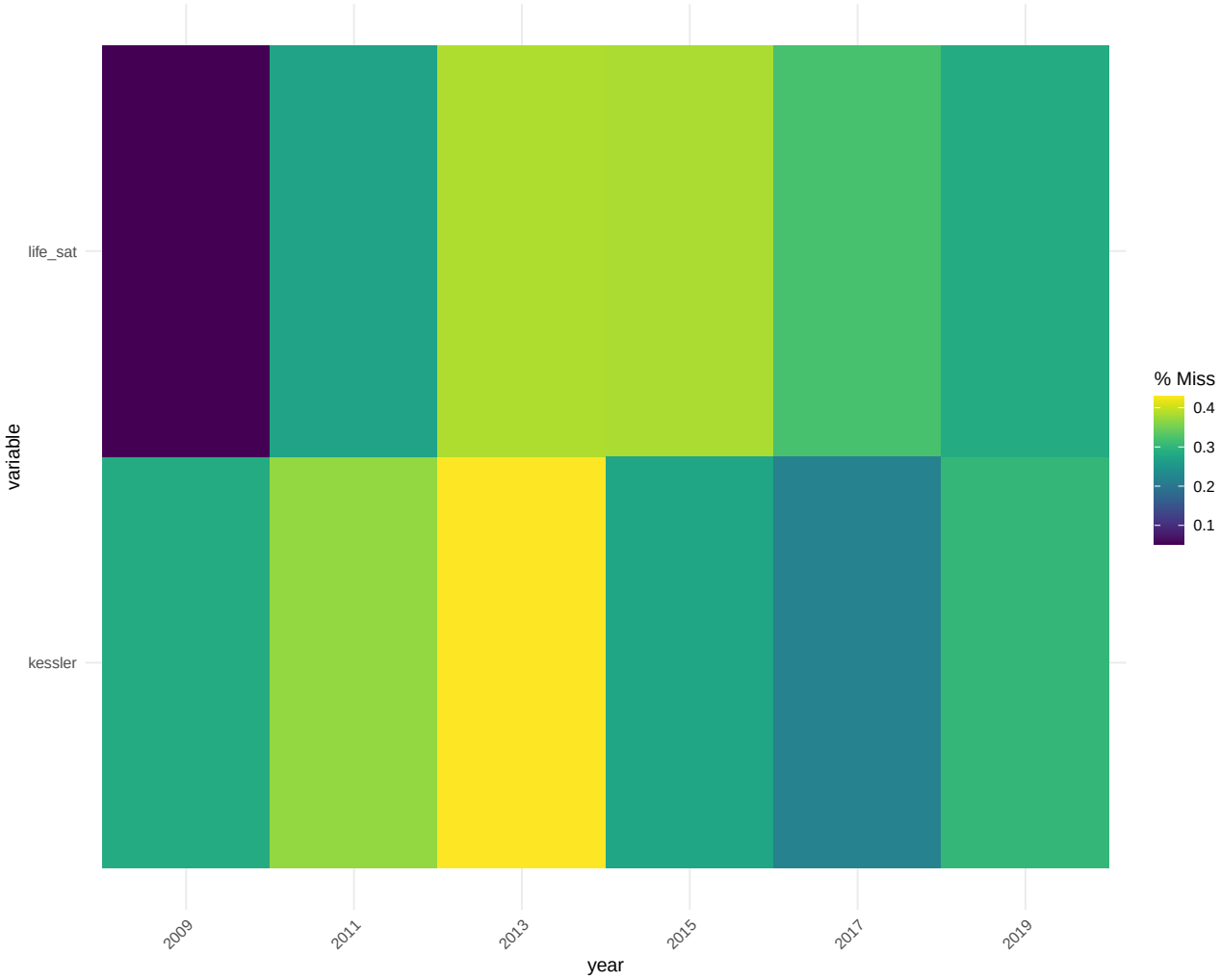

Figure B.16: PSID: Missingness plot.

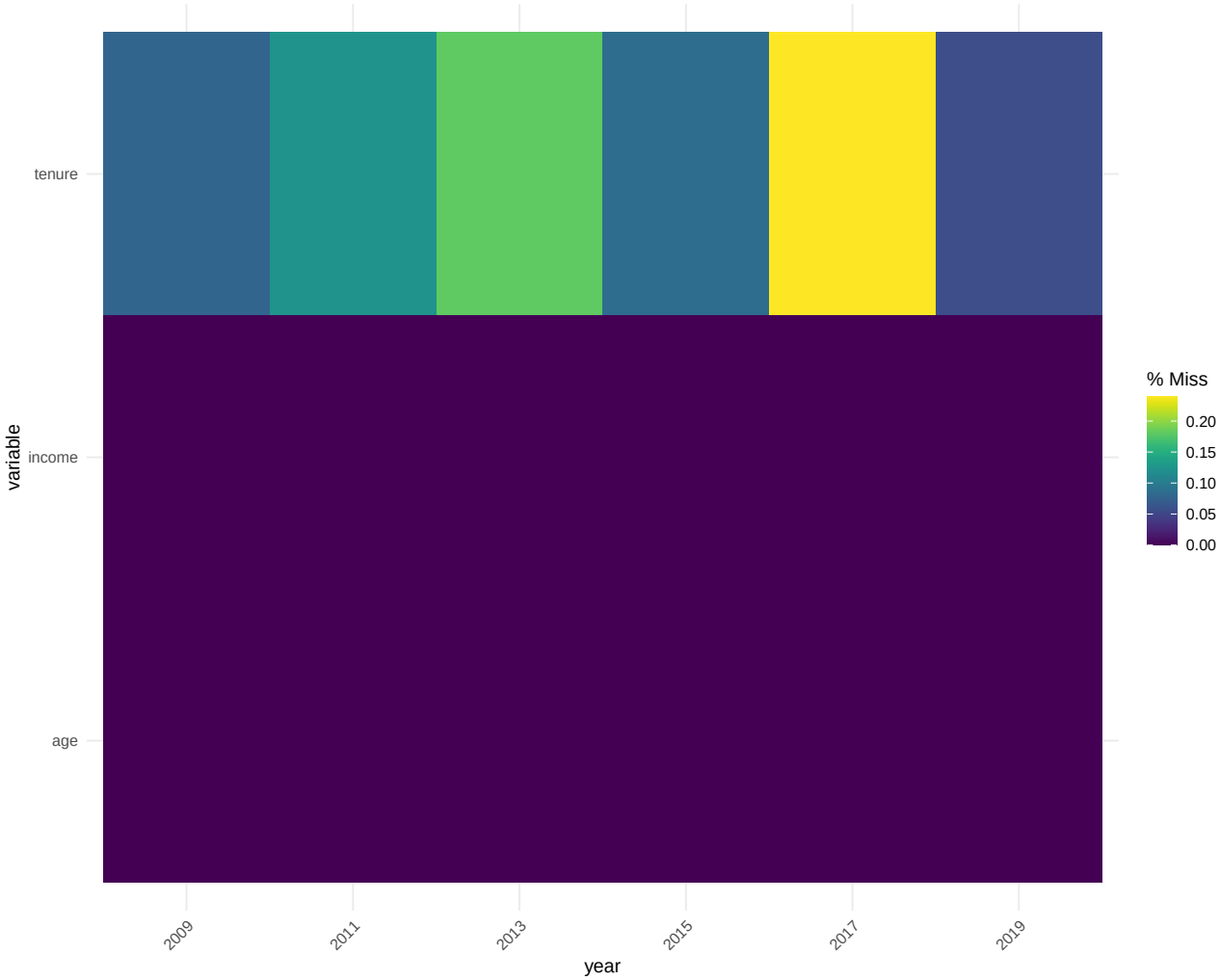

Figure B.17: PSID: Missingness plot.

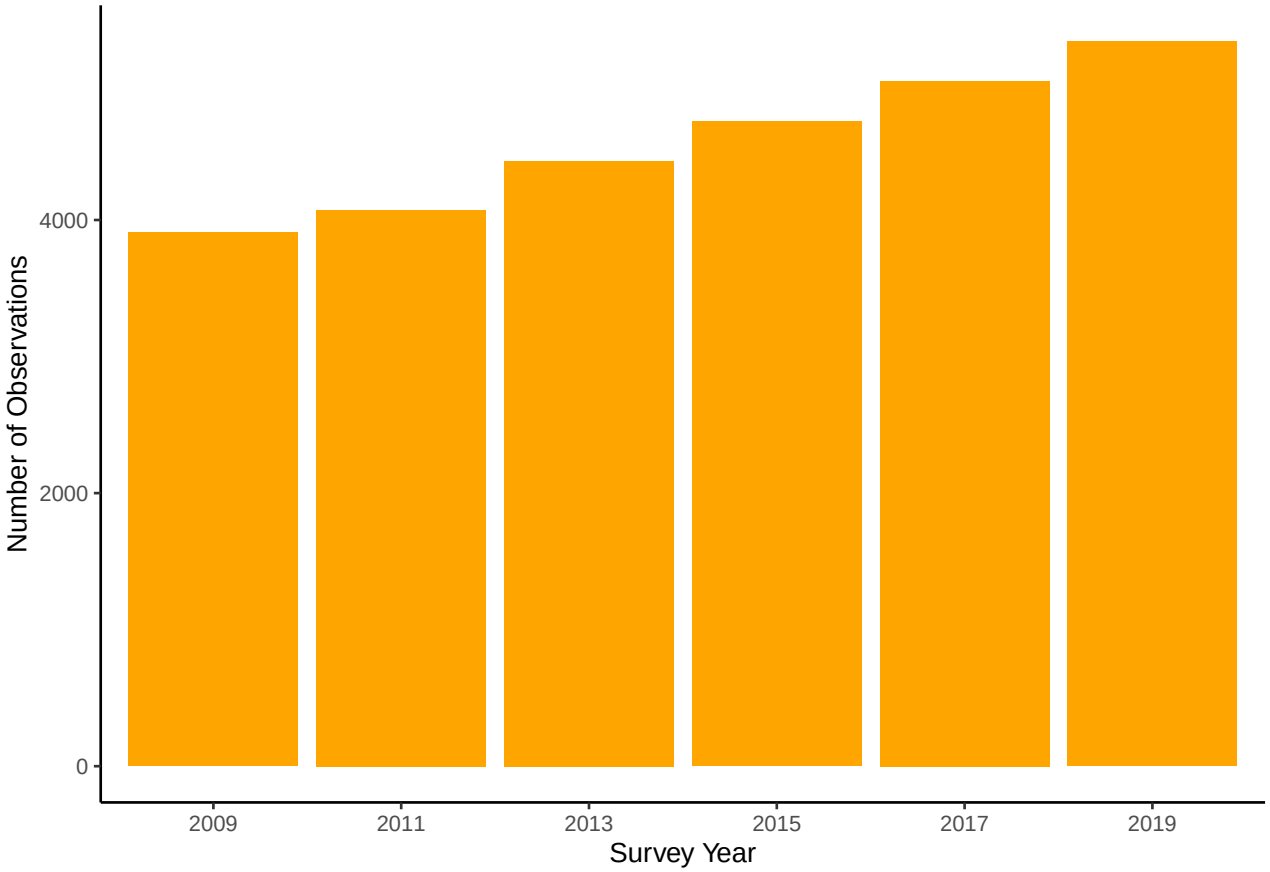

Figure B.18: PSID: Observations by wave.

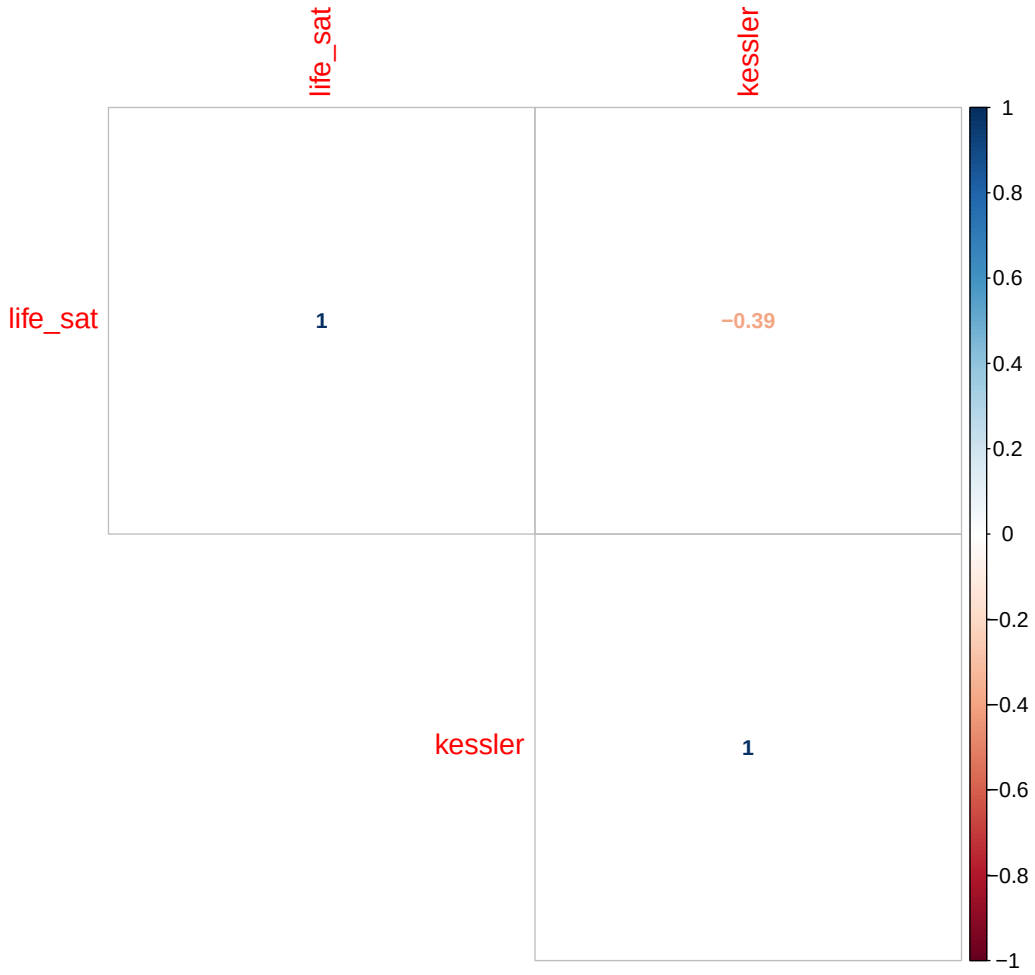

Figure B.19: PSID: Correlation plot of well-being variables. Mean values for each participant are calculated prior to correlation.

Table B.37: PSID: Sample for waves where well-being measure included.

		Males			Females		
WB Variable	**Waves**	**N**	**Observations**	**Mean Age**	**N**	**Observations**	**Mean Age**
Life Sat	6	3,003	10,977	40.89	4,334	16,347	41.06
Kessler	6	3,001	10,968	40.89	4,329	16,350	41.07

B.4.1 Do rank effects survive FEIS?

B.4.1.1 With Outliers

Table B.38: PSID with Outliers: Regression results for specification including both log(income) and rank of income.

	Fixed Effects			FEIS		
Model	**log(income)**	**Income Rank**	**Observations**	**log(income)**	**Income Rank**	**Observations**
Life Satisfaction	-0.005	0.155 **	n = 29,038	-0.003	0.127	n = 18,734
	(0.00)	(0.05)	i = 7,573	(0.01)	(0.12)	i = 3,310
Kessler	-0.003	-0.026	n = 29,031	-0.009	0.100	n = 18,721
	(0.00)	(0.05)	i = 7,564	(0.01)	(0.11)	i = 3,306

Significance: *** p ≤ 0.001; **p ≤ 0.01; * p ≤ 0.05; . p ≤ 0.10.
Standard errors in parentheses.

B.4.1.2 Age Only

Table B.39: PSID with Age Slope Only: Regression results for specification including both log(income) and rank of income.

	Fixed Effects			FEIS		
Model	**log(income)**	**Income Rank**	**Observations**	**log(income)**	**Income Rank**	**Observations**
Life Satisfaction	-0.011	0.172 .	n = 27,349	-0.022	0.231 .	n = 23,915
	(0.03)	(0.09)	i = 7,341	(0.04)	(0.13)	i = 5,005
Kessler	-0.044	0.066	n = 27,343	-0.023	0.042	n = 23,913
	(0.03)	(0.09)	i = 7,334	(0.04)	(0.12)	i = 5,002

Significance: *** p ≤ 0.001; **p ≤ 0.01; * p ≤ 0.05; . p ≤ 0.10.
Standard errors in parentheses.

B.4.2 Does comparison group matter?

Table B.40: PSID: Average Comparison Group Size

Comparison Group	Variable Name	Average Group Size	Observations Dropped
Wave	income_rank	4,577	0
Wave and Region	income_rank_region	88	0
Wave, Gender and Education	income_rank_gender_education	456	122
Wave and Age	income_rank_age	381	0
Wave, Gender, Age and Education	income_rank_gender_education_age	40	136
Wave, Industry and Occupation*	income_rank_industry_occupation	36	8,374

* 8,374 observations dropped due to missingness or comparison group size is less than 10.

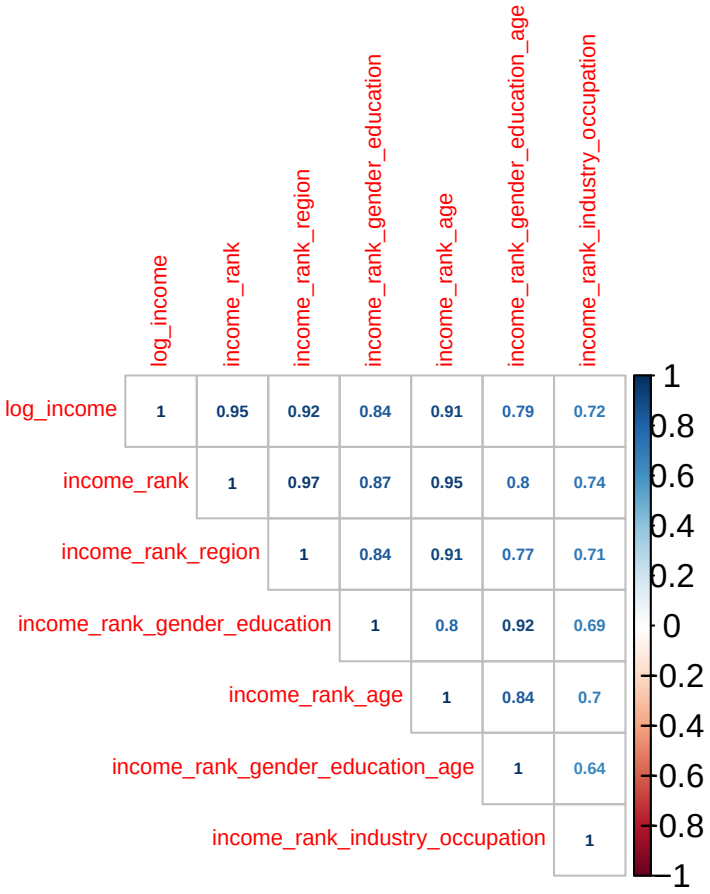

Figure B.20: PSID: Correlation plot of income measures for different comparison groups.

B.4.2.1 Collischon and Eberl Comparison Groups

Table B.41: PSID: Model fit improvements for comparison group rank instead of overall rank. Using subset required to form Wave, Industry and Occupation comparison group.

	Fixed Effects				FEIS			
Model	**Comparison Group**	**Within R^2**	**Improvement**	**Income Rank**	**Comparison Group**	**Within R^2**	**Improvement**	**Income Rank**
Kessler	Wave, Gender, Age and Education	0.0776	1.89%	0.208 . (0.11)	Wave, Industry and Occupation	0.0389	0.24%	-0.053 (0.04)
Life Satisfaction	Wave, Gender, Age and Education	0.0634	1.54%	0.291 * (0.12)	Wave	0.0380	0%	0.227 *** (0.06)

The Within R^2 given is for the listed comparison group. Percentage improvement is compared to the Within R^2 for the Wave comparison group.
Significance: *** p ≤ 0.001; **p ≤ 0.01; * p ≤ 0.05; . p ≤ 0.10.
Standard errors in parentheses.

Appendix C

Negative Associations Between Alcohol Consumption and Subjective Well-being in the UK: A Longitudinal Analysis

C.1 Variable Descriptions and Summary Statistics

C.1.1 Well-Being Variables

Table C.1: Summary statistics for well-being variables (all waves).

Variable	Label	Stats / Values	Freqs (% of Valid)
sclfsato [numeric]	Satisfaction with life overall	Mean (sd) : 5.2 (1.4) min < med < max: 1 < 6 < 7 IQR (CV) : 1 (0.3)	1 : 2861 (0.7%) 2 : 20941 (5.4%) 3 : 31399 (8.1%) 4 : 39342 (10.2%) 5 : 70627 (18.3%) 6 : 174694 (45.3%) 7 : 45563 (11.8%)
scghq1_dv [numeric]	Psychological Distress (GHQ-12)	Mean (sd) : 11.2 (5.5) min < med < max: 0 < 10 < 36 IQR (CV) : 6 (0.5)	37 distinct values
sf12mcs_dv [numeric]	Mental Functioning (SF-12)	Mean (sd) : 49.2 (10.2) min < med < max: 0 < 51.7 < 78.1 IQR (CV) : 13.6 (0.2)	6442 distinct values
swemwbs_dv [numeric]	Positive Mental Well-Being (SWEMWBS)	Mean (sd) : 24.9 (4.7) min < med < max: 7 < 25 < 35 IQR (CV) : 6 (0.2)	29 distinct values

Table C.2: Summary statistics for alcohol variables (all waves).

Variable	Label	Stats / Values	Freqs (% of Valid)
auditc3	Frequency	1. 2-3 Times Per W	21176 (27.7%)
[factor]		2. 2-4 Times Per M	21636 (28.3%)
		3. 4+ Times Per We	12475 (16.3%)
		4. Monthly Or Less	20735 (27.1%)
		5. Never	461 (0.6%)
auditc4	Intensity	1. 1-2 Drinks	45036 (59.1%)
[factor]		2. 10+ Drinks	1229 (1.6%)
		3. 3-4 Drinks	20170 (26.5%)
		4. 5-6 Drinks	7557 (9.9%)
		5. 7-9 Drinks	2234 (2.9%)
auditc5	Binge Drinking Frequency	1. Daily Or Almost	1253 (1.6%)
[factor]		2. Less Than Month	26209 (34.3%)
		3. Monthly	11506 (15.1%)
		4. Never	29151 (38.2%)
		5. Weekly	8192 (10.7%)
audit_score	AUDIT-C Score	Mean (sd) : 7 (2.2)	3 : 311 (0.4%)
[numeric]		min < med < max:	4 : 10510 (13.8%)
		3 < 7 < 15	5 : 11492 (15.1%)
		IQR (CV) : 3 (0.3)	6 : 13024 (17.1%)
			7 : 13361 (17.6%)
			8 : 9251 (12.2%)
			9 : 6900 (9.1%)
			10 : 4967 (6.5%)
			11 : 3612 (4.8%)
			12 : 1619 (2.1%)
			13 : 658 (0.9%)
			14 : 185 (0.2%)
			15 : 126 (0.2%)
audit_risk	Risk Category	1. Higher Risk	21118 (28.1%)
[factor]		2. Increasing Risk	37877 (50.5%)
		3. Low Risk	10821 (14.4%)
		4. Possible Depend	5231 (7.0%)
alc_expend_per_adult	Alcohol Expenditure	Mean (sd) : 24 (54)	596 distinct values
[numeric]		min < med < max:	
		0 < 10 < 14000	
		IQR (CV) : 30 (2.2)	

C.1.2 Control Variables (All Waves)

Table C.3: Summary statistics for control variables (all waves).

Variable	Label	Stats / Values	Freqs (% of Valid)
gender	Gender	1. Female	250572 (54.4%)
[character]		2. Male	210028 (45.6%)
		3. Missing	4 (0.0%)
dvage	Age	Mean (sd) : 48.9 (18.1)	87 distinct values
[integer]		min < med < max:	
		18 < 48 < 104	
		IQR (CV) : 29 (0.4)	
marstat_dv	Marital status	1. Divorced/Dissol	29000 (6.3%)
[factor]		2. Living As Coupl	50836 (11.0%)
		3. Married/Civil P	248636 (54.0%)
		4. Missing	897 (0.2%)
		5. Never Married	94989 (20.6%)
		6. Separated (Incl	7990 (1.7%)
		7. Widowed/Survivi	28256 (6.1%)
health	Health	1. Excellent	69161 (15.0%)
[character]		2. Fair	67891 (14.7%)
		3. Good	134637 (29.2%)
		4. Missing	8667 (1.9%)
		5. Poor	29269 (6.4%)
		6. Very Good	150979 (32.8%)

Variable	Label	Stats / Values	Freqs (% of Valid)
qfhigh_dv	Highest Qualification	1. 1st Degree Or E	58001 (12.6%)
[character]		2. A Level	35082 (7.6%)
		3. As Level	5505 (1.2%)
		4. Cert 6th Year S	1120 (0.2%)
		5. Cse	13812 (3.0%)
		6. Diploma In He	26474 (5.7%)
		7. Gcse/O Level	80405 (17.5%)
		8. Higher Degree	42341 (9.2%)
		9. Highers (Scot)	4149 (0.9%)
		10. I'nationl Bacca	413 (0.1%)
		11. Inapplicable	64886 (14.1%)
		12. Missing	578 (0.1%)
		13. None Of The Abo	98107 (21.3%)
		14. Nursing/Other M	8054 (1.7%)
		15. Other Higher De	477 (0.1%)
		16. Other School Ce	9576 (2.1%)
		17. Standard/O/Lowe	5126 (1.1%)
		18. Teaching Qual N	6350 (1.4%)
		19. Welsh Baccalaur	148 (0.0%)
jbnssec8_dv	Socio-economic Classification	1. Higher Professi	22302 (4.8%)
[character]		2. Inapplicable	194506 (42.2%)
		3. Intermediate	35255 (7.7%)
		4. Large Employers	11798 (2.6%)
		5. Lower Managemen	74973 (16.3%)
		6. Lower Superviso	18905 (4.1%)
		7. Missing	5418 (1.2%)
		8. Routine	24924 (5.4%)
		9. Semi-Routine	45572 (9.9%)
		10. Small Employers	26951 (5.9%)

Variable	Label	Stats / Values	Freqs (% of Valid)
jbstat	Labour Market Status	1. Doing Something	2695 (0.6%)
[character]		2. Don't Know	69 (0.0%)
		3. Family Care Or	25754 (5.6%)
		4. Full-Time Stude	19498 (4.2%)
		5. Govt Training S	284 (0.1%)
		6. Lt Sick Or Disa	17007 (3.7%)
		7. Missing	36 (0.0%)
		8. On Apprenticesh	396 (0.1%)
		9. On Maternity Le	2629 (0.6%)
		10. Paid Employment	221824 (48.2%)
		11. Refused	199 (0.0%)
		12. Retired	110733 (24.0%)
		13. Self Employed	36720 (8.0%)
		14. Unemployed	22478 (4.9%)
		15. Unpaid, Family	282 (0.1%)
country	Country	1. England	361856 (78.6%)
[factor]		2. Missing	194 (0.0%)
		3. Northern Irelan	29048 (6.3%)
		4. Scotland	38435 (8.3%)
		5. Wales	31071 (6.7%)
gor_dv	Region	1. East Midlands	33480 (7.3%)
[character]		2. East Of England	38676 (8.4%)
		3. London	60585 (13.2%)
		4. Missing	194 (0.0%)
		5. North East	16711 (3.6%)
		6. North West	46221 (10.0%)
		7. Northern Irelan	29048 (6.3%)
		8. Scotland	38435 (8.3%)
		9. South East	53899 (11.7%)
		10. South West	35813 (7.8%)
		11. Wales	31071 (6.7%)
		12. West Midlands	38089 (8.3%)
		13. Yorkshire And T	38382 (8.3%)

Variable	Label	Stats / Values	Freqs (% of Valid)
ethn_dv	Ethnicity	1. African	10236 (2.2%)
[character]		2. Any Other Asian	5506 (1.2%)
		3. Any Other Black	906 (0.2%)
		4. Any Other Ethni	2054 (0.4%)
		5. Any Other Mixed	2048 (0.4%)
		6. Any Other White	14146 (3.1%)
		7. Arab	1492 (0.3%)
		8. Bangladeshi	8992 (2.0%)
		9. British/English	359032 (77.9%)
		10. Caribbean	8507 (1.8%)
		11. Chinese	2063 (0.4%)
		12. Gypsy Or Irish	124 (0.0%)
		13. Indian	17011 (3.7%)
		14. Irish	5471 (1.2%)
		15. Missing	2724 (0.6%)
		16. Pakistani	14596 (3.2%)
		17. White And Asian	1608 (0.3%)
		18. White And Black	1033 (0.2%)
		19. White And Black	3055 (0.7%)
fihhmnnet1_dv	Monthly total household net	Mean (sd) : 3218.3	164580 distinct
[numeric]	income - no deductions.	(5196.7)	values
		min < med < max:	
		-51971.5 < 2699 <	
		1556033	
		IQR (CV) : 2300.3 (1.6)	
wave	Survey Wave.	Mean (sd) : 5.5 (3.1)	1 : 49191 (10.7%)
[integer]		min < med < max:	2 : 52524 (11.4%)
		1 < 5 < 11	3 : 47989 (10.4%)
		IQR (CV) : 5 (0.6)	4 : 45468 (9.9%)
			5 : 43273 (9.4%)
			6 : 43691 (9.5%)
			7 : 40820 (8.9%)
			8 : 38098 (8.3%)
			9 : 34976 (7.6%)
			10 : 33351 (7.2%)
			11 : 31223 (6.8%)

C.2 Data Structure

C.2.1 Total Observations

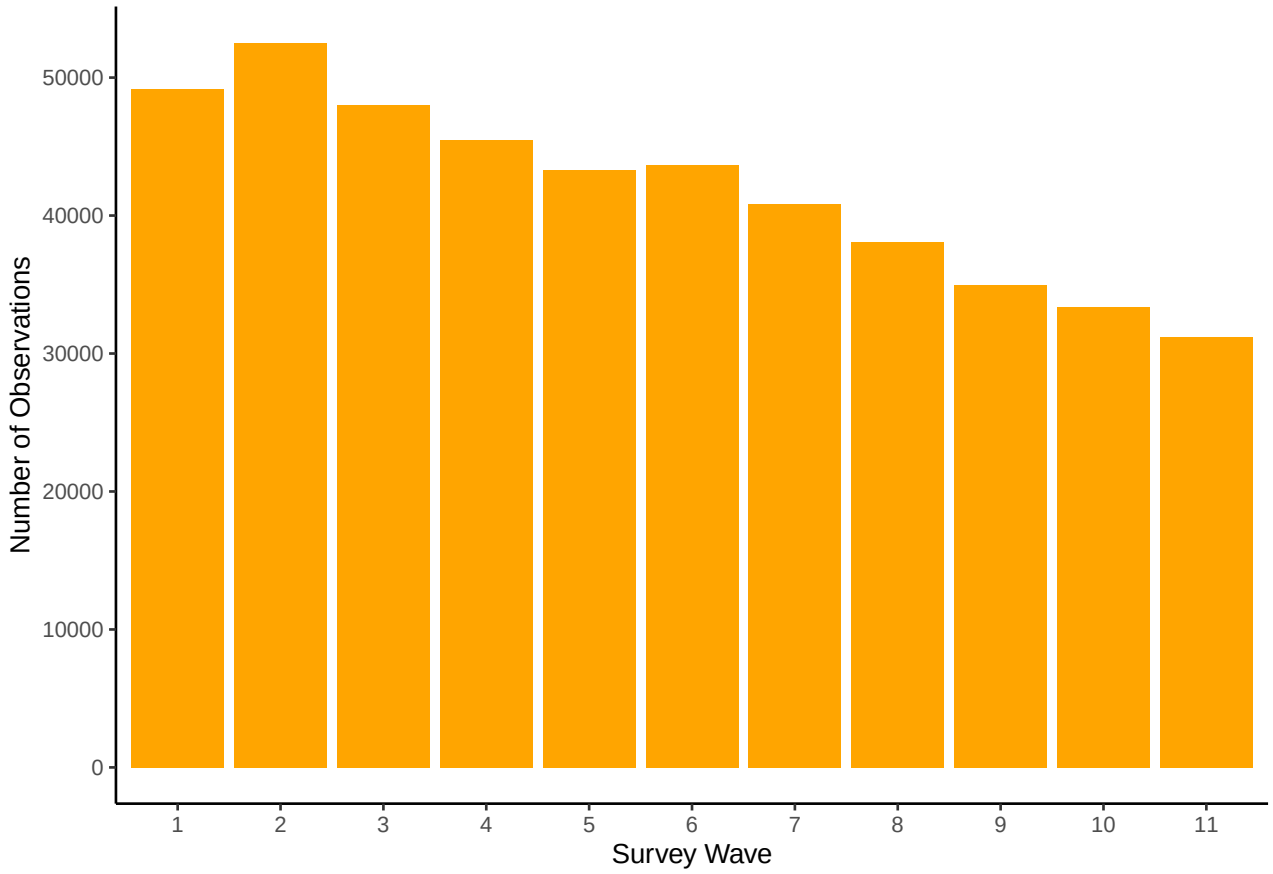

Figure C.1: Number of observations by wave.

C.2.2 Well-Being Measures

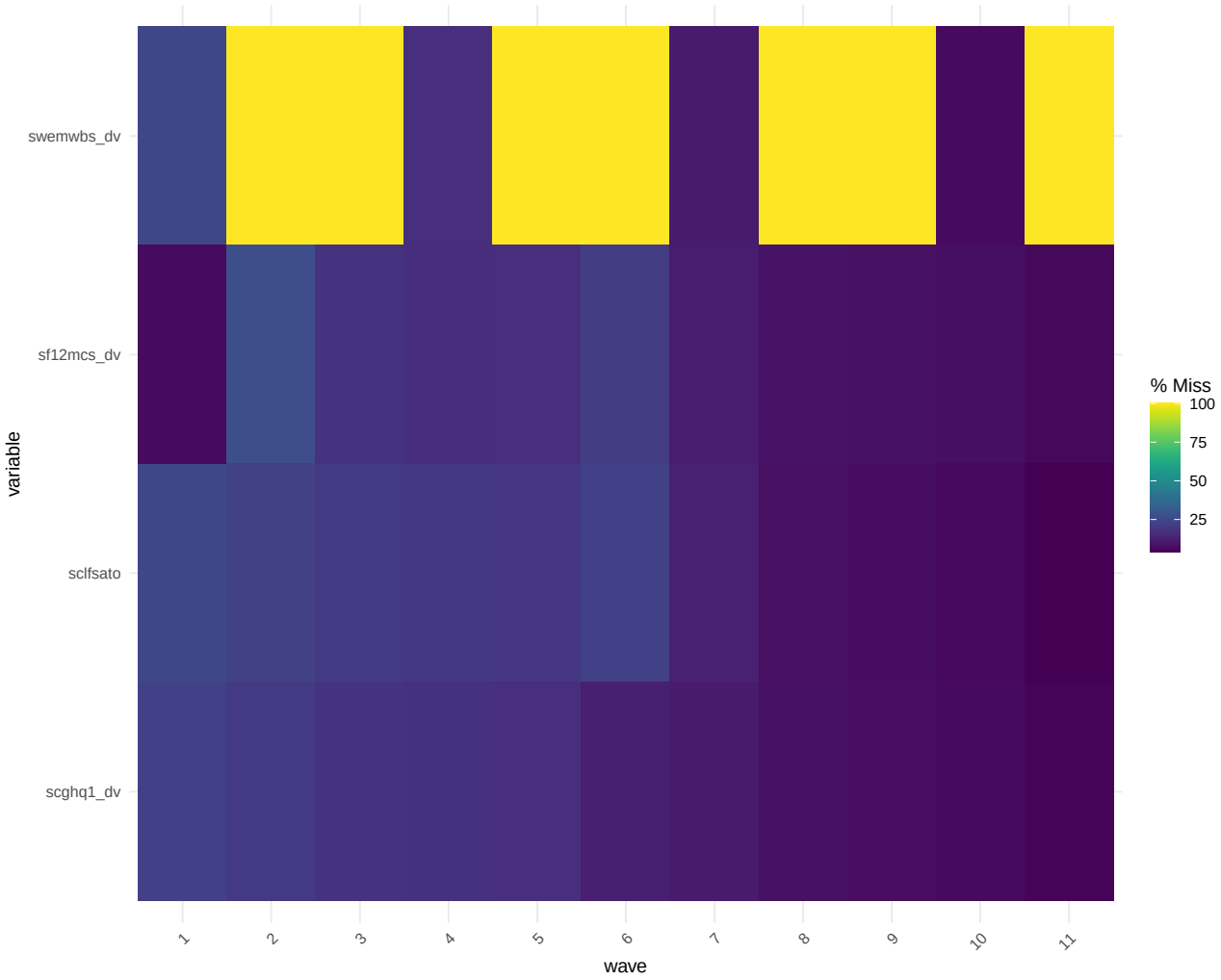

Figure C.2: Data structure of well-being measures by wave.

C.2.3 Alcohol Measures

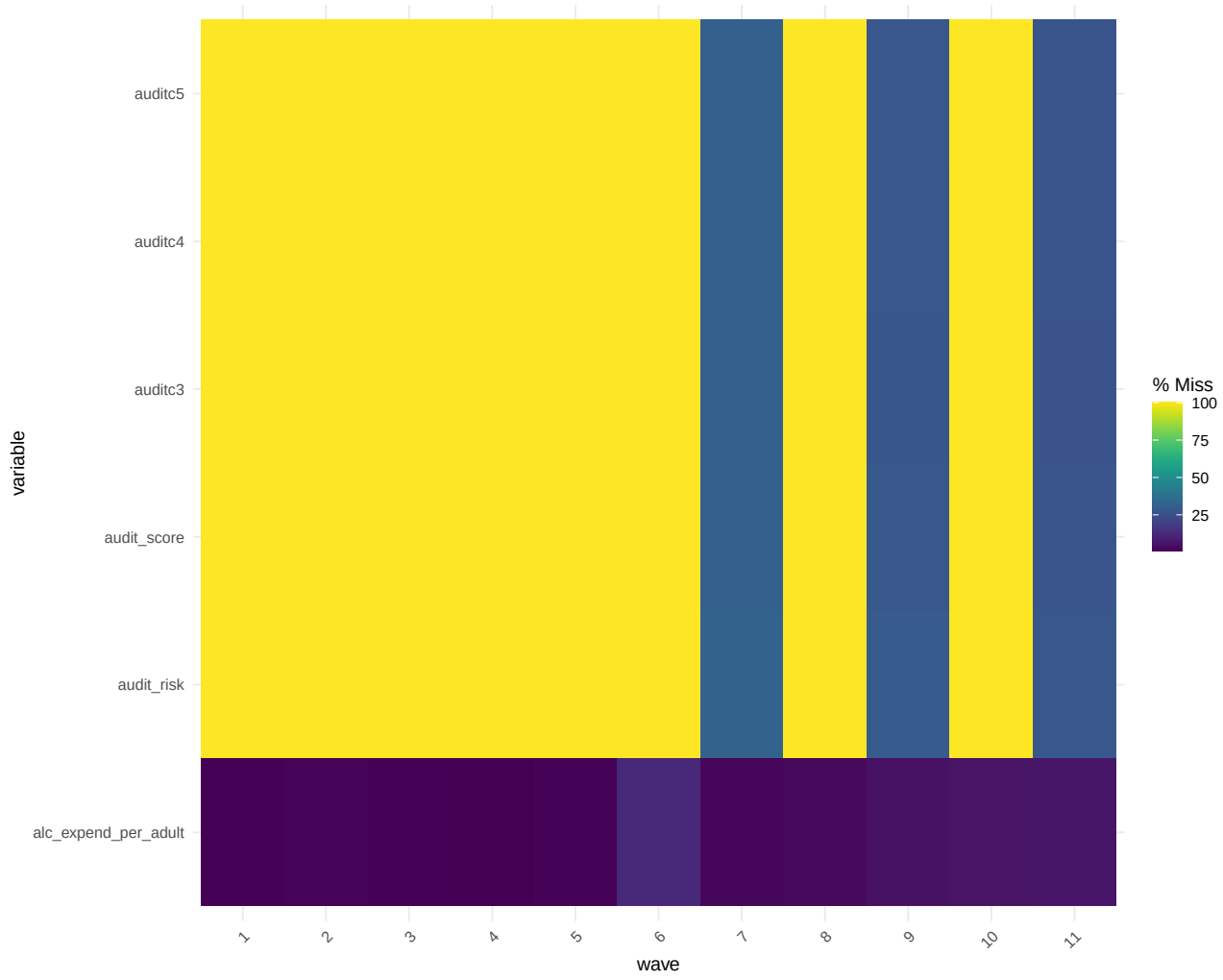

Figure C.3: Data structure of alcohol measures by wave.

C.3 Derived Variables

C.3.1 AUDIT-C Categories

```
# Deriving AUDIT-C Risk Categories
data <- data %>% mutate(audit_risk = case_when(
  audit_score >= 1 & audit_score <= 4 ~ "low risk",
  audit_score >= 5 & audit_score <= 7 ~ "increasing risk",
  audit_score >= 8 & audit_score <= 10 ~ "higher risk",
  audit_score >= 11 & audit_score <= 12 ~ "possible dependence",
))
```

C.3.2 Expenditure

```
# Household expenditure divided by number of adults.
data <- data %>% mutate(alc_expend_per_adult = xpaltob_g3 / (hhsize - nkids_dv))
```

C.3.3 Income Rank

```
data <- data %>%
  arrange(wave, desc(fihhmnnet1_dv)) %>%
  group_by(wave) %>%
  mutate(income_rank =  ((order(fihhmnnet1_dv, decreasing = F)) - 1) / (n() - 1))
```

Appendix D

Consumption and Time are Complementary Goods: Evidence from Life Satisfaction Data

D.1 Summary Statistics

D.1.1 Leisure and Consumption

Table D.1: Summary statistics for key variables.

Variable	Stats	Frequencies
leisure_hours [numeric]	Mean (Sd) : 12.8 (10.6) Min < Med < Max: 0 < 10 < 112 Iqr (Cv) : 13 (0.8)	66 distinct values
total_expenditure [numeric]	Mean (Sd) : 31916.2 (18129.3) Min < Med < Max: 616 < 28311.3 < 405768.7 Iqr (Cv) : 18417.9 (0.6)	10854 distinct values
working_hours [numeric]	Mean (Sd) : 42.2 (11.4) Min < Med < Max: 0 < 40 < 112 Iqr (Cv) : 5 (0.3)	89 distinct values

D.1.2 Well-Being Variables

Table D.2: Summary statistics for life satisfaction.

Variable	Stats / Values	Freqs (% of Valid)
life_sat	Mean (Sd) : 3.8 (0.8)	1 : 76 (0.7%)
[numeric]	Min < Med < Max:	2 : 278 (2.5%)
	1 < 4 < 5	3 : 3302 (29.3%)
	Iqr (Cv) : 1 (0.2)	4 : 5262 (46.7%)
		5 : 2352 (20.9%)

D.1.3 Control Variables

Table D.3: Summary statistics for control variables.

Variable	Stats / Values	Freqs (% of Valid)
marital_status	1. Married/Perm Cohabiting	5914 (52.3%)
[factor]	2. Single	3335 (29.5%)
	3. Divorced	1389 (12.3%)
	4. Separated	486 (4.3%)
	5. Widowed	177 (1.6%)
	6. Missing	1 (0.0%)
sex	1. Female	6438 (57.0%)
[factor]	2. Male	4864 (43.0%)
age	Mean (sd) : 40.8 (12.5)	68 distinct values
[numeric]	min < med < max:	
	18 < 38 < 87	
	IQR (CV) : 19 (0.3)	
education	1. Some College	3417 (30.2%)
[factor]	2. High School	3017 (26.7%)
	3. College Graduate	2212 (19.6%)
	4. Postgraduate	1967 (17.4%)
	5. Less Than High School	635 (5.6%)
	6. DK; NA	54 (0.5%)
health	1. Very Good	4276 (37.8%)
[factor]	2. Good	3888 (34.4%)
	3. Excellent	1792 (15.9%)
	4. Fair	1191 (10.5%)
	5. Poor	146 (1.3%)
	6. NA/Refused	9 (0.1%)

Variable	Stats / Values	Freqs (% of Valid)
state	1. California	980 (8.7%)
[factor]	2. Texas	799 (7.1%)
	3. North Carolina	640 (5.7%)
	4. Michigan	554 (4.9%)
	5. South Carolina	523 (4.6%)
	6. Florida	490 (4.3%)
	7. Georgia	464 (4.1%)
	8. Ohio	454 (4.0%)
	9. New York	423 (3.7%)
	10. Mississippi	422 (3.7%)
	[42 others]	5553 (49.1%)
children	Mean (sd) : 0.9 (1.2)	11 distinct values
[numeric]	min < med < max:	
	0 < 0 < 11	
	IQR (CV) : 2 (1.4)	
industry	1. Health Care and Social As	2076 (18.4%)
[factor]	2. Manufacturing	1286 (11.4%)
	3. Educational Services	985 (8.7%)
	4. Retail Trade	899 (8.0%)
	5. Accommodations and Food S	772 (6.8%)
	6. Public Administration and	720 (6.4%)
	7. Professional, Scientific,	642 (5.7%)
	8. Transportation and Wareho	611 (5.4%)
	9. Finance and Insurance	594 (5.3%)
	10. Construction	540 (4.8%)
	[10 others]	2177 (19.3%)
occupation	1. Chief Executives	2774 (24.6%)
[factor]	2. Office and Administrative	1010 (9.0%)
	3. Transportation and Materi	740 (6.6%)
	4. Management Occupations	689 (6.1%)
	5. Sales and Related Occupat	640 (5.7%)
	6. Production Occupations	584 (5.2%)
	7. Food Preparation and Serv	508 (4.5%)
	8. Business and Financial Op	446 (4.0%)
	9. Construction Trades and E	400 (3.5%)
	10. Education, Training, and	381 (3.4%)
	[16 others]	3103 (27.5%)

Variable	Stats / Values	Freqs (% of Valid)
race	1. White	6190 (54.8%)
[factor]	2. Black	4346 (38.5%)
	3. Other	436 (3.9%)
	4. Asian	170 (1.5%)
	5. Native	79 (0.7%)
	6. DK/NA/Refused	71 (0.6%)
ethnicity	1. National origin (e.g., Fr	7443 (65.9%)
[factor]	2. DK; NA	1275 (11.3%)
	3. Racial (e.g., white or Ca	1105 (9.8%)
	4. Hyphenated American (e.g.	945 (8.4%)
	5. American	294 (2.6%)
	6. Nonspecific Hispanic iden	114 (1.0%)
	7. Other	83 (0.7%)
	8. Religious (e.g., Jewish,	43 (0.4%)
nationality	1. Ethnic Identity not Natio	2914 (25.8%)
[factor]	2. African	2333 (20.6%)
	3. Western European	2242 (19.8%)
	4. British	1375 (12.2%)
	5. Central American	614 (5.4%)
	6. American (meaning U.S.)	475 (4.2%)
	7. Eastern European	388 (3.4%)
	8. Caribbean	204 (1.8%)
	9. Northern European/Scandin	201 (1.8%)
	10. American Indian, Eskimo,	165 (1.5%)
	[9 others]	391 (3.5%)
family_income	Mean (sd) : 89237.4 (88817.8)	5983 distinct values
[numeric]	min < med < max:	
	-73950 < 67846 < 2125100	
	IQR (CV) : 73950 (1)	
wealth	Mean (sd) : 195845.7 (866034)	4007 distinct values
[numeric]	min < med < max:	
	-11449000 < 30250 < 51794997	
	IQR (CV) : 149027.5 (4.4)	

Bibliography

Abeler, J. and Marklein, F. (2017). Fungibility, labels, and consumption. *Journal of the European Economic Association*, 15(1):99–127.

Abrams, K., Kushner, M., Medina, K. L., and Voight, A. (2001). The pharmacologic and expectancy effects of alcohol on social anxiety in individuals with social phobia. *Drug and Alcohol Dependence*, 64(2):219–231.

Acosta-González, H. N. and Marcenaro-Gutiérrez, O. D. (2022). What explains life satisfaction? Relative income or rank income? The case of Ecuador. *Applied Economics Letters*, 29(3):195–199.

Adler, M. D. (2013). Happiness surveys and public policy: What's the use? *Duke Law Journal*, 62(8):1509–1601.

Ahmed, S. (2007). The happiness turn. *New Formations*, 63:7–14.

Aldrovandi, S., Wood, A. M., Maltby, J., and Brown, G. D. A. (2015). Students' concern about indebtedness: A rank based social norms account. *Studies in Higher Education*, 40(7):1307–1327.

Alvey, J. E. (1998). Adam Smith's higher vision of capitalism. *Journal of Economic Issues*, 32(2):441–448.

American Psychiatric Association (2013). Schizophrenia spectrum and other psychotic disorders. In *Diagnostic and statistical manual of mental disorders (DSM-5)*. American Psychiatric Association, Arlington, TX, fifth edition.

Andersen, S. H. (2009). Unemployment and subjective well-being. *Work and Occupations*, 36(1):3–25.

Anderson, A. R. and Fowers, B. J. (2020). Lifestyle behaviors, psychological distress, and well-being: A daily diary study. *Social Science & Medicine*, 263:113263.

Anderson, C., Hildreth, J. A. D., and Howland, L. (2015). Is the desire for status a fundamental human motive? A review of the empirical literature. *Psychological Bulletin*, 141(3):574–601.

Ang, A., Papanikolaou, D., and Westerfield, M. M. (2014). Portfolio choice with illiquid assets. *Management Science*, 60(11):2737–2761.

Angrave, D. and Charlwood, A. (2015). What is the relationship between long working hours, over-employment, under-employment and the subjective well-being of workers? Longitudinal evidence from the UK. *Human Relations*, 68(9):1491–1515.

Ardahan, F. and Lapa, T. Y. (2010). Üniversite Öğrencilerinin serbest zaman tatmin düzeylerinin cinsiyete ve gelire göre incelenmesi (An examination of leisure satisfaction level of university students with regard to gender and income). *Spor Bilimleri Dergisi*, 21:129 – 136.

Assenza, T., Cardaci, A., and Delli Gatti, D. (2019). Perceived wealth, cognitive sophistication and behavioral inattention. Institute for Monetary and Financial Stability. IMFS Working Paper Series, No. 135.

Ateca-Amestoy, V. (2011). Leisure and subjective well-being. In Cameron, S., editor, *Handbook on the Economics of Leisure*, pages 52–76. Edward Elgar Publishing.

Ateca-Amestoy, V., del Rosal, R. S., and Vera-Toscano, E. (2008). The leisure experience. *The Journal of Socio-Economics*, 37(1):64–78.

Baber, H. E. (Baber2010). Worlds, capabilities and well-being. *Ethical Theory and Moral Practice*, 13(4):377–392.

Bagozzi, R. P., Wong, N., and Yi, Y. (1999). The role of culture and gender in the relationship between positive and negative affect. *Cognition & Emotion*, 13(6):641–672.

Balestrino, A. (2011). On economics, leisure and much more. In Cameron, S., editor, *Handbook of the Economics of Leisure*, chapter 2, pages 15–37. Edward Elgar, Cheltenham.

Bamberger, P. A., Koopmann, J., Wang, M., Larimer, M., Nahum-Shani, I., Geisner, I., and Bacharach, S. B. (2018). Does college alcohol consumption impact employment upon graduation? Findings from a prospective study. *Journal of Applied Psychology*, 103(1):111–121.

Barak, Y. (2006). The immune system and happiness. *Autoimmunity Reviews*, 5(8):523–527.

Barr, T., Helms, C., Grant, K., and Messaoudi, I. (2016). Opposing effects of alcohol on the immune system. *Progress in Neuro-Psychopharmacology and Biological Psychiatry*, 65:242–251.

Barsalou, L. W. (1983). Ad hoc categories. *Memory & Cognition*, 11(3):211–227.

Baumberg, B. (2006). The global economic burden of alcohol: A review and some suggestions. *Drug and Alcohol Review*, 25(6):537–551.

Baumberg Geiger, B. and MacKerron, G. (2016). Can alcohol make you happy? A subjective wellbeing approach. *Social Science & Medicine*, 156:184–191.

Bell, D. N. and Blanchflower, D. G. (2019). The well-being of the overemployed and the underemployed and the rise in depression in the UK. *Journal of Economic Behavior & Organization*, 161:180–196.

Bellezza, S., Paharia, N., and Keinan, A. (2017). Conspicuous consumption of time: When busyness and lack of leisure time become a status symbol. *Journal of Consumer Research*, 44:118–138.

Benartzi, S. and Thaler, R. H. (1995). Myopic loss aversion and the equity premium puzzle. *The Quarterly Journal of Economics*, 110(1):73–92.

Bjälkebring, P. and Peters, E. (2021). Money matters (especially if you are good at math): Numeracy, verbal intelligence, education, and income in satisfaction judgments. *PLOS ONE*, 16(11):e0259331.

Black, J., Hashimzade, N., and Myles, G. D. (2017). *A Dictionary of Economics*. Oxford University Press, Oxford.

Blanchflower, D. G. and Oswald, A. J. (2004). Well-being over time in Britain and the USA. *Journal of Public Economics*, 88(7-8):1359–1386.

Boden, J. M. and Fergusson, D. M. (2011). Alcohol and depression. *Addiction*, 106(5):906–914.

Boehm, J. K. (2018). The road to positive health: Behavioral and biological pathways linking positive psychological functioning with health outcomes. In Ryff, C. D. and Krueger, R. F., editors, *The Oxford Handbook of Integrative Health Science*. Oxford University Press, Oxford.

Boehm, J. K., Williams, D. R., Rimm, E. B., Ryff, C., and Kubzansky, L. D. (2013). Association between optimism and serum antioxidants in the midlife in the United States study. *Psychosomatic Medicine*, 75(1):2–10.

Boyce, C. J. (2010). Understanding fixed effects in human well-being. *Journal of Economic Psychology*, 31(1):1–16.

Boyce, C. J., Brown, G. D. A., and Moore, S. C. (2010). Money and happiness: Rank of income, not income, affects life satisfaction. *Psychological Science*, 21(4):471–475.

Boyce, C. J., Daly, M., Hounkpatin, H. O., and Wood, A. M. (2017). Money may buy happiness, but often so little that it doesn't matter. *Psychological Science*, 28(4):544–546.

Boyce, C. J., Wood, A. M., Banks, J., Clark, A. E., and Brown, G. D. A. (2013). Money, well-being, and loss aversion. *Psychological Science*, 24(12):2557–2562.

Breese, G. R., Sinha, R., and Heilig, M. (2011). Chronic alcohol neuroadaptation and stress contribute to susceptibility for alcohol craving and relapse. *Pharmacology & Therapeutics*, 129(2):149–171.

Breeze, J. (1998). Can paternalism be justified in mental health care? *Journal of Advanced Nursing*, 28(2):260–265.

Brouwer, P. J. S. D. (2009). Maslowian Portfolio Theory: An alternative formulation of the Behavioural Portfolio Theory. *Journal of Asset Management*, 9(6):359–365.

Brown, G. D. A., Gardner, J., Oswald, A. J., and Qian, J. (2008). Does wage rank affect employees' well-being? *Industrial Relations*, 47(3):355–389.

Brown, G. D. A. and Gathergood, J. (2020). Consumption changes, not income changes, predict changes in subjective well-being. *Social Psychological and Personality Science*, 11(1):64–73.

Brown, G. D. A., Gathergood, J., and Weber, J. (2017). Relative rank and life satisfaction: Evidence from US households. *SSRN Electronic Journal*.

Brulé, G. and Ravazzini, L. (2019). The four forms of wealth and happiness: How different forms of wealth affect the subjective well-being of the elderly in Europe. In Brulé, G. and Suter, C., editors, *Wealth(s) and Subjective Well-Being*, pages 199–219. Springer International Publishing, Basel, Switzerland.

Brulé, G. and Suter, C. (2019). Why wealth matters more than income for subjective well-being? In Brulé, G. and Suter, C., editors, *Wealth(s) and Subjective Well-Being*, pages 1–13. Springer International Publishing, Basel, Switzerland.

Bryan, G., Karlan, D., and Nelson, S. (2010). Commitment devices. *Annual Review of Economics*, 2(1):671–698.

Budria, S. (2012). Are relative-income effects constant across the well-being distribution? *Journal of Happiness Studies*, 14(4):1379–1408.

Bursztyn, L., Ferman, B., Fiorin, S., Kanz, M., and Rao, G. (2017). Status goods: Experimental evidence from platinum credit cards. *The Quarterly Journal of Economics*, 133(3):1561–1595.

Bush, B., Shaw, S., Cleary, P., Delbanco, T. L., and Aronson, M. D. (1987). Screening for alcohol abuse using the CAGE questionnaire. *The American Journal of Medicine*, 82(2):231–235.

Caetano, G., Palacios, M., and Patrinos, H. A. (2019). Measuring aversion to debt: An experiment among student loan candidates. *Journal of Family and Economic Issues*, 40(1):117–131.

Callender, C. and Jackson, J. (2005). Does the fear of debt deter students from higher education? *Journal of Social Policy*, 34(4):509–540.

Cantril, H. (1965). *The pattern of human concerns*. Rutgers University Press, New Brunswick, NJ.

Caprariello, P. A. and Reis, H. T. (2013). To do, to have, or to share? Valuing experiences over material possessions depends on the involvement of others. *Journal of Personality and Social Psychology*, 104(2):199–215.

Carel, H. (2019). Whose values? Whose reasons? A commentary on 'Rethinking disease: A fresh diagnosis and a new philosophical treatment' by Powell and Scarffe. *Journal of Medical Ethics*, 45(9):592–593.

Carroll, C. D. and Samwick, A. A. (1998). How important is precautionary saving? *Review of Economics and statistics*, 80(3):410–419.

Carroll, N., Frijters, P., and Shields, M. A. (2007). Quantifying the costs of drought: new evidence from life satisfaction data. *Journal of Population Economics*, 22(2):445–461.

Chadi, A. (2013a). The role of interviewer encounters in panel responses on life satisfaction. *Economics Letters*, 121(3):550–554.

Chadi, A. (2013b). Third person effects in interview responses on life satisfaction. *Schmollers Jahrbuch*, 133(2):323–333.

Chadi, A. (2019). Dissatisfied with life or with being interviewed? Happiness and the motivation to participate in a survey. *Social Choice and Welfare*, 53(3):519–553.

Chakhssi, F., Kraiss, J. T., Sommers-Spijkerman, M., and Bohlmeijer, E. T. (2018). The effect of positive psychology interventions on well-being and distress in clinical samples with psychiatric or somatic disorders: A systematic review and meta-analysis. *BMC Psychiatry*, 18(1).

Chastain, G. (2006). Alcohol, neurotransmitter systems, and behavior. *The Journal of General Psychology*, 133(4):329–335.

Cheng, T. C., Powdthavee, N., and Oswald, A. J. (2017). Longitudinal evidence for a midlife nadir in human well-being: Results from four data sets. *The Economic Journal*, 127(599):126–142.

Cheung, F. and Lucas, R. E. (2014). Assessing the validity of single-item life satisfaction measures: Results from three large samples. *Quality of Life Research*, 23(10):2809–2818.

Chi, P., Du, H., King, R. B., Zhou, N., Cao, H., and Lin, X. (2019). Well-being contagion in the family: Transmission of happiness and distress between parents and children. *Child Indicators Research*, 12(6):2189–2202.

Chida, Y. and Steptoe, A. (2008). Positive psychological well-being and mortality: A quantitative review of prospective observational studies. *Psychosomatic Medicine*, 70(7):741–756.

Chopik, W. J. and O'Brien, E. (2017). Happy you, healthy me? Having a happy partner is independently associated with better health in oneself. *Health Psychology*, 36(1):21–30.

Clark, A. (2016). SWB as a measure of individual well-being. In Adler, M. D. and Fleurbaey, M., editors, *The Oxford Handbook of Well-Being and Public Policy*. Oxford University Press, Oxford.

Clark, A. E., Kristensen, N., and Westergård-Nielsen, N. (2009). Economic satisfaction and income rank in small neighbourhoods. *Journal of the European Economic Association*, 7(2-3):519–527.

Clark, A. E. and Oswald, A. J. (1996). Satisfaction and comparison income. *Journal of Public Economics*, 61(3):359–381.

Clark, A. E. and Oswald, A. J. (2002). A simple statistical method for measuring how life events affect happiness. *International Journal of Epidemiology*, 31(6):1139–1144.

Collewet, M., de Grip, A., and de Koning, J. (2017). Conspicuous work: Peer working time, labour supply, and happiness. *Journal of Behavioral and Experimental Economics*, 68:79–90.

Collischon, M. and Eberl, A. (2021). The link between relative pay and job satisfaction revisited. *European Sociological Review*, 37(2):238–252.

Comtois, D. (2020). *summarytools: Tools to Quickly and Neatly Summarize Data*. R package version 0.9.6.

Craddock, N., Antebi, D., Attenburrow, M.-J., Bailey, A., Carson, A., Cowen, P., Craddock, B., Eagles, J., Ebmeier, K., Farmer, A., Fazel, S., Ferrier, N., Geddes, J., Goodwin, G., Harrison, P., Hawton, K., Hunter, S., Jacoby, R., Jones, I., Keedwell, P., Kerr, M., Mackin, P., McGuffin, P., MacIntyre, D. J., McConville, P., Mountain, D., O'Donovan, M. C., Owen, M. J., Oyebode, F., Phillips, M., Price, J., Shah, P., Smith, D. J., Walters, J., Woodruff, P., Young, A., and Zammit, S. (2008). Wake-up call for british psychiatry. *British Journal of Psychiatry*, 193(1):6–9.

Crisp, R. (2021). Well-Being. In Zalta, E. N., editor, *The Stanford Encyclopedia of Philosophy*. Metaphysics Research Lab, Stanford University, Winter 2021 edition.

Croissant, Y. and Millo, G. (2008). Panel data econometrics in R: The plm Package. *Journal of Statistical Software*, 27(2):1—43.

Crossley, T. F., de Bresser, J., Delaney, L., and Winter, J. (2017). Can survey participation alter household saving behaviour? *The Economic Journal*, 127(606):2332–2357.

Csikszentmihalyi, M. and Hunter, J. (2003). Happiness in everyday life: The uses of experience sampling. *Journal of Happiness Studies*, 4(2):185–199.

Dalingwater, L. (2019). Linking health and wellbeing in public discourse and policy: The case of the UK. *Interventions Économiques*, 62.

Daly, M., Boyce, C., and Wood, A. (2015). A social rank explanation of how money influences health. *Health Psychology*, 34(3):222–230.

de Bruijn, E.-J. and Antonides, G. (2021). Poverty and economic decision making: A review of scarcity theory. *Theory and Decision*, 92:5–37.

de Jong, W. J., Cleveringa, A. M., Greijdanus, B., Meyer, P., Heineman, E., and Hulscher, J. B. (2015). The effect of acute alcohol intoxication on gut wall integrity in healthy male volunteers: A randomized controlled trial. *Alcohol*, 49(1):65–70.

de Millas, W., Lambert, M., and Naber, D. (2006). The impact of subjective well-being under neuroleptic treatment on compliance and remission. *Dialogues in Clinical Neuroscience*, 8(1):131–136.

De Neve, J.-E., Clark, A. E., Krekel, C., Layard, R., and O'Donnell, G. (2020). Taking a wellbeing years approach to policy choice. *BMJ*, 371:m3853.

Deaton, A. and Stone, A. A. (2016). Understanding context effects for a measure of life evaluation: How responses matter. *Oxford Economic Papers*, 68(4):861–870.

DeLeire, T. and Kalil, A. (2010). Does consumption buy happiness? Evidence from the United States. *International Review of Economics*, 57(2):163–176.

Department for Business, I. and Skills (2010). Guidance on the regulations implementing the consumer credit directive.

Di Tella, R. and MacCulloch, R. (2010). Happiness adaptation to income beyond "basic needs". In Diener, E., Kahneman, D., and Helliwell, J., editors, *International Differences in Well-Being*, pages 217–246. Oxford University Press, Oxford.

Diener, E. (1984). Subjective well-being. *Psychological Bulletin*, 95(3):542–575.

Diener, E., Colvin, C. R., Pavot, W. G., and Allman, A. (1991). The psychic costs of intense positive affect. *Journal of Personality and Social Psychology*, 61(3):492–503.

Diener, E., Emmons, R. A., Larsen, R. J., and Griffin, S. (1985). The satisfaction with life scale. *Journal of Personality Assessment*, 49(1):71–75.

Diener, E., Lucas, R. E., and Oishi, S. (2018). Advances and open questions in the science of subjective well-being. *Collabra: Psychology*, 4(1):15.

Diener, E. and Seligman, M. E. (2002). Very happy people. *Psychological Science*, 13(1):81–84.

Diener, E. and Seligman, M. E. (2004). Beyond money. *Psychological Science in the Public Interest*, 5(1):1–31.

Diener, E., Wirtz, D., Tov, W., Kim-Prieto, C., won Choi, D., Oishi, S., and Biswas-Diener, R. (2009). New well-being measures: Short scales to assess flourishing and positive and negative feelings. *Social Indicators Research*, 97(2):143–156.

Disabato, D. J., Goodman, F. R., Kashdan, T. B., Short, J. L., and Jarden, A. (2016). Different types of well-being? A cross-cultural examination of hedonic and eudaimonic well-being. *Psychological Assessment*, 28(5):471–482.

Dockery, A. M. (2012). Deriving the labour supply curve from happiness data. *Economics Letters*, 117(3):898–900.

Dolan, P. and Kavetsos, G. (2016). Happy talk: Mode of administration effects on subjective well-being. *Journal of Happiness Studies*, 17(3):1273–1291.

Dolan, P. and Kudrna, L. (2016). Sentimental hedonism: Pleasure, purpose, and public policy. In Vittersø, J., editor, *Handbook of Eudaimonic Well-Being*, pages 437–452. Springer International Publishing.

Dolan, P. and Metcalfe, R. (2012). Measuring subjective wellbeing: Recommendations on measures for use by national governments. *Journal of Social Policy*, 41(2):409–427.

Dolan, P., Peasgood, T., and White, M. (2008). Do we really know what makes us happy? A review of the economic literature on the factors associated with subjective well-being. *Journal of Economic Psychology*, 29(1):94–122.

Duckworth, A. L., Steen, T. A., and Seligman, M. E. (2005). Positive psychology in clinical practice. *Annual Review of Clinical Psychology*, 1(1):629–651.

Duesenberry, J. S. (1949). *Income, Saving and the Theory of Consumer Behaviour*. Harvard University Press, Cambridge.

Dumitrescu, E.-I. and Hurlin, C. (2012). Testing for Granger non-causality in heterogeneous panels. *Economic Modelling*, 29(4):1450–1460.

Dunbar, R. I. M., Launay, J., Wlodarski, R., Robertson, C., Pearce, E., Carney, J., and MacCarron, P. (2017). Functional benefits of (modest) alcohol consumption. *Adaptive Human Behavior and Physiology*, 3(2):118–133.

Duncan, G. (2014). Politics, paradoxes and pragmatics of happiness. *Culture, Theory and Critique*, 55(1):79–95.

Dunn, E. W., Whillans, A. V., Norton, M. I., and Aknin, L. B. (2020). Prosocial spending and buying time: Money as a tool for increasing subjective well-being. In *Advances in Experimental Social Psychology*, volume 61, pages 67–126. Academic Press, San Diego, CA.

Easterlin, R. A. (1974). Does economic growth improve the human lot? Some empirical evidence. In David, P. A. and Reder, M. W., editors, *Nations and Households in Economic Growth*, pages 89–125. Elsevier.

Easterlin, R. A. (2001). Income and happiness: Towards a unified theory. *The Economic Journal*, 111(473):465–484.

Edgeworth, F. Y. (1881). *Mathematical Psychics: An Essay on the Application of Mathematics to the Moral Sciences*. C. Kegan Paul & Co, London.

Edwards, J. M. and Pellé, S. (2011). Capabilities for the miserable; happiness for the satisfied. *Journal of the History of Economic Thought*, 33(3):335–355.

Ehrenreich, B. (2010). *Smile or Die*. Granta Books, London, England.

Enos, G. (2020). COVID-19 experience reinforces theory that negative emotions drive alcohol use. *Alcoholism & Drug Abuse Weekly*, 32(43):1–8.

Epper, T., Fehr, E., Fehr-Duda, H., Kreiner, C. T., Lassen, D. D., Leth-Petersen, S., and Rasmussen, G. N. (2020). Time discounting and wealth inequality. *American Economic Review*, 110(4):1177–1205.

Eriksson, L., Rice, J. M., and Goodin, R. E. (2006). Temporal aspects of life satisfaction. *Social Indicators Research*, 80(3):511–533.

Esteve, R., Martin, J. S., and Lopez, A. E. (1999). Grasping the meaning of leisure: Developing a self-report measurement tool. *Leisure Studies*, 18(2):79–91.

Etkin, J. and Mogilner, C. (2016). Does variety among activities increase happiness? *Journal of Consumer Research*, 43(2):210–229.

Fadda, D., Scalas, L. F., Meleddu, M., and Morin, A. J. (2017). A bifactor-ESEM representation of the questionnaire for eudaimonic wellbeing. *Personality and Individual Differences*, 116:216–222.

Fan, D., Liu, L., Xia, Q., Wang, W., Wu, S., Tian, G., Liu, Y., Ni, J., Wu, S., Guo, X., and Liu, Z. (2017). Female alcohol consumption and fecundability: A systematic review and dose-response meta-analysis. *Scientific Reports*, 7(1).

Ferrer-i-Carbonell, A. and Frijters, P. (2004). How important is methodology for the estimates of the determinants of happiness? *The Economic Journal*, 114(497):641–659.

Field, M. and Cox, W. (2008). Attentional bias in addictive behaviors: A review of its development, causes, and consequences. *Drug and Alcohol Dependence*, 97(1-2):1–20.

Finnis, J. (2011). *Natural law and natural rights*. Clarendon Law Series. Oxford University Press, London, second edition.

Fisher, I. (1891). *Mathematical Investigations in the Theory of Value and Prices*. PhD thesis, Yale University.

Fisher, P. (2019). Does repeated measurement improve income data quality? *Oxford Bulletin of Economics and Statistics*, 81(5):989–1011.

FitzRoy, F. R. and Nolan, M. A. (2021). Income status and life satisfaction. *Journal of Happiness Studies*, 23(1):233–256.

Fletcher, G. (2015). Objective list theories. In Fletcher, G., editor, *The Routledge Handbook of Philosophy of Well-Being*, pages 164–176. Routledge, London.

Forgas, J. P. (2013). Don't worry, be sad! On the cognitive, motivational, and interpersonal benefits of negative mood. *Current Directions in Psychological Science*, 22(3):225–232.

Forgas, J. P. (2014). On the downside of feeling good. In Gruber, J. and Moskowitz, J. T., editors, *Positive Emotion*, pages 301–322. Oxford University Press, Oxford.

Fowler, J. H. and Christakis, N. A. (2008). Dynamic spread of happiness in a large social network: longitudinal analysis over 20 years in the Framingham Heart Study. *BMJ*, 337:a2338.

Foye, C., Clapham, D., and Gabrieli, T. (2018). Home-ownership as a social norm and positional good: Subjective wellbeing evidence from panel data. *Urban Studies*, 55(6):1290–1312.

Frankham, C., Richardson, T., and Maguire, N. (2020). Psychological factors associated with financial hardship and mental health: A systematic review. *Clinical Psychology Review*, 77:101832.

Franzen, A. (2006). Social networks and labour market outcomes: The non-monetary benefits of social capital. *European Sociological Review*, 22(4):353–368.

Frawley, A. (2015). Happiness research: A review of critiques. *Sociology Compass*, 9(1):62–77.

Frey, B. S., Luechinger, S., and Stutzer, A. (2008). The life satisfaction approach to valuing public goods: The case of terrorism. *Public Choice*, 138(3-4):317–345.

Frey, B. S., Luechinger, S., and Stutzer, A. (2010). The life satisfaction approach to environmental valuation. *Annual Review of Resource Economics*, 2(1):139–160.

Frey, B. S. and Stutzer, A. (2012). The use of happiness research for public policy. *Social Choice and Welfare*, 38(4):659–674.

Frijters, P., Clark, A. E., Krekel, C., and Layard, R. (2020). A happy choice: Wellbeing as the goal of government. *Behavioural Public Policy*, 4(2):126–165.

Frijters, P. and Leigh, A. (2008). Materialism on the march: From conspicuous leisure to conspicuous consumption? *The Journal of Socio-Economics*, 37(5):1937–1945.

Fromm, E. (1959). Values, psychology and human existence. In Maslow, A. H., editor, *New Knowledge in Human Values*. Harper & Row, New York.

Fulford, K. W., Broome, M., Stanghellini, G., and Thornton, T. (2005). Looking with both eyes open: Fact and value in psychiatric diagnosis? *World Psychiatry*, 4(2):78–86.

Garland, E. L., Fredrickson, B., Kring, A. M., Johnson, D. P., Meyer, P. S., and Penn, D. L. (2010). Upward spirals of positive emotions counter downward spirals of negativity: Insights from the broaden-and-build theory and affective neuroscience on the treatment of emotion dysfunctions and deficits in psychopathology. *Clinical Psychology Review*, 30(7):849–864.

Garratt, E. A., Chandola, T., Purdam, K., and Wood, A. M. (2016). The interactive role of income (material position) and income rank (psychosocial position) in psychological distress: A 9-year longitudinal study of 30,000 UK parents. *Social Psychiatry and Psychiatric Epidemiology*, 51(10):1361–1372.

Gathergood, J. (2012). Debt and depression: Causal links and social norm effects. *The Economic Journal*, 122(563):1094–1114.

Gathergood, J. and Weber, J. (2014). Self-control, financial literacy & the co-holding puzzle. *Journal of Economic Behavior & Organization*, 107(B):455–469.

Giancola, P. R. and Zeichner, A. (1997). The biphasic effects of alcohol on human physical aggression. *Journal of Abnormal Psychology*, 106(4):598–607.

Gilligan, C., Anderson, K. G., Ladd, B. O., Yong, Y. M., and David, M. (2019). Inaccuracies in survey reporting of alcohol consumption. *BMC Public Health*, 19(1):1639.

Gilovich, T., Kumar, A., and Jampol, L. (2015). A wonderful life: Experiential consumption and the pursuit of happiness. *Journal of Consumer Psychology*, 25(1):152–165.

Giurge, L. M., Yemiscigil, A., Sherlock, J., and Whillans, A. V. (2020). Uncovering inequalities in time-use and well-being during COVID-19: A multi-country investigation. Working Paper.

Gokdemir, O. (2015). Consumption, savings and life satisfaction: the Turkish case. *International Review of Economics*, 62(2):183–196.

Goldberg, D. (1972). *The detection of psychiatric illness by questionnaire; a technique for the identification and assessment of non-psychotic psychiatric illness*. Oxford University Press, London.

González-Cutre, D., Sicilia, Á., Sierra, A. C., Ferriz, R., and Hagger, M. S. (2016). Understanding the need for novelty from the perspective of self-determination theory. *Personality and Individual Differences*, 102:159–169.

Goodman, F. R., Disabato, D. J., Kashdan, T. B., and Kauffman, S. B. (2017). Measuring well-being: A comparison of subjective well-being and PERMA. *The Journal of Positive Psychology*, 13(4):321–332.

Goodman, F. R., Stiksma, M. C., and Kashdan, T. B. (2018). Social anxiety and the quality of everyday social interactions: The moderating influence of alcohol consumption. *Behavior Therapy*, 49(3):373–387.

Gorbachev, O. and Luengo-Prado, M. J. (2019). The credit card debt puzzle: The role of preferences, credit access risk, and financial literacy. *Review of Economics and Statistics*, 101(2):294–309.

Gorka, S. M., Hedeker, D., Piasecki, T. M., and Mermelstein, R. (2017). Impact of alcohol use motives and internalizing symptoms on mood changes in response to drinking: An ecological momentary assessment investigation. *Drug and Alcohol Dependence*, 173:31–38.

Graham, C. (2017). Who believes in the American Dream? Public attitudes about mobility in the United States and beyond. In *Happiness for All?*, pages 42–75. Princeton University Press.

Graham, C. and Nikolova, M. (2013). Does access to information technology make people happier? Insights from well-being surveys from around the world. *The Journal of Socio-Economics*, 44:126–139.

Gravelle, H. and Sutton, M. (2009). Income, relative income, and self-reported health in Britain 1979-2000. *Health Economics*, 18(2):125–145.

Greenberg, A. E. and Mogilner, C. (2021). Consumer debt and satisfaction in life. *Journal of Experimental Psychology: Applied*, 27(1):57–68.

Griffin, J. (1988). *Well-Being*. Oxford University Press, Oxford.

Gross, D. B. and Souleles, N. S. (2002). Do liquidity constraints and interest rates matter for consumer behavior? Evidence from credit card data. *The Quarterly journal of economics*, 117(1):149–185.

Guillen-Royo, M., Velazco, J., and Camfield, L. (2013). Basic needs and wealth as independent determinants of happiness: An illustration from Thailand. *Social Indicators Research*, 110(2):517–536.

Gutjahr, E. and Gmel, G. (2001). The social costs of alcohol consumption. In Klingemann, H. and Gmel, G., editors, *Mapping the Social Consequences of Alcohol Consumption*, pages 133–143. Springer Netherlands, Dordrecht, Netherlands.

Ha, J. Y. and Smith, A. C. (2019). Legal access to alcohol and academic performance: Who is affected? *Economics of Education Review*, 72:19–22.

Halpern-Manners, A., Warren, J. R., and Torche, F. (2017). Panel conditioning in the General Social Survey. *Sociological Methods & Research*, 46(1):103–124.

Harsanyi, J. (1977). Rule utilitarianism and decision theory. *Erkenntnis*, 11(1):25–53.

Hastings, J. S. and Shapiro, J. M. (2013). Fungibility and consumer choice: Evidence from commodity price shocks. *The quarterly journal of economics*, 128(4):1449–1498.

Haushofer, J. (2019). Is there a psychological poverty trap?

Haushofer, J. and Fehr, E. (2014). On the psychology of poverty. *Science*, 344(6186):862–867.

Haybron, D. (2008a). *The Pursuit of Unhappiness: The Elusive Psychology of Well-Being*. Oxford University Press, Oxford.

Haybron, D. M. (2005). On being happy or unhappy. *Philosophy and Phenomenological Research*, 71(2):287–317.

Haybron, D. M. (2008b). Philosophy and the science of subjective well-being. In Eid, M. and Larsen, R. J., editors, *The science of subjective well-being*, page 17–43. Guilford Press., London.

Haybron, D. M. (2016). Mental state approaches to well-being. In Adler, M. D. and Fleurbaey, M., editors, *The Oxford Handbook of Well-Being and Public Policy*. Oxford University Press, Oxford.

Haybron, D. M. and Tiberius, V. (2015). Well-being policy: What standard of well-being? *Journal of the American Philosophical Association*, 1(4):712–733.

Headey, B., Kelley, J., and Wearing, A. (1993). Dimensions of mental health: Life satisfaction, positive affect, anxiety and depression. *Social Indicators Research*, 29(1):63–82.

Headey, B., Muffels, R., and Wooden, M. (2007). Money does not buy happiness: Or does it? A reassessment based on the combined effects of wealth, income and consumption. *Social Indicators Research*, 87(1):65–82.

Headey, B. and Wooden, M. (2004). The effects of wealth and income on subjective well-being and ill-being. *Economic Record*, 80(s1):S24–S33.

Headey, B. and Wooden, M. (2005). The importance of wealth for subjective well-being. *Journal of Financial Transformation*, 15:59–67.

Heath, C. and Soll, J. B. (1996). Mental budgeting and consumer decisions. *Journal of Consumer Research*, 23(1):40.

Heffetz, O. and Rabin, M. (2013). Conclusions regarding cross-group differences in happiness depend on difficulty of reaching respondents. *American Economic Review*, 103(7):3001–3021.

Heilig, M., Egli, M., Crabbe, J. C., and Becker, H. C. (2010). Acute withdrawal, protracted abstinence and negative affect in alcoholism: Are they linked? *Addiction Biology*, 15(2):169–184.

Held, B. S. (2002). The tyranny of the positive attitude in America: Observation and speculation. *Journal of Clinical Psychology*, 58(9):965–991.

Hetschko, C. (2016). On the misery of losing self-employment. *Small Business Economics*, 47(2):461–478.

Hicks, J. R. and Allen, R. G. D. (1934). A reconsideration of the theory of value. part I. *Economica*, 1(1):52.

Hindriks, F. and Douven, I. (2017). Nozick's experience machine: An empirical study. *Philosophical Psychology*, 31(2):278–298.

Hone, L. C., Jarden, A., Schofield, G. M., and Duncan, S. (2014). Measuring flourishing: The impact of operational definitions on the prevalence of high levels of wellbeing. *International Journal of Wellbeing*, 4(1):62–90.

Hounkpatin, H. O., Wood, A. M., and Brown, G. D. A. (2020). Comparing indices of relative deprivation using behavioural evidence. *Social Science & Medicine*, 259:112914.

Hounkpatin, H. O., Wood, A. M., Brown, G. D. A., and Dunn, G. (2015). Why does income relate to depressive symptoms? Testing the income rank hypothesis longitudinally. *Social Indicators Research*, 124(2):637–655.

Howell, R. T. and Hill, G. (2009). The mediators of experiential purchases: Determining the impact of psychological needs satisfaction and social comparison. *The Journal of Positive Psychology*, 4(6):511–522.

Hu, X., Barber, L. K., and Santuzzi, A. M. (2021). Does active leisure improve worker well-being? An experimental daily diary approach. *Journal of Happiness Studies*, 22(5):2003–2029.

Hu, Y., Stewart-Brown, S., Twigg, L., and Weich, S. (2007). Can the 12-item General Health Questionnaire be used to measure positive mental health? *Psychological Medicine*, 37(7):1005–1013.

Huang, L. and Shi, H. (2015). Keeping up with the Joneses: From conspicuous consumption to conspicuous leisure? *Oxford Economic Papers*, 67(4):949–962.

Huppert, F. A. (2009a). A new approach to reducing disorder and improving well-being. *Perspectives on Psychological Science*, 4(1):108–111.

Huppert, F. A. (2009b). Psychological well-being: Evidence regarding its causes and consequences. *Applied Psychology: Health and Well-Being*, 1(2):137–164.

Hurka, T. (1999). The three faces of flourishing. *Social Philosophy and Policy*, 16(1):44–71.

Hurka, T. (2016). Objective goods. In Adler, M. D. and Fleurbaey, M., editors, *The Oxford Handbook of Well-Being and Public Policy*. Oxford University Press, Oxford.

Hyman, H. H. (1942). *The Psychology of Status*. Phd thesis, Columbia University.

Iasiello, M., van Agteren, J., Schotanus-Dijkstra, M., Lo, L., Fassnacht, D. B., and Westerhof, G. J. (2022). Assessing mental wellbeing using the mental health continuum—short form: A systematic review and meta-analytic structural equation modelling. *Clinical Psychology: Science and Practice*.

Infurna, F. J. and Luthar, S. S. (2017). The multidimensional nature of resilience to spousal loss. *Journal of Personality and Social Psychology*, 112(6):926–947.

Ito, M., Matsuzaki, N., and Kawahara, J. (2018). Measurement of mood states following light alcohol consumption: Evidence from the implicit association test. *Behavioral Sciences*, 8(9):79.

James, W. (1902). *The Varieties of Religious Experience*. Longman Green, New York.

Jantsch, A. and Veenhoven, R. (2019). Private wealth and happiness. In Brulé, G. and Suter, C., editors, *Wealth(s) and Subjective Well-Being*, pages 17–50. Springer International Publishing, Basel, Switzerland.

Jenkinson, C. and Layte, R. (1997). Development and testing of the UK SF-12. *Journal of Health Services Research & Policy*, 2(1):14–18.

Jeste, D. V., Palmer, B. W., Rettew, D. C., and Boardman, S. (2015). Positive psychiatry: Its time has come. *The Journal of Clinical Psychiatry*, 76(06):675–683.

Jevons, W. S. (1871). *The Theory of Political Economy*. Macmillan and Co, London.

Jones, A., Crawford, J., Rose, A., Christiansen, P., and Cooke, R. (2020). Regret me not: Examining the relationship between alcohol consumption and regrettable experiences. *Substance Use & Misuse*, 55(14):2379–2388.

Jones, B. A. (2017). Are we underestimating the economic costs of wildfire smoke? An investigation using the life satisfaction approach. *Journal of Forest Economics*, 27:80–90.

Joseph, S. and Wood, A. (2010). Assessment of positive functioning in clinical psychology: Theoretical and practical issues. *Clinical Psychology Review*, 30(7):830–838.

Jovanović, V. (2015a). A bifactor model of subjective well-being: A re-examination of the structure of subjective well-being. *Personality and Individual Differences*, 87:45–49.

Jovanović, V. (2015b). Structural validity of the Mental Health Continuum-Short Form: The bifactor model of emotional, social and psychological well-being. *Personality and Individual Differences*, 75:154–159.

Kader, H. (2021). Human well-being, morality and the economy: An Islamic perspective. *Islamic Economic Studies*, 28(2):102–123.

Kageyama, J. (2012). Happiness and sex difference in life expectancy. *Journal of Happiness Studies*, 13(5):947–967.

Kahneman, D. and Deaton, A. (2010). High income improves evaluation of life but not emotional well-being. *Proceedings of the National Academy of Sciences*, 107(38):16489–16493.

Kahneman, D., Krueger, A. B., Schkade, D. A., Schwarz, N., and Stone, A. A. (2004). A survey method for characterizing daily life experience: The day reconstruction method. *Science*, 306(5702):1776–1780.

Kahneman, D. and Sugden, R. (2005). Experienced utility as a standard of policy evaluation. *Environmental and Resource Economics*, 32(1):161–181.

Kahneman, D. and Thaler, R. H. (2006). Anomalies: Utility maximization and experienced utility. *Journal of Economic Perspectives*, 20(1):221–234.

Kahneman, D. and Tversky, A. (1979). Prospect theory: An analysis of decision under risk. *Econometrica*, 47(2):263.

Kahneman, D. and Tversky, A. (1984). Choices, values, and frames. *American Psychologist*, 39(4):341–350.

Kahneman, D., Wakker, P. P., and Sarin, R. (1997). Back to Bentham? Explorations of experienced utility. *The Quarterly Journal of Economics*, 112(2):375–406.

Kaiser, C. and Oswald, A. J. (2022). The scientific value of numerical measures of human feelings. *Proceedings of the National Academy of Sciences*, 119(42):e2210412119.

Kansky, J., Allen, J. P., and Diener, E. (2016). Early adolescent affect predicts later life outcomes. *Applied Psychology: Health and Well-Being*, 8(2):192–212.

Karlsson, H., Persson, E., Perini, I., Yngve, A., Heilig, M., and Tinghög, G. (2022). Acute effects of alcohol on social and personal decision making. *Neuropsychopharmacology*, 47(4):824–831.

Kashdan, T. B., Biswas-Diener, R., and King, L. A. (2008). Reconsidering happiness: The costs of distinguishing between hedonics and eudaimonia. *The Journal of Positive Psychology*, 3(4):219–233.

Katschnig, H. (1997). How useful is the concept of quality of life in psychiatry? *Current Opinion in Psychiatry*, 10(5):337–345.

Katschnig, H. and Krautgartner, M. (2002). Quality of life: A new dimension in mental health care. In Sartorius, N., Gaebel, W., López-Ibor, J. J., and Maj, M., editors, *Psychiatry in Society*, pages 171–192. John Wiley & Sons, Ltd, Chichester.

Kaur, S., Mullainathan, S., Oh, S., and Schilbach, F. (2021). Does financial strain lower productivity? National Bureau of Economic Research. Working Paper 28338.

Kaya, S. (2016). The relationship between leisure satisfaction and happiness among college students. *Universal Journal of Educational Research*, 4(3):622–631.

Kessler, R. C., Andrews, G., Colpe, L. J., Hiripi, E., Mroczek, D. K., Normand, S. L. T., Walters, E. E., and Zaslavsky, A. M. (2002). Short screening scales to monitor population prevalences and trends in non-specific psychological distress. *Psychological Medicine*, 32(6):959–976.

Keyes, C. L. M. (2002). The mental health continuum: From languishing to flourishing in life. *Journal of Health and Social Behavior*, 43(2):207–222.

Keyes, C. L. M. (2005). Mental illness and/or mental health? Investigating axioms of the complete state model of health. *Journal of Consulting and Clinical Psychology*, 73(3):539–548.

Keyes, C. L. M., Shmotkin, D., and Ryff, C. D. (2002). Optimizing well-being: The empirical encounter of two traditions. *Journal of Personality and Social Psychology*, 82(6):1007–1022.

Kiefer, F. and Wiedemann, K. (2004). Neuroendocrine pathways of addictive behaviour. *Addiction Biology*, 9(3-4):205–212.

Kifle, T. (2014). Do comparison wages play a major role in determining overall job satisfaction? Evidence from Australia. *Journal of Happiness Studies*, 15(3):613–638.

Killingsworth, M. A. (2021). Experienced well-being rises with income, even above $75,000 per year. *Proceedings of the National Academy of Sciences*, 118(4):e2016976118.

Knight, J. and Gunatilaka, R. (2017). Is happiness infectious? *Scottish Journal of Political Economy*, 64(1):1–24.

Koob, G. F., Powell, P., and White, A. (2020). Addiction as a coping response: Hyperkatifeia, deaths of despair, and COVID-19. *American Journal of Psychiatry*, 177(11):1031–1037.

Krueger, A. B. and Mueller, A. I. (2012). Time use, emotional well-being, and unemployment: Evidence from longitudinal data. *American Economic Review*, 102(3):594–599.

Kuehnle, D. and Wunder, C. (2015). Using the life satisfaction approach to value daylight savings time transitions: Evidence from Britain and Germany. *Journal of Happiness Studies*, 17(6):2293–2323.

Kullenberg, C. and Nelhans, G. (2015). The happiness turn? Mapping the emergence of "happiness studies" using cited references. *Scientometrics*, 103(2):615–630.

Kuykendall, L., Lei, X., Zhu, Z., and Hu, X. (2020). Leisure choices and employee well-being: Comparing need fulfillment and well-being during TV and other leisure activities. *Applied Psychology: Health and Well-Being*, 12(2):532–558.

Kuznets, S. (1934). National income, 1929–1932. S. Doc. 124, 73rd Cong., 2d sess.

Lac, A. and Berger, D. E. (2013). Development and validation of the alcohol myopia scale. *Psychological Assessment*, 25(3):738–747.

Lac, A. and Donaldson, C. D. (2016). Alcohol attitudes, motives, norms, and personality traits longitudinally classify nondrinkers, moderate drinkers, and binge drinkers using discriminant function analysis. *Addictive Behaviors*, 61:91–98.

Lai, H. M. X., Cleary, M., Sitharthan, T., and Hunt, G. E. (2015). Prevalence of comorbid substance use, anxiety and mood disorders in epidemiological surveys, 1990–2014: A systematic review and meta-analysis. *Drug and Alcohol Dependence*, 154:1–13.

Lakshmanasamy, T. and Maya, K. (2020). Rank status and happiness in India: A panel ordered probit estimation of the effect of ordinal relative comparison on well-being. *Indian Journal of Health and Wellbeing*, 11(1-3):48–56.

Lamborn, P., Cramer, K. M., and Riberdy, A. (2018). The structural validity and measurement invariance of the Mental Health Continuum – Short Form (MHC-SF) in a large Canadian sample. *Journal of Well-Being Assessment*, 2(1):1–19.

Lang, G. and Bachinger, A. (2017). Validation of the German Warwick-Edinburgh Mental Well-Being Scale (WEMWBS) in a community-based sample of adults in Austria: a bi-factor modelling approach. *Journal of Public Health*, 25(2):135–146.

Lao, Y., Hou, L., Li, J., Hui, X., Yan, P., and Yang, K. (2020). Association between alcohol intake, mild cognitive impairment and progression to dementia: a dose–response meta-analysis. *Aging Clinical and Experimental Research*, 33(5):1175–1185.

Lapa, T. Y. (2013). Life satisfaction, leisure satisfaction and perceived freedom of park recreation participants. *Procedia - Social and Behavioral Sciences*, 93:1985–1993.

Lapuz, J. and Griffiths, M. D. (2010). The role of chips in poker gambling: An empirical pilot study. *Gambling Research: Journal of the National Association for Gambling Studies (Australia)*, 22(1):34–39.

Layard, R. (1980). Human satisfactions and public policy. *The Economic Journal*, 90(360):737–750.

Lea, S. E. G. and Webley, P. (2006). Money as tool, money as drug: The biological psychology of a strong incentive. *Behavioral and Brain Sciences*, 29(2):161–209.

Lee, S. S., Yu, K., Choi, E., and Choi, I. (2022). To drink, or to exercise: That is (not) the question! Daily effects of alcohol consumption and exercise on well-being. *Applied Psychology: Health and Well-Being*, 14(2):555–571.

Leiser, D. and Shemesh, Y. (2018). *How We Misunderstand Economics and Why It Matters : The Psychology of Bias, Distortion and Conspiracy*. Routledge, Abingdon.

Leonard, K. E. and Rothbard, J. C. (1999). Alcohol and the marriage effect. *Journal of Studies on Alcohol, Supplement*, s13:139–146.

Lerner, J. S., Small, D. A., and Loewenstein, G. (2004). Heart strings and purse strings. carryover effects of emotions on economic decisions. *Psychological Science*, 15(5):337–341.

Levav, J. and Mcgraw, A. P. (2009). Emotional accounting: How feelings about money influence consumer choice. *Journal of Marketing Research*, 46(1):66–80.

Levin, L. (1998). Are assets fungible? *Journal of Economic Behavior & Organization*, 36(1):59–83.

Li, J., Wang, H., Li, M., Shen, Q., Li, X., Zhang, Y., Peng, J., Rong, X., and Peng, Y. (2020). Effect of alcohol use disorders and alcohol intake on the risk of subsequent depressive symptoms: A systematic review and meta-analysis of cohort studies. *Addiction*, 115(7):1224–1243.

Li, M. and Chapman, G. B. (2013). A big fish or a small pond? Framing effects in percentages. *Organizational Behavior and Human Decision Processes*, 122(2):190–199.

Linder, S. (1970). *The Harried Leisure Class*. Columbia University Press, New York.

Lindqvist, E., Östling, R., and Cesarini, D. (2020). Long-run effects of lottery wealth on psychological well-being. *The Review of Economic Studies*, 87(6):2703–2726.

Lisi, G. (2018). Job satisfaction, job match quality and labour supply decisions. *International Review of Economics*, 65(4):489–505.

Loewenstein, G. and Issacharoff, S. (1994). Source dependence in the valuation of objects. *Journal of Behavioral Decision Making*, 7(3):157–168.

Longo, Y., Coyne, I., and Joseph, S. (2017). The scales of general well-being (SGWB). *Personality and Individual Differences*, 109:148–159.

Longo, Y., Coyne, I., Joseph, S., and Gustavsson, P. (2016). Support for a general factor of well-being. *Personality and Individual Differences*, 100:68–72.

Longo, Y., Jovanović, V., de Carvalho, J. S., and Karaś, D. (2020). The general factor of well-being: Multinational evidence using bifactor ESEM on the Mental Health Continuum–Short Form. *Assessment*, 27(3):596–606.

Ludwig, V. and Brüderl, J. (2018). Is there a male marital wage premium? New evidence from the United States. *American Sociological Review*, 83(4):744–770.

Luechinger, S. (2009). Valuing air quality using the life satisfaction approach. *The Economic Journal*, 119(536):482–515.

Luechinger, S. and Raschky, P. A. (2009). Valuing flood disasters using the life satisfaction approach. *Journal of Public Economics*, 93(3-4):620–633.

Luhmann, M., Lucas, R. E., Eid, M., and Diener, E. (2012). The prospective effect of life satisfaction on life events. *Social Psychological and Personality Science*, 4(1):39–45.

Lui, P. P. and Fernando, G. A. (2018). Development and initial validation of a multidimensional scale assessing subjective well-being: The well-being scale (WeBS). *Psychological Reports*, 121(1):135–160.

Lyubomirsky, S., King, L., and Diener, E. (2005). The benefits of frequent positive affect: Does happiness lead to success? *Psychological Bulletin*, 131(6):803–855.

Macchia, L., Plagnol, A. C., and Powdthavee, N. (2020). Buying happiness in an unequal world: Rank of income more strongly predicts well-being in more unequal countries. *Personality and Social Psychology Bulletin*, 46(5):769–780.

MacKerron, G. (2012). Happiness Economics From 35,000 Feet. *Journal of Economic Surveys*, 26(4):705–735.

MacKillop, J. (2016). The behavioral economics and neuroeconomics of alcohol use disorders. *Alcoholism: Clinical and Experimental Research*, 40(4):672–685.

Mani, A., Mullainathan, S., Shafir, E., and Zhao, J. (2013). Poverty impedes cognitive function. *Science*, 341(6149):976–980.

Martin, C. S., Earleywine, M., Musty, R. E., Perrine, M. W., and Swift, R. M. (1993). Development and validation of the biphasic alcohol effects scale. *Alcoholism: Clinical and Experimental Research*, 17(1):140–146.

Martínez-Marquina, A. and Shi, M. (2021). The burden of household debt.

Maslow, A. H. (1943). A theory of human motivation. *Psychological Review*, 50(4):370–396.

Maslow, A. H. (1954). Toward a positive psychology. In Maslow, A. H., Frager, R., and Fadiman, J., editors, *Motivation and Personality*. Harper & Row, New York.

Massin, S. and Kopp, P. (2014). Is life satisfaction hump-shaped with alcohol consumption? Evidence from Russian panel data. *Addictive Behaviors*, 39(4):803–810.

Matte, J., Fachinelli, A. C., Toni, D. D., Milan, G. S., and Olea, P. M. (2021). Relationship between leisure involvement, voluntary simplicity, leisure satisfaction, and experiential consumption. *Leisure Sciences*.

McDonald, M. and O'Callaghan, J. (2008). Positive psychology: A Foucauldian critique. *The Humanistic Psychologist*, 36(2):127–142.

McGraw, A. P., Tetlock, P. E., and Kristel, O. V. (2003). The limits of fungibility: Relational schemata and the value of things. *Journal of Consumer Research*, 30(2):219–229.

McMahon, D. M. (2004). The history of happiness, 400 b.c.–a.d. 1780. *Dædalus*, 133(2):5–17.

Meissner, T. (2016). Intertemporal consumption and debt aversion: An experimental study. *Experimental Economics*, 19(2):281–298.

Merrill, J. E. and Read, J. P. (2010). Motivational pathways to unique types of alcohol consequences. *Psychology of Addictive Behaviors*, 24(4):705–711.

Merton, R. K. and Kitt, A. S. (1950). Contributions to the theory of reference group behavior. In Merton, R. K. and Lazarsfeld, P. F., editors, *Continuities in Social Research: Studies in the Scope and Method of the American Soldier*, pages 40–105. Free Press, Glencoe.

Miller, K. G., Wright, A. G., Peterson, L. M., Kamarck, T. W., Anderson, B. A., Kirschbaum, C., Marsland, A. L., Muldoon, M. F., and Manuck, S. B. (2016). Trait positive and negative emotionality differentially associate with diurnal cortisol activity. *Psychoneuroendocrinology*, 68:177–185.

Millo, G. (2017). Robust standard error estimators for panel models: A unifying approach. *Journal of Statistical Software*, 82(3):1–27.

Mishan, E. J. (1960). A survey of welfare economics, 1939-59. *The Economic Journal*, 70(278):197—-265.

Misselbrook, D. (2014). W is for Wellbeing and the WHO definition of health. *British Journal of General Practice*, 64(628):582–582.

Mitchell, P. and Alexandrova, A. (2021). Well-being and pluralism. *Journal of Happiness Studies*, 22(6):2411–2433.

Miyamoto, Y. and Ryff, C. D. (2010). Cultural differences in the dialectical and non-dialectical emotional styles and their implications for health. *Cognition and Emotion*, 25(1):22–39.

Monahan, J. and Lannutti, P. (2000). Alcohol as social lubricant.. *Human Communication Research*, 26(2):175–202.

Moreno, K. K. and Zhang, Y. M. (2021). The impact of the big fish effect on investor reactions to financial and nonfinancial disclosure. *Journal of Behavioral Finance*, 22(2):113–125.

Morewedge, C. K., Holtzman, L., and Epley, N. (2007). Unfixed resources: Perceived costs, consumption, and the accessible account effect. *Journal of Consumer Research*, 34(4):459–467.

Morozink, J. A., Friedman, E. M., Coe, C. L., and Ryff, C. D. (2010). Socioeconomic and psychosocial predictors of Interleukin-6 in the MIDUS national sample. *Health Psychology*, 29(6):626–635.

Mujcic, R. and Frijters, P. (2013). Economic choices and status: Measuring preferences for income rank. *Oxford Economic Papers*, 65(1):47–73.

Murphy, M. (2001). *Natural Law and Practical Rationality*. Cambridge University Press, Cambridge.

Murray, C. J. L. et al. (2020). Global burden of 87 risk factors in 204 countries and territories, 1990–2019: A systematic analysis for the global burden of disease study 2019. *The Lancet*, 396(10258):1223–1249.

Musikanski, L. (2013). Happiness in public policy. *Journal of Social Change*, 6(1):55–85.

Naguib, C. (2020). The influence of individual income ranks on job satisfaction: A dynamic perspective. *SSRN Electronic Journal*.

Nikolaev, B. (2018). Does higher education increase hedonic and eudaimonic happiness? *Journal of Happiness Studies*, 19:483–504.

Nikolaou, D. (2019). Sex, drugs, alcohol and subjective well-being: Selection or causation? *Kyklos*, 72(1):76–117.

Nikolova, M. and Graham, C. (2021). The economics of happiness. In Zimmermann, K. F., editor, *Handbook of Labor, Human Resources and Population Economics*, pages 1–33. Springer International Publishing.

Nozick, R. (1974). *Anarchy, State, and Utopia*. Basic Books, New York.

Nussbaum, M. C. (2012). Who is the happy warrior? Philosophy, happiness research, and public policy. *International Review of Economics*, 59(4):335–361.

Office for National Statistics (2018). Adult drinking habits in great britain: 2017.

Office for National Statistics (2018). Surveys using our four personal well-being questions.

Office for National Statistics (2019). Wealth and assets survey user guide round 6.

Office For National Statistics, Social Survey Division (2020). Wealth and assets survey, waves 1-5 and rounds 5-6, 2006-2018.

Oishi, S., Diener, E., and Lucas, R. E. (2007). The optimum level of well-being: Can people be too happy? *Perspectives on Psychological Science*, 2(4):346–360.

Okulicz-Kozaryn, A. (2010). Europeans work to live and Americans live to work (who is happy to work more: Americans or Europeans?). *Journal of Happiness Studies*, 12(2):225–243.

Oman, S. (2016). Measuring national wellbeing: What matters to you? What matters to whom? In White, S. C. and Blackmore, C., editors, *Cultures of Wellbeing*, pages 66–94. Palgrave Macmillan UK, London.

Ong, A. D., Benson, L., Zautra, A. J., and Ram, N. (2018). Emodiversity and biomarkers of inflammation. *Emotion*, 18(1):3–14.

Oswald, A. J. and Powdthavee, N. (2008). Does happiness adapt? A longitudinal study of disability with implications for economists and judges. *Journal of Public Economics*, 92(5-6):1061–1077.

Parducci, A. (1965). Category judgment: A range-frequency model. *Psychological Review*, 72(6):407–418.

Parfit, D. (1986). *Reasons and Persons*. Oxford University Press, Oxford.

Parks, A. C. and Titova, L. (2016). Positive psychological interventions. In Wood, A. M. and Johnson, J., editors, *The Wiley Handbook of Positive Clinical Psychology*, pages 305–320. John Wiley & Sons, Ltd, Nashville, TN.

Patrick, M. E. (2016). A call for research on high-intensity alcohol use. *Alcoholism: Clinical and Experimental Research*, 40(2):256–259.

Petry, N. M. (2001). Delay discounting of money and alcohol in actively using alcoholics, currently abstinent alcoholics, and controls. *Psychopharmacology*, 154(3):243–250.

Pfaff, T. (2013). Income comparisons, income adaptation, and life satisfaction: How robust are estimates from survey data? *SSRN Electronic Journal*.

Piccinelli, M., Bisoffi, G., Bon, M. G., Cunico, L., and Tansella, M. (1993). Validity and test-retest reliability of the italian version of the 12-item general health questionnaire in general practice: A comparison between three scoring methods. *Comprehensive Psychiatry*, 34(3):198–205.

Pierce, J. L., Kostova, T., and Dirks, K. T. (2001). Toward a theory of psychological ownership in organizations. *The Academy of Management Review*, 26(2):298.

Plug, E. J. S. and van Praag, B. M. S. (1995). Family equivalence scales with a narrow and broad welfare context. *Journal of Income Distribution*, 4(2):171–186.

Polachek, S. W. and Kim, M.-K. (1994). Panel estimates of the gender earnings gap. *Journal of Econometrics*, 61(1):23–42.

Polak, M. A. and Conner, T. S. (2012). Impairments in daily functioning after heavy and extreme episodic drinking in university students. *Drug and Alcohol Review*, 31(6):763–769.

Pomerance, J. N. (2020). *Two Essays Toward a Conceptual Framework for the Pain of Paying*. PhD thesis, University of Colorado.

Popovici, I. and French, M. T. (2013). Does unemployment lead to greater alcohol consumption? *Industrial Relations: A Journal of Economy and Society*, 52(2):444–466.

Pouwels, B., Siegers, J., and Vlasblom, J. D. (2008). Income, working hours, and happiness. *Economics Letters*, 99(1):72–74.

Powdthavee, N. (2005). Unhappiness and crime: Evidence from South Africa. *Economica*, 72(287):531–547.

Powdthavee, N. and van den Berg, B. (2011). Putting different price tags on the same health condition: Re-evaluating the well-being valuation approach. *Journal of Health Economics*, 30(5):1032–1043.

Powell, R. and Scarffe, E. (2019). 'Rethinking "disease": A fresh diagnosis and a new philosophical treatment'. *Journal of Medical Ethics*, 45(9):579–588.

Praag, B. M. S. V. and Baarsma, B. E. (2004). Using happiness surveys to value intangibles: The case of airport noise. *The Economic Journal*, 115(500):224–246.

Prati, A. (2017). Hedonic recall bias. Why you should not ask people how much they earn. *Journal of Economic Behavior & Organization*, 143:78–97.

Prelec, D. and Simester, D. (2001). Always leave home without it: A further investigation of the credit-card effect on willingness to pay. *Marketing Letters*, 12(1):5–12.

Pugno, M. (2014). Capability and happiness: A suggested integration from a dynamic perspective. *Journal of Happiness Studies*, 16(6):1383–1399.

Pugno, M. (2017). Scitovsky meets Sen: endogenising the dynamics of capability. *Cambridge Journal of Economics*, 41:1177—-1196.

R Core Team (2020). *R: A Language and Environment for Statistical Computing*. R Foundation for Statistical Computing, Vienna, Austria.

Radloff, L. S. (1977). The CES-D scale. *Applied Psychological Measurement*, 1(3):385–401.

Raes, F., Smets, J., Nelis, S., and Schoofs, H. (2012). Dampening of positive affect prospectively predicts depressive symptoms in non-clinical samples. *Cognition & Emotion*, 26(1):75–82.

Rasmussen, D. C. (2006). Does "bettering our condition" really make us better off? Adam Smith on progress and happiness. *American Political Science Review*, 100(3):309–318.

Rawls, J. (1971). *A Theory of Justice*. The Belknap Press of Harvard University Press, Cambridge, Massachusetts.

Rehm, J., Gmel, G. E., Gmel, G., Hasan, O. S. M., Imtiaz, S., Popova, S., Probst, C., Roerecke, M., Room, R., Samokhvalov, A. V., Shield, K. D., and Shuper, P. A. (2017). The relationship between different dimensions of alcohol use and the burden of disease—an update. *Addiction*, 112(6):968–1001.

Ridley, M., Rao, G., Schilbach, F., and Patel, V. (2020). Poverty, depression, and anxiety: Causal evidence and mechanisms. Technical report, National Bureau of Economic Research.

Ried, L. D., Tueth, M. J., Handberg, E., and Nyanteh, H. (2006). Validating a self-report measure of global subjective well-being to predict adverse clinical outcomes. *Quality of Life Research*, 15(4):675–686.

Roache, R. and Savulescu, J. (2018). Psychological disadvantage and a welfarist approach to psychiatry. *Philosophy, Psychiatry, & Psychology*, 25(4):245–259.

Robbins, L. (1932). *An Essay on the Nature and Significance of Economic Science*. Macmillian and Co, London.

Rohsenow, D. J., Howland, J., Arnedt, J. T., Almeida, A. B., Greece, J., Minsky, S., Kempler, C. S., and Sales, S. (2010). Intoxication with Bourbon versus Vodka: Effects on hangover, sleep, and next-day neurocognitive performance in young adults. *Alcoholism: Clinical and Experimental Research*, 34(3):509–518.

Rojas, M. (2019). The relevance of Richard A. Easterlin's groundbreaking work. a historical perspective. In Rojas, M., editor, *The Economics of Happiness*, pages 3–24. Springer International Publishing, Cham, Switzerland.

Romeo, J., Wärnberg, J., Nova, E., Díaz, L. E., Gómez-Martinez, S., and Marcos, A. (2007). Moderate alcohol consumption and the immune system: A review. *British Journal of Nutrition*, 98(S1):S111–S115.

Ronayne, D. and Brown, G. D. (2017). Multi-attribute decision by sampling: An account of the attraction, compromise and similarity effects. *Journal of Mathematical Psychology*, 81:11–27.

Rozin, P. and Royzman, E. B. (2001). Negativity bias, negativity dominance, and contagion. *Personality and Social Psychology Review*, 5(4):296–320.

Ruberton, P. M., Gladstone, J., and Lyubomirsky, S. (2016). How your bank balance buys happiness: The importance of "cash on hand" to life satisfaction. *Emotion*, 16(5):575–580.

Ruini, C. and Ryff, C. D. (2016). Using eudaimonic well-being to improve lives. In Wood, A. M. and Johnson, J., editors, *The Wiley Handbook of Positive Clinical Psychology*, pages 153–166. John Wiley & Sons, Ltd, Nashville, TN.

Rusk, R. D. and Waters, L. E. (2013). Tracing the size, reach, impact, and breadth of positive psychology. *The Journal of Positive Psychology*, 8(3):207–221.

Russell, J. A. and Carroll, J. M. (1999). On the bipolarity of positive and negative affect. *Psychological Bulletin*, 125(1):3–30.

Rüttenauer, T. and Ludwig, V. (2020). Fixed effects individual slopes: Accounting and testing for heterogeneous effects in panel data or other multilevel models. *Sociological Methods & Research*.

Ryff, C. D. (1989). Happiness is everything, or is it? Explorations on the meaning of psychological well-being. *Journal of Personality and Social Psychology*, 57(6):1069–1081.

Ryff, C. D. (2014). Psychological well-being revisited: Advance in the science and practice of eudaimonia. *Psychotherapy and Psychosomatics*, 83(1):10–28.

Ryff, C. D. and Boylan, J. M. (2016). Linking happiness to health: Comparisons between hedonic and eudaimonic well-being. In Bruni, L. and Porta, P. L., editors, *Handbook of Research Methods and Applications in Happiness and Quality of Life*, pages 54–70. Edward Elgar Publishing., Cheltenham.

Ryff, C. D., Boylan, J. M., and Kirsch, J. A. (2021). Eudaimonic and hedonic well-being. In Lee, M. T., Kubzansky, L. D., and VanderWeele, T. J., editors, *Measuring Well-Being*, pages 92–135. Oxford University Press, Oxford.

Ryff, C. D. and Keyes, C. L. M. (1995). The structure of psychological well-being revisited. *Journal of Personality and Social Psychology*, 69(4):719–727.

Ryff, C. D., Love, G. D., Urry, H. L., Muller, D., Rosenkranz, M. A., Friedman, E. M., Davidson, R. J., and Singer, B. (2006). Psychological well-being and ill-being: Do they have distinct or mirrored biological correlates? *Psychotherapy and Psychosomatics*, 75(2):85–95.

Saffer, H. and Dave, D. (2006). Alcohol advertising and alcohol consumption by adolescents. *Health Economics*, 15(6):617–637.

Samokhvalov, A. V., Popova, S., Room, R., Ramonas, M., and Rehm, J. (2010). Disability associated with alcohol abuse and dependence. *Alcoholism: Clinical and Experimental Research*, 34(11):1871–1878.

Samuelson, P. (1947). *Foundations of Economic Analysis*. Economic Studies. Harvard University Press, London.

Sarkar, D., Jung, M. K., and Wang, H. J. (2015). Alcohol and the immune system. *Alcohol Research: Current Reviews*, 37(2):153—-155.

Sayette, M. A. (2017). The effects of alcohol on emotion in social drinkers. *Behaviour Research and Therapy*, 88:76–89.

Sayette, M. A., Creswell, K. G., Fairbairn, C. E., Dimoff, J. D., Bentley, K., and Lazerus, T. (2019). The effects of alcohol on positive emotion during a comedy routine: A facial coding analysis. *Emotion*, 19(3):480–488.

Scanlon, T. M. (1986). The status of well-being. The Tanner Lectures on Human Values 7.

Schilbach, F., Schofield, H., and Mullainathan, S. (2016). The psychological lives of the poor. *American Economic Review*, 106(5):435–440.

Schmiedeberg, C. and Schröder, J. (2017). Leisure activities and life satisfaction: an analysis with German panel data. *Applied Research in Quality of Life*, 12(1):137–151.

Schrieks, I. C., Stafleu, A., Kallen, V. L., Grootjen, M., Witkamp, R. F., and Hendriks, H. F. J. (2014). The biphasic effects of moderate alcohol consumption with a meal on ambiance-induced mood and autonomic nervous system balance: A randomized crossover trial. *PLoS ONE*, 9(1):e86199.

Scitovsky, T. (1973). Notes on the producer society. *De Economist*, 121(3):225–250.

Scitovsky, T. (1976). *The Joyless Economy: An Inquiry into Human Satisfaction and Consumer Dissatisfaction*. Oxford University Press, New York.

Scott, D. (2017). Why Veblen matters: The role of status seeking in contemporary leisure. In Spracklen, K., Lashua, B., Sharpe, E., and Swain, S., editors, *The Palgrave Handbook of Leisure Theory*, pages 385–399. Palgrave Macmillan UK, Basingstoke.

Searle, M. S. and Jackson, E. L. (1985). Socioeconomic variations in perceived barriers to recreation participation among would-be participants. *Leisure Sciences*, 7(2):227–249.

Seligman, M. (2011). *Flourish*. Nicholas Brealey Publishing, London.

Seligman, M. (2018). PERMA and the building blocks of well-being. *The Journal of Positive Psychology*, 13(4):333–335.

Seligman, M. E. P. and Csikszentmihalyi, M. (2000). Positive psychology: An introduction. *American Psychologist*, 55(1):5–14.

Sen, A. (1983). Poor, relatively speaking. *Oxford Economic Papers*, 35(2):153–169.

Sen, A. (1984). *Resources, values & development*. Harvard University Press, London.

Sen, A. (1985). Well-being, agency and freedom: The Dewey Lectures 1984. *The Journal of Philosophy*, 82(4):169–221.

Sen, A. (1993). Capability and well-being. In Nussbaum, M. and Sen, A., editors, *The Quality of Life*, pages 30–53. Oxford University Press, Oxford.

Sen, A. (1999). *Development as Freedom*. Oxford University Press, New York.

Senik, C. (2014). Wealth and happiness. *Oxford Review of Economic Policy*, 30(1):92–108.

Shah, A. K., Mullainathan, S., and Shafir, E. (2012). Some consequences of having too little. *Science*, 338(6107):682–685.

Shaper, A., Wannamethee, G., and Walker, M. (1988). Alcohol and mortality in British men: Explaining the u-shaped curve. *The Lancet*, 332(8623):1267–1273.

Sharma, E., Tully, S., and Cryder, C. (2021). Psychological ownership of (borrowed) money. *Journal of Marketing Research*, 58(3):497–514.

Shaw, S. M. (1985). The meaning of leisure in everyday life. *Leisure Sciences*, 7(1):1–24.

Shaw, S. M., Bonen, A., and McCabe, J. F. (1991). Do more constraints mean less leisure? Examining the relationship between constraints and participation. *Journal of Leisure Research*, 23(4):286–300.

Shefrin, H. M. and Statman, M. (2000). Behavioral portfolio theory. *The Journal of Financial and Quantitative Analysis*, 35(2):127–151.

Shefrin, H. M. and Thaler, R. H. (1988). The behavioral life-cycle hypothesis. *Economic Inquiry*, 26(4):609–643.

Shiffman, S., Stone, A. A., and Hufford, M. R. (2008). Ecological momentary assessment. *Annual Review of Clinical Psychology*, 4(1):1–32.

Shin, J. and Ariely, D. (2004). Keeping doors open: The effect of unavailability on incentives to keep options viable. *Management Science*, 50(5):575–586.

Shiota, M. N., Papies, E. K., Preston, S. D., and Sauter, D. A. (2021). Positive affect and behavior change. *Current Opinion in Behavioral Sciences*, 39:222–228.

Shores, K. A., Scott, D., and Floyd, M. F. (2007). Constraints to outdoor recreation: A multiple hierarchy stratification perspective. *Leisure Sciences*, 29(3):227–246.

Shurman, J., Koob, G. F., and Gutstein, H. B. (2010). Opioids, pain, the brain, and hyperkatifeia: A framework for the rational use of opioids for pain. *Pain Medicine*, 11(7):1092–1098.

Siddaway, A. P., Taylor, P. J., and Wood, A. M. (2018). Reconceptualizing anxiety as a continuum that ranges from high calmness to high anxiety: The joint importance of reducing distress and increasing well-being. *Journal of Personality and Social Psychology*, 114(2):e1–e11.

Siddaway, A. P., Wood, A. M., and Taylor, P. J. (2017). The Center for Epidemiologic Studies-Depression (CES-D) scale measures a continuum from well-being to depression: Testing two key predictions of positive clinical psychology. *Journal of Affective Disorders*, 213:180–186.

Sims, T., Tsai, J. L., Jiang, D., Wang, Y., Fung, H. H., and Zhang, X. (2015). Wanting to maximize the positive and minimize the negative: Implications for mixed affective experience in American and Chinese contexts. *Journal of Personality and Social Psychology*, 109(2):292–315.

Sisti, D., Young, M., and Caplan, A. (2013). Defining mental illnesses: Can values and objectivity get along? *BMC Psychiatry*, 13(1).

Slavish, D. C., Jones, D. R., Smyth, J. M., Engeland, C. G., Song, S., McCormick, N. M., and Graham-Engeland, J. E. (2020). Positive and negative affect and salivary markers of inflammation among young adults. *International Journal of Behavioral Medicine*, 27(3):282–293.

Smeets, P., Whillans, A., Bekkers, R., and Norton, M. I. (2020). Time use and happiness of millionaires: Evidence from the Netherlands. *Social Psychological and Personality Science*, 11(3):295–307.

Smith, H. J., Pettigrew, T. F., Pippin, G. M., and Bialosiewicz, S. (2012). Relative deprivation. *Personality and Social Psychology Review*, 16(3):203–232.

Smith, K. and Foster, J. (2014). Alcohol, health inequalities and the harm paradox: Why some groups face greater problems despite consuming less alcohol.

Soman, D. (2003). The effect of payment transparency on consumption: Quasi-experiments from the field. *Marketing Letters*, 14(3):173–183.

Soman, D. and Cheema, A. (2002). The effect of credit on spending decisions: The role of the credit limit and credibility. *Marketing Science*, 21(1):32–53.

Stark, W. (1946). Jeremy Bentham as an economist. *The Economic Journal*, 56(224):583.

Statman, M. (2017). Standard and behavioral life-cycle theories and public policy. *The Journal of Retirement*, 5(2):12–25.

Stebbins, R. (2009). *Leisure and Consumption: Common Ground/Separate Worlds*. Palgrave Macmillan, Basingstoke.

Stefkovics, Á. and Sik, E. (2022). What drives happiness? The interviewer's happiness. *Journal of Happiness Studies*, 23(6):2745–2762.

Stein, D. J. (2012). Positive mental health: A note of caution. *World Psychiatry*, 11(2):107–109.

Stevenson, B. and Wolfers, J. (2008). Economic growth and subjective well-being: Reassessing the Easterlin paradox. *Brookings Papers on Economic Activity*, pages 1–87.

Stewart, N., Brown, G. D. A., and Chater, N. (2005). Absolute identification by relative judgment. *Psychological Review*, 112(4):881–911.

Stewart, N., Chater, N., and Brown, G. D. A. (2006). Decision by sampling. *Cognitive Psychology*, 53(1):1–26.

Stewart-Brown, S., Tennant, A., Tennant, R., Platt, S., Parkinson, J., and Weich, S. (2009). Internal construct validity of the Warwick-Edinburgh Mental Well-being Scale (WEMWBS): a rasch analysis using data from the Scottish Health Education Population Survey. *Health and Quality of Life Outcomes*, 7(1):15.

Stiglitz, J. E., Sen, A., and Fitoussi, J.-P. (2009). *Report by the Commission on the Measurement of Economic Performance and Social Progress*. Commission on the Measurement of Economic Performance and Social Progress, Paris.

Stockwell, T., Zhao, J., Greenfield, T., Li, J., Livingston, M., and Meng, Y. (2016). Estimating under- and over-reporting of drinking in national surveys of alcohol consumption: Identification of consistent biases across four English-speaking countries. *Addiction*, 111(7):1203–1213.

Stone, A. A., Schwartz, J. E., Schkade, D., Schwarz, N., Krueger, A., and Kahneman, D. (2006). A population approach to the study of emotion: Diurnal rhythms of a working day examined with the day reconstruction method. *Emotion*, 6(1):139–149.

Stouffer, S. A. (1949). *American Soldier*. Princeton University Press, Princeton, NJ.

Sturgis, P., Allum, N., and Brunton-Smith, I. (2009). Attitudes over time: The psychology of panel conditioning. In Lynn, P., editor, *Methodology of Longitudinal Surveys*, pages 113–126. John Wiley & Sons, Ltd.

Sturm, R., Haag, F., Janicova, A., Xu, B., Vollrath, J. T., Bundkirchen, K., Dunay, I. R., Neunaber, C., Marzi, I., and Relja, B. (2021). Acute alcohol consumption increases systemic endotoxin bioactivity for days in healthy volunteers. *European Journal of Trauma and Emergency Surgery*, 48(3):1569–1577.

Stutzer, A. and Frey, B. S. (2008). Stress that doesn't pay: The commuting paradox. *Scandinavian Journal of Economics*, 110(2):339–366.

Sugden, R. and Sen, A. (1986). Commodities and capabilities. *The Economic Journal*, 96(383):820.

Suh, E. M. and Choi, S. (2018). Predictors of subjective well-being across cultures. In Diener, E., Oishi, S., and Tay, L., editors, *Handbook of Well-Being*. DEF Publishers, Salt Lake City.

Sumner, L. W. (1999). The desire theory. In *Welfare, Happiness, and Ethics*, pages 113–137. Oxford University Press.

Sussman, A. B. and Shafir, E. (2012). On assets and debt in the psychology of perceived wealth. *Psychological Science*, 23(1):101–108.

Tan, J. J. X., Kraus, M. W., Carpenter, N. C., and Adler, N. E. (2020). The association between objective and subjective socioeconomic status and subjective well-being: A meta-analytic review. *Psychological Bulletin*, 146(11):970–1020.

Tay, L., Batz, C., Parrigon, S., and Kuykendall, L. (2017). Debt and subjective well-being: The other side of the income-happiness coin. *Journal of Happiness Studies*, 18(3):903–937.

Tay, L. and Diener, E. (2011). Needs and subjective well-being around the world. *Journal of Personality and Social Psychology*, 101(2):354–365.

Tay, L., Morrison, M., and Diener, E. (2014). Living among the affluent. *Psychological Science*, 25(6):1235–1241.

Taylor, T. E. (2012). Objective or subjective? In *Knowing What is Good For You*, pages 37–56. Palgrave Macmillan UK, Basingstoke.

Tekin, E. (2004). Employment, wages, and alcohol consumption in Russia. *Southern Economic Journal*, 71(2):397.

Telyukova, I. A. (2013). Household need for liquidity and the credit card debt puzzle. *Review of Economic Studies*, 80(3):1148–1177.

Tennant, R., Hiller, L., Fishwick, R., Platt, S., Joseph, S., Weich, S., Parkinson, J., Secker, J., and Stewart-Brown, S. (2007). The Warwick-Edinburgh Mental Well-being Scale (WEMWBS): development and UK validation. *Health and Quality of Life Outcomes*, 5(1):63.

Thaler, R. H. (1990). Anomalies: Saving, fungibility, and mental accounts. *Journal of Economic Perspectives*, 4(1):193–205.

Thaler, R. H. (1999). Mental accounting matters. *Journal of Behavioral Decision Making*, 12(3):183–206.

Thurnell-Read, T. (2021). 'if they weren't in the pub, they probably wouldn't even know each other': Alcohol, sociability and pub based leisure. *International Journal of the Sociology of Leisure*, 4(1):61–78.

Tiberius, V. (2015). Prudential value. In Hirose, I. and Olson, J., editors, *The Oxford Handbook of Value Theory*. Oxford University Press, Oxford.

Tiberius, V. and Hall, A. (2010). Normative theory and psychological research: Hedonism, eudaimonism, and why it matters. *The Journal of Positive Psychology*, 5(3):212–225.

Tonietto, G. N., Malkoc, S. A., Reczek, R. W., and Norton, M. I. (2021). Viewing leisure as wasteful undermines enjoyment. *Journal of Experimental Social Psychology*, 97:104198.

Trudel-Fitzgerald, C., Millstein, R. A., von Hippel, C., Howe, C. J., Tomasso, L. P., Wagner, G. R., and VanderWeele, T. J. (2019). Psychological well-being as part of the public health debate? Insight into dimensions, interventions, and policy. *BMC Public Health*, 19(1).

Tsurumi, T., Yamaguchi, R., Kagohashi, K., and Managi, S. (2021). Are cognitive, affective, and eudaimonic dimensions of subjective well-being differently related to consumption? Evidence from Japan. *Journal of Happiness Studies*, 22(6):2499–2522.

Tversky, A. and Griffin, D. (2000). Endowments and contrast in judgments of well-being. In Kahneman, D., editor, *Choices, Values, and Frames*, pages 709–725. Cambridge University Press, Cambridge.

Tykocinski, O. E. and Pittman, T. S. (2013). Money imbued with essence: How we preserve, invest, and spend inherited money. *Basic and Applied Social Psychology*, 35(6):506–514.

Urry, H. L., Nitschke, J. B., Dolski, I., Jackson, D. C., Dalton, K. M., Mueller, C. J., Rosenkranz, M. A., Ryff, C. D., Singer, B. H., and Davidson, R. J.

(2004). Making a life worth living: Neural correlates of well-being. *Psychological Science*, 15(6):367–372.

Valente, R. R. and Berry, B. J. L. (2016). Working hours and life satisfaction: A cross-cultural comparison of Latin America and the United States. *Journal of Happiness Studies*, 17(3):1173–1204.

van der Meer, P. H. and Wielers, R. (2013). What makes workers happy? *Applied Economics*, 45(3):357–368.

van Hoorn, A. and Maseland, R. (2013). Does a Protestant work ethic exist? Evidence from the well-being effect of unemployment. *Journal of Economic Behavior & Organization*, 91:1–12.

Van Landeghem, B. (2012). Panel conditioning and self-reported satisfaction: Evidence from international panel data and repeated cross-sections. *SSRN Electronic Journal*.

Van Landeghem, B. (2014). A test based on panel refreshments for panel conditioning in stated utility measures. *Economics Letters*, 124(2):236–238.

van Schrojenstein Lantman, M., Roth, T., Roehrs, T., and Verster, J. C. (2017). Alcohol hangover, sleep quality, and daytime sleepiness. *Sleep and Vigilance*, 1(1):37–41.

van Steenbergen, H., de Bruijn, E. R., van Duijvenvoorde, A. C., and van Harmelen, A.-L. (2021). How positive affect buffers stress responses. *Current Opinion in Behavioral Sciences*, 39:153–160.

VanderWeele, T. J. (2017). On the promotion of human flourishing. *Proceedings of the National Academy of Sciences*, 114(31):8148–8156.

VanderWeele, T. J., Trudel-Fitzgerald, C., Allin, P., Farrelly, C., Fletcher, G., Frederick, D. E., Hall, J., Helliwell, J. F., Kim, E. S., Lauinger, W. A., Lee, M. T., Lyubomirsky, S., Margolis, S., McNeely, E., Messer, N., Tay, L., Viswanath, V., Węziak-Białowolska, D., and Kubzansky, L. D. (2020). Current recommendations on the selection of measures for well-being. *Preventive Medicine*, 133:106004.

Veblen, T. (1899). *The Theory of the Leisure Class: An Economic Study of Institutions*. Macmillan, London.

Veenhoven, R. (2012). Cross-national differences in happiness: Cultural measurement bias or effect of culture? *International Journal of Wellbeing*, 4(2):333–353.

Veit, C. T. and Ware, J. E. (1983). The structure of psychological distress and well-being in general populations. *Journal of Consulting and Clinical Psychology*, 51(5):730–742.

Vothknecht, S., Schoevers, R. A., and de Haan, L. (2011). Subjective well-being in schizophrenia as measured with the subjective well-being under neuroleptic treatment scale: A review. *Australian & New Zealand Journal of Psychiatry*, 45(3):182–192.

Walsh, L. C., Boehm, J. K., and Lyubomirsky, S. (2018). Does happiness promote career success? Revisiting the evidence. *Journal of Career Assessment*, 26(2):199–219.

Wang, H., Cheng, Z., and Smyth, R. (2019). Wealth, happiness and happiness inequality in China. In Brulé, G. and Suter, C., editors, *Wealth(s) and Subjective Well-Being*, pages 445–461. Springer International Publishing, Basel, Switzerland.

Ward, G. (2020). Happiness and voting: Evidence from four decades of elections in Europe. *American Journal of Political Science*, 64(3):504–518.

Ware, J. E., Kosinski, M., and Keller, S. D. (1995). *How to Score the SF-12 Physical and Mental Health Summary Scales*. The Health Institute, New England Medical Center, Boston, MA.

Ware, J. E., Kosinski, M., and Keller, S. D. (1996). A 12-item short-form health survey. *Medical Care*, 34(3):220–233.

Watson, D., Clark, L. A., and Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology*, 54(6):1063–1070.

Wedderhoff, N., Gnambs, T., Wedderhoff, O., Burgard, T., and Bošnjak, M. (2021). On the structure of affect. *Zeitschrift für Psychologie*, 229(1):24–37.

Wei, X., Huang, S. S., Stodolska, M., and Yu, Y. (2015). Leisure time, leisure activities, and happiness in China. *Journal of Leisure Research*, 47(5):556–576.

Weinstein, N. and Stone, D. N. (2018). Need depriving effects of financial insecurity: Implications for well-being and financial behaviors. *Journal of Experimental Psychology: General*, 147(10):1503–1520.

Wetherall, K., Daly, M., Robb, K. A., Wood, A. M., and O'Connor, R. C. (2015). Explaining the income and suicidality relationship: Income rank is more strongly associated with suicidal thoughts and attempts than income. *Social Psychiatry and Psychiatric Epidemiology*, 50(6):929–937.

White, S. C. (2016). Introduction: The many faces of wellbeing. In White, S. C. and Blackmore, C., editors, *Cultures of Wellbeing*, pages 1–44. Palgrave Macmillan UK, London.

Williams, J., Powell, L. M., and Wechsler, H. (2003). Does alcohol consumption reduce human capital accumulation? Evidence from the College Alcohol Study. *Applied Economics*, 35(10):1227–1239.

Wilson, W. R. (1967). Correlates of avowed happiness. *Psychological Bulletin*, 67(4):294–306.

Wolbring, T., Keuschnigg, M., and Negele, E. (2013). Needs, comparisons, and adaptation: The importance of relative income for life satisfaction. *European Sociological Review*, 29(1):86–104.

Wong, P. T. P. (2011). Positive psychology 2.0: Towards a balanced interactive model of the good life. *Canadian Psychology / Psychologie canadienne*, 52(2):69–81.

Wong, P. T. P. (2016). Self-transcendence: A paradoxical way to become your best. *International Journal of Existential Psychology & Psychotherapy*, 6(1).

Wong, P. T. P. and Roy, S. (2022). Critique of positive psychology and positive interventions. In Brown, N. J. L., Lomas, T., and Eiroa-Orosa, F. J., editors, *The Routledge International Handbook of Critical Positive Psychology*, pages 142–160. Routledge, London.

Wood, A. M., Boyce, C. J., Moore, S. C., and Brown, G. D. A. (2012). An evolutionary based social rank explanation of why low income predicts mental distress: A 17 year cohort study of 30,000 people. *Journal of Affective Disorders*, 136(3):882–888.

Wood, A. M. and Davidson, A. T. (2020). Why the field of moral philosophy must guide any discussion on well-being. *World Psychiatry*, 19(1):53–55.

Wood, A. M. and Joseph, S. (2010). The absence of positive psychological (eudemonic) well-being as a risk factor for depression: A ten year cohort study. *Journal of Affective Disorders*, 122(3):213–217.

Wood, A. M. and Tarrier, N. (2010). Positive clinical psychology: A new vision and strategy for integrated research and practice. *Clinical Psychology Review*, 30(7):819–829.

Wood, A. M., Taylor, P. J., and Joseph, S. (2010). Does the CES-D measure a continuum from depression to happiness? Comparing substantive and artifactual models. *Psychiatry Research*, 177(1-2):120–123.

Wooden, M. and Li, N. (2014). Panel conditioning and subjective well-being. *Social Indicators Research*, 117(1):235–255.

Wooden, M., Warren, D., and Drago, R. (2009). Working time mismatch and subjective well-being. *British Journal of Industrial Relations*, 47(1):147–179.

Wooldridge, J. (2010). *Econometric Analysis of Cross Section and Panel Data*. MIT Press, Cambridge, Mass.

World Health Organisation (2001). AUDIT: the Alcohol Use Disorders Identification Test: guidelines for use in primary health care.

Wu, F. (2020). An examination of the effects of consumption expenditures on life satisfaction in Australia. *Journal of Happiness Studies*, 21(8):2735–2771.

Yesuf, M. and Bluffstone, R. A. (2009). Poverty, risk aversion, and path dependence in low-income countries: Experimental evidence from Ethiopia. *American Journal of Agricultural Economics*, 91(4):1022–1037.

Zhang, J. and Xiong, Y. (2015). Effects of multifaceted consumption on happiness in life: A case study in Japan based on an integrated approach. *International Review of Economics*, 62(2):143–162.

Zhao, M. Y. and Tay, L. (2022). From ill-being to well-being: Bipolar or bivariate? *The Journal of Positive Psychology*.

Zhu, C., Su, R., Zhang, X., and Liu, Y. (2021). Relation between narcissism and meaning in life: The role of conspicuous consumption. *Heliyon*, 7(9):e07885.

Zilioli, S., Imami, L., and Slatcher, R. B. (2015a). Life satisfaction moderates the impact of socioeconomic status on diurnal cortisol slope. *Psychoneuroendocrinology*, 60:91–95.

Zilioli, S., Slatcher, R. B., Ong, A. D., and Gruenewald, T. L. (2015b). Purpose in life predicts allostatic load ten years later. *Journal of Psychosomatic Research*, 79(5):451–457.

Zuzanek, J. and Zuzanek, T. (2015). Of happiness and of despair, is there a measure? Time use and subjective well-being. *Journal of Happiness Studies*, 16(4):839–856.