Does Other People's Education Make Us Less Happy?

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Abstract

A growing body of literature suggests that the extent to which people feel happy with their lives depends, at least partially, on how they compare to those around them. Much of this literature, however, has focused on the relative effect of income on happiness while other factors such as education, marriage, or leisure have received less attention. In this study, I extend this line of inquiry by investigating how individuals' level of education, as well as the average level of education of their reference group, influences their happiness. Using longitudinal data from the Household Income and Labour Dynamics in Australia (HILDA) survey, I find that, even after controlling for an individual's own education, higher reference group education is associated with lower levels of happiness. More educated people, however, are found to be less affected by social comparison. The panel nature of the HILDA dataset, and additional tests, indicate that the negative association between happiness and reference group education is not driven by people's (changing) interpretations of the happiness scale, self-selection, or the income of their reference group. Additional robustness tests show that the results are not sensitive to variations in the definition of a reference group.

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1. Introduction

Mainstream economic models assume that individuals derive utility solely from their own consumption. The idea that people do not assess their life in isolation, however, but often compare their consumption to that of others, was central to the teachings of classical economists and their understanding of human behavior. In his Theory of Moral Sentiments, for example, Adam Smith (1759, p.50-51) writes: "To what purpose is all the toil and bustle in this world? … to supply the necessities of nature … to afford him food and clothing, the comfort of a house and of a family … The contrary has been so often observed … to be attended to, to be taken notice of with sympathy, complacency and approbation."

In the past decade, many papers in the emerging economics of happiness literature have examined empirically the effect of social comparison on subjective well-being (SWB).[2] The results largely confirm the intuition of the fathers of classical economic thought. Indeed, happiness[3] depends, at least partially, on how people compare to those around them. Much of this literature, however, has focused on the effect of relative income on happiness, and far less is known about the contextual (relative) effect on SWB of other factors such as education, marriage, or leisure.

In this paper, I extend this line of research by investigating whether individuals feel worse off when people in their reference group are better educated. Although education and income are often used interchangeably in social comparison studies, there is evidence in social epidemiology that they do not measure the same underlying phenomenon and their social comparison effects should be examined independently (Geyer, Hemström et al. 2006). Furthermore, the work of Solnick and Hemenway (1998, 2005) and Tversky and Griffin (1991) shows that people have relative preferences for some goods, but not others.

There are compelling theoretical and empirical reasons to believe that education is at least to some extent a positional good. From an evolutionary standpoint, the pursuit of status is motivated by sexual selection: to make sure that their genes spread across populations, sexual species need to appear more attractive than their same sex competitors (Darwin, 1871). Higher education may signal many desirable attributes—

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[2] For an excellent review of this literature see Frey and Stutzer (2002). Clark, Frijters et al. (2008) provide an engaging overview in the context of income comparisons.

[3] In this study, I use happiness, subjective well-being, and life satisfaction interchangeably. It is important to note, however, that psychologists identify three separate dimensions of happiness: (1) life satisfaction, which the outcome variable in this study, and reflects a cognitive evaluation of one's life at a point in time, (2) the presence of positive feelings or affect, e.g., positive emotions such as feelings of joy or sense of vitality, and (3) The absence of negative feelings or affect such as feelings of boredom, loneliness, etc. (Diener, 1984).

intelligence, motivation, or trustworthiness—that go beyond higher income and consumption. In this sense a college degree is a desirable trait both as an investment in future earnings and an "interesting dinner conversation" (Whelan, 2006). Previous research, for example, finds education and intelligence to be one of the most desirable traits in a partner (Boxer et al. 2014). The advantage that people get from a higher degree, however, whether in the work place or in other reams of life, diminishes with the number of people that hold the same degree. As Hirsch (1976, p.3) observed: "the utility of expenditure on a given level of education as a means of access to the most sought after jobs will decline as more people attain that level of education."

In the realm of social interactions, higher education can also lead to higher socio-metric status, i.e., the respect and admiration people receive in group-to-group interactions (Anderson, Kraus et al. 2012). This can contribute to greater feelings of power, control, and social acceptance, which are important determinants of SWB (Keltner, Gruenfeld et al. 2003). Socio-metric status, however, declines when the average education of the peer group increases. In addition, a number of studies in epidemiology find that lower educational and occupational status is associated with higher levels of stress hormones such as cortisol (Steptoe, Kunz-Ebrecht et al. 2003, Cohen, Doyle et al. 2006). Long et al. (1982), for example, find that when confronted with a person who shows signs of high status, not necessarily associated with higher income, individuals experience higher heart rate and increased blood pressure.

Using the latest release of the Household Income and Labour Dynamics in Australia (HILDA) survey, I show that the relationship between education and happiness is at least to some extent influenced by relative considerations. The results indicate that even after controlling for an individual's own level of education, higher level of reference group education is associated with lower satisfaction with life. This correlation is highly statistically significant and holds even when I control for reference group income and use several alternative measures of well-being that are less prone to different (changing) interpretations of survey questions on happiness. This relationship, however, is conditional on one's level of education: people with higher education are less prone to be negatively affected by social comparisons.

Developing a deeper understanding of the relationship between education and its contextual effect on SWB is important for several reasons. First, an increasing number of parents in developed countries believe that the most important goal that they want their children to achieve as adults is to be happy (Malhotra, 2015). In this regard, many

parents see higher education as a necessary tool to help their children reach this goal. The most recent World Happiness Report (Helliwell et al., 2015), for instance, encourages the development of skills that lead to higher levels of subjective well-being as a top priority for every school.

Yet, several recent studies document a negative or insignificant correlation between higher education and SWB (Clark & Oswald, 1996; Green, 2011; Powdthavee, 2010; Shields, Price, & Wooden, 2009). Many of these studies are based on the HILDA dataset (Powdthavee, 2010; Shields, Price, & Wooden, 2009), which makes the current study ideal for testing alternative hypotheses. One possible explanation for these puzzling results is that education makes people more ambitious, which might reduce happiness since higher expectations are more difficult to fulfill (Clark & Oswald, 1996). Another possible story is that most studies estimate reduced form happiness regressions that often control for variables such as income, health, and marital status and thus close these channels through which education may contribute positively to higher levels of SWB (Powdthavee, Lekfuangfu, & Wooden, 2015). The results in this paper suggest another possible explanation: Even if higher education is negatively correlated with SWB, some people may still pursue it because of its positional (status) effect.

Second, understanding the relative effect of education on SWB is also important because it can imply different predictions of the impact of public policy (Layard 1980, Ljungqvist and Uhlig 2000, Abel 2005, Frank 2005). For example, in the past several decades a large literature has emphasized that negative positional externalities can lead to arm races for conspicuous consumption and cause large welfare loses (Frank 1999, Frank 2005, Layard 2005, Frank 2012). [4] Frank (1999), for example, argues that spending patterns in the United States are significantly tilted in favor of "luxury" conspicuous consumption (i.e., consumption for the sake of displaying social status). Yet, as cars and houses grow bigger and more expensive, consumers spend more time at work and less time enjoying family and friends; they save less and borrow more; overall, social

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[4] A positional good is one whose utility depends on how it compares to other goods in the same category. A positional externality happens when new purchases alter the relevant context within which existing positional goods are evaluated (Frank, 2005). Consider the following example by Karl Marx (1847): "A house may be large or small; as long as the neighboring houses are likewise small, it satisfies all social requirement for a residence. But let there arise next to the little house a palace, and the little house shrinks to a hut. The little house now makes it clear that its inmate has no social position at all to maintain, or but a very insignificant one; and however high it may shoot up in the course of civilization, if the neighboring palace rises in equal of even in greater measure, the occupant of the relatively little house will always find himself more uncomfortable, more dissatisfied, more cramped within his four walls." Frank (1999) uses similar logic to argue that conspicuous consumption (i.e., consumption for the sake of status display) has significantly increased in the US over the last century. The result has been positional arm races (e.g., people are buying bigger houses, fancier cars, more exotic vacations, etc.); yet SWB has stagnated. He proposes a "luxury tax" as a solution to this problem.

well-being does not improve, but comes at a cost of misallocating resources to positional consumption. If education is a positional good that people desire largely because it sets them above their peers, then this could lead to positional arm races for higher education that can increase the number of people with higher degrees even if the private cost of obtaining more schooling is relatively high.

In the United States, for example, the number of college graduates has dramatically increased since the 1970's despite an unprecedented growth in the price of college tuition. Just in the past three decades the price to attend a private university has increased by more than 750 percent[5] (1000 percent for public institutions) leaving many to speculate that the increase in the price of college education is a result of a speculative bubble (Reynolds, 2012).[6] More and more students are taking on an increasing amount of debt to pay inflated tuition; yet, many Americans find themselves without the jobs and salaries necessary to justify paying the ever increasing price of higher education. According to the Bureau of Labor Statistics, in 2010, more than 17 million Americans were working jobs that required a lower skill level than the one associated with their degree (Vedder, 2010). In Australia, graduate employment is at its lowest since 1993 and an increasing number of big employers have decided to drop a "college degree" as a necessary prerequisite for a job because of the perception that college graduates have "no real skills" (Burke, 2016). If the social returns from higher education are smaller than commonly assumed, then competition for education status may lead to a sub-optimal number of people with higher degrees.

Finally, the idea that people care about relative status in the domain of education can be related to the rational actor theory approach in the sociology of economics. This theory suggests that a number of observed differences in educational choices between children from different social classes may come from their aspiration levels which are shaped by their socio-economic background (for an excellent summary, see Lévy-Garboua & Page, 2009). What is not in this literature, however, is the role of the reference group. The results in this study suggest that not only parents' achievements influence kids' educational aspirations, but also the kids' peers. As a consequence, one would expect that children from low socioeconomic background who happen to live in regions with above average educational levels will end up having higher aspirations. The current paper makes such mechanism possible through the channels of SWB.

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[5] As a comparison, the average price of a new home increased with 280 percent between 1980 and the peak of the housing bubble in 2007 (Reynolds, 2012).
[6] For example, see a series of articles on HigherEd: http://www.huffingtonpost.com/news/higher-education-bubble/

This paper contributes to the empirical literature on social comparison in three ways. First, to the best of my knowledge, this is the first paper that examines empirically how the average education of an individual's reference group influences their SWB. I also test if education plays a moderating role in the social comparison process. I find suggestive evidence for both of these theories. The richness of the HILDA dataset also allows me to control for a large number of personal characteristics such as health, the log of personal income, and marital status that can be correlated with both SWB and other explanatory variables in the model.

Second, even after controlling for a rich set of covariates, there is still a possibility that individuals, who find themselves in a more or less educated group of people, might adjust how they perceive (and answer) questions about their happiness. To mitigate this problem, I use several alternative measures of well-being that are less likely to be affected by such shifts in the interpretation of the definition of happiness and find similar results. I show, for example, that higher reference group education increases the use of anti-depressant prescription drugs and spousal separation.

Lastly, I show that the negative effect on reference group education holds even when I control for reference group income. This eliminates concerns that the results are merely capturing the average income of the respondent's reference group. Several robustness tests that use alternative definitions of a reference group provide further confidence in the findings.

2. Theoretical Consideration and Hypotheses

In this section, I provide a short overview of the social comparison theory and formulate a testable set of hypotheses. More extensive overviews of the social comparison theory are available elsewhere (Clark, Frijters et al. 2008).

2.1. Social Comparison and Well-being

While traditional economic models assume that individuals only care about their own income, there is by now compelling theoretical and empirical evidence that people also care about their relative status. Although this point is fairly obvious, in what way such relative considerations can be incorporated in economic models and what is their implication for human well-being and public policy has been widely debated in the past several decades (Easterlin, 1995, Layard 1980, Ljungqvist and Uhlig 2000, Abel 2005, Frank 2005).

The main idea of the social comparison theory, which was more formally introduced and empirically tested by the social psychologist Leon Festinger (1954), is that individuals constantly compare to one another in order to assess their abilities and attitudes. For example, people compare themselves to others in order to more accurately gauge how attractive, smart, educated or well-dressed they are. Recent research also suggests that people engage in social comparison not only to accurately assess their abilities, but also to improve their skills and self-image (Suls & Wheeler, 2012). More generally, people compare themselves to other people with certain qualities and usually in a particular domain of life. This comparison is sociological and external (McBride, 2001) and deeply-rooted in human nature (Frank, 1999). The group of individuals who have a strong influence on our behavior and is used as a benchmark for making such social comparisons is called the social reference group.

Research on the effect of social comparison on SWB is still in its infancy. Several psychological mechanisms, however, have been proposed suggesting contrasting effects. On the one hand, some studies suggest that upward social comparisons can motivate people to self-improve (Blanton et al., 1999). A person with a high school degree, for example, may choose to pursue a college degree if their reference point (perhaps a good high school friend) is someone who already has a higher degree. The so-called "tunnel-effect" (Hirschman and Rothschild, 1973) suggests that people can derive utility from other people's higher achievement if they see this type of social comparison to be informative about their own future selves. Senik (2004), for example, finds a strong positive and significant correlation between reference group income and SWB using the Russian Longitudinal Monitoring Survey, which she attributes to the "tunnel-effect."[7]

Majority of the previous empirical studies, however, find that an increase in reference-group income is associated with decline in SWB for those who did not experience an equivalent increase in status (Clark & Oswald, 1996; Ferrer-i-Carbonell, 2005; McBride, 2001; Stutzer, 2004). One possible explanation for this effect is that people who are worse off experience feelings of relative deprivation, envy, jealousy, or unfairness when they compare themselves to people who are better off. Such feelings of deprivation can arise if individuals believe that they lack certain qualities or resources that are socially desirable. Clark (1997), for example, uses the theory of relative deprivation to explain the puzzling (for most economists) observation that women are more satisfied with their jobs than men, even though by many objective standards

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[7] Two other papers find similar positive effect, e.g., see Senik (2008) and Kingdon and Knight (2007).

women's jobs are worse off than that of men. In economics, there is also a large literature that suggests that people are inequality averse and have strong preferences for more equal distribution of income.[8]

The theory of relative deprivation and social comparison has a long history in the social sciences. The classical economists, for example, understood that human behavior is largely motivated not by absolute norms, but by relative considerations. Interpersonal preferences also played a central role in the writings of Karl Marx (1847), who observed that: "our wants and pleasures have their origin in society; we do not measure them in relation to the objects which serve for their gratification. Since they are of a social nature, they are of relative nature." More than a century ago, the sociologist and economist Thorstein Veblen, coined the term conspicuous consumption to describe the behavior of the newly rich class of buying extravagant and expensive goods solely for public display of socio-economic power and prestige. More recently, the philosopher Alain de Botton (2004) has developed a theory of status anxiety, which explains how feelings of envy and deprivation often arise in egalitarian and democratic modern societies as most people have high aspirations to climb the socio-economic ladder but often fall short of reaching this goal.

In this context, higher education could be seen as a status symbol, at least to some extent. Historically, higher education was available only for a privileged few. Even in 1972 only one in ten Americans had a college degree. Today, on the other hand, more than one in three Americans finish their college degree, and higher education is largely viewed as the most effective path to socio-economic mobility (Reynolds, 2012). As more and more people go to college, higher education becomes a social norm and feelings of deprivation may arise if individuals do not fulfill this newly set standard. Such feelings of deprivation may also be explained from the perspective of evolutionary psychology. The pursuit of status is largely motivated by sexual selection: organisms that successfully outperform their competitors leave more copies of themselves in the gene pool of successive generations (Darwin, 1871).

The theory of social comparison and relative deprivation has been central in understanding one of the most hotly debated puzzles in the economics of subjective well-being literature, the so-called Easterlin Paradox (Easterlin 1974, Easterlin 1995, Easterlin 2001). The paradox is based on the empirical observation that although income is one of the strongest determinants of SWB within and across countries, it does not

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[8] For a more recent survey, see Ferrer-i-Carbonell & Ramos (2013)

seem to affect SWB over time. Thus, while material standards of living have significantly improved in the past century, happiness levels have stayed relatively constant.[9] The explanation of this paradox is that individuals derive happiness from income, but only by comparing their consumption to that of others. Over time, incomes grow, but material aspirations adjust and hedonic adaptation sets in. Within a point in time, however, richer individuals report higher levels of happiness, largely because their wealth and consumption sets them above their peers.

2.2. With Whom Do We Socially Compare?

An important question in the literature on social comparison, that remains largely unclear, is how do people determine who is in their reference group. A typical answer has been the so called "similar others." This reference group of "similar others" can include people of similar age, education, gender, or income. Furthermore, the reference group can be highly contextual (Carlson & Furr, 2009) and can change throughout one's life. For example, early in life, parents and other family members give children direct feedback that plays a significant role in forming their own self-views (Felson, 1992). In later childhood and adolescence, classmates, and to a lesser extent teachers and coaches, also become an important sources of feedback (Harter, 2003). Later in life, feedback from close friends and partners has a strong influence on one's self-views and behavior (Drigotas, 2002).

Unfortunately, survey data rarely include information on people's social networks, which makes studying the effect of reference groups on people's behavior and SWB quite difficult. One exception is a series of recent papers that evaluates a densely interconnected social network of 12,067 people from 1971 to 2003 as part of the Framingham Heart Study (e.g., see Christakis & Fowler, 2009). The main finding of these papers is that social networks play an important role in influencing people's thoughts, feelings, and behavior and that a number of discernable phenomenon (such as cooperation, innovation, or even obesity) can spread within these networks in predictable ways. For example, Christakis & Fowler (2009) show that a person is 57 percent more likely to become obese if his or her friends are also obese. This effect is significant and extends up to three degrees of separation (a friend of a friend of a friend). Similar social network effects have been previously found in the context school

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[9] The findings of the Easterlin Paradox have been challenged by a number of studies (see Veenhoven and Hagerty 2006, and Stevenson and Wolfers 2008) although Easterlin et al. (2010) provides counter evidence to these recent critiques.

achievement (Sacerdote, 2000), smoking habits and even voting behavior (Christakis & Folwer, 2009).

Of course, it is not only individuals that matter when it comes to social comparisons. Cultural values often play an important role in defining the characteristics and behavior that people desire. For example, in the United States, there is a strong emphasis on individualism, competitiveness, meritocracy. When individuals meet such cultural expectations they feel good about themselves and experience higher self-esteem (Cross & Gore, 2003). According to Gilbert et al. (1995), then, individuals initially compare themselves to everyone, or more generally, to the whole society. TV and recent developments of social media (such as Facebook, Linked, etc.) have also made comparisons with larger number of people much easier.

In the economics literature, there are two approaches of calculating the reference group (Clark, Frijters et al. 2008), with most of this studies done in the context of income comparisons. The first approach is the one found in Clark and Oswald (1996) where the authors first estimate wage equations and then compute the predicted income of 'someone like me', controlling for individual characteristics such as age, sex, education and region. The second approach, which is far more common in the literature, is to calculate cell averages (e.g., average income by age group, sex, and region).

A major methodological problem with both of these approaches has been that of identification: since reference group income is often estimated as a linear function of the same variables (e.g., age, sex, and region) that are later included in the happiness regression, we need certain exclusion restrictions to be able to separate the direct effect of income from the contextual one (Manski 1993). For example, some of the variables that identify the reference group income should not enter into the happiness regression. The cell approach only requires the assumption that individuals compare themselves to the average income within a cell, and has been the preferred method in the literature. Yet, determining the reference group is a major methodological stumbling block in the literature that I do not try to solve in this paper.

A number of studies using the second approach, cell means, have found evidence for social comparison in the context of income. However, the definition of reference group in these studies has varied substantially. Easterlin (1974), for example, assumes that individuals compare themselves with all other citizens of their country. Persky and Tam (1990) use individuals who live in the same geographical region. McBride (2001) includes in the reference group all individuals who are within five years of age from each

other. Blanchflower and Oswald (2004) define the reference group as the average income in a state. Luttmer (2005) also takes a geographic approach and uses local average earnings for US neighborhoods. Firebaugh and Tach (2009) use individuals with the same age and year that the survey was conducted. Ferrer-i-Carbonell (2005) combines various criteria so that the reference group includes people of the same educational level, age bracket, and region (West or East Germany). Finally, Perez-Asenjo (2011) identifies age as the most important characteristic in determining the reference group, although sex, race, and religion are also found to be important features of the reference group. While in this study, I define reference group based on age and gender, I also provide a number of robustness tests that use several alternative definitions that are in line with the findings of the literature (e.g., using geographical identifiers).

Although economists have studied the social comparison theory almost exclusively in the context of income, social status might matter in other domains of life. Wodsworth (2014), for example, finds comparison effects in the domain of sexual life. Powdthavee and Oswald (2007) argue that the utility of obese people is less likely to be affected in an environment with many obese people. Clark (2003) finds that the effect of unemployment on happiness is lower when the general level of unemployment is higher.

2.3. Hypotheses

In light of the theoretical and empirical evidence in the previous section, I use the following model:

$$U = U(E, E_r, X) \tag{1}$$

where true utility, U, depends on the level of individual's education, E, the education of the reference group, E_r, and a number of individual characteristics including age, age squared, marital status, health, exercise habits, employment status, and the log of personal income. The set of variables in X is informed by previous studies in the literature and data availability (Frey and Stutzer 2002). [10]

I assume that the self-reported measure of happiness is a good proxy for "experienced utility."[11] While self-reported data, by their nature, cannot be validated, a large literature exists that validates such data indirectly showing that SWB metrics are reliable, valid, and psychometrically sound (Kahneman, Diener et al. 1999, Kahneman

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[10] In formulating the hypothesis in this section, I follow largely Ferrer-i-Carbonell (2005).
[11] By "experienced utility" I mean how people actually feel as opposed to what is revealed by their actions (i.e., revealed preference approach which is common in economics).

and Krueger 2006, Diener, Inglehart et al. 2013, OECD 2013, Stone and Mackie 2014). Moreover, subjective well-being metrics are commonly used in economic research and policy analysis (Di Tella, MacCulloch et al. 2001, Diener 2009).

Previous studies on the relationship between education and SWB provide mixed results. Many studies, mostly using cross-sectional data, find a positive association (e.g., Easterlin 2001, Blanchflower and Oswald 2004, Ferrer-i-Carbonell 2005, Graham and Pettinato 2002). Other studies, however, have documented a negative relationship (e.g., Clark and Oswald 1996, Powthavee, 2008, Shield el al., 2009).

I test two different hypotheses. The first specification examines the effect of reference group education in addition to the direct effect of education on SWB. My hypothesis is that the higher the education of the reference group, E_r, the less satisfied individuals are with their own life, so that $\frac{\partial U}{\partial E_r} < 0$, all else constant. In this first specification, I define E_r as the average education of the reference group, i.e., $\frac{1}{N} \sum_i E$ where i are individuals who belong to the same reference group. To the best of my knowledge, no previous studies have included the reference group education in happiness regressions.

The second hypothesis is that the comparison is not symmetric. Duesenberry (1949, ch.2), for example, argued that only poorer individuals are affected by social comparison while the happiness of the richer is unaffected by contextual effects. In this case, I expect that the effect of reference group education will differ with the level of education, so I interact the education variable with reference group education, i.e., $E * E_r$. I expect, that the interaction term will have a positive sign implying that more educated individuals will be less affected by this type of social comparison.

3. Data and Analytical Approach

3.1. The Data

The empirical analysis uses data from the HILDA survey, waves 1-13.[12] HILDA is a nationally representative panel of Australian households that started in 2001. The survey asks questions on respondents' socio-demographic characteristics, subjective well-being, labor market participation, and family circumstances. Wave 1 contains 19,914 individuals

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[12] In this paper, I used PanelWhiz to extract the variables across different years (see Haisken-DeNew and Hahn 2010). Developed by Dr. John Haisken De-New, PanelWhiz is a collection of Stata add-ons, which facilitate the use of panel datasets. For more information, visit: http://www.panelwhiz.eu/

living in 7,682 households, which form the basis of the sample for subsequent years (Wooden, Freidin et al. 2002). Majority of interviews are collected face-to-face with all adults (15 years or older) who are members of the original sample, and adults who, in later waves, are residing in the original sample household. Due to attrition, which arises when a non-random sample of individuals chooses not to respond, the number of individuals varies from year to year. However, the proportion of respondents from one wave who successfully re-interview in the next wave is reasonably high, from a low of 87% in wave 2 to a high of 97 percent in wave 9 (Watson and Wooden 2012).

The dependent variable, life satisfaction, is collected with the following question: "*All things considered, how satisfied are you with your life?*" The scale of possible answers is presented using a visual aid in which the extreme points of the scale were labeled 0 "*totally dissatisfied*" and 10 "*totally satisfied*". Thus, the SWB measure is a reflective assessment involving evaluative judgment of one's life as a whole (on the meta level) and requires an effort to remember and evaluate past experiences.

The measure of education reflects the number of years an individual spends obtaining their highest degree. A respondent who has completed secondary school, for example, is assumed to have completed 12 years of education while somebody with a college degree is assumed to have completed 16 years of education. While I am not measuring the actual number of years spent obtaining a degree (which can vary with the number of degrees or time spent studying that did not lead to a degree), this approach is common in the economics of education literature (Card 1999).

In order to estimate the relative influence of education on SWB, I estimate a variable for "reference group education." I use the cell means approach and define the reference group as individuals inside the same age group, gender, and year of the HILDA survey. For each year of the survey, I calculate the mean level of education for males and females ages 15-17, 18-21, 22-25, 26-29,…,66-69, and 74-77. This generates a total of 416 reference groups. For example, the reference group of a 48-year-old female from the 2013 wave of the HILDA survey is other female respondents ages 46-49 that interviewed the same year. Table 1 in the Appendix reports cell means for reference group education.

Table 1: Average Education by Reference Group

Age Group	2001	2002	2003	2004	2005	Year 2006	2007	2008	2009	2010	2011	2012	2013
a. *Male*													
15-18	10.3	10.2	10.2	10.2	10.2	10.2	10.3	10.3	10.3	10.3	10.4	10.4	10.4
18-21	11.7	11.7	11.7	11.7	11.5	11.5	11.5	11.5	11.5	11.5	11.6	11.8	11.7
22-25	12.1	12.4	12.3	12.4	12.5	12.4	12.3	12.3	12.2	12.1	12.1	12.1	12.3
26-29	12.6	12.8	12.7	12.7	12.7	12.8	12.6	12.7	12.8	12.8	13.0	12.9	12.9
30-33	12.3	12.6	12.7	12.9	12.9	13.0	12.9	13.0	12.8	13.0	13.0	13.1	13.2
34-37	12.4	12.3	12.3	12.5	12.8	12.8	12.9	13.0	13.0	13.2	13.3	13.1	13.2
38-41	12.3	12.4	12.4	12.5	12.5	12.6	12.6	12.7	12.8	12.9	13.0	13.1	13.2
42-45	12.6	12.5	12.5	12.5	12.5	12.6	12.5	12.7	12.7	12.5	12.7	12.8	12.9
46-49	12.4	12.4	12.7	12.6	12.7	12.6	12.6	12.6	12.5	12.7	12.7	12.8	12.7
50-53	12.1	12.3	12.3	12.5	12.6	12.6	12.7	12.8	12.8	12.9	12.8	12.7	12.6
54-57	11.7	12.1	12.1	12.3	12.3	12.3	12.5	12.6	12.6	12.7	12.8	12.9	12.9
58-61	11.3	11.2	11.4	11.8	11.9	12.0	12.2	12.3	12.3	12.3	12.5	12.7	12.8
62-65	11.2	11.4	11.6	11.5	11.6	11.7	11.7	11.9	12.0	12.3	12.3	12.4	12.3
66-69	11.1	11.4	11.4	11.7	11.5	11.5	11.6	11.5	11.6	11.6	11.9	12.0	12.2
70-73	10.3	10.6	10.8	11.0	11.3	11.5	11.4	11.9	11.7	11.7	11.9	11.6	11.8
74-77	10.3	10.2	10.2	10.4	10.3	10.6	11.0	11.2	11.5	11.6	11.7	11.9	12.0
b. *Female*													
15-18	10.3	10.4	10.3	10.2	10.4	10.3	10.4	10.5	10.4	10.4	10.4	10.5	10.5
18-21	11.8	11.8	11.8	11.8	11.7	11.7	11.7	11.8	11.8	11.8	11.8	11.9	12.0
22-25	12.7	12.7	12.7	12.7	12.9	12.8	12.7	12.8	12.7	12.6	12.8	12.8	12.9
26-29	12.5	12.9	12.9	12.9	13.0	13.2	13.1	13.2	13.2	13.2	13.3	13.3	13.3
30-33	12.3	12.5	12.7	13.0	12.9	13.0	13.1	13.2	13.3	13.5	13.6	13.6	13.6
34-37	12.3	12.4	12.5	12.5	12.7	12.7	12.9	13.1	13.2	13.2	13.4	13.6	13.5
38-41	12.2	12.4	12.5	12.5	12.6	12.6	12.8	12.8	12.8	12.7	13.1	13.2	13.3
42-45	12.1	12.2	12.3	12.4	12.5	12.6	12.7	12.7	12.7	12.7	12.8	12.8	13.0
46-49	11.9	12.0	12.1	12.2	12.3	12.5	12.6	12.8	12.7	12.7	12.9	12.7	12.9
50-53	11.4	11.6	11.8	11.9	12.0	12.1	12.3	12.4	12.6	12.6	12.6	12.8	12.8
54-57	11.0	11.1	11.4	11.5	11.6	11.7	12.0	12.0	12.1	12.2	12.3	12.4	12.6
58-61	10.7	11.0	11.0	11.0	11.2	11.4	11.5	11.7	11.9	11.8	11.9	12.1	12.2
62-65	10.6	10.5	10.8	10.8	10.9	11.0	10.9	11.1	11.2	11.5	11.7	11.8	11.8
66-69	10.2	10.4	10.5	10.7	10.7	10.7	10.8	10.9	11.0	11.1	11.2	11.3	11.3
70-73	9.7	10.0	10.0	10.2	10.3	10.5	10.5	10.8	10.7	10.7	10.9	11.1	11.1
74-77	9.3	9.3	9.7	9.6	9.9	10.1	10.2	10.3	10.1	10.3	10.5	10.7	10.8

Source: HILDA (2001-2013), Authors' calculations.

The choice of reference group is motivated by two observations. First, according to Darwin (1871) the pursuit for status is largely driven by sexual selection: to make sure that their genes spread across the population, sexual species need to appear more attractive than their same sex competitors. Second, empirical evidence also suggests that age is the most important determinant of reference group selection Perez-Asenjo (2011). While other considerations may very well play a role in the social comparison process, I assume that these two factors are the most fundamental ones. I further assume, as it is common in the literature, that the reference group is exogenously determined in the model.

Here, it is important to note that most previous studies use reference group as a given. In other words, the researchers choose a reference group based on certain characteristics and then show, for example, that it is negatively correlated with a certain outcome such as SWB. One exception is a paper by Knight et al. (2009) in which the authors ask directly 9,200 rural Chinese households to whom they compare themselves. The options are largely geographical and majority of respondents (40 percent) report that they compare themselves to all other people in their region (village). To the best of my knowledge Perez-Asenjo (2011) is the only paper that attempts to identify the characteristics that define a reference group and finds that age and sex are the two most important factors.

The choice of reference group is also motivated by the nature of the dataset. Ideally, information about the respondent's social network (e.g., close friends, colleagues, neighbors) will provide a much better approximation for their social reference group. Unfortunately, survey data rarely include such information. However, recognizing that the definition of a reference group might vary, I provide a number of robustness tests (Table 7) in which I use several alternative definitions for a reference group that are in line with previous studies.

Finally, I include a number of additional controls for the respondent's socio-economic status such as age, age squared, marital status, education, employment status, frequency of exercise, health, and a logarithmic transformation of the individual's labor income. The final sample consists of 151,226 person-year observations (25,425 individuals) and covers the period from 2001 to 2013. Table 2 provides summary statistics for all variables used in this study.

Table 2: Summary Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Life Satisfaction (1-10)	151,226	7.91	1.47	0	10
Life Satisfaction (Conditional)	151,226	0.48	0.50	0	1
Ref Group Education	151,226	12.18	0.85	9.28	13.63
Years of Education	151,226	12.18	2.49	0	18.5
Age	151,226	42.93	16.59	15	77
Age squared	151,226	2.12	1.49	0.23	5.93
Marital Status (Base = Married)					
Single	151,226	0.23	0.42	0	1
Widowed	151,226	0.03	0.17	0	1
Divorced	151,226	0.06	0.24	0	1
Separated	151,226	0.03	0.17	0	1
Frequency of Exercise (Base==Never)					
Less than weekly	151,226	0.16	0.36	0	1
At least weekly	151,226	0.74	0.44	0	1
Employment Status (Base = Unemployed)					
Employed	151,226	0.62	0.49	0	1
Health (Base=Poor)					
Fair	151,226	0.13	0.33	0	1
Good	151,226	0.35	0.48	0	1
Very Good	151,226	0.37	0.48	0	1
Excellent	151,226	0.12	0.33	0	1
Log of Income	151,226	6.85	4.94	0	13.67
Region (Base = Sydney)					
NSW	151,226	0.14	0.34	0	1
Melbourne	151,226	0.17	0.38	0	1
Victoria	151,226	0.07	0.26	0	1
Brisbane	151,226	0.09	0.29	0	1
QLD	151,226	0.11	0.32	0	1
Adelaide	151,226	0.06	0.24	0	1
SA	151,226	0.03	0.17	0	1
Perth	151,226	0.07	0.26	0	1
WA	151,226	0.03	0.16	0	1
Tasmania	151,226	0.03	0.18	0	1
Northern	151,226	0.01	0.08	0	1
ACT	151,226	0.02	0.14	0	1

Source: HILDA (2001-2013), Authors' calculations.

3.2. Empirical Strategy

Since the dependent variable, life satisfaction, is measured on a scale from 0-10, it requires an ordered logit estimation (Greene 2003). However, I use a linear OLS and random-effects (RE) estimator with robust standard errors, clustered at the individual level. This is standard practice in the literature since results from OLS and ordered logit regressions hardly differ in the context of SWB research (Ferrer-i-Carbonell and Frijters 2004).[13] In addition, while the ordered logit models are theoretically appealing, the OLS estimates have the practical advantage of providing easy-to-interpret marginal effects

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[13] The results are qualitatively the same when using an ordered logit estimator. These results available upon request.

(Clark, Frijters, and Shields 2008). Furthermore, interpreting the answers to happiness surveys as cardinal and comparable is common among psychologists and sociologists (Kahneman et al., 1999). Thus, I estimate the following model:

$$SWB_{it} = \beta edu_{it} + \phi edu_{r,it} + \sum_k \delta_k x_{k,it} + \varepsilon_{it}$$

(2)

where i = individual, t=year, and $x = k$ explanatory variables, edu = years of education, edu_r=reference group education, and ε_{it} is an error term. We can further rewrite the error term as:

$$\varepsilon_{it} = \alpha_i + \epsilon_{it}$$

(3)

where α_i represents individual specific fixed-effects and ϵ_{it} is the usual error term. As common, the error terms are assumed to be random and not correlated with the explanatory variables. This assumption, however, seems to be rather strong, especially when it comes to the fixed-effects term, α_i. For example, each individual may be using his or her own scale when answering the happiness question, which is unobserved to the researcher. This makes comparing life satisfaction across individuals problematic. Moreover, unobserved individual specific characteristics such as ability, motivation, or family background are most likely correlated with both SWB and other explanatory variables such as income and education. However, I am primarily interested in the effect of reference group education on SWB. In this case, concerns about endogeneity and omitted variable bias are mitigated since it is not very likely that the SWB of one individual (or their education or income) will influence the average level of education of their reference group.

There are two approaches to deal with the correlation of the individual observations over time: (1) random-effects (RE) and (2) individual fixed-effects (FE) model. I choose the first approach for several reasons. First, the random-effects estimator is largely preferred in most branches of applied statistics (Cameron & Trivedi, 2009) and previous studies in the social comparison literature (e.g., see Ferrer-i-Carbonell 2005) have used this approach, which makes results more comparable. In the context of educational research, Clark et al. (2010) also argue that the random effects model should be preferred because results are more efficient and allow wider range of research questions to be addressed.

Second, and more importantly, VanPraag & Ferrer-i-Carbonell (2008) provide compelling argument that in the context of happiness research the second approach is more appropriate. With a FE model, α_i, is an unknown parameter that needs to be estimated. This means that for 10,000 individuals in the sample, we would need to estimate 10,000 extra parameters (1 extra parameter per person).[14] This is hardly what we call a parsimonious model. More importantly, in the model above we allow for the possibility of level, βX_i, and shock effects, δX_{it}. However, if we replace the random effect by N individual fixed effects, α_i, there is no place for a level effects to be estimated (since $\alpha_i = 0$). Thus, we can estimate only shock effects. VanPraag & Ferrer-i-Carbonell (2008) argue that this is not intuitively reasonable even if the fit becomes better. Moreover, in the context of the current study, the variation in reference group education does not change substantially over time for some of the alternative definitions of reference group. Thus, using a random effects model allows me to test several alternative hypotheses with respect to people's reference group.

Of course, it is possible that the definition of happiness will change over time, i.e., self-reported happiness is a proxy for relative experiences, not absolute ones. For example, if people's reference group education changes, they may interpret and answer the SWB scale differently. To address this issue, I provide results from several alternative measures of well-being, some of which have relatively objective definition such as reporting recent separation from spouse. These results can be found in Table 5. Throughout the study, I also present estimates from a pooled Ordinary Least Squares (OLS) models since majority of the previous studies in the happiness-education literature estimate OLS regressions. Furthermore, the OLS models produce easy to interpret marginal effects, which facilitate the discussion of the results.

4. Empirical Estimates

4.1. Main Results (Reference Group)

I start the analysis in Table 3, which presents the main results from the two different estimation techniques outlined in the previous section. Both models use pooled data from all waves of the survey and provide variation across individuals and

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[14] This is the reason why, for example, in the context of cross-sectional regression analysis the model would imply that $\alpha_i = SWB_i$ and the structural effects will be discarded as trivial.

Table 3: Main Results, HILDA 2001-2013

	Overall				25 and over			
	OLS		RE		OLS		RE	
Ref Group Education	-0.115***	(0.011)	-0.147***	(0.009)	-0.090***	(0.015)	-0.146***	(0.013)
Years of Education	-0.030***	(0.003)	-0.016***	(0.003)	-0.032***	(0.003)	-0.017***	(0.003)
Age	-0.050***	(0.003)	-0.036***	(0.003)	-0.044***	(0.004)	-0.028***	(0.003)
Age squared/1000	0.649***	(0.036)	0.471***	(0.031)	0.603***	(0.041)	0.399***	(0.036)
Marital Status (Base = Married)								
Single	-0.402***	(0.021)	-0.334***	(0.016)	-0.466***	(0.027)	-0.439***	(0.022)
Widowed	-0.329***	(0.045)	-0.447***	(0.048)	-0.320***	(0.046)	-0.444***	(0.049)
Divorced	-0.538***	(0.034)	-0.486***	(0.029)	-0.549***	(0.035)	-0.492***	(0.029)
Separated	-0.857***	(0.044)	-0.734***	(0.034)	-0.872***	(0.044)	-0.741***	(0.035)
Frequency of Exercise (Base==Never)								
Less than weekly	-0.013	(0.021)	0.053***	(0.015)	-0.020	(0.023)	0.054***	(0.016)
At least weekly	0.086***	(0.021)	0.126***	(0.014)	0.089***	(0.023)	0.128***	(0.016)
Employment Status (Base = Unemployed)								
Employed	-0.011	(0.019)	0.006	(0.015)	-0.033	(0.022)	0.001	(0.018)
Health (Base=Poor)								
Fair	0.976***	(0.056)	0.801***	(0.038)	0.979***	(0.058)	0.800***	(0.040)
Good	1.573***	(0.057)	1.249***	(0.039)	1.569***	(0.060)	1.235***	(0.041)
Very Good	2.043***	(0.057)	1.576***	(0.039)	2.029***	(0.060)	1.541***	(0.041)
Excellent	2.497***	(0.058)	1.868***	(0.041)	2.458***	(0.062)	1.799***	(0.043)
Log of Income	0.003	(0.002)	0.003	(0.002)	0.004	(0.002)	0.004**	(0.002)
Region (Base=Sydney)								
NSW	0.188***	(0.026)	0.156***	(0.024)	0.207***	(0.029)	0.170***	(0.029)
Melbourne	0.044*	(0.024)	0.036	(0.022)	0.064**	(0.027)	0.045*	(0.026)
Victoria	0.209***	(0.030)	0.150***	(0.030)	0.231***	(0.034)	0.157***	(0.034)
Brisbane	0.130***	(0.028)	0.092***	(0.025)	0.158***	(0.032)	0.110***	(0.030)
QLD	0.134***	(0.027)	0.133***	(0.026)	0.149***	(0.031)	0.148***	(0.031)
Adelaide	0.002	(0.034)	0.037	(0.030)	0.025	(0.041)	0.074**	(0.037)
SA	0.239***	(0.045)	0.190***	(0.039)	0.247***	(0.051)	0.203***	(0.047)
Perth	-0.006	(0.031)	-0.009	(0.029)	0.022	(0.036)	0.011	(0.033)
WA	0.191***	(0.046)	0.132***	(0.043)	0.225***	(0.051)	0.187***	(0.049)
Tasmania	0.194***	(0.045)	0.174***	(0.040)	0.249***	(0.053)	0.222***	(0.048)
Northern	0.159**	(0.080)	0.091	(0.072)	0.197**	(0.094)	0.153*	(0.090)
ACT	0.101**	(0.048)	0.102**	(0.046)	0.116**	(0.057)	0.151***	(0.055)
Observations	151,226		151,226		122,669		122,669	
Adjusted R-squared	0.179		0.176		0.182		0.178	
Number of individuals	25,425		25,425		19,335		19,335	

Note: Robust standard errors clustered at the individual level are reported in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

time. In addition to studying the overall sample, I provide estimations for individuals 25 years of age and over who have likely already completed their education. As explained in section 2.1, the influence of reference group education on SWB may be different for younger people who are still pursuing their higher education than those who are already in job market.

The main result from this table is that higher "reference group education" is associated, on average, with lower level of life satisfaction, all else constant. In all models the variable on reference group education has a negative and statistically significant sign. If causal, the coefficients in model (2) would imply that an increase in mean reference group education by one year decreases life satisfaction by 0.146 points (on a scale from 0-10). The magnitude of the effect is substantial relative to other variables that are also significantly correlated with happiness. For example, the associated decline of life satisfaction with increase in the mean reference group education by four years [one can think of a person with a high school degree whose mean reference group education increases from high school (12 years) to college (16 years)] is equivalent to that associated with divorce.

To further help us visualize the relationship between reference group education and life satisfaction, Fig. 1 shows predictive margins with 95 % confidence intervals. Panel A of this figure, for instance, shows the predicted level of life satisfaction from RE model (overall sample) in Table 3 at different levels of reference group education while holding the other variables in the model at their means. The figure implies that the "average" person who has a reference group with a mean education of 8 years will report life satisfaction of approximately 8.5 while the same person will report life satisfaction of less than 7.6 if their reference group has a mean education of 14 years. By average person here I utilize the common, although not universal, practice of using the mean values of all independent variable in the model, which are shown in Table 2. Panel B of Fig.1 shows the same effect for sample of individuals who are 25 years and over.

I further find that the effect of education, once I control for factors such as health, income, marital and employment status, is negative and statistically significant. This is consistent with previous studies that use the HILDA dataset (Powdthavee, Lekfuangfu et al. 2015). The other explanatory variables in this study also have the expected signs and are in line with the happiness literature. For example, happiness is a quadratic function of age reaching its minimum at around 42 years of age. People who are married, exercise more frequently, and have better health report higher levels of life satisfaction (Frey and Stutzer 2002).

Figure 1: Predictive Margins with 95% Confidence Intervals

Panel A: Predictions, Overall Sample

Panel B: Predictions, 25 and over
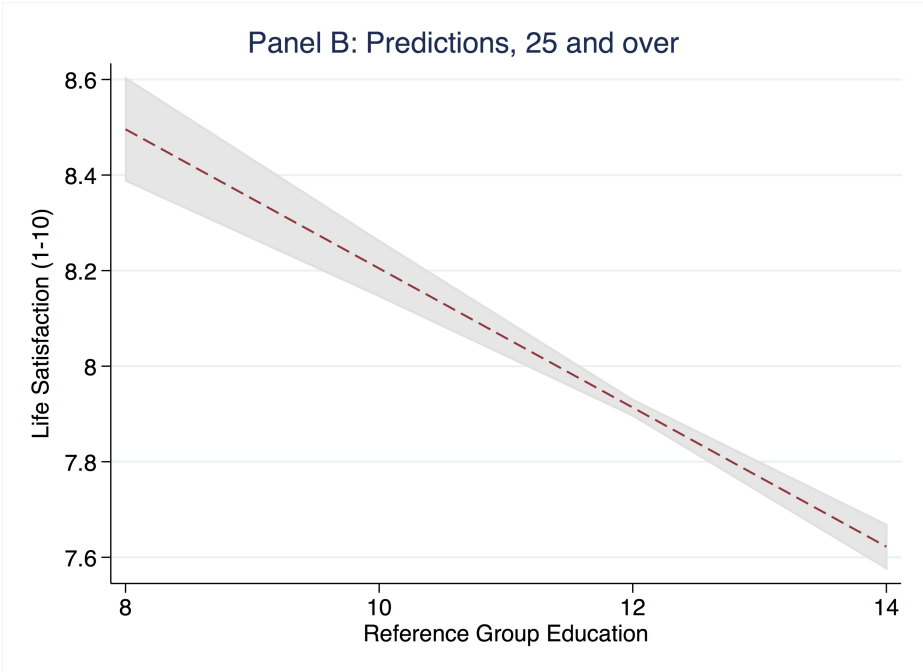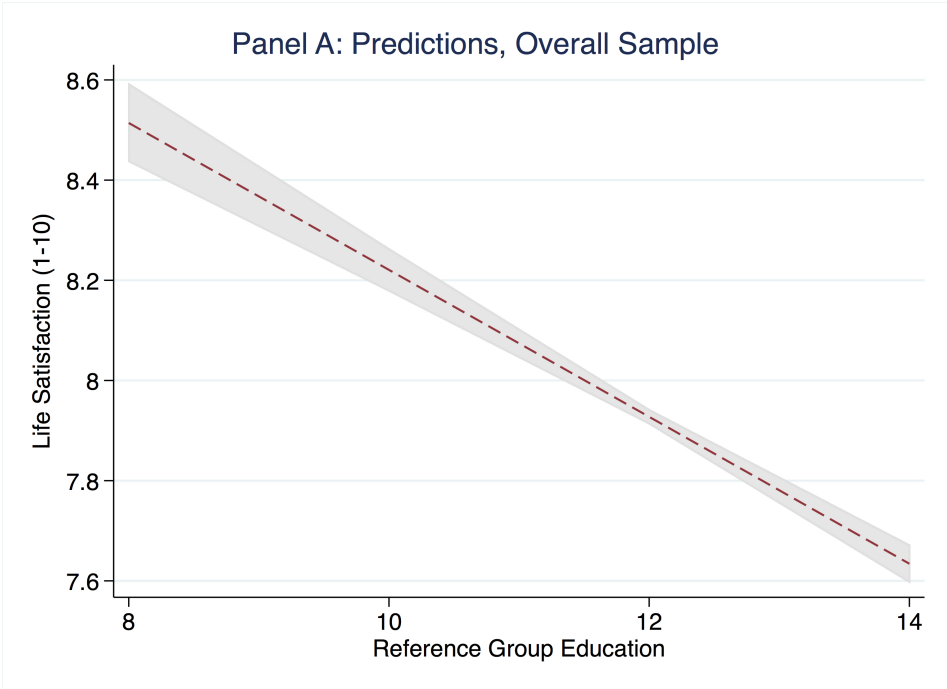
Note: Panel A represents predictive margins with 95% confidence intervals for model (2) RE in Table 3. Life satisfaction is predicted at different values of the mean reference group education while holding all other variables in the model at their means. Panel B represents predicted probabilities for model (4) RE in Table 3 conditional on the mean values of all other variables in the model.

Table 4: Asymmetric Effect, HILDA 2001-2013

	Overall				25 and over			
	OLS		RE		OLS		RE	
Ref Group Education	-0.207***	(0.038)	-0.324***	(0.033)	-0.180***	(0.042)	-0.293***	(0.040)
Years of Education	-0.127***	(0.038)	-0.207***	(0.033)	-0.126***	(0.041)	-0.170***	(0.039)
Education*Ref Group Education	0.008***	(0.003)	0.016***	(0.003)	0.008**	(0.003)	0.013***	(0.003)
Age	-0.049***	(0.003)	-0.035***	(0.003)	-0.043***	(0.004)	-0.028***	(0.003)
Age squared/1000	0.642***	(0.036)	0.465***	(0.031)	0.587***	(0.042)	0.392***	(0.036)
Marital Status (Base = Married)								
Single	-0.398***	(0.021)	-0.330***	(0.016)	-0.463***	(0.027)	-0.436***	(0.022)
Widowed	-0.337***	(0.046)	-0.453***	(0.048)	-0.328***	(0.046)	-0.451***	(0.049)
Divorced	-0.535***	(0.034)	-0.483***	(0.029)	-0.546***	(0.035)	-0.490***	(0.029)
Separated	-0.856***	(0.044)	-0.732***	(0.034)	-0.870***	(0.044)	-0.739***	(0.035)
Frequency of Exercise (Base==Never)								
Less than weekly	-0.012	(0.021)	0.054***	(0.015)	-0.019	(0.023)	0.054***	(0.016)
At least weekly	0.087***	(0.021)	0.127***	(0.014)	0.091***	(0.023)	0.129***	(0.016)
Employment Status (Base = Unemployed)								
Employed	-0.007	(0.019)	0.010	(0.015)	-0.029	(0.022)	0.003	(0.018)
Health (Base=Poor)								
Fair	0.976***	(0.056)	0.800***	(0.038)	0.980***	(0.058)	0.800***	(0.040)
Good	1.574***	(0.057)	1.248***	(0.039)	1.570***	(0.060)	1.235***	(0.041)
Very Good	2.043***	(0.057)	1.575***	(0.039)	2.030***	(0.060)	1.542***	(0.041)
Excellent	2.496***	(0.058)	1.866***	(0.041)	2.458***	(0.062)	1.799***	(0.043)
Log of Income	0.002	(0.002)	0.003	(0.002)	0.003	(0.002)	0.004**	(0.002)
Region (Base=Sydney)								
NSW	0.190***	(0.026)	0.159***	(0.024)	0.209***	(0.029)	0.174***	(0.029)
Melbourne	0.044*	(0.024)	0.035	(0.022)	0.064**	(0.027)	0.045*	(0.026)
Victoria	0.210***	(0.030)	0.150***	(0.030)	0.232***	(0.034)	0.159***	(0.034)
Brisbane	0.130***	(0.028)	0.094***	(0.025)	0.158***	(0.032)	0.111***	(0.030)
QLD	0.136***	(0.027)	0.136***	(0.026)	0.151***	(0.031)	0.150***	(0.031)
Adelaide	0.004	(0.034)	0.040	(0.030)	0.027	(0.041)	0.076**	(0.037)
SA	0.239***	(0.045)	0.191***	(0.039)	0.247***	(0.051)	0.205***	(0.047)
Perth	-0.005	(0.031)	-0.007	(0.029)	0.022	(0.036)	0.012	(0.033)
WA	0.192***	(0.046)	0.135***	(0.043)	0.227***	(0.051)	0.190***	(0.049)
Tasmania	0.194***	(0.045)	0.175***	(0.040)	0.250***	(0.053)	0.224***	(0.048)
Northern	0.160**	(0.080)	0.092	(0.072)	0.198**	(0.094)	0.155*	(0.090)
ACT	0.102**	(0.048)	0.103**	(0.046)	0.117**	(0.057)	0.153***	(0.055)
Observations	151,226		151,226		122,669		122,669	
Adjusted R-squared	0.179		0.175		0.183		0.179	
Number of individuals	25,425		25,425		19,335		19,335	

Note: Robust standard errors clustered at the individual level are reported in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

4.2. Asymmetry in the Social Comparison

Next, I test if the social comparison is conditional on the level of education. To do this, I replicate the analysis from Table (3) by adding an interaction variable between reference group education and years of education. The results are presented in Table 4. In all of the models, I find evidence for a statistically significant and positive interaction effect. This effect implies that people with higher education are less likely to be negatively affected by social comparison. The coefficients in the RE model (overall sample), for example, suggest that that beyond 20 years of education (graduate degree), the negative comparison effect becomes positive. The coefficients from the OLS model (overall sample), however, suggest that this turning point is at 22 years of education. In all models, however, while education seems to mitigates the negative social comparison effect, it does not seem to completely disappears.

4.3. Is Reference Group Education Merely Reflecting Reference Group Income?

A possible limitation of the analysis so far is that the reference group education captures the mean income of an individual's reference group. In this case, all I am measuring is the contextual effect of income and not education. Therefore, Table 5 replicates the main analysis (Table 3) by adding an addition control for reference group income (I use the same definition of reference group as outlined in section 3.2). The results are consistent with our general findings so far. Even after controlling for reference group income, reference group education has a negative and significant sign. Consistent with previous studies, I also find a negative effect of reference group income on SWB. The magnitude of the education comparison effect, however, declines by more than one third. This suggests that much of the social comparison happens through the income channel. Nevertheless, the contextual effect of education is almost as strong as the relative effect of income, which suggests that people use education, and not just income, as a benchmark for social comparison.

4.4. Do People Change Their Interpretation of Happiness?

Another possible criticism could be that an increase in reference group education may influence how people perceive and answer questions about their happiness. While it is difficult to rule out this concern, using alternative measures of well-being that are somewhat less sensitive to shifting interpretations of the survey questions may provide some insights.

Table 5: Controlling for Reference Group Income, HILDA 2001-2013

	Overall				25 and over			
	OLS		RE		OLS		RE	
Ref Group Education	-0.055***	(0.014)	-0.082***	(0.012)	-0.023	(0.017)	-0.084***	(0.015)
Years of Education	-0.053***	(0.007)	-0.046***	(0.005)	-0.060***	(0.008)	-0.050***	(0.006)
Ref Group Income	-0.031***	(0.003)	-0.017***	(0.003)	-0.033***	(0.003)	-0.017***	(0.003)
Age	-0.036***	(0.003)	-0.026***	(0.003)	-0.023***	(0.004)	-0.014***	(0.004)
Age squared/1000	0.450***	(0.041)	0.328***	(0.035)	0.325***	(0.051)	0.203***	(0.043)
Marital Status (Base = Married)								
Single	-0.388***	-0.021	-0.325***	-0.016	-0.455***	-0.027	-0.431***	-0.022
Widowed	-0.329***	-0.045	-0.442***	-0.048	-0.317***	-0.046	-0.440***	-0.049
Divorced	-0.539***	-0.034	-0.486***	-0.029	-0.551***	-0.035	-0.492***	-0.029
Separated	-0.862***	-0.044	-0.735***	-0.034	-0.877***	-0.044	-0.741***	-0.035
Frequency of Exercise (Base==Never)								
Less than weekly	-0.013	(0.021)	0.053***	(0.015)	-0.021	(0.023)	0.054***	(0.016)
At least weekly	0.090***	(0.021)	0.127***	(0.014)	0.094***	(0.023)	0.129***	(0.016)
Employment Status (Base = Unemployed)								
Employed	-0.012	(0.018)	0.009	(0.015)	-0.036*	(0.022)	0.002	(0.018)
Health (Base=Poor)								
Fair	0.971***	(0.056)	0.799***	(0.038)	0.975***	(0.058)	0.799***	(0.040)
Good	1.565***	(0.057)	1.245***	(0.039)	1.561***	(0.060)	1.232***	(0.041)
Very Good	2.031***	(0.057)	1.571***	(0.039)	2.018***	(0.060)	1.538***	(0.041)
Excellent	2.485***	(0.058)	1.862***	(0.041)	2.447***	(0.062)	1.796***	(0.043)
Log of Income	0.006**	(0.002)	0.004**	(0.002)	0.007***	(0.002)	0.006***	(0.002)
Region (Base=Sydney)								
NSW	0.189***	(0.026)	0.156***	(0.024)	0.208***	(0.029)	0.170***	(0.029)
Melbourne	0.044*	(0.024)	0.036	(0.022)	0.064**	(0.027)	0.045*	(0.026)
Victoria	0.208***	(0.030)	0.147***	(0.030)	0.229***	(0.034)	0.155***	(0.034)
Brisbane	0.130***	(0.028)	0.093***	(0.025)	0.156***	(0.032)	0.109***	(0.030)
QLD	0.134***	(0.027)	0.132***	(0.026)	0.150***	(0.031)	0.147***	(0.031)
Adelaide	0.006	(0.034)	0.040	(0.030)	0.028	(0.041)	0.075**	(0.037)
SA	0.240***	(0.044)	0.192***	(0.039)	0.247***	(0.051)	0.205***	(0.047)
Perth	-0.006	(0.031)	-0.010	(0.029)	0.021	(0.036)	0.010	(0.033)
WA	0.189***	(0.046)	0.128***	(0.043)	0.223***	(0.051)	0.184***	(0.049)
Tasmania	0.194***	(0.045)	0.176***	(0.040)	0.250***	(0.053)	0.224***	(0.047)
Northern	0.160**	(0.080)	0.091	(0.072)	0.199**	(0.094)	0.155*	(0.090)
ACT	0.103**	(0.048)	0.103**	(0.046)	0.117**	(0.057)	0.151***	(0.055)
Observations	151,226		151,226		122,669		122,669	
Adjusted R-squared	0.18		0.176		0.184		0.18	
Number of individuals	25,425		25,425		19,335		19,335	

Note: Robust standard errors clustered at the individual level are reported in parentheses.

*** p<0.01, ** p<0.05, * p<0.1

First, Stutzer (2004) argues that a couple surrounded by neighbors earning more may experience more disagreements since their aspirations might be escalated due to the spending patterns of their richer neighbors. Luttmer (2005) finds empirical evidence for this hypothesis using data for US neighborhoods. Similarly, I expect that escalated expectations of couples whose reference group has higher education may lead to more spousal disagreements and ultimately to separation. Table 6 presents evidence that individuals who have higher reference group education are more likely to report being separated, although they are more likely to be satisfied with their relationship.

Table 6: Alternative Measures of Well-being, HILDA 2001-2013

Dependent Variable	Ref Group Education (St. Error)		Observations	R-sq	Individuals
(1) Separation from Spouse	0.009***	(0.002)	135,043	0.0125	23,600
(2) Satisfaction w Spouse	-0.120***	(0.042)	46,180	0.0226	13,418
(3) Friends	-0.108***	(0.0141)	151,900	0.0227	25,420
(4) Financial Satisfaction	-0.029*	(0.016)	153,185	0.0867	25,478
(5) Nervous	0.016	(0.014)	49,350	0.0831	19,211
(6) Health	-0.040***	(0.008)	151,288	0.1027	25,432
(7) Anti-Depressants	0.055***	(0.020)	3,934	0.1447	2,976

Note: Robust standard errors clustered at the individual level are reported in parentheses. Models (1)-(6) are estimated with a random-effects model and include all variables from the basic specification presented in model Table 5. Model (7) is estimated using OLS with robust errors clustered at the individual level due to data availability. The Dependent variable "separation from spouse" represents a dummy equal to 1 if the respondent reported being recently separated from their spouse. Nervous is a measure of mental health that represents responses to the question: "*Have you been a nervous person lately*" with possible answers 1"all of the time" to 6 "none of the time". Health is a self-reported measure of subjective health with a scale 1 "poor" to 5 "excellent". Friends is collected with the question: "I seem to have a lot of friends" with a scale 1 (strongly agree) to 7 (strongly disagree). Financial Satisfaction is measured on a scale from 0 (totally dissatisfied) to 10 (totally satisfied). And, Anti-Depressants is a dummy equal to 1 if the respondent self-reports taking prescription medication for depression and anxiety. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Second, Weber (1922) defined status as "…effective claim to social esteem in terms of positive or negative privileges." The position in a social group may thus determine the allocation of many socially provided goods such as sexual mates, friends, invitations, partnerships, and esteem that can lead to material advantages (Corneo and Jeanne, 1998). Table 6 suggests that individuals who have higher reference group education are less likely to report having "a lot of friends" (model 3) and less likely to satisfied with their financial situation (model 4) compared to people whose reference group education is lower.

Finally, there is a large literature that provides medical and biological evidence that social status induces real psychological responses (e.g., higher heart rate and blood pressure and lower serotonin levels).[15] The results in Table 6 imply that as reference group education increases, people are more likely to report feeling nervous (model 5), although this effect is not statistically significant, lower subjective evaluation of their health (model 6), and use of prescription medications to fight anxiety and depression. These results are suggestive that results are not merely driven by people's relative interpretation of the happiness scales.

4.5. Alternative Definitions of a Reference Group

Since the definition of reference group varies widely in the literature, Table 7 replicates the most complete model from Table 5, which includes reference group income and the rest of the explanatory variables, using seven alternative measures for reference group education.

Table 7: Alternative Definitions of Reference Group, HILDA 2001-2013

Reference Group	Overall			25 and over		
	Coeff	St. Dev.	R-squared	Coeff	St. Dev.	R squared
(1) Age-Sex	**-0.082***	**(0.012)**	**0.176**	**-0.084***	**(0.015)**	**0.1767**
(2) Year	-0.034*	(0.019)	0.1744	-0.114***	(0.022)	0.1766
(3) Age	-0.090***	(0.013)	0.1742	-0.088***	(0.016)	0.1767
(4) Sex	-0.042**	(0.018)	0.1756	-0.133***	(0.022)	0.1767
(5) Region	-0.079***	(0.011)	0.1755	-0.107***	(0.013)	0.1787
(6) Age Sex Region	-0.050***	(0.007)	0.1744	-0.044***	(0.007)	0.1781
(7) Pr Higher	-0.092***	(0.035)	0.175	-0.131**	(0.064)	0.177
(8) College Higher	-0.148***	(0.035)	0.175	-0.171***	(0.043)	0.1779
Observations	151,226			122,669		
Individuals	25,425			19,335		

Note: I replicate the results from the most complete model in Table 5 using alternative definitions of a reference group. All models are estimated with a RE model; robust standard errors clustered at the individual level are reported in parentheses. OLS results are consistent with the findings in this table and available upon request. The variable Pr Higher measures the proportion of people with more years of education than the respondent in the sample by age group and sex cohort. The variable College Higher measures the proportion of people with college (or higher) degree by age group and sex cohort. **Bold** estimates show the reference benchmark results from Table 5.

*** $p<0.01$, ** $p<0.05$, * $p<0.1$

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[15] Wilkinson and Picket (2010) cite extensive evidence that social status is one of the most important determinants of SWB. Low social status carries a strong message of inferiority, which together with lack of friends and stress in early life is seriously detrimental to health and longevity.

The top of the table starts with the definition that was introduced in section 3.2, which assumes that people make comparisons based on their age group and sex. For convenience the estimates, which are also found in Table 5, are presented in **bold**. Model (2) assumes that the comparison is made with everyone in the nation and therefore reference group is defined as the average education of Australians by year. This definition is similar to the one Easterlin (1995) uses in his studies on income comparison. Next, model (3), (4), and (5) assume that the comparisons happen only across the domains of age, sex, and region,[16] respectively. And model (6) assumes that the person's cohort is determined by all three domains. Finally, model (7) and (8) test the alternative hypothesis that what matters in education is not the average education of other people, but the proportion of people with higher degrees in their sex-age cohort, and, in the case of model (8), the proportion of people with college degrees in their age-sex cohort. In all models, even after controlling for reference group income, I find that the effect of reference group education is still negative and statistically significant. This is consistent with the main findings of the paper.

5. Conclusion

One of the most important insights from the economics of happiness literature is that happiness depends, at least partially, on how people compare to those around them. Much of this literature, however, has focused on the effect of relative income on happiness, and far fewer studies have examined the positional aspects of other factors such as education, marriage, or leisure. In this study, I investigate the positional effect of education on SWB by using self-reported data on life satisfaction from the HILDA longitudinal dataset that covers more than 150,000 person-year observations from 2001-2013.

The results suggest that the relationship between education and happiness is at least to some extent determined by relative considerations. As hypothesized, I find that the effect of reference group education is negative and highly statistically significant. It is also economically relevant: an increase in reference group education by four years, for example, is associated with a decline in life satisfaction similar to the one associated with divorce. The results are consistent even after controlling for reference group income, which suggests that people use education, and not just income, as a benchmark for comparison.

I also test if the SWB effect of social comparison is conditional on the level of education. I find evidence for positive and statistically significant interaction effect. The results imply

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[16] Here, I use the thirteen regions (Sydney, Melbourne, Victoria, etc.) that are available in the dataset.

that although the negative social comparison effect is mitigated by higher education, it never quite disappears, at least for majority of people in the sample.

There are several methodological problems that make causal inferences in the context of happiness research and this study problematic. First, there are concerns about the direction of causality. Happy people after all are more successful across multiple domains of life including marriage, friendship, income, work performance, and health (De Neve & Oswald, 2012; Graham, Eggers, & Sukhtankar, 2004; Lyubomirsky, King, & Diener, 2005). Similar concerns could be raised with respect to education – perhaps, happier people are more likely to finish a higher degree because they are more creative and likely to thrive in a group environment. Yet, it is highly unlikely that one's SWB will influence the average education of the people in their reference group.

There are also concerns about unobserved heterogeneity. For example, unobserved personality traits such as optimism or locus of control can be correlated with both SWB and other explanatory variables in the model. Optimists, for example, may be more likely to report higher happiness even if they face the same objective conditions as less optimistic people. I am more interested, however, less on the effect of these personal characteristics and more on the effect of reference group education. In this regard, it is also unlikely that individual characteristics such as marital status, education, or income will affect the average level of education in the reference group, which mitigates concerns about omitted variable bias. Nevertheless, it is still possible that individuals' definition of happiness might change if their reference group changes. To mitigate such concerns, I show that the results hold when I use a set of alternative measures of well-being, some of which less prone to be influenced by changing interpretation of the definition of happiness.

A more important critique in the context of the current research, however, is that I am neither able to measure the process through which people make such social comparisons nor do I know whether individuals have sufficient information about the average education of their reference group. While information on educational attainment is often readily available through variety of media, and individuals often have knowledge of the education of their closer peer group, I am not able to account for these processes. In this regard, I do not suggest that the findings in this study imply that all people make such social comparisons or have knowledge of their reference group education. However, much of the value of happiness research has been to detect patterns across different groups of the population (Fitoussi, Sen et al. 2009). In this regard, while the data do not allow us to directly measure the process of comparison, the compelling theoretical and empirical

evidence in this and many other papers imply that social comparison is the most likely explanation for the patterns documented in this paper. Furthermore, the results seem to be robust with respect to several alternative definitions of reference group.

Finally, I am not suggesting that people pursue higher education for the sake of status alone. There is a large literature that provides convincing evidence that education is correlated with many beneficial outcomes beyond higher income and social status. Many of the regressions in the education-happiness literature control for these channels, and thus significantly underestimate the effect of education on SWB. Powdthavee, Lekfuangfu et al. (2015), for example, find that the overall, direct and indirect, effect of education through the income, health, and other channels is positive and significant. However, the results in this study suggest that individuals also care about status in the domain of education perhaps as much as they care about how their income compares to that of others. This could explain why academics, for example, are willing to spend extra years of schooling and at the end may take lower paying jobs compared to someone with lower education. Thus, the current findings contribute to the growing economics of happiness literature that views social comparison as fundamental to our understanding of social processes and most importantly of the causes and correlates of happiness.

6. References

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