

The effects of non-clinical factors on subjective well-being: Comparing the United Kingdom and China

Abstract

This paper surveys the effects of socio-demographic factors on subjective well-being in contemporary UK and China. Drawing on data from the United Kingdom Household Longitudinal Study and the China Health and Nutrition Survey, this study longitudinally examines two main forms of socio-demographic factors: **1)** labour force status and circumstances and **2)** demographic profiles – e.g. education background, ethnic group, marital status. The analysis uses the variable individual's satisfaction with life overall as the indicator of well-being. This study investigates how subjective wellbeing is associated with these variables in both countries and which variables are the strongest determinants of high and low wellbeing for the population of the UK and China. This study inequality in terms of SWB between the male and female individuals after controlling for income, education background, marital status etc. Women in the UK are happier with their lives than their male counterparts, whereas men in China are happier than their female counterparts. The most significant finding in the comparison is how marital status and income affected SWB differently in China and the UK. Married individuals in China reports significantly lower SWB than the unmarried. The UK, on the other hand, sees lower SWB for unmarried individuals and married individuals have some of the highest SWB levels.

Keywords: subjective well-being; demographic factors; longitudinal study

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1. Introduction

Subjective well-being (henceforth SWB) is observed to command a strong intellectual interest in the research and policy environments (see Easterlin, 1974; Veenhoven, 2008; Diener, 2009a, 2009b; Stiglitz et al., 2010). The concept can be broadly understood as the perceived quality of one's life. However, there is a multitude of ways to conceptualize SWB. For example, SWB can be regarded as the individual's satisfaction with their life (Han, 2015) or can be considered as an indicator of the perceived quality of the social system they inhabit (Veenhoven, 2008).

Additionally, the measurement of SWB is methodologically problematic. Given that different measures of SWB presents different results, then the process of variable or indicator selection in the effort to measure SWB is highly impactful for the research findings (see Peasgoods, 2008). Therefore, this impact of variable selection and measurement is highly relevant to theoretical analysis and public policy decision making.

Generally, SWB is derived from individual assessments of their life or specific domains of life, for example, satisfaction with life, spouse, health etc. The assessment of such domains, coded as satisfaction, is then mapped to various factors that are hypothesized to influence an individual's SWB. For example, Peasgood (2008) finds significant differences in the SWB between individuals with children, those that have further education backgrounds, and inter-sex differences.

This paper operationalizes SWB as a socio-economic phenomenon that are related to non-clinical factors (such as demographic profile), in order to investigate SWB in two vastly different societies, the UK and China, than hitherto presented in the literature. By comparing two distinct socio-economic contexts with different demographic profiles over time, useful insights into their social progress and population characteristics can be provided.

This is particularly relevant in the case of China as an emerging economy that is populated by various ethnic groups with different socio-demographic backgrounds. However, the development and character of the modern Chinese society is not strongly associated with the psychological wellbeing of its population as much as the economic success or material well-being (middle-class consumption, income, social security, house ownership etc.). Moreover, the current literature is sparse on comparisons of SWB between developing and developed countries. In light of this, the SWB in the UK is compared to that of China in this study, given the UK is similarly populated by various ethnic groups but dissimilarly characterized in terms of economic circumstances and societal values.

This paper uses data from the nationally representative British Household Panel Survey (BHPS), United Kingdom Household Longitudinal Study (UKHLS), and the China Health and Nutrition Survey (CHNS) to show that SWB varies in different societies with different levels economic maturity. These surveys

contain a variety of SWB measures, including employment status, overall life satisfaction, marital status, and, all of which will be introduced in further detail below.

In the process of connecting people's demographic profiles to their health, employment status, and, furthermore, to their SWB, this paper will address the following questions: What are the empirical differences between the variables or determinants of SWB in the UK and China? More specifically, are the factors determining high and low SWB for individuals in the UK different than those for China? Which factors are the most important for determining if an individual is from the UK or China, given their circumstances and SWB information? What are the between-culture and within-culture differences?

The value of this investigation can be regarded as being dependent on the following conditions: **1)** Large differences in SWB exists between the UK and China for the same measures of SWB, given their contrasting societal and economic conditions; **2)** The selected variables to measure individual SWB are useful in assessing societal wellbeing over time, particularly for public policy. This is particularly relevant to governments that are shifting from active pursuits of 'hard' economic targets to achieving 'softer' goals such as increasing public psychological well-being or achieving national quality of life targets.

This paper is organized as follows: Section 1 provides an overview of the theory and contemporary research on SWB. Section 2 introduces the data, the variables, and the methodological design of the analysis in this study. Section 3 presents and contrasts the main findings for the UK and China. Section 4 concludes this paper with a discussion of the implications of the results, with respect to the emerging socio-demographic issues in contemporary UK and China.

2. Theoretical overview

SWB has attracted significant attention in national and cross-national research in understanding population dynamics and social progress over the last few decades. To begin with, the study of well-being is multi-faceted in theory and approaches. These studies approach the subject of well-being from various angles; for example, happiness, standard of living, objective and subjective quality of life are found to be categorized broadly under the term SWB in the literature (Li, 2016). These angles of research tend to be strongly related as researchers aim to capture the overall well-being or welfare of people.

The choice of research angle is largely dependent on the field the research is native to. For example, the economic perspective of SWB in the literature tend to be concerned with questions such as: Does higher disposable income cause higher levels of individual happiness? Do differences in GDP per capita explain the variation in happiness between developed and developing countries?

In the contemporary research on SWB, Waldron (2010) and Li (2016) highlight that the scholarly interest in SWB (in developed countries) is based on the following phenomenon: the day-to-day quality of life as the individual perceive it has not increased despite the improvements in their objective living standards. More specifically, the raising of the level of material well-being during previous several decades has not been matched by a rise in the level of psychological well-being or SWB. Easterlin (1973, 1974) investigates how increased levels of disposable income seem to barely affect the level of national happiness in the US. The same strand of economic research by Easterlin showed that people in relatively wealthier countries, such as Germany, did not necessarily have happier people than a poorer country, such as Nigeria (Easterlin, 1974; Li, 2016).

The salient differences found in SWB from comparisons between developed and developing countries are theoretically interesting. In addition, it is noteworthy that variation in self-perceived quality of life in different parts of one country or population is also worth investigation. For example, Scandinavian societies are found to exhibit greater well-being than the US, which is attributed to the former's better public health systems and longer longevity of its people (see Wilkinson, 1996).

However, striking differences in SWB may also be found in different parts of one country, for example, differences by region, sex, or ethnic group. Putnam (2000) found that the mortality rate (an indicator of well-being) varies across the states in the US. The potential differences in other indicators of well-being in one country makes investigating within-country differences theoretically relevant.

The between and within-country variations in SWB has generated efforts to understand the factors causing cross-national differences (Diener et al., 2003). Although SWB is relatively new in terms of research relevance and empirical robustness, its origins as a theoretical concept can be traced to the theory of utilitarianism, originally proposed by the philosopher Jeremy Bentham (1789) and revisited later by the economist John-Stuart Mill (1895), both of whom wrote accounts describing how factors of pleasure and pain determines individual well-being.

Early research into SWB largely deals with issues of measuring SWB and relies heavily on domain satisfaction questions, such as job satisfaction (Bowling et al., 2010; Nielsen et al., 2011) and marriage happiness (Dush and Amato, 2005). Furthermore, satisfaction with life has been shown in the psychology literature and public policy research to be correlated with marital status, employment status, and personal characteristics (Dolan et al. 2006; Dolan et al. 2008); thus, the usage of socio-demographic factors is ubiquitous in the study of SWB.

Contemporary research continues to map variables representing pleasures and pains to the perceived well-being or happiness of people. Modern psychologists broadly categorize SWB as a concept representing emotions and cognitive evaluations. For example, Diener et al. (1999) theorizes SWB as a psychology concept consisting of three components: **1)** the cognitive evaluation of global and domain

satisfaction; **2)** frequent experiences of the ‘positive affects’ – i.e. the internal state of feeling ‘happy’ when an objective has been satisfied; **3)** infrequent experiences of ‘negative affect’.

This view is updated by Diener et al. (2009), who describes SWB as an umbrella term capturing emotional responses (positive or negative affects), domain satisfaction, and global life satisfaction. Sociologists extend this psychological line of enquiry further, for example, Veenhoven (2008) investigates what represents a standard of a good life and examines how an individual normally feels in their day-to-day experiences affects the overall evaluation of their life – i.e. subjective well-being.

Contemporary sociologists and psychologists such as Diener et al., (2009a) generally distinguish between self-reported wellbeing (SWB) and objective wellbeing (non self-reported assessments). This paper focuses on subjective measures of wellbeing – i.e. the self-reported well-being or self-assessments of life quality. To this end, Dolan and Metcalfe (2012) describes three branches of subjective measures of wellbeing:

- 1) Evaluative: SWB is surveyed by asking individuals to provide a cognitive assessment of their life or certain domains of their life. Life satisfaction is a common example of an assessment of life.
- 2) Hedonic: SWB is measured using the emotional states of individuals. For example, general happiness or stress as cognitive assessments of life.
- 3) Eudemonic: Individuals are surveyed for their notion of how fulfilling or worthwhile their life is, in order to approximate an appraisal of their life. This is closely associated with self-determination theory that describes the need for a sense of purpose in life.

Much of the empirical literature primarily focus on the evaluative function of SWB, although it is practically difficult to separate the eudemonic and hedonic characteristics of SWB from the evaluative. For example, how fulfilling or how stressful an individual’s life is, can be strongly related to their satisfaction within various domains of life, such as marriage and occupation (see Carr et al., 2014).

The term SWB in modern research and policy spheres concerns individual’s self-reported conditions – i.e. how good or bad they perceive their psychological wellbeing to be. The analysis undertaken (usually through surveys) using this understanding seeks to study what are the thoughts and feelings of individuals about their overall wellbeing. Layard (2005) argues that the human perception is central to objective of defining wellbeing; indeed, the only person who really knows their state of wellbeing is themselves.

Survey questions that asks for subjective evaluations of wellbeing gives room for people to indicate their individual differences in terms of what matters for their wellbeing. More specifically, one individual may respond to a satisfaction with life question by assigning greater importance to their occupation and the skill their job requires; another may respond to the same question by giving greater

emphasis to their marriage and education background. Such possible differences are indicative of the fact that evaluative based variables, such as ‘satisfaction with life’, represents the true thoughts and feelings of individuals that are often missed by observable conditions or phenomena such as GDP measures or consumption per capita, which may have weak association with an individual’s actual wellbeing.

The idea that the wellbeing of individuals can be guided by public policy has important implications for the societal development of a country. Indeed, the growing relevance of wellbeing to the design of practical policy has incentivized to governments and think tanks around the world to survey their population in order to design economic and social policies that promote wellbeing (Deeming, 2013). For example, the UK’s Office for National Statistics (ONS) piloted the ‘Measuring National Wellbeing Programme’ in 2010 to investigate the heterogeneous nature of wellbeing in the UK.

Early studies of wellbeing were guided by the assumption that national income and individual income can be proxies for measuring wellbeing. This assumption was generated from political importance attached to economic growth and more recently, income inequality. Indeed, the importance of GDP accounting in the economics of both the UK and China is a reflection of how instrumental income is in directing government policy and to certain extent, the research angle of the academic community. Even now, GDP and personal income level, are regarded as barometers of success of a country and general indicator of the wellbeing of its population (Peasgood, 2008). These measures are liberally applied across countries in the empirical research on wellbeing, irrespective if they are rich or poor.

However, the usefulness of wellbeing in policy research has led to a gradual acceptance that economic measures (such as GDP, consumption per capita, relative income etc.) are necessary, but not a sufficient condition for measuring wellbeing (Stiglitz et al., 2010). The analysis of SWB has been refined in the use of variables to better improve the monitoring of social progress. This empirical refinement in the literature is largely built on the concerns of governments – including the British and Chinese governments – on the issue of improving standards of living.

More specifically, governments and empirical research are moving beyond traditional measures such as GDP, poverty reduction targets, consumption per capita, to re-define living standards and wellbeing (see Stratton, 2010; Taylor, 2011). This push for a more comprehensive measurement of SWB has directed the angle of contemporary researchers to search for more non-clinical and non-economic factors. Deeming (2013) observes that the UK government in the last decade attempted to examine the different aspects of SWB in various household surveys (see ONS, 2011; Tinkler and Hicks, 2011; Shenton et al., 2012).

However, the government-led ONS research was purposed not to deliver informative and deep insights from the data; but rather focus on descriptive reports that display the mean estimates of SWB for various groups of the UK population using personal characteristics (sex, age, self-reported health and long-term

illness or disability). Many existing government survey findings or publications based on surveys such as the ONS household surveys, BHPS, UKHLS, and the CHNS does not reveal to great degree which sections or groups of a country's population are likely to report low satisfaction with life or low SWB.

To this end, the literature within the academic and research community suggests that various objective-based variables, such as age, gender, unemployment, and occupation type can do more to explain why SWB varies within sections of a population (e.g. Clark and Oswald, 1994; Layward, 2005; Dolan et al., 2008; Diener, 2009b; Li, 2016). Over the course of the historical development of wellbeing research, the empirical literature does contain a range of socio-demographic indicators of wellbeing that are often attached with economic measures. For example, Nordhaus and Tobin (1971) constructed an economic welfare indicator that can be considered to be one of the several predecessors to the contemporary socio-demographic based analysis of SWB. The measure includes socio-demographic factors such as leisure time and commuting as part of an adjusted type of GNP (Gross national product) measure.

Furthermore, the social indicators movement of the 1960s and 1970s within the academic field promoted the use of socio-demographic data to measure quality of life or individual wellbeing (see Sheldon and Freeman, 1970; Land and Michalos, 2018; Shek and Wu, 2018). The methodology of the research from this period generally consisted of collecting and analysing data on housing conditions, health status, marital status, occupation, and education backgrounds (e.g. Andrews, 1974).

The theoretical development of the 1960s and 1970s saw a significant revision in the conceptual understanding and measurement of wellbeing. For example, Andrews (1974) argued that objective indicators (for example income) are only indirect measures of SWB and more perceptual based measures (such as self-reported satisfaction with life) should be measured and interpreted. In light of this, Deeming (2013) similarly argues there is a great need to investigate social survey data (in addition to economic data), to ensure as many different socio-demographic factors are controlled for. This is particularly important in the context of cross-national comparisons where more light should be shed on the factors affecting SWB in the UK and China.

The effort contributed to the construction of a more socio-demographic based analysis of wellbeing in the literature are based on several objectives (Andrews, 1974). Before proceeding further, it is useful to describe these goals as they set the context within which the methodology and analysis of this paper is presented later. The primary objective is to prioritize the inclusion of perceptual variables or indicators, such as satisfaction with life overall, which assess the current state of an individual SWB. This is to include a direct measure of an individual's cognitive evaluation of their own wellbeing.

Indeed, it is naturally sensible to gather from individuals within a system (for example, a society or a country) on how they perceive their state of life in that system. Objective variables that describe marital status or education backgrounds are unable to reflect to the same level as subjective variables on how individuals perceive the condition or standard of their life. Nonetheless, this primary objective should

be accompanied by a secondary objective of accounting for a set of objective indicators, such as occupation, marital status, and education background, for the purpose of developing a comprehensive analysis of SWB.

The overarching objective is to construct a comprehensive set of variables that are both coherent and significant indicators of wellbeing. More importantly, these variables should be monitorable over a period of time for any individual. Given this set of variables, then the task of analysing individual SWB can begin in a longitudinal manner – i.e. monitoring over time. Given the data on these variables can be gathered over time via surveys, then the process of understanding the difference in SWB between sections of a population, between countries, and at different periods of time is made clearer.

Additionally, an empirical enquiry into the causes of such differences can be made more robust by the use of a comprehensive set of perceptual and objective variables. More importantly, the role of perceptual variables (satisfaction with life, general happiness, job satisfaction etc.) can be regarded as representing the dependent variable, whose sources of variation can be represented by objective variables (occupation, marital status, education background etc.)

The above sketches the empirical history of SWB in terms of concept and methodological matters. This paper's methodology adopts the objectives set illustrated above and uses a perceptual variable as the dependent variable in the analysis and comparison of SWB between countries. Furthermore, the differences in this dependent variable between countries can be explained by objective variables that serve as the independent variables or control variables in our analysis.

2.1 The UK and China context

The scholarly interest in SWB in the UK has grown substantially over the past decade in empirical research, as evidenced by the 'National accounts of wellbeing' report (Michaelson et al., 2008). In 2008, the UK government promoted the development of comprehensive mental capital and wellbeing measure (Goswami, 2008). This coincided with a working paper developed by the HM Treasury, in which Lepper and McAndrew (2008) argued wellbeing – both subjective and objective – is a reliable concept to measure social progress and assist policy analysis.

Furthermore, the milestone OECD report published by Stiglitz et al. (2009) advised that the ONS and research entities should incorporate subjective (along with objective) variables or measures of wellbeing in national accounts or surveys. Currently, the measurement of SWB in the UK largely relies on surveys that ask individuals to evaluate their global life satisfaction or psychological wellbeing. This methodology aims to gather and study individuals self-reported feelings about the various aspects of the system they live in (e.g. work, marriage, education) or life in general (e.g. overall life satisfaction).

In light of the above, the engagement with wellbeing in the UK can be considered to be strongly associated with the country's government policy. Indeed, the distinct advantage of surveying people

nationally for their wellbeing is that it circumvents the problem of paternalistic policy design – i.e. avoiding prescriptive decisions or questions that assume if some thing is good or bad for the population, (Waldron, 2010).

The understanding of SWB as both a concept and policy tool within the UK can be traced back to the Victorian era (1837-1901), when the prevailing social policy placed particularly strong emphasis on the promotion of mental health (Waldron, 2010). However, this emphasis was largely abandoned after the second world war when the concept of behaviourism piqued the interests of the British academia in the 1950s. The British government policy and research circles in the aftermath of the second world war expressed a greater interest in the observable (i.e. material wellbeing) and a disinterest in the unobservable (i.e. psychological wellbeing). The economics of post war Britain explicitly focused on satisfying the material needs of its population by means of restructuring a country whose economy was dominated by war manufacturing for over half a decade.

The issue of mental health that saw some government support and public popularity a century ago in Victorian Britain was perceived to be difficult to measure in the post-war Britain. Additionally, psychological health was regarded as an unreliable variable to control by government policy; indeed, the SWB or psychological wellbeing of a person was considered to be that person's own responsibility (Waldron, 2010). Moreover, fulfilling the material needs of a society was perceived to be the pre-requisite for improving the psychological well-being of its people; a line of thought that still largely exists today contemporary UK and China.

Although the UK has experienced unprecedented economic growth and development since the 1950s, including improvements in the material wellbeing of its population; the commonly-cited 'Easterlin Paradox' that suggests the UK has not observed an increased satisfaction with life since the 1950s in spite of this growth (see Stevenson et al., 2008). The paradox describes how economic growth, improved physical conditions, greater material wealth does not contribute significantly to perceived quality-of-life or satisfaction with life. More specifically, it argues there is no relationship between a country's economic development and the average happiness level of its population.

Easterlin (1973) finds that individuals measure their wellbeing not in terms of the absolute number of things or positions they possess but the relative quantity they have to what is regarded as the social norm. This is no different for non-tangible possessions such as job occupation, educational, or marital status. The argument goes that individuals want to possess more or less these attributes based on what is considered to be an acceptable level in the societal system they inhabit.

In light of the Easterlin paradox, China saw dramatic developments in its economy and society since the 'reform and opening-up' program of the 1980s. The lifting of poverty and rising disposable incomes are generally associated in popular media as contributing to the improvement of welfare in the Chinese society. However, Asadullah et al. (2018) argues that the Chinese population's sense of happiness or

wellbeing does not appear to be very strongly associated with improvements in economic conditions, such as per capita consumption or income.

According to a study conducted by Easterlin et al. (2012), China has actually experienced a significant decline in psychological wellbeing or general happiness during the last two decades in the World Value Survey Data, in spite of significant gains in poverty reduction. Similarly, Knight and Gunatilaka (2014) found that SWB levels have remain stagnant despite the rapid rate of increase in income per capita and improvements in China's human development index in the last decade. Appleton and Song (2008) also finds the urban Chinese population have low satisfaction with life based on surveys in 2002.

This begs the following question: why has China's SWB level remains largely static over the last few decades? The wellbeing of the typical Chinese person has been largely unchanged even though the national economy saw a four-fold increase in the level of per capita consumption during 1980 to 2010 (Asadullah et al., 2008). Indeed, before the late 1990s, the 'middle class' of China was non-existent; by early 2000, approximately 500 million households had an annual income range of 11, 500 USD to 43, 000 USD, which paved the way for high spending per capita observed in China.

To this end Knight, Song, and Gunatilaka (2009) suggests that the determinants of SWB or 'happiness' in China are not necessarily economic in nature (i.e. not rooted in per capita spending, income levels, or savings) and place more emphasis on the sociological factors (e.g. marital status, urban-rural household, education background). There is evidence to suggest that the Chinese middle class are far from happy in spite of how prosperous they are relative to their parents and grand-parents decades ago, most of whom came from rural backgrounds.

Li (2016) argues that when countries reach a certain level of economic development, further increases in the level of GDP is observed to carry diminishing returns. Moreover, the equality (or lack of equality) in measures such as income, social status, labour force conditions for a population, become increasingly important as the growth of the economy plateaus (Wilkinson and Pickett, 2009; Li, 2016). This argument is based on findings that more egalitarian societies such as those observed in the Scandinavian countries achieve better health outcomes (another indicator of SWB) than societies with greater inequality, such as those in the US, the UK, and China.

The reason why countries like the UK and China have poorer outcomes in health and perceived life quality is presented as the following: the less affluent sections of the population in unequal societies use the more affluent sections as measuring sticks for their well-being. When a country raises the material-wellbeing of its population but does not curb the almost inevitable inequality in outcomes, the poorer sections of society, Wilson and Picket (2009) argues, continuously compare their lives to their richer and more well-off counterparts. These poorer individuals perceive themselves to be more relatively deprived and the accompanying stress and shame from this perception generates behaviours

such as excessive smoking and alcohol consumption, contributing to poorer psychological and physical health outcomes.

Li (2016) adds that a society which improved its sense of equality across various measures would protect its people against within-population competition in economic or socio-demographic factors (e.g. education backgrounds, marital status, type of occupation). In light of this argument, Wilkinson and Pickett (2009) comments that when the economic conditions (or material wellbeing) of a country has been improved beyond a certain level then the perceived satisfaction with life of its people becomes conditional not on how richer they become, but how fairer the system they live in becomes.

The evidence on well-being in China suggests that economic variables may not be the most decisive factors in determining high or low appraisal of one's life. For this reason, more analysis of sociological factors using survey data is necessary to portray a more convincing case of what really affects an individual's SWB in China. The literature is plentiful in terms of empirical investigations of SWB. Indeed, the determinants of satisfaction with life and happiness in China are well documented using survey data. However, earlier research on China is unfortunately narrow in terms of the population sample. Many of these SWB studies limit their study sample to the elderly, rural or urban migrants (e.g. Chen and Short, 2008; Knight et al., 2009; Knight and Gunatilaka, 2010; Wang, Cheng, and Smyth, 2013; Liu et al., 2017).

Additionally, many studies of SWB in China in the literature are inexorably attached to investigations of the effects of relative income (e.g. Oshio, Nozaki, and Kobayashi, 2013) and income inequality on SWB (e.g. Bakkeli, 2020) or the relative income effect on urban and rural Chinese (e.g. Appleton and Song, 2008; Liu and Shang, 2012; Knight et al., 2009). Only a handful looks at sociological determinants of SWB, such as social networks (e.g. Churchill and Mishra, 2017), ethnic group backgrounds, or gender (e.g. Mishra et al., 2014; Mishra and Smyth 2014). Indeed, a comprehensive study that investigates what affects SWB in the Chinese society overall is absent in the literature, particularly with respect to contexts such as the Easterlin paradox.

3. Methodology

The foregoing establishes the theoretical and policy relevance of SWB in the UK and China. Though the UK and China are popularly and easily presented as a developed and developing country respectively from the perspective of their economies. It is much more difficult to say if the UK's population is necessarily happier than China's population is simply because the society its people live in is much more developed. It follows that China may not necessarily have lower levels of SWB even if its society is embedded in a developing economy.

Given that the UK and China has been characterized by the Easterlin paradox to some extent in the literature, then it is worth investigating how both countries has been coping in terms of SWB in recent

years. It is interesting to note that both the UK and China focused on fulfilling the material well-being of its people in the latter half of the 20th century, which saw almost complete absence of addressing the issue of psychological well-being or perceived quality of life of its citizens.

The preceding context provides a rich background as to how SWB can be understood in two vastly different countries with contrasting societies, but confronting the same problem of low happiness of its population. To sum up the discussion here, it is appropriate to say that a more productive approach to engage with the issue of SWB is to focus on the socio-demographics conditions at the individual level. This study adopts this approach to analyse the UK and China, where various forms of social and economic advantages and disadvantages have powerful effects on their population's satisfaction with life or SWB. The attention on socio-economic-demographic characteristics in this study allows for a more detailed investigation of the interrelationship between the various characteristics than hitherto available in the literature.

Moreover, following analysis is done in recognition of the sociological viewpoint of Veenhoven (2008), who associates SWB with socioeconomic conditions and societal or institutional characteristics, in order to examine how an individual's cognitive evaluation of their life quality is affected by their position within society. In doing so, this study assesses the effects of demographic factors such as ethnicity, education background, and occupation type on SWB in contemporary UK and China.

Using this approach, the research problem this study consists of three main non-clinical, socioeconomic components. First, it concerns an individual's objective socioeconomic conditions. Second, the SWB measured here accounts for the individual's life satisfaction and is based on the theoretical context provided by Veenhoven (2008). Third, the SWB is presented here in the form of life satisfaction, which is investigated longitudinally by mapping an individual's socioeconomic conditions to their life satisfaction over time.

It is useful to introduce the variables here and their theoretical relevance to SWB, as presented in the literature before proceeding further to the analysis and descriptive statistics.

3.1 Variables

The studies identified in the previous section concludes that SWB is affected by a variety of outcomes and backgrounds – e.g. marriage, education, occupation. Given this review of empirical background of SWB, then it should be noted that the choice of which factor to focus on in research or policy analysis is dependent on the significance or size of effect of the variables on SWB (Layard et al., 2014).

a. Education

Investigating the impact of educational achievement or backgrounds is important to find whether the better educated sections of a population is necessarily more satisfied with life than those that are less educated. The emphasis on high education attainment is prevalent in both the British and Chinese

society, where quality schooling is generally viewed as the best way to improve social mobility – i.e. move from a lower social class to a higher class.

Indeed, high education attainment is generally associated with better outcomes in the job market and is considered to be the primary source of human capital (Crocker, 2002). Additionally, Hayward et al. (2005) has shown that workers with higher education were more likely to be in possession of higher wages, higher benefits, and hold more secure jobs.

Moreover, given that the UK and China have a social norm of emphasising the importance of educational attainment, then it is natural to expect many if not most individuals within their respective countries to achieve an education level equal to or higher than the social norm. In this context, education is similar to a physical item such as a house or car, as it elevates individuals to a higher quality of life within their society.

b. Work

SWB studies have previously shown unemployment is related to lower satisfaction with life levels; this was shown to be due to a lack of engagement with society rather than the loss of income due to unemployment (Waldron, 2010). Donovan and Halpern (2002) argued that assistance for the unemployed to return to employment is significantly more effective to alleviate low satisfaction with life than financial support policies.

This paper goes beyond using the variable unemployment or current labour force status (e.g. retired, student, working, ill or disabled etc.). The analysis here also controls for the level of skill an individual's occupation requires and whether the individual is an employee or self-employed. The inclusion of these additional control variables is for the purpose of an in-depth investigation of the impact of work on an individual's SWB.

c. Marital status & gender

The empirical literature reveals a complex relationship between marital status and SWB. For example, Dayton (1936) and Odegard (1946) argues that married individuals are generally more content with their emotional states than the unmarried. However, later investigations show that married women are often experience greater distress and poorer levels of wellbeing than the unmarried women (Bernard, 1982).

Bernard (1982) argues that the traditional role of women as the housewife was responsible for the low satisfaction with life experienced by married women. This argument is extended further by claiming there is a social norm that marriage assigns the male partner higher importance within the family unit. Additionally, studies of marriage reveal that long term marriage gave greater benefits of psychological wellbeing to the husband than the wife (Gove and Tudor, 1973). Although reviews of the literature since

the 1970s indicate the existence of greater benefits in terms of mental health and SWB wellbeing for married men and women compared to their unmarried counterparts (see Ross and Mirowsky, 1989; Gove et al., 1990)

The society in both the UK and China have experiences of a patriarchal family, whereby the male of the household is considered to be the head. This experience is still prevalent in many households in China, particularly rural households (Hu, 2018). This is sharp to many urban households in which a more egalitarian family is observed – i.e. both husband and wife are considered to be equal in terms of responsibility and status, with no strict designation of who is the head of the household.

The UK, similar to urban Chinese households, has a more egalitarian setting for married individuals. More specifically, many married individuals (men and women) in the UK and China are form dual income households, in which both partners work to provide for the family. Nonetheless, it is worth investigating whether married individuals in China are more or less satisfied with life than married individuals in the UK, given the vastly different cultural attitude to marriage between the two countries (Higgins et al., 2002).

d. Ethnic group

Although the literature has expanded in the analysis of SWB using economic and social outcomes (see Layard et al., 2014), it has given relatively lighter attention to the variation of SWB across the ethnic groups of a population or on the differences in wellbeing between the ethnic minorities and the ethnic majority in a country (Dorsett et al., 2015).

The population of the UK has been characterized by migrants from various geographical corners, over the course of its colonial history and in modern decades. This resulted in a country with an ethnically diverse population profile. Similarly, China's population is extensively colourful in terms of ethnic groups, with fifty-five ethnic minority groups in addition to the Han majority (total of fifty-six groups).

Given such population characteristics, then the ethnic element of SWB is highly relevant for research and policy purposes. Shaw et al. (2012) shows that variation in mental wellbeing does exist between ethnic groups. For example, the psychological wellbeing for non-white individuals was worse compared to white individuals in the UK, but tended to improve of their life time (Hauck and Rice, 2004). These studies show the SWB of ethnic groups, ethnic minorities to be specific, can be an indicator of social integration or assimilation.

The literature contains no analysis of SWB for China's ethnic groups, of the same extent observed for the UK population. However, given that variation in SWB exists between the UK's ethnic groups, then it is reasonable to expect some degree of variation in wellbeing may be existent between China's ethnic groups. In light of this, the true cause of such inter-ethnic variation is worth investigation.

e. Urban or rural household

Comparisons of urban and rural Chinese households (see Han, 2015) reveal strong differences in SWB, which are argued to be based on long-standing institutional and social differences between the two groups. The difference in SWB is also attributed to the social inequality observed in China. This scale of inequality is largely determined by the disparities in standards of living, outlooks on life, family values, job expectations, and household roles of individuals. The literature finds the differences in SWB between urban-rural China to be far larger than many current developing countries and developed countries (such as the UK) during their historical industrialization period (Knight, 2008; Han, 2015). The high level of urban-rural inequality in China makes it a relevant country to investigate if the SWB of its urban-rural population is vastly different.

The literature surprisingly contains relatively little research on the differences in SWB between urban-rural households in the UK. Most studies are limited to a specific region (e.g. Scotland, Wales) and does not delve deeper into specific urban or rural areas. Nonetheless, given the rising inequality in the UK (see Onaran and Guschanski, 2016), then it is reasonable to expect some degree of difference in SWB may exist between the urban-rural population. The recent political and socioeconomic upheavals in the UK makes it a suitable case to study the difference in SWB between the rural and urban individual.

4. Data

4.1 Data source

The empirical analysis in this paper is based on panel data sourced from the United Kingdom Household Longitudinal Study (UKHLS) and the China Health and Nutrition Survey (CHNS). Both are nationally representative data collection projects that are conducted through a repeated, cross sectional general survey. The UKHLS and the CHNS was designed to examine the effects of health, education, employment circumstances, family, and social life on individual behaviours and outcomes in a longitudinal way; thus, these surveys were chosen for this study as it is relevant to the analysis of SWB.

The UKHLS is a longitudinal study led by the Institute for Social and Economic Research at the University of Essex. The study annually surveys approximately 40,000 households in the UK, beginning from 2009 (Wave 1). Households and individuals are surveyed via face-to-face interviews or given a standardized online survey for self-completion; participants over the age of 16 are classified as adults. All households at Wave 1 are contacted each following year using the aforementioned methods to survey any changes to their lives.

The CHNS is a longitudinal survey conducted together by the National Institute for Nutrition and Health of the Chinese Centre for Disease Control and Prevention, and the Carolina Population Centre at the University of North Carolina. The CHNS builds its sample of participants using a multistage random cluster process from 12 provinces that are distinct in terms of geography and economy. All participants

are surveyed using a standardized questionnaire, beginning from 1989, followed by additional nine survey waves during the period of 1991 to 2015.

4.2 Data sampling

This study focuses on respondents who are over 16 years old from the 2009, 2011, and 2015 waves. The sampling process only includes those individuals that follow up successfully in 2009, 2011, 2015 waves for both the UK and China data. This decision is based on the fact that data on well-being and

the control variables in China is only available in 2009, 2011, and 2015. The sampling process is summarized in the flowchart below:

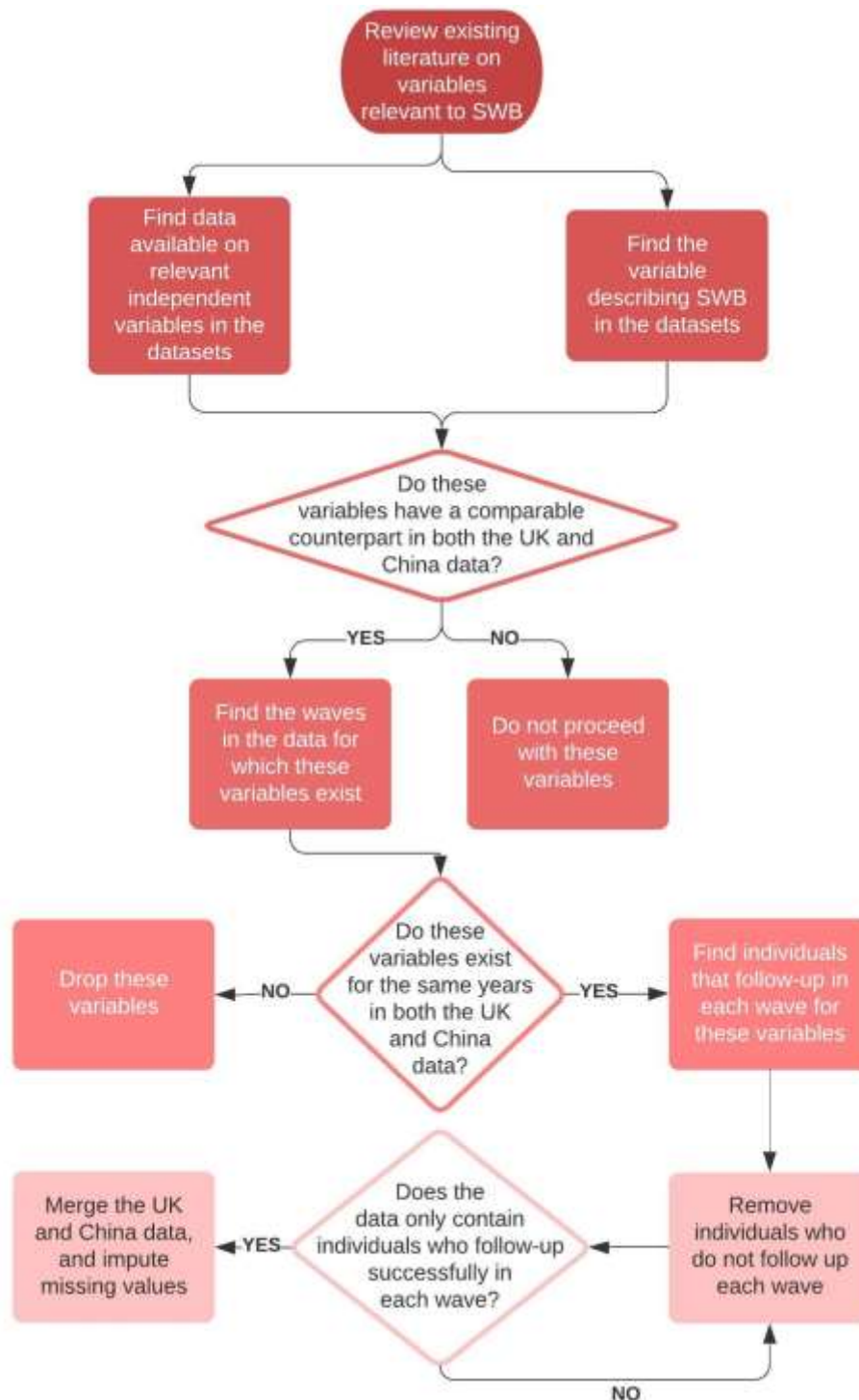


Fig. 1. Flowchart describing the data sampling process

The sampling process selects all individuals who responded year-on-year to several survey questions relevant to our study – i.e. questions regarding their SWB, demographic profile, labour force circumstances, marital status etc. The sampling only considers those respondents who followed up and provided information on the both our dependent variable (SWB) and control variables. Any individual that does not have information on either the dependent or control variables is eliminated from the

process. This sampling process generates a total of 645 individuals from the CHNS and 16, 042 individuals from the UKHLS. These individuals are those that successfully responded to the survey question regarding their SWB in 2009, 2011, 2015 and provides the relevant demographic and employment conditions variables.

The relatively lower number of individuals from the CHNS is due to the fact that survey questions relevant to individual SWB are limited to the 2006, 2009, 2011, and 2015 waves; with the 2006 wave containing 3442 people that responded to survey questions relevant to SWB, out of the total 11, 860 people in 2006. Out of these 3442 people in the 2006 wave, only 68 people followed up in the later waves – i.e. continued to provide information on their SWB. Furthermore, the lower count is because the questions relevant to SWB is part of a memory test that was not introduced into the CHNS questionnaire in the waves prior to 2006.

Additionally, not all individuals who gave responses regarding their SWB simultaneously gave responses regarding other variables within a wave. For example, many individuals in the 2009, 2011, and 2015 waves did not respond to questions regarding their occupation, educational qualifications, or marital status, even though they responded to questions regarding their SWB. Given this situation, then it is inevitable that many individuals who followed up and responded to SWB questions in the 2009, 2011, and 2015 waves are excluded if they did not respond to other questions relevant to our independent variables.

Out of the total 36, 996 people who gave responses to questions regarding their SWB in the CHNS in 2006, 2009, 2011, and 2015, only 973 people successfully followed up and responded to the SWB relevant questions during the 2009, 2011, and 2015. Out of these 973 respondents, only 645 individuals gave responses and provided information on both our dependent variable (SWB) and independent variables of interest (discussed in detail below).

It is important to mention that the sampling process is based on the availability of the same control or independent variables in both the UKHLS and the CHNS – i.e. a direct or approximate match of the independent variable exists in both surveys. It is noteworthy to also mention that the several questions or variables in the CHNS surveys are added and dropped in different years. For example, the variable ‘self-assessment of an individual’s own health’ is available in the 1993 wave in the CHNS but dropped in the later waves, but added again in the waves after 2009. However, this variable is present in all waves in the UKHLS and its predecessor the British Household Panel Survey (BHPS), thus it is not selected for analysis.

Given this situation, then the sampling process first identifies waves in the UKHLS and CHNS with data on SWB and find within these waves the relevant independent variables that have a match in both surveys. This process gives us those people that have data on their SWB and the relevant demographic and socio-economic variables for analysis.

4.2 Dependent variable: Subjective well-being

The dependent variable representing SWB this study is constructed based on a survey question common to both the UKHLS and CHNS, which asks the respondent ‘How satisfied overall are you with your life?’ and ‘Rate your present life’, respectively. The question in the CHNS have five possible answers; respondents can choose between ‘very good’, ‘good’, ‘OK’, ‘bad’, and ‘very bad’. The UKHLS have seven possible answers and respondents can choose between ‘completely satisfied’, ‘mostly satisfied’, ‘somewhat satisfied’, ‘neither satisfied nor dissatisfied’, ‘somewhat dissatisfied’, ‘mostly dissatisfied’, and ‘completely dissatisfied’.

Both questions are re-engineered to be the variable ‘Life rating’. The scale is recoded consistently from one (lowest SWB score) to five (highest SWB score) for both the UKHLS and CHNS sample, so that a feasible comparison is possible. The variable ‘Life rating’ is used to build the variable ‘Subjective Well-being’, whereby a score of one to two in Life rating is coded as ‘Low’ in Subjective Well-being; three is coded as ‘Fair’; and four to five is coded as ‘High’.

The survey question relevant to satisfaction with present life or ‘rate your present life’ in the CHNS is non-existent for waves surveyed before 2006 and there are only 68 participants with complete cases of overall life satisfaction in 2006. The sample selection here only considers those respondents that follow up in subsequent waves – i.e. those participants that successively responded to the surveys in 2009, 2011, and 2015. There are very few respondents in the 2006 wave of the CHNS who followed up in the later waves of 2009, 2011, and 2015; thus the 2006 wave of the CHNS is excluded due the problem of a small sample size it would create for our longitudinal data analysis.

Moreover, the analysis uses objective variables, for example employment and marital status, to map the effects of non-clinical, socio-demographic factors to individual SWB, indicated by the variable overall satisfaction with life, which is treated as representative variable for SWB for both UK and China individuals.

4.3 Independent variables

The demographic composition of the sample data consists of the variables *sex*, *age*, *highest education qualification*, *marital status*, *rural or urban household* and *ethnic group*. An additional ordinal variable called *age group* is constructed and orders each individual into six age groups: ‘16-26’, ‘27-37’, ‘38-48’, ‘49-59’, ‘60-70’, and ‘70+’. The variable *marital status* sorts each individual into five categories: ‘married’, ‘widowed’, ‘never married’, ‘divorced’, and ‘separated’. Additionally, individuals in the data sample is categorized under household location, whereby they are either classified as belonging to an ‘urban’ or a ‘rural’ household.

The variable *highest education qualification* is derived from the highest educational attainment of the respondent. All respondents with A-level or high / upper school equivalent qualifications are classified

into ‘High secondary’. Likewise, respondents holding GCSEs and middle school equivalent qualifications are sorted into ‘Mid secondary’. All respondents who attained university degrees, technical or vocational degrees are sorted into ‘Degree’. Those who have completed Master’s degrees or higher are categorized under ‘Higher degree’.

The ethnicity data of the UKHLS sample is derived from multiple sources and pre-processed into seventeen different groups: ‘British’, ‘Irish’, ‘Other White’, ‘Chinese’, ‘Indian’, ‘Pakistani’, ‘Bangladeshi’, ‘Asian White’, ‘Other Asian’, ‘Arab’, ‘African Black’, ‘Caribbean Black’, ‘Black White’, ‘Other Black’, ‘Other Mixed’, ‘Gypsy’, and ‘Other’. The ethnic groups of the CHNS sample is sourced from the survey’s nationality data and organized into six groups: ‘Han’, ‘Man’, ‘Miao’, ‘Tujia’, ‘Buyi’, and ‘Other’.

The employment aspects and conditions of each individual consists of the variables *employee or self-employed, working (or not), primary occupation type, labour force status*. Each individual is sorted into either self-employed or employee and whether they are currently working or not.

The variable *primary occupation type* describes the level of skill or expertise an individual’s profession requires and is derived from the work role they are involved in. For example, individuals who are company executives, athletes, musicians, actors, army officers, police officers, and managers are classified as ‘Professional / Technical / Managerial’. Those who hold general office staff positions are categorized as ‘Skilled non-manual’. Those individuals who are farmers, fisherman, hunters, service workers, drivers are sorted into ‘Skilled manual’. Any non-skilled individual is classified under ‘Unskilled occupation’.

The variable *labour force status* shows an individual’s state of participation in the labour force and each individual are organized into seven categories: ‘Working’, ‘Retired’, ‘Family/home care’, ‘Unemployed / Seeking work’, ‘Sick / Disabled’, ‘Student’, and ‘Other’.

The data sample is appended with the dummy variable named *Country* indicating whether an individual is from the UK or China. Moreover, a variable called *Wave* is included to specify which year the observation in the sample belongs to. All categories and numerical scaling of the independent variables are made uniform across the UKHLS and CHNS samples for ease of comparison.

4.4 Handling missing values

The missing data on the dependent variable ‘Life rating’ is imputed using ‘Multivariate Imputation by Chained Equations’ in R. For example, if a participant has a missing case of ‘Life rating’ in 2009 but has complete cases in 2011 and 2015, then the missing value for that individual in 2009 is imputed multiple times. The median of these multiple imputations is taken to be the value representative of that individual’s ‘Life rating’ in the 2009 wave. This method is applied across the data sample to those respondents that successfully followed up in all years but have missing data on one wave.

The missing values on categorical independent variables (e.g. education backgrounds) are imputed using the LOCF (Last observation carried forward) and NOCB (Next observation carried backwards) methods in R. LOCF carries the previous values of a variable forward to impute future missing values and NOCB uses the current values of a variable to impute previous missing values. These methods are used here to reduce the number of participants eliminated from the analysis and to assist the analysis of trends. This step is critical to preserve the number of participants of the CHNS, otherwise the sample would be small.

The proportion of missing data on the independent variables range from 3% to 8%. In this case, the imputation methods used is expected to not give a biased estimate of the effects of the independent variables or underestimate the variability in the estimated SWB results.

4.5 Factor analysis

The objective here is to describe variability in the dataset among correlated variables using less variables called factors. Each factor is a ‘latent’ object that can describe multiple variables. The term latent here can be understood as a category to which a group of variables belong to:

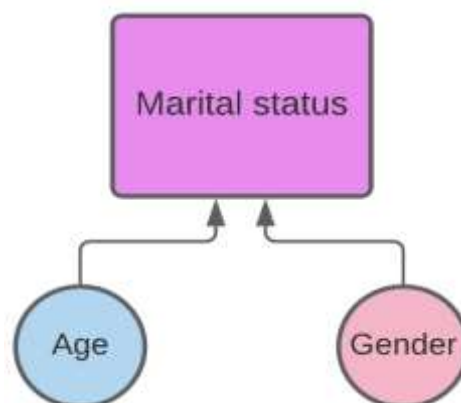


Fig. 2. Factor (Marital status) composed of two variables (Age and gender)

This process is useful for finding if it is possible to reduce the number of variables in a large dataset before building models. Additionally, it is a practical method to check if the selected variables are coherent and useful for analysis. The variables listed in the foregoing sections are inputted into a factor analyser algorithm built in Python to see whether the variables can be described as fewer latent factors. Eigenvalues are used here to investigate how many factors can describe the variance in our dataset. Eigenvalues in this context is a measure of how much variance each factor can explain, given that each factor is a grouping of the variables. The screeplots below indicates the number of factors that describe the data of the UK and China:

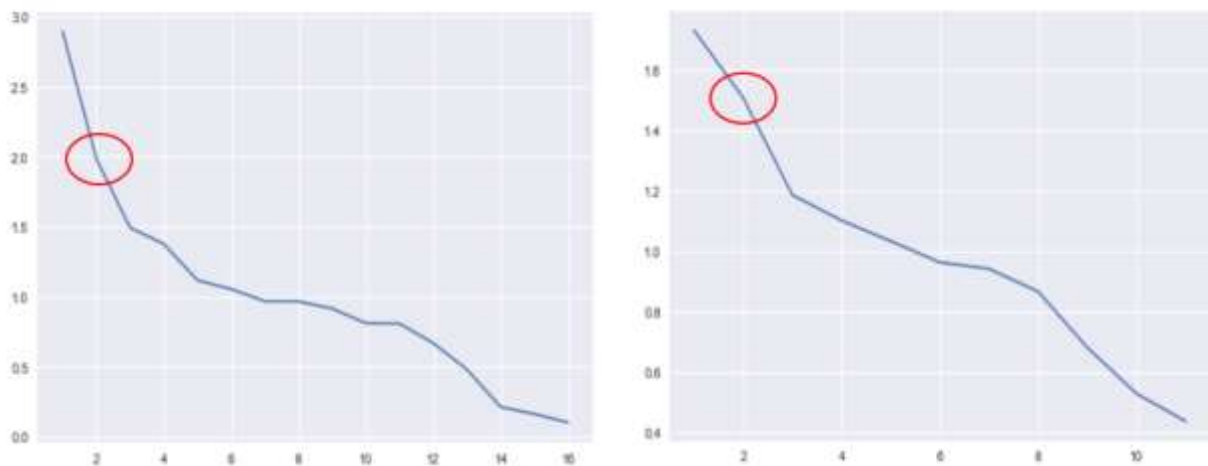


Fig. 3. Screeplot from factor analysis (the UK on the left, China on the right)

The y-axis is the amount of variance described by the factors and the x-axis represents the number of factors. The study here uses two factors for both the UK and China, following the ‘elbow rule’ in screeplots (the point highlighted within the red circle in the screeplots above), this is because the inclusion of additional factors does not contribute significantly to the explanation of additional variation in the data.

The two factors are inputted into a factor analysis algorithm, which rotate the factors to create an interpretable structure. The method of rotation used here is varimax rotation, which ensures the two factors are not correlated and maximizes the sum of variance squared loadings. Loadings in this context indicates the importance of a variable to a factor. For example, a high factor one loading for a variable indicates that it is important for factor one. In the analysis here, a cut-off of 0.5 loading score is used to determine which variable belongs to which factor – i.e. any variables that score above 0.5 in a factor is considered to belong to that factor. Note that one variable can belong to multiple factors.

Below are the two factors generated, along with the variables they contain and their interpretability:

1. **Demographic effects on life quality:** sex, age, marital status, ethnic group, current education background, household location, life rating.
2. **Employment situation on life quality:** age, ethnic group, education background, working or not, primary occupation type, labour force status, income, life rating.

Additionally, a robustness check is conducted to investigate the quality of the factors (and variables). The Cronbach’s alpha measure is used here to determine if the variables form a coherent group and reliable factors in investigating ‘Subjective Well-being’. The coefficient for the Cronbach’s alpha is 0.75, which indicates the variables are coherent and useful for further analysis.

5. Descriptive statistics and exploratory analysis

5.1 The UK

Descriptive Statistics

	N	Mean	Std. dev.	Min.	25 %	Median	75 %	Max.
Age	65,850	50.085	16.642	16.000	37.000	50.00	63.000	101.000
Income	65,850	1,481.585	1,429.432	-8,038.330	736.670	1,232.33	1,896.875	45,833.340
Life_rating	65,850	3.649	1.016	1.000	3.000	4.00	4.000	5.000
GDP.growth...annual...	65,850	-0.117	2.940	-4.248	-4.248	1.54	2.356	2.356
GDP.per.capita..current.USD.	65,850	41,908.847	2,557.991	38,713.137	38,713.137	42,038.57	44,974.832	44,974.832
Gini.coefficient	65,850	33.567	0.519	33.200	33.200	33.20	34.300	34.300

Fig. 4. UK statistics (2009-2015)

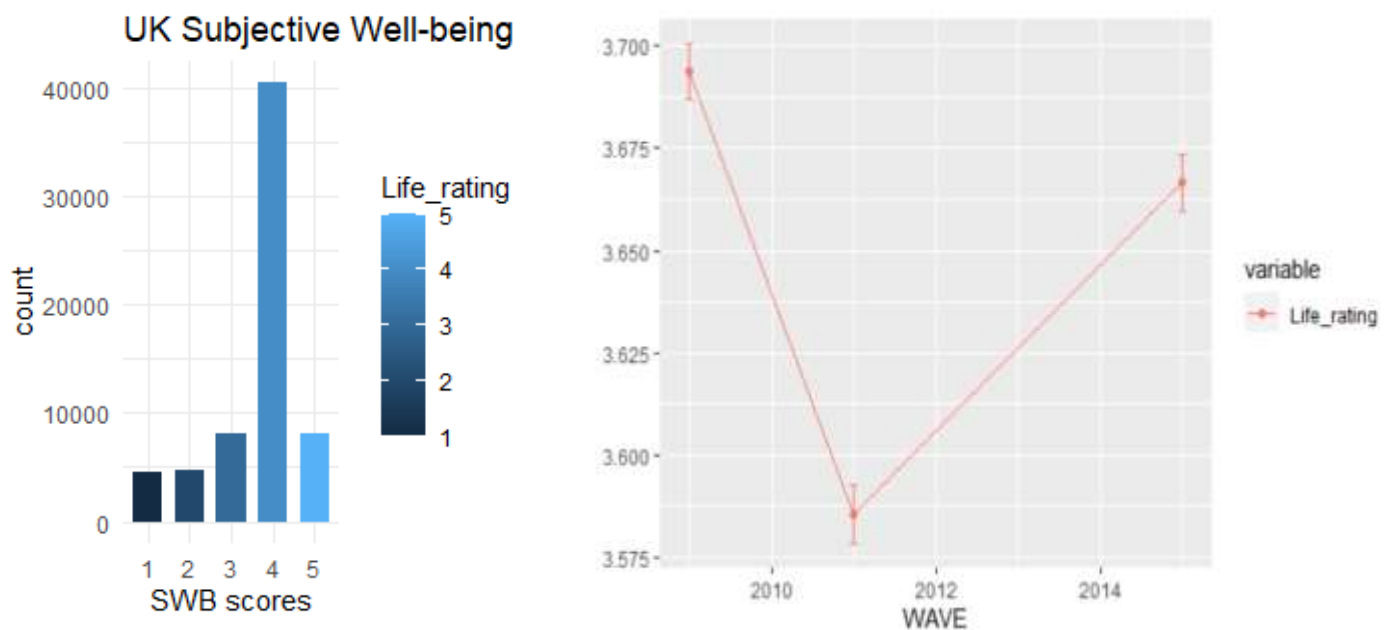


Fig. 5. General trend of satisfaction with life (SWB) in the UK (2009-2015)

The average age of the UK individual under analysis is 50 years with an average of 3.649 points in terms of satisfaction with life overall, represented by the variable 'Life rating', which is the variable determining SWB for an individual. The standard deviation in satisfaction with life is very low at 1.016 points, suggesting very little variation in the scores for satisfaction with life for UK individuals. The Gini coefficient (measure of income distribution and indicator of income inequality) averaged 33.567, indicating a low-moderate income inequality by World Bank estimates.

Fig. 5 shows the sharp decline in satisfaction with life overall (represented by Life rating) in the UK after 2009, which can be attributed to the effects of the Great Recession of 2008. This decline was

followed by a gradual rebound from the period of 2011 to 2015 (which can be regarded as the period of economic recovery in post-recession UK).

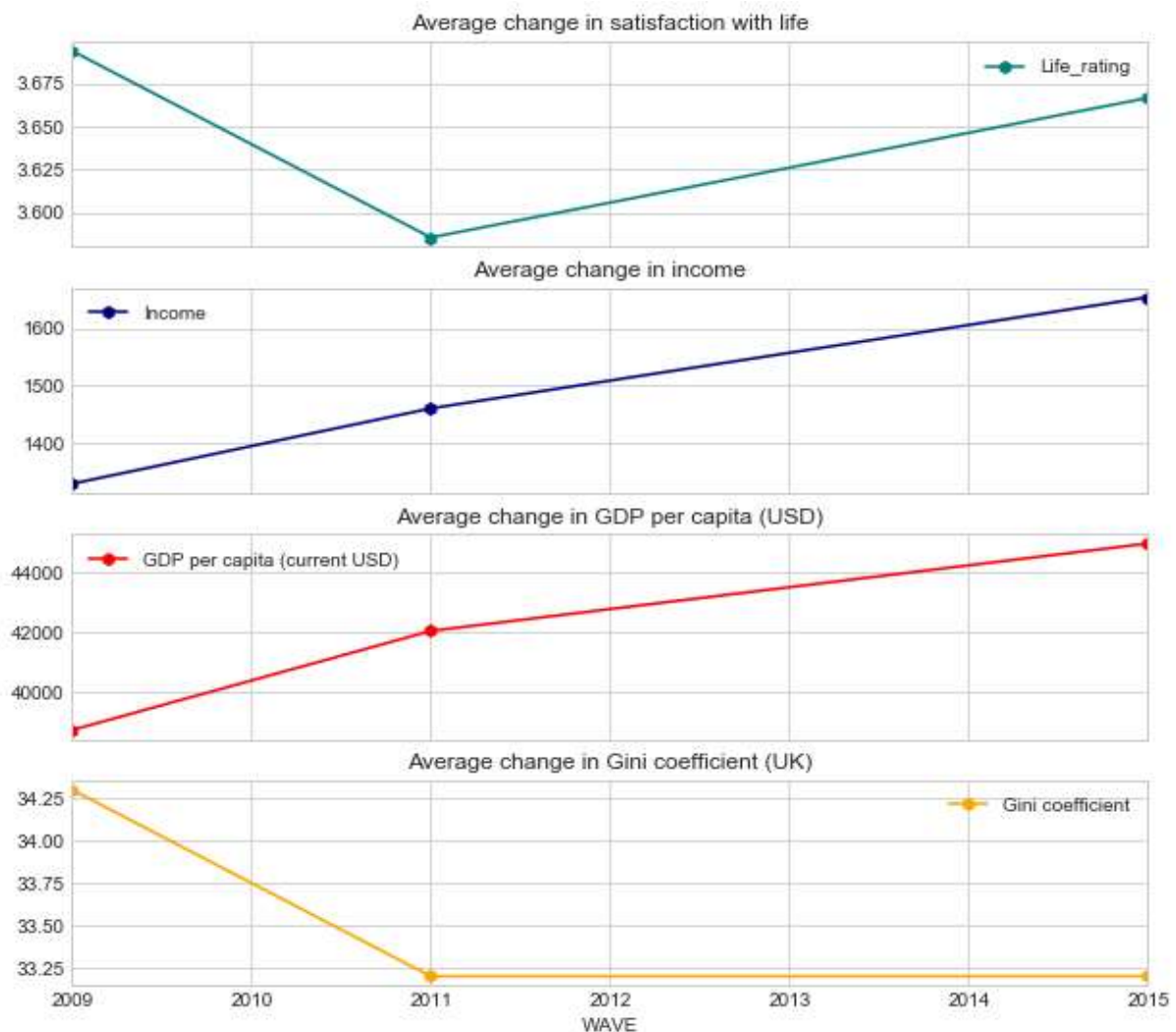


Fig. 6. Average change and percentage changes in SWB, income, GDP per capita, Gini coefficient (UK)

Fig 6 shows the income growth of individuals in the UK behaves in a similar pattern to the average GDP per capita. However, the average rate of change in the satisfaction with life overall exhibits a slower growth after 2011.

The Gini coefficient largely remained unchanged after its decline beginning in 2009. It is interesting to note that satisfaction with life overall increased after 2011 as the Gini coefficient fell and remained stable. The evidence suggests satisfaction with life overall increased as income and GDP per capita increased and Gini coefficient decreased.

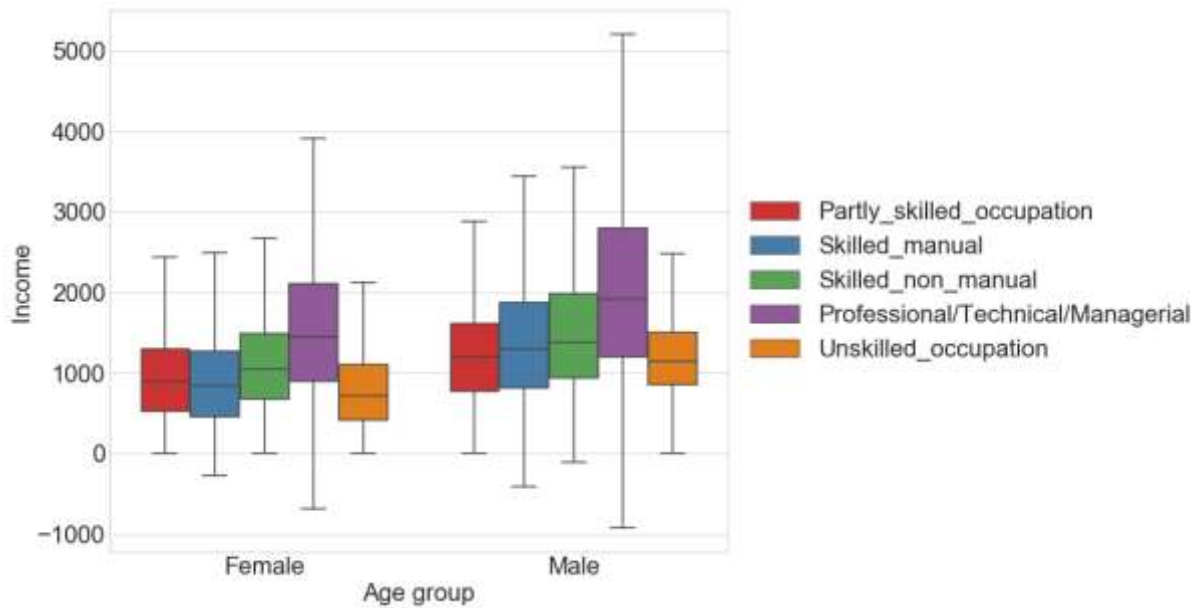


Fig. 7. Boxplot of net income differences between male and female, accounting for occupation skill (UK)

Fig. 7 shows that the income distribution across the occupation skill categories for male and female individuals have a clear division between the skill demanded from their jobs. Occupations demanding higher skill such as those in the Professional/Technical/Managerial professions command a higher income than those partly skilled and unskilled professions.

The data indicates that male individuals command higher incomes than their female counterparts. More specifically, male individuals with a partly skilled occupation (e.g. seasonal fruit harvesters) have higher median incomes than female individuals with skilled non manual occupations (e.g. secretarial work). After controlling for occupation skill, the lower income for female individuals may be suggestive of possibly different wellbeing levels between females and males. Moreover, the dispersion in income for male and female individuals with Professional/Technical/Managerial positions are noticeably higher than other occupation categories.

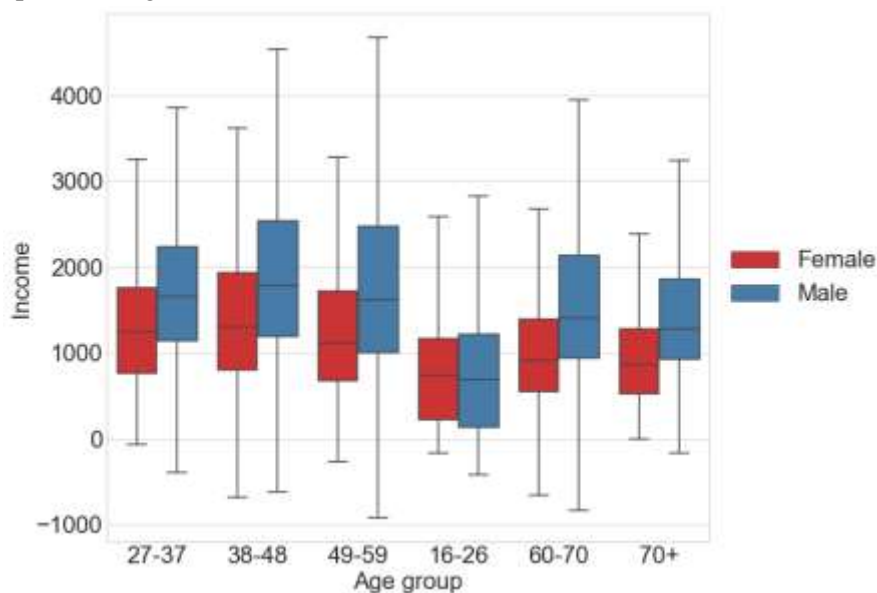


Fig. 8. Boxplot of net income differences between male and female, accounting for occupation (UK)

Fig. 8 supports the evidence in Fig. 5 and shows that female individuals earn lower incomes than male individuals, controlling for age (indicated in age groups). The median income for both male and female peaks during the 38-48 years of age. It is notable that the difference in male and female net income grows as individuals approach their late 20s, 30s, 40s, and 50s. From this we can gather that the net income gap widens between the sexes as individuals become older, as evidenced by the minor differences in income between male and female in the 16-26 age group. The increase in the income gap as male and female age may have further implications on their satisfaction with life overall.

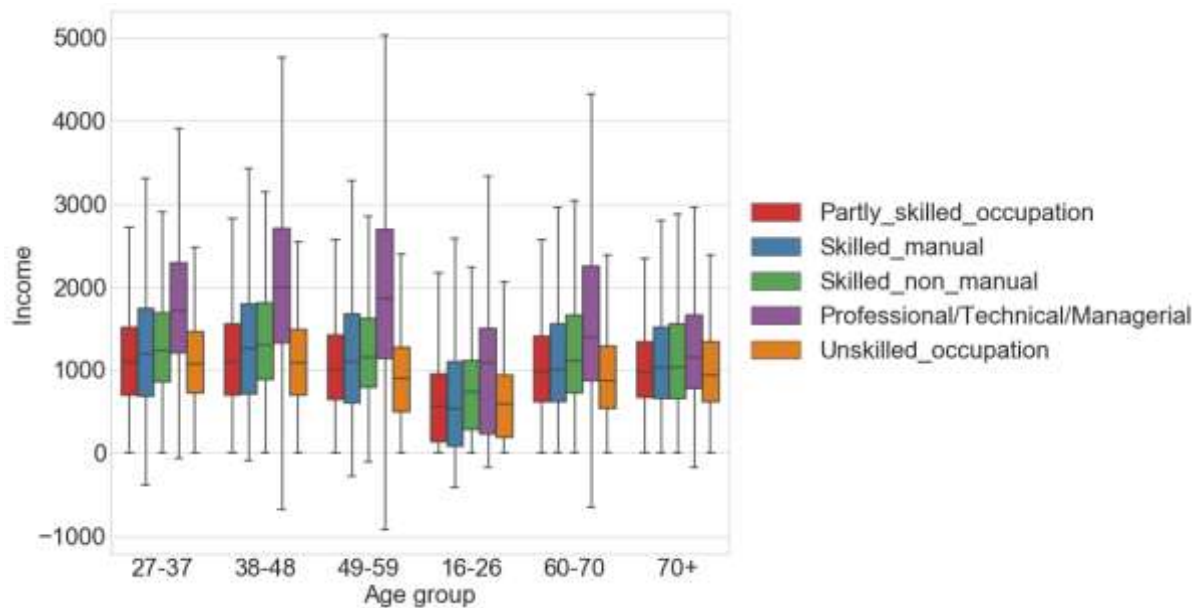


Fig. 9. Boxplot of net income differences controlling for occupation skill and age group (UK)

Fig. 9 supports the above findings and shows that income differences controlling for age does widen as age increases. More specifically, individuals aged between 16-26 and have an unskilled occupation have approximately the same level of income as those individuals with skilled manual occupations.

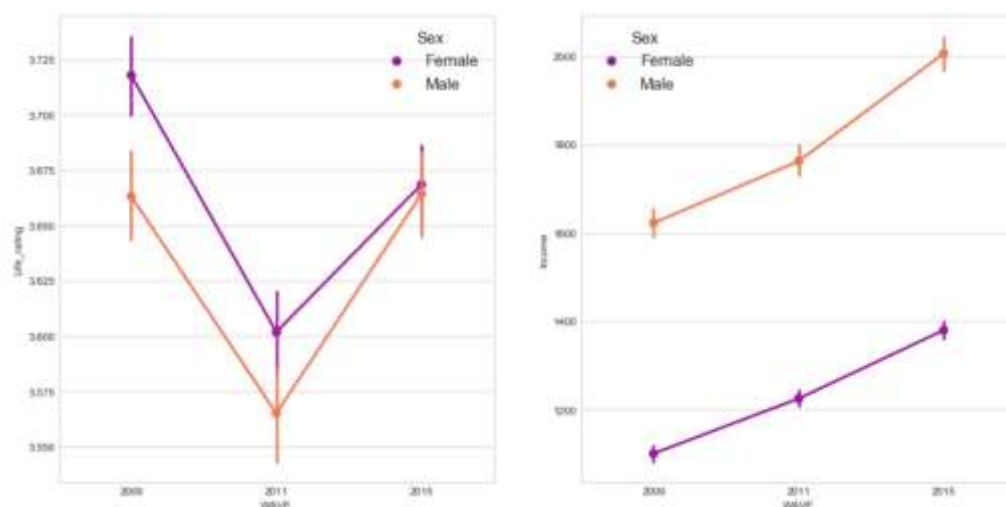


Fig. 10. SWB (left) and income (right) trends of men and women (UK)

Fig. 10 shows that the trend of wellbeing for females and males follow the overall trend of wellbeing in the UK in Fig. 5. However, wellbeing for female individuals remain higher than males throughout the 2009 to 2015 period, though both sexes approach a similar point of wellbeing in 2015.

The income trends for female and male individuals suggest that higher incomes do not necessarily produce greater wellbeing. It is observed from Fig. 8 that that a large gap in net income exists between males and females. More specifically, it shows that working females in the data sample have not caught up in terms of net income to their male counterparts. However, the evidence shows female individuals are on average more satisfied with their lives even though they generate less net income.

From the above, we can infer that higher incomes do not always result in greater SWB. Indeed, it seems reasonable to argue that individuals with higher incomes experience higher stress and anxiety levels in order to maintain their level of income or improve their earning ability in the labour market.

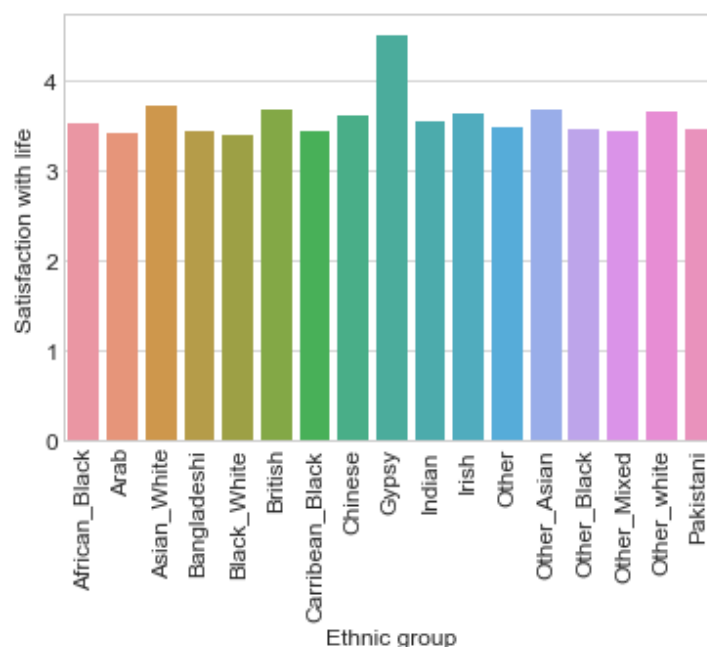


Fig. 11. Bar chart of SWB for different ethnicities (UK)

Fig. 11. shows that the SWB for most ethnicities are similar, with the exception of Gypsy. The data sample on ethnicity is dominated by the White British and Asian ethnicities, with a low number of individuals classified as Gypsy, thus the higher satisfaction with life shown here by the Gypsy ethnicity may be skewed by the low sample.

Additionally, it is noteworthy that ethnic minorities – i.e. those who are not White, generally have a lower average SWB relative to ethnicities such as British, Irish, Other White, and Asian White. This suggests that the wellbeing levels for ethnic minority individuals and individuals with a migrant history background have lower levels of wellbeing in the UK. This noticeable difference in SWB between White ethnicities and ethnic minorities is a plausible indicator of poorer integration within a

predominantly white society or that the socio-economic conditions of ethnic minorities are worse compared to the white ethnic groups.

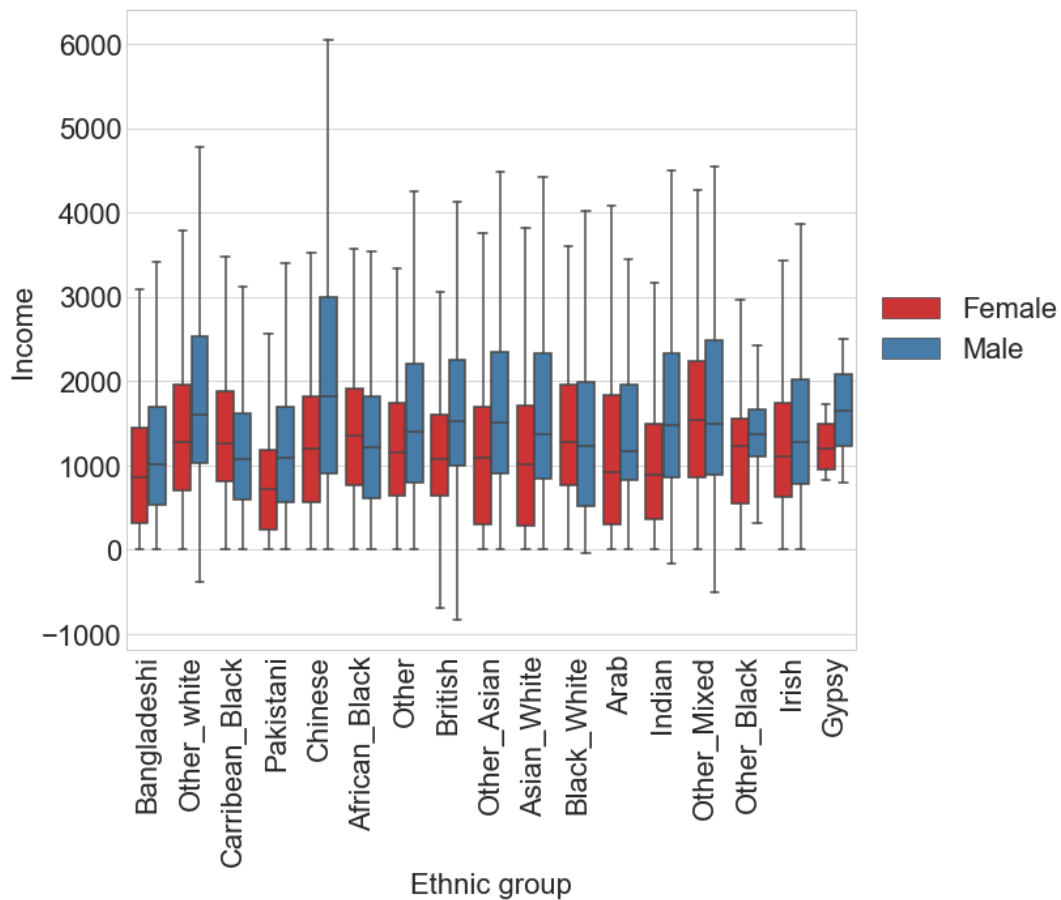


Fig. 12. Boxplot of income differences in sex, accounting for ethnicity (UK)

Fig. 12 shows the net income gap between male and females previously discussed are sizeable for most ethnic groups. The highest difference is observed in the level of net incomes for male Chinese and female Chinese individuals, where the difference in median incomes is much larger than any other ethnic group.

Several instances of female individuals earning more than their male counterparts are observed, notably in the African Black, Caribbean Black, Black White, and Other Mixed backgrounds. Interestingly, these individuals are all classified under the Black ethnic group; this, warrants further investigation as to the occupational difference

Furthermore, Fig. 10 indicates ethnic minority individuals generally have lower earning power relative to the White ethnic groups. However, higher incomes do not necessarily produce higher SWB levels, as previously shown.

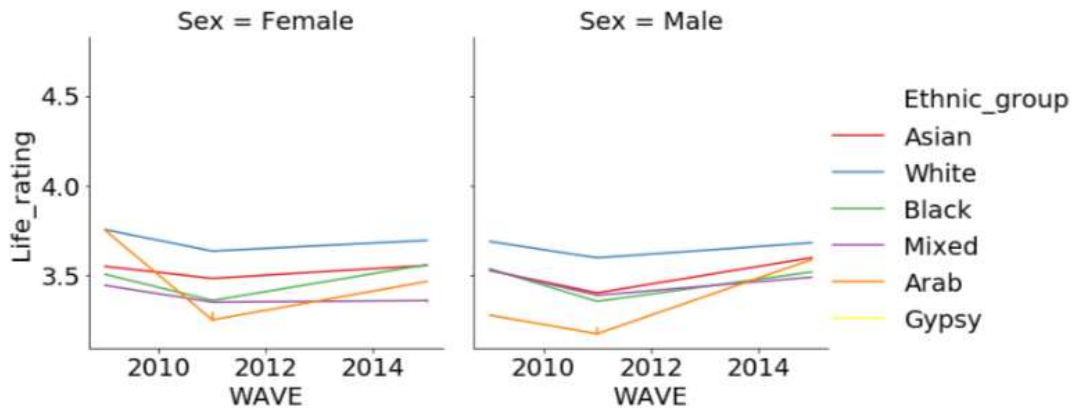


Fig. 13. Line plot of SWB differences, accounting for sex and ethnicity (UK)

Fig. 13 shows that White ethnic groups such as British and Irish have generally higher wellbeing levels than ethnic minorities. All ethnic groups suffered a decline in wellbeing from 2009 to 2011. Female Arabs experienced the worst fall in wellbeing for and followed by female Blacks.

The decline in male wellbeing across the ethnic groups is noticeably stronger than that of the females. This may be attributed to the significant job losses of male workers in the aftermath of the 2008 recession. It is striking that the wellbeing levels of the White and Asian ethnic groups did not experience a great decline relative to other ethnic groups in the same period. Moreover, the wellbeing levels for female and male Whites are almost indistinguishable.

The pattern of wellbeing across the ethnic groups is consistent with their levels of income. Specifically, Whites and Asians have higher incomes and wellbeing levels than their Black and Arab counterparts, controlling for sex.

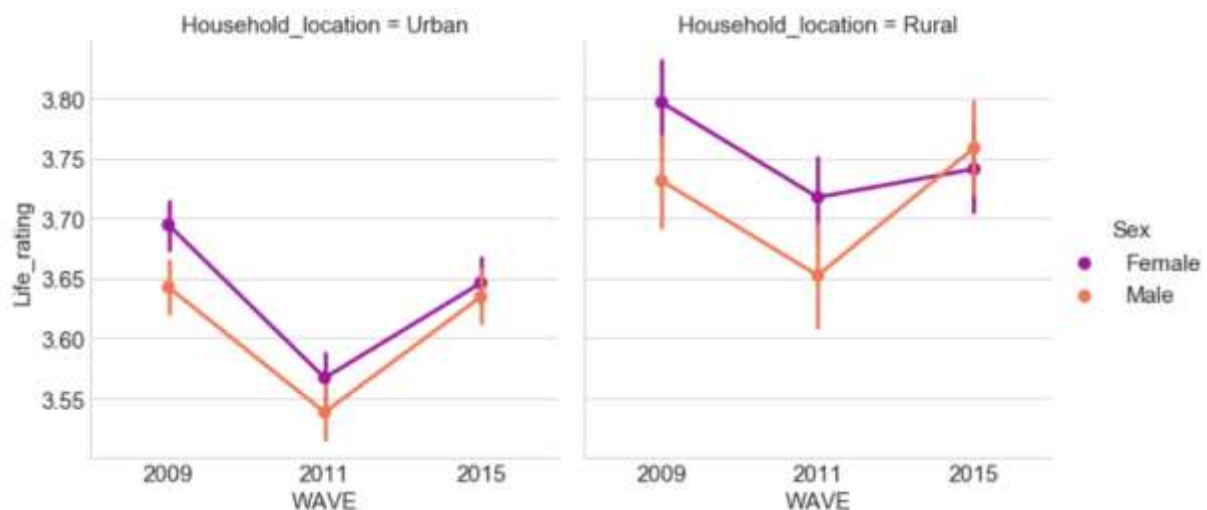


Fig. 14. SWB differences between urban and rural residents (UK)

Controlling for where individuals live – i.e. urban or rural residence, the wellbeing of urban males and females are significantly lower than their rural counterparts (Fig. 12). However, the dispersion of values in wellbeing levels for rural individuals are much higher than those who live in urban areas. This can

be plausibly attributed to variations in the community and infrastructure conditions of the rural areas. The quality of community and infrastructure can be surmised to affect the wellbeing or socioeconomic conditions of an individual.

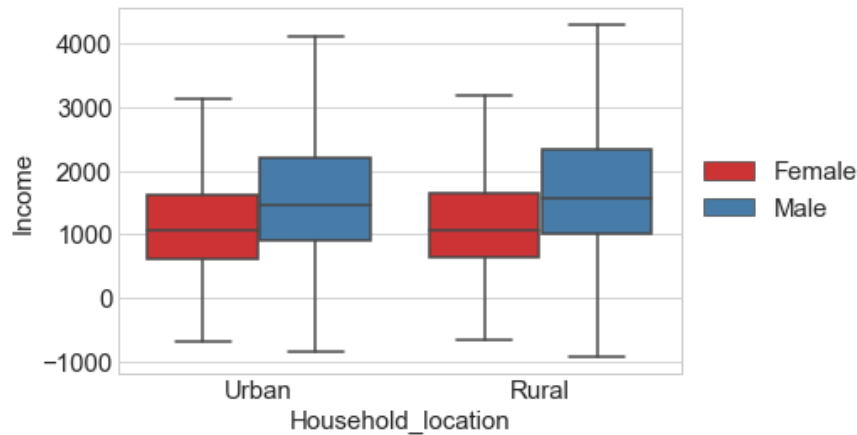


Fig. 15. Income difference between urban and rural population (UK)

The lower wellbeing of urbanized individuals relative to rural individuals can be explained by a variety of factors. For example, the lower level of wellbeing can be attributed to the fact that individuals living in urban areas experience higher stress and greater financial responsibilities due to higher rent and property prices (relative to more rural areas). Additionally, fig. 15 shows that the income difference between urban and rural dwelling individuals is negligibly small, thus urbanized individuals are not necessarily better off in terms of income than rural dwelling individuals.

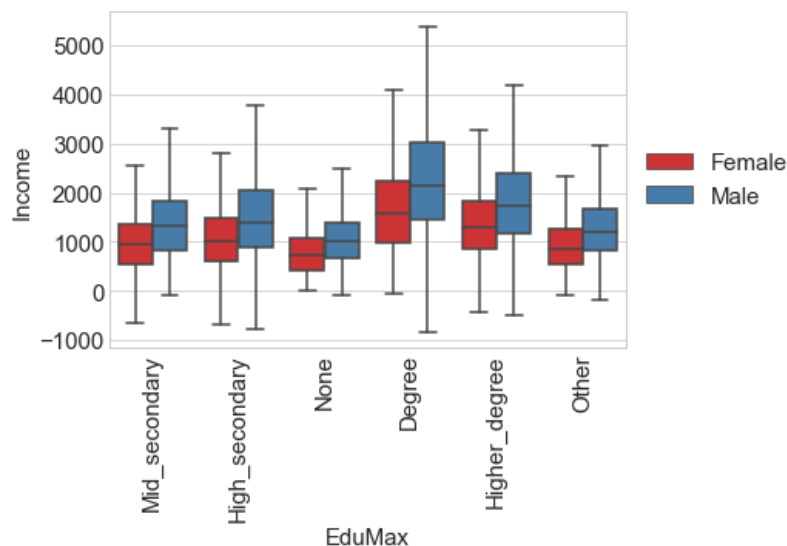


Fig. 16. SWB and income differences accounting for sex and education (UK)

Fig. 16 indicates the net income of male individuals are higher than females, after controlling for each individual's highest education qualification. The difference in the median income for males and females with degrees and higher degrees is significantly greater than differences in other educational backgrounds. Moreover, the gap in median income between males and females exists even when both sexes do not have any educational qualifications.

In the context of SWB, the evidence suggests that even after controlling for educational backgrounds, the lower net income of females does not necessarily cause the wellbeing of female individuals to be worse than that of males (Fig. 16). This suggests other institutional, economic or social factors are causing the net income differences and variation in wellbeing between males and females.

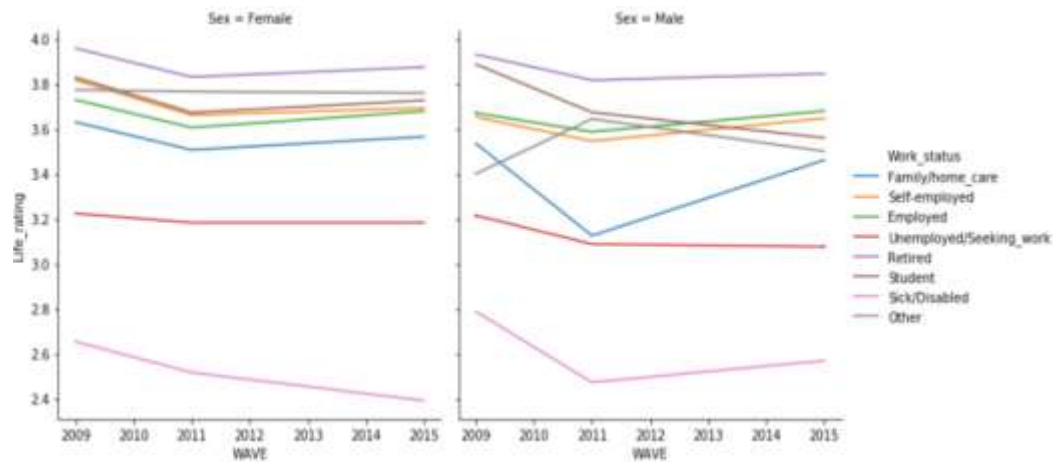


Fig. 17. SWB differences accounting for labour force status (UK)

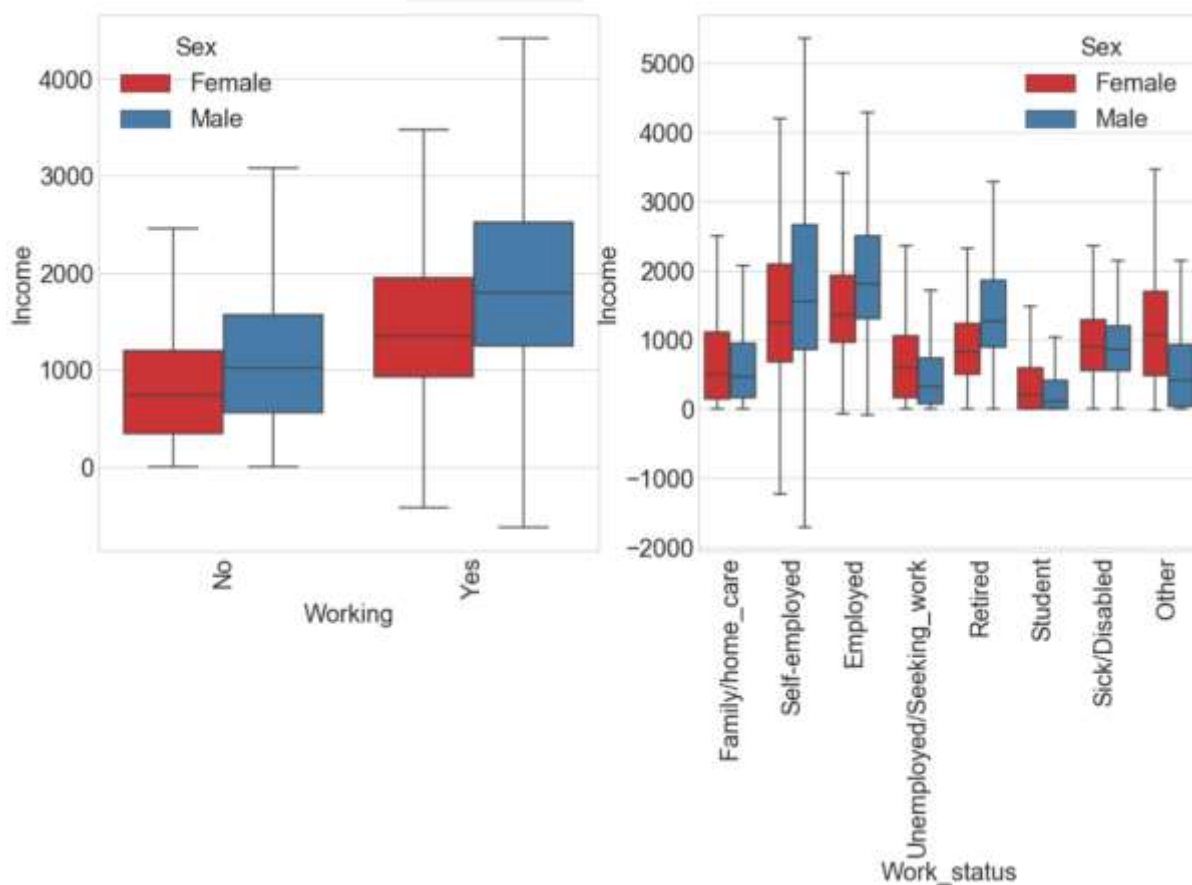


Fig. 18. SWB differences accounting for labour force status (UK)

Fig. 18 shows that the median income of the employed individual is the highest (for both male and female), followed closely by the self-employed. Several instances of females having higher net income are found. The student, sick/disabled, and unemployed categories see the median incomes of females as slightly higher than their male counterparts. The difference in net income between the self-employed and employee men and women may have significant implications on their SWB.

The SWB trends show that retired individuals and students have some of the highest SWB levels (Fig. 17), followed by the employee and self-employed men and women. The lower SWB level of the self-employed relative to the employee can be attributed to the larger risk undertaken by these individuals compared to employees. Moreover, the relatively higher SWB of the employees can be accredited to their growth of income over time as they contribute increasing value to their employers (Shen et al., 2013).

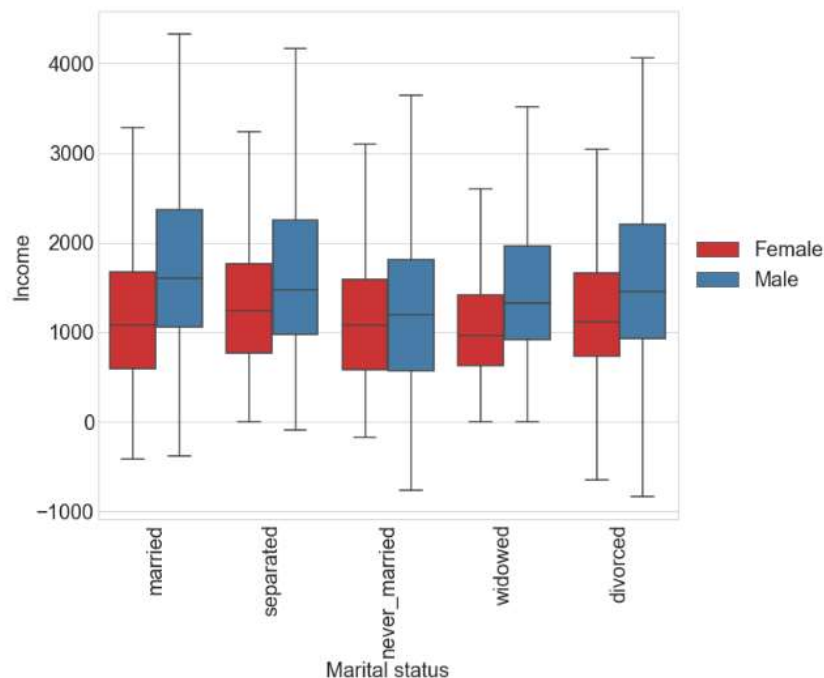


Fig. 19. Income differences accounting for marital status

Fig. 19 shows that married men have higher median incomes than the married woman, which can be attributed to the higher financial responsibilities as a result of being married and raising families. The median income for married women, on the other hand, is strikingly lower than women who are separated and is almost the same as those women who never married. The evidence here suggests the income levels for women does not vary significantly depending on their marital status. More specifically, the factors that significantly affect women's income and SWB are education, ethnicity, and occupation.

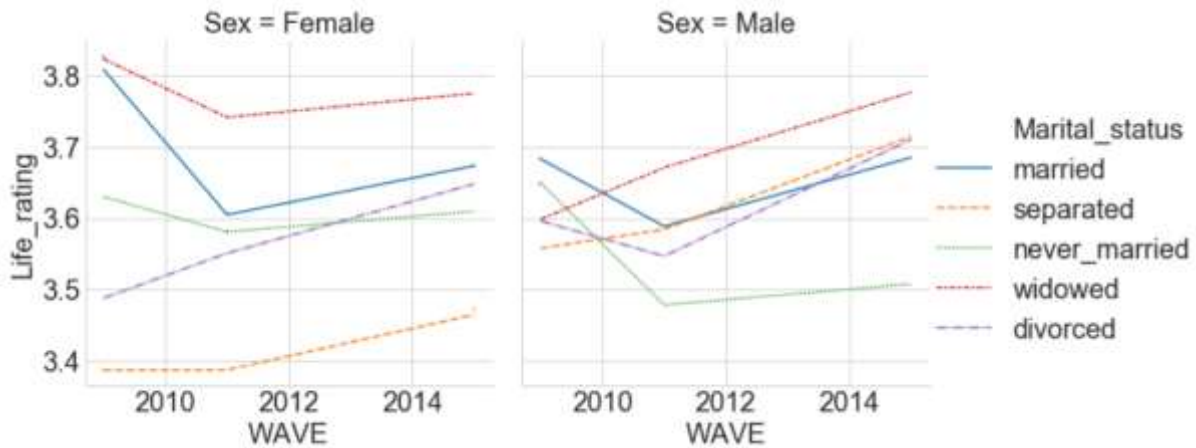


Fig. 20. SWB differences accounting for sex and marital status (UK)

The trend of SWB in Fig. 20 shows that married and widowed individuals have some of the highest SWB levels. Note that the number of widowed individuals is very low in the sample and is not nationally representative in this case. Women that are never married in the UK are generally happier than unmarried men. However, women who are separated from their spouses are much less happy than separated men.

It is notable in Fig. 20 that married men become less happy than those who are separated or divorced over time, this observation may be attributed to a myriad of sociological factors, such as that married men must undertake more responsibilities and financial stress that accompanies their married life. On the other hand, it is reasonable to suggest that divorced and separated men do not have the same levels of stress experienced by those who are married.

5.2 China

Descriptive Statistics

	N	Mean	Std. dev.	Min.	25 %	Median	75 %	Max.
Age	1,131	51.660	14.072	20.000	42.000	52.000	62.000	92.000
Income	1,131	25,836.344	43,184.321	-5,300.000	12,000.000	19,490.500	30,000.000	1,099,989.000
Life_rating	1,131	3.779	0.823	1.000	3.000	4.000	4.000	5.000
GDP.growth..annual..._x	1,131	8.664	1.149	7.042	7.042	9.400	9.551	9.551
GDP.per.capita..current.USD._x	1,131	5,839.104	1,736.626	3,832.236	3,832.236	5,618.132	8,066.942	8,066.942
Gini.coefficient_x	1,131	43.333	4.299	38.600	38.600	42.400	49.000	49.000

Fig. 21. China statistics (2009-2015)

The average age of the Chinese individual analysed is 51 years (close to that of the UK). The average level of SWB is 3.779 points with a standard deviation of 0.823 points. This indicates that there is miniscule variation in the SWB levels of UK individuals. The annual GDP growth averages at 8.664 (compared to -0.117 in the UK).

However, the average GDP per capita (in USD) is significantly lower in China (5, 839.104) compared to that of the UK (41, 908.847). Additionally, the variation in GDP per capita is high for the Chinese population, with a standard deviation of 1,735.922 USD, when accounting for the average GDP per capita. The income inequality is also worse in China (Gini coefficient averages at 43 points) compared to the UK (average of 33.56 points).

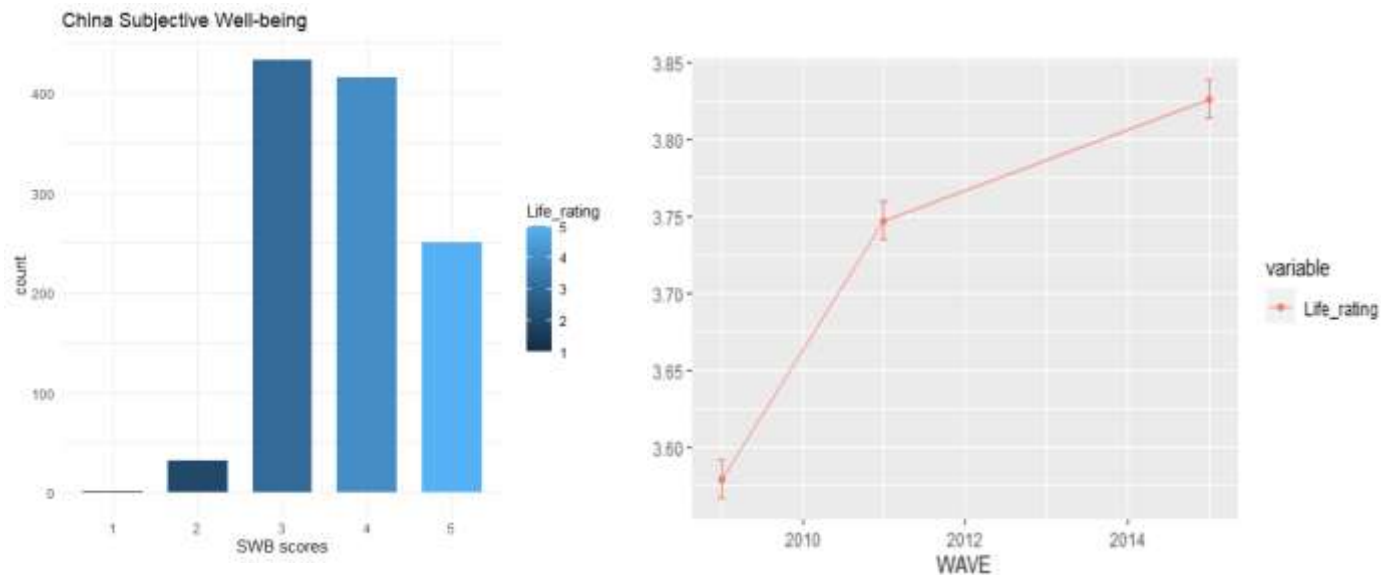


Fig. 22. SWB trend of China (2009-2015)

Fig. 22 shows that the SWB levels of the Chinese have been rising steadily over the past several years. This is attributed to the fact that more recently developed economies experienced significantly less impact from the 2008 recession. In fact, China's economic growth accelerated substantially during the same period which the UK saw a faced a decline in growth with the accompanying degradation in quality of life for the UK population.

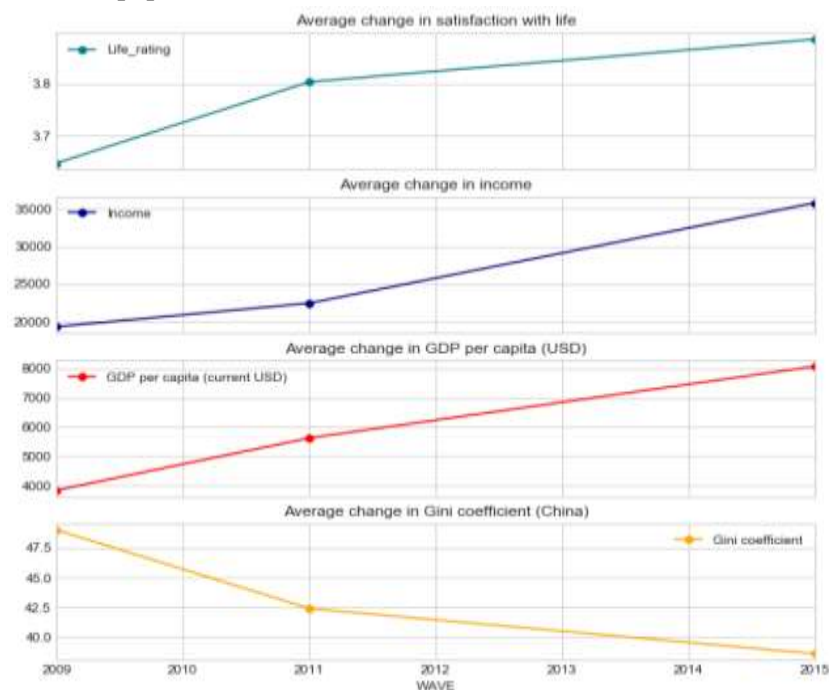


Fig. 23. Average rate of change in SWB, Income, GDP, and Gini coefficient (2009-2015)

Fig. 23 shows that the average rate of change of SWB in China is slightly slower than that of the UK. However, the average rate of income growth in China's is slightly faster than that of the UK. From 2009 to 2015, China saw a gradual decline in the Gini coefficient (at a rate slower than the UK). Strikingly, both countries saw a rise in the SWB as the Gini coefficient fell, indicating a relationship between the distribution of income within a country and SWB. Additionally, a positive relationship is observed between the average growth in GDP per capita, income, and SWB in both countries.

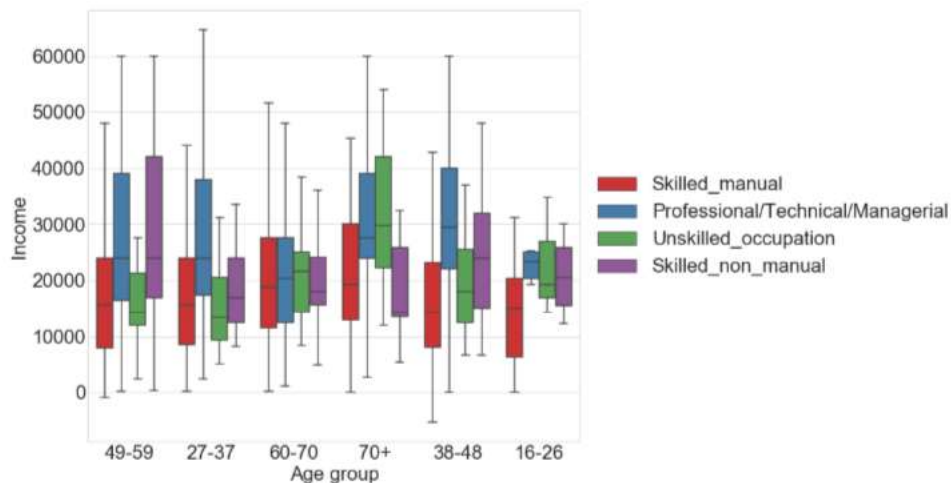


Fig. 24. Boxplot of net income differences between age groups, accounting for occupation skill (China)

Fig. 24 shows the income difference between various age groups of the Chinese population, controlling for their occupation skill. Individuals in highly skilled professional/technical/managerial occupations command some of the highest median incomes. Older generations Chinese, noticeably in the 70+ bracket also see significantly high income for professional work. Several outliers exist, such as the high income for individuals over 60 years of age individuals and works in an unskilled occupation (but has higher median income than professional occupations). This may be attributed to socioeconomic factors not within the scope of this study e.g. an individual's social network. The overall pattern is highly skilled occupations confer higher incomes for the younger generation.

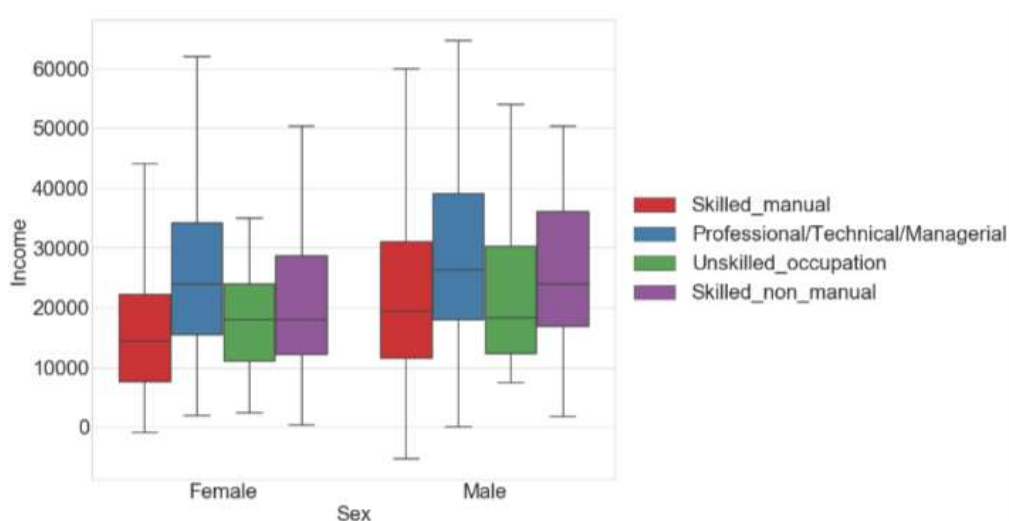


Fig. 25. Boxplot of net income differences between male and female, accounting for occupation skill (China)

The median income for male Chinese individuals is higher than their female counterparts, after controlling for occupation skill (Fig. 24). Indeed, the median income for male Chinese working skilled manual jobs (e.g. farming) and skilled non manual jobs (e.g. general office work) have almost the same income as a female Chinese individual working in a professional trade (e.g. manager). However, both sexes have the same median income when working in an unskilled occupation.

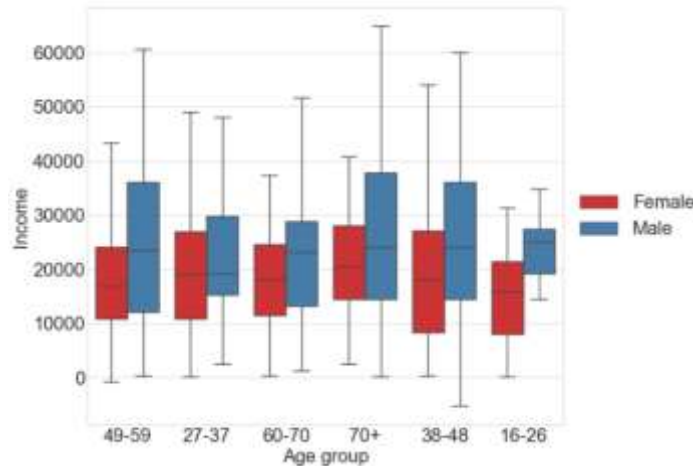


Fig. 26. Boxplot of SWB differences between male and female, accounting for age group (China)

The median income for female Chinese across all age groups are lower than their male counterparts, similar to the UK situation (Fig. 25). This difference is at the lowest for Chinese individuals in the 27-37 age bracket, and widest at the 16-26 age bracket. Similar to the UK population, the median income gap for male and female Chinese grows as the age increases. In contrast to the UK, the income difference in the 16-26 age group for Chinese individuals is much larger. This may be attributed to the greater inequality of socioeconomic conditions in China compared to the UK. More specifically, social mobility in China is highly restrictive due to institutions such as the Gaokao and the Hukou system, which widens the income difference of the younger Chinese.

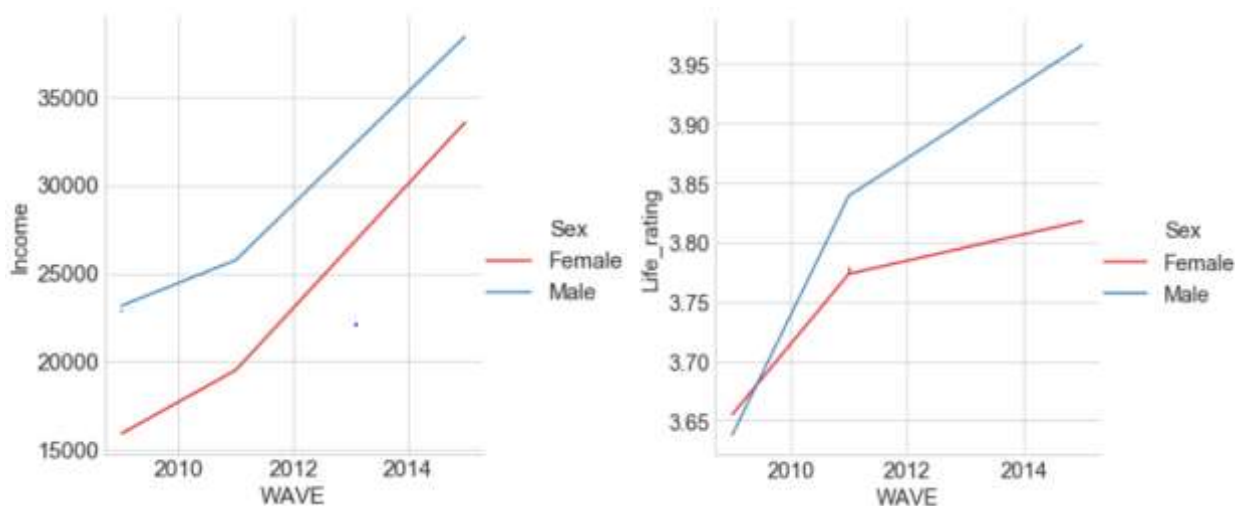


Fig. 27. Income (left) and SWB (right) trends of men and women (China)

Fig. 26 show that the SWB of male Chinese individuals are significantly higher than their female counterparts throughout the 2009-2015 period, which sharply contrasts with the UK (where the opposite is observed). Additionally, the difference between male and female SWB is growing wider, although their levels were almost the same in 2009. This is significantly different to the UK situation, where the SWB of female and male approaches a similar point in the 2015. The income trend in Fig. 26 indicate that rising incomes for female Chinese individuals did not contribute to improving their SWB over the years to the same extent which it improved male SWB.

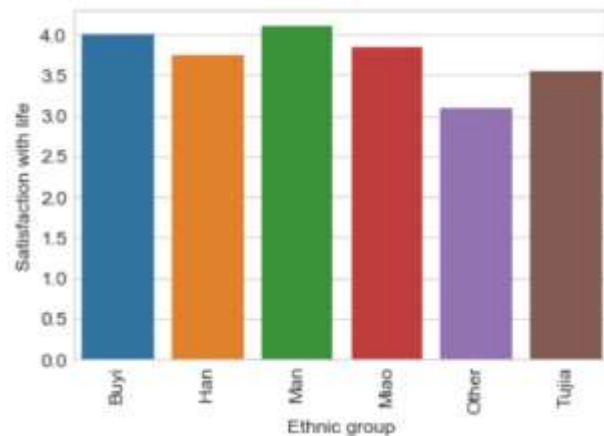


Fig. 28. Bar chart of SWB for different ethnicities (China)

Fig. 28 shows the SWB levels for ethnic groups in China. The group ‘Other’ includes ethnicities that are not officially recognized by the government. The data shows ethnic minority groups such as the Buyi, Man, and Miao have higher average SWB levels compared to Han Chinese (the ethnic majority) because of the smaller populations of the former group. However, after taking into account the population of each group, the Han Chinese have the highest SWB.

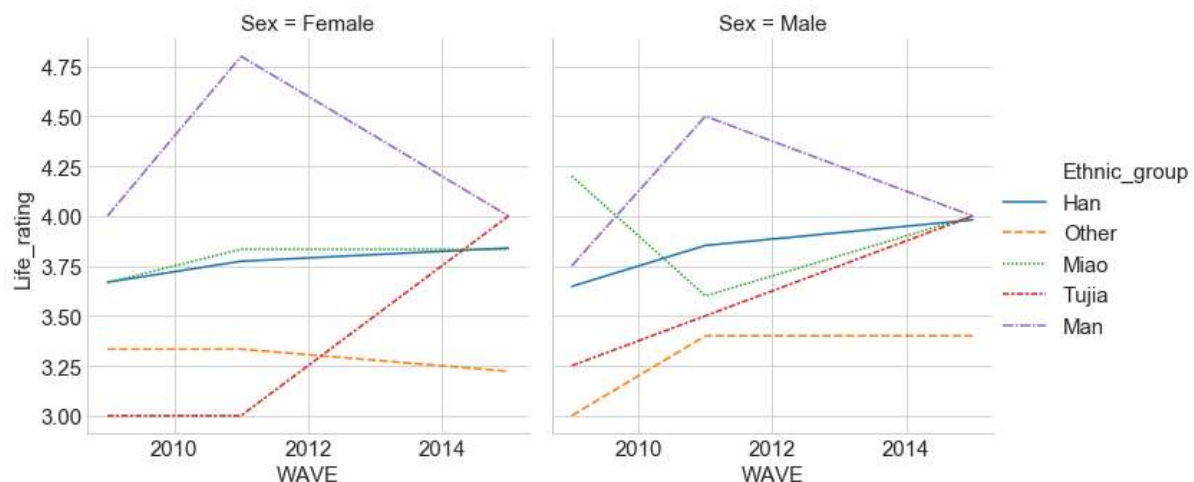


Fig. 29. Line plot of SWB for different ethnicities (China)

Fig. 29 shows the steady increase in the SWB levels of the Han and Tujia ethnic groups, whereas the Man group saw a sharp decline in SWB after 2011 for both sexes. This observation is consistent with the socio-demographic situation of the UK where the ethnic majority (White) have higher SWB than other ethnic groups.

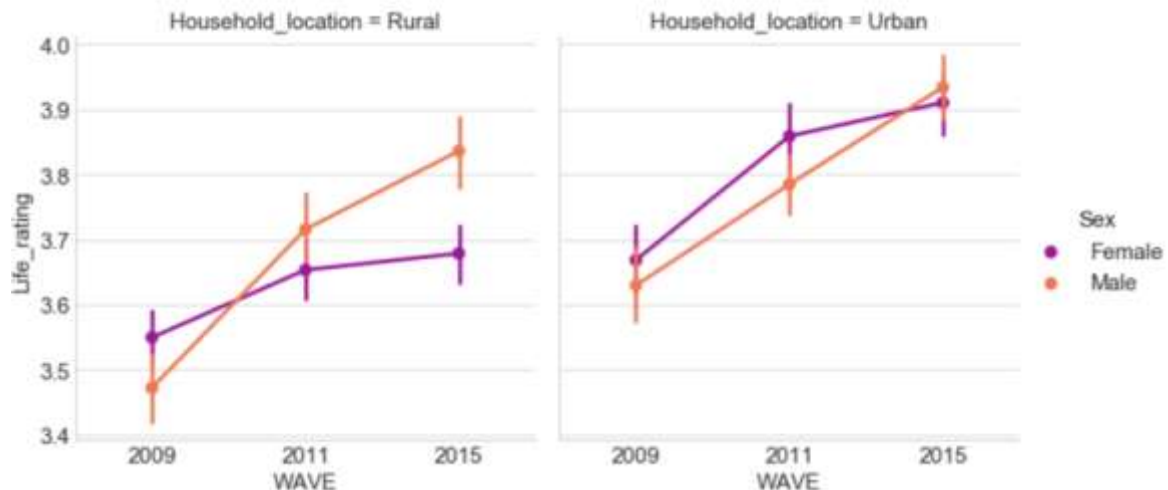


Fig. 30 SWB differences between urban and rural residents (China)

Fig. 30 shows that China contrasts sharply with the UK. The SWB of the urban Chinese population has been increasing year on year and is much higher than the rural population. This is consistent with the current socio-demographic trends of China, which is characterized by waves of rural-to-urban migration. This produced stronger inequality in outcomes, particularly in terms of income, between the rural and urban Chinese.

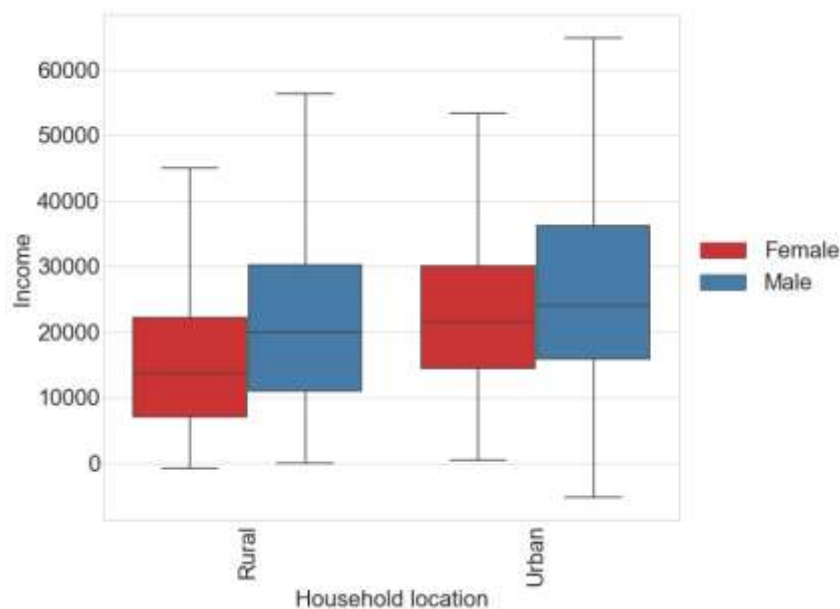


Fig. 31 SWB differences between urban and rural residents (China)

Fig. 31 shows the income difference of the rural-urban incomes is consistent with the rural-urban SWB. In contrast to the UK, urban Chinese individuals earn higher incomes than their rural counterparts, which may explain why urbanized Chinese have higher SWB levels (Fig. 30).

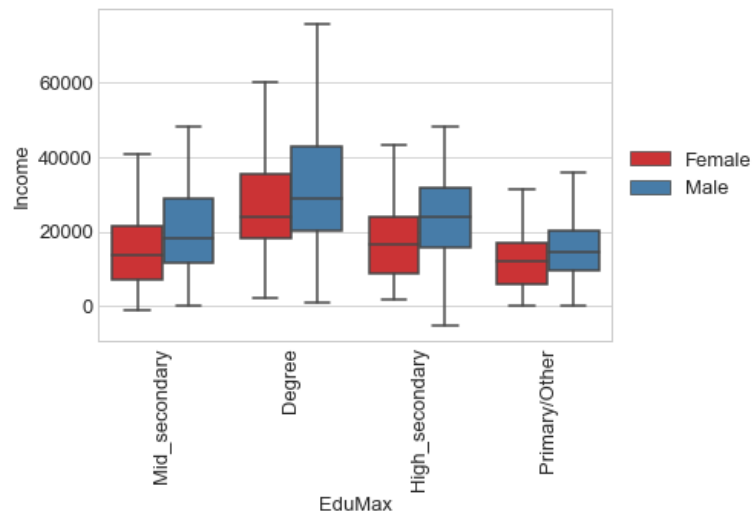


Fig. 32 Income differences controlling for education background (China)

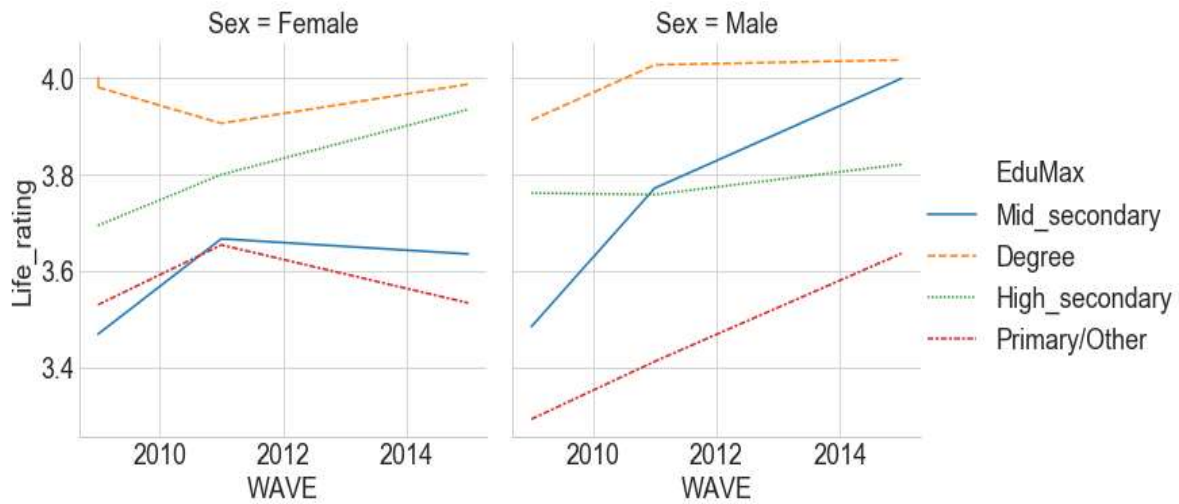


Fig. 33 SWB differences controlling for education background (China)

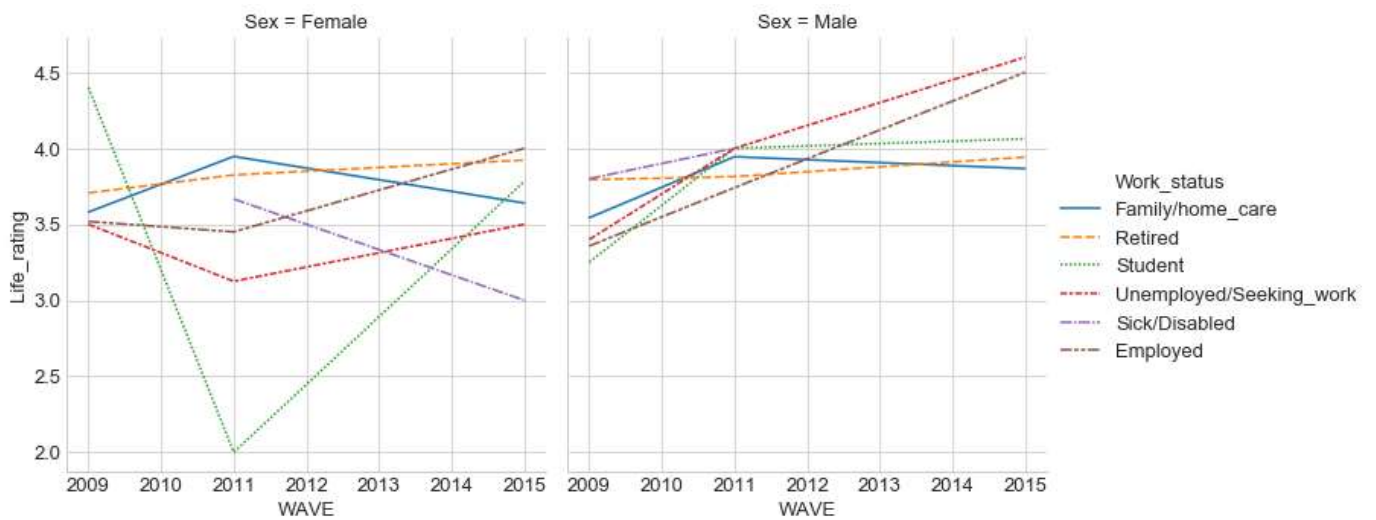


Fig. 34. SWB differences accounting for labour force status (2009-2015)

Fig. 32 and 33 suggests Chinese individuals with a degree has the highest income and SWB, whereas those with only primary school qualification have the lowest income and SWB. Similar to the UK situation, the median income of women with degrees is lower than their male counterparts. Fig. 32 shows that the median income of women is almost equivalent to the median income of a male Chinese with a high school degree. This suggests that a high education background provides higher incomes and a SWB in China.

Fig. 34 shows the SWB of employed individuals have been steadily increasing throughout the years for both male and females. The male population on average have SWB levels than the female, as evident by the fact that the SWB has been increasing irrespective of their labour force status. The SWB trend shows that employed and retired female individuals have been increasing year on year. There was a sharp decline in the SWB of female students from 2009 to 2011, but increased rapidly from 2011 to 2015.

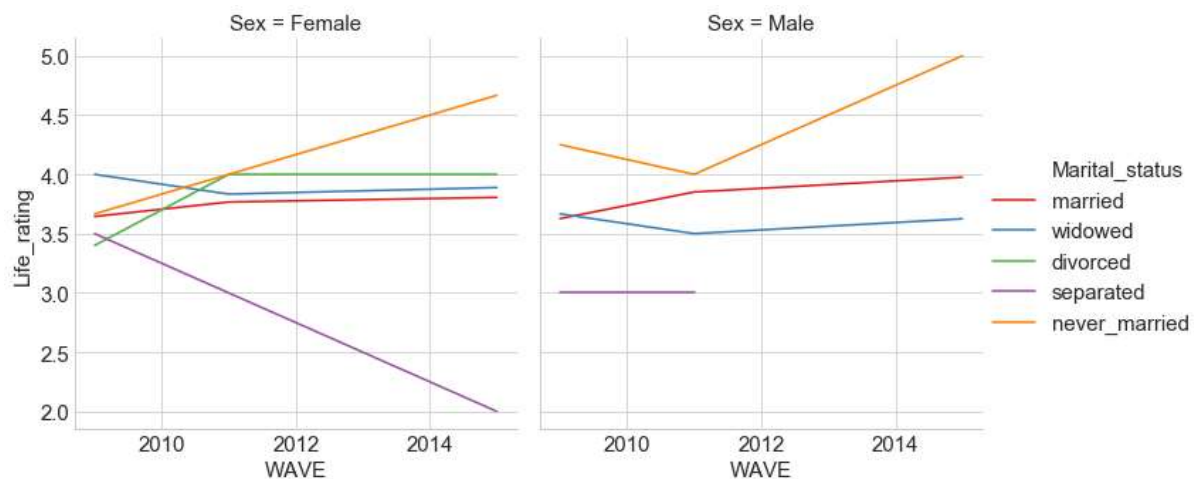


Fig. 35. SWB differences accounting for marital status (2009-2015)

Fig. 35 indicates unmarried men and women have the highest SWB, which has been increasing since 2011. This contrasts with the UK, where married women are generally happier. Additionally, unmarried men in China has higher SWB than married, whereas unmarried men in the UK have the lowest SWB. This suggests that being married in the UK may be an important contributor to men and women's SWB, unlike China.

6. Modelling approach

Given the data analysed here is longitudinal by nature, then independence of observations is absent (an assumption fundamental to generalized linear models). Indeed, the observations within an individual are expected to be more similar than those observations between individuals. Observations between individuals can be understood as those values that are specific to one individual within a time frame - i.e. repeated observations within a variable.

This problem can be negotiated by fitting a generalized linear mixed model (GLM) – i.e. one which has a random intercept and slope for every individual in the data. This approach allows for the investigation of what is the effect of the independent variables (treatment) on the dependent (outcome) for any individual, provided that they have their own random intercept and slope. However, this GLM is not useful in the context of this study. What is of importance here are the average effects of the independent variables on the population’s SWB within the UK and China – i.e. the marginal effect of variables.

The question this study seeks to answer is how the dependent variable (SWB) changes when one independent variable change? To do this, a GLM is fitted with a generalized estimating equations (GEE). The GEE model allows for assessing the population specific marginal effects of variables and it considers the possibility that observations within individuals are more likely to be similar than values between observations. Moreover, GEE can work with dependent variables measured in discrete values.

The GEE models for the data on the UK and China data are fitted in R. The model selection is based on the QIC (Quasi-likelihood Information Criterion) and the model with the lowest QIC is chosen (shown below).

6.1 The UK model

The QIC for the UK model is -142793.40 and the summary of the model is provided below:

Variables	Estimates	p-value
Intercept	3.81	0.0001
Sex (Male)	-0.05	0.0001
Age	0.01	0.03
Income	0.7	0.4
Household location (Urban)	-0.05	0.2
Marital status:		
married	0.03	0.016
never married	0.01	0.25
separated	-0.07	0.018
widowed	-0.04	0.046

Primary occupation type:	Estimates	p-value
Professional	0.02	0.01
Skilled manual	0.01	0.54
Skilled non manual	0	0.71
Unskilled	-0.01	0.02

Work status:	Estimates	p-value
Family/home care	-0.17	0.01
Other	-0.06	0.56
Retired	0	0.9
Self-employed	-0.02	0.023
Sick/Disabled	-1.15	< 0.001
Student	0.02	0.07
Unemployed / Seeking work	-0.54	<0.001

Ethnic group:	Estimates	p-value
Arab	-0.15	0.061
Asian White	0.18	0.007
Bangladeshi	-0.05	0.231
Black White	0.1	0.068
British	0.09	0.002
Caribbean		
Black	-0.09	0.028
Chinese	0.02	0.048
Gypsy	0.95	0.003
Pakistani	-0.06	0.015
Indian	-0.01	0.3
Irish	0.11	0.016
Other Asian	0.11	0.021
Other Black	-0.06	0.045
Mixed	-0.16	0.028
Other white	0.05	0.186

Education:	Estimates	p-value
High secondary	-0.09	< 0.001
Higher degree	-0.08	< 0.001
Mid secondary	-0.1	< 0.001
None	-0.09	< 0.001
Other	-0.1	< 0.001

Fig. 36 The UK GEE model

The p-value of majority of the variables are < 0.05 , which indicate the inputted independent variables are significant (at the 95% confidence threshold) for explaining SWB. A negative coefficient for the variable estimate indicates a negative association with SWB. For example, being male in the UK is associated with poorer SWB. Conversely, positive coefficients indicate a positive association with SWB, for example being married is associated with higher SWB. Overall, the model results are consistent with visualizations of the foregoing section. This indicates the model has sufficient explanatory power with the provided independent variables.

6.2 China model

The QIC for the China model is -2773.3 and a summary is provided in the tables below:

Variables	Estimates	p-value
Intercept	3.35	<0.0001
Sex (Male)	1	0.04
Age	1	0.033
Income	1	0.162
Household location (Urban)	1.03	0.042
Marital status:		
married	1.07	0.16
never married	1.16	0.054
separated	0.85	0.67
widowed	1.05	0.375

Ethnic group:	Estimates	p-value
Man	1.12	0.001
Miao	0.97	0.37
Han	0.88	0.004
Tujia	0.9	0.001

Primary occupation type:	Estimates	p-value
Professional	1.04	0.001
Skilled manual	0.98	0.466
Skilled non manual	0.99	0.03
Unskilled	-0.1	0.024

Education:	Estimates	p-value
High secondary	-0.09	< 0.001
Higher degree	-0.08	< 0.001
Mid secondary	-0.1	< 0.001
None	-0.09	< 0.001
Other	-0.1	< 0.001

Work status:	Estimates	p-value
Employed	0.97	0.001
Retired	0.99	0.07
Sick/Disabled	0.8	0.79
Student	1.01	0.875
Unemployed / Seeking work	0.96	0.207

Fig. 37 The China GEE model

Most of the variables in the model have a p-value of less than 0.1 which indicates the independent variables are significant at the 90% threshold. The coefficient estimates for most of the variables are

consistent with the exploratory analysis of the China data. For example, being unmarried in China is associated with higher SWB and having an unskilled occupation is associated with lower SWB.

7. Discussion

The foregoing analysis and model shows that female population in the UK is happier than their Chinese counterparts, compared to the male populations. This suggests there is a stronger socio-economic inequality between the sexes in China. Indeed, the income difference between male and female in China is significantly larger than what is observed in the UK.

Furthermore, significant difference can be found in the SWB when controlling for marital status. Individuals who never married in the study period are happier than those who married in China, which is the opposite of what was found in the UK. This may be due to additional institutional factors not accounted in this study – e.g. role of husband and wife in the household, the level of housework done by men and women.

Both the UK and China saw increasing SWB as individual income and GDP per capita increased. This runs contrary to what has been found in the literature earlier, which suggests that rising incomes in China has little effect on SWB. However, this rise in SWB in China and the UK in the study period may be attributed to the decrease in the income inequality (Gini coefficient), which is consistent with arguments in the literature that claim it is the relative income (relative to the societal norm) that matters, not the absolute level. The effect of increasing incomes in the UK produced little increase in the SWB for women, compared to a larger increase for men. Indeed, women in the UK are happier even though they earn less than men. This is the opposite of what is observed in China for the same period.

Another striking observation is the difference in SWB between the urban and rural populations observed in the UK and China. The rural population in the UK has higher SWB than the Chinese rural population, which can be attributed to the fact rural communities in China are far less economically developed than the UK. Furthermore, China sees extensive inequality in living standards between the rural and urban areas. This is less so for the UK, where the rural areas are far more developed in terms of infrastructure and are often earmarked significant areas of agricultural job growths.

An observation common to both the UK and China is that the individuals who are highly educated and work in professional occupations are more likely to report higher SWB than other groups. This is consistent with arguments present in the literature, which describe the positive effects of education on improving competitiveness in the labour market. Indeed, those who have degrees in both the UK and China have higher median wages and are among the sections of the population that report the highest SWB levels. This indicates that the path into higher education is an effective conduit for securing greater satisfaction with life in the future.

8. Conclusion

This study shows the relationship between socio-demographic variables, economic indicators, and SWB in a comparison on the UK and China. The exercise done here describes how SWB can be analysed and modelled in a longitudinal way. It shows how trends of categorical variables such as education and marital status can be analysed and how they can be mapped to the SWB. The results show significant differences in the determinants of SWB in China and the UK, for the given data. Marital status and household location were found to be the most contrasting variables in the determination of SWB in the comparison.

The analysis conducted here has been largely restricted to the availability of the data in China. In light of this, it is recommended that any future research that intend to investigate SWB in China for the purpose of comparing with another country (such as the UK) should quality of the data present in available surveys. This prevents the problem of making cross-country comparisons based on unbalanced sample sizes. Indeed, the problem of small sample size significantly affects the quality of the longitudinal analysis and modelling, thus this study acknowledges that the analysis conducted here for China is likely to not be nationally representative in the same way the UK data is.

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