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What Can Life Satisfaction Data Tell Us About Discrimination Against Sexual Minorities? A Structural Equation Model for Australia and the United Kingdom

Nattavudh Powdthavee
Mark Wooden

THE LONDON SCHOOL OF ECONOMICS AND POLITICAL SCIENCE

E·S·R·C ECONOMIC & SOCIAL RESEARCH COUNCIL

Abstract
Very little is known about how the differential treatment of sexual minorities could influence subjective reports of overall well-being. This paper seeks to fill this gap. Data from two large surveys that provide nationally representative samples for two different countries – Australia (the HILDA Survey) and the UK (the UK Household Longitudinal Study) – are used to estimate a simultaneous equations model of life satisfaction. The model allows for self-reported sexual identity to influence a measure of life satisfaction both directly and indirectly through seven different channels: (i) income; (ii) employment; (iii) health (iv) partner relationships; (v) children; (vi) friendship networks; and (vii) education. Lesbian, gay and bisexual persons are found to be significantly less satisfied with their lives than otherwise comparable heterosexual persons. In both countries this is the result of a combination of direct and indirect effects.

Key words: Sexual orientation, sexual minorities, discrimination, life satisfaction, HILDA survey, UKHLS
JEL: I31, J71

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Nattavudh Powdthavee is a Principal Research Fellow with the Wellbeing Programme at the Centre for Economic Performance, London School of Economics. He is also Professorial Research Fellow at the Melbourne Institute of Applied Economic and Social Research, University of Melbourne. Mark Wooden is a Professorial Research Fellow and the Director of HILDA Survey Project at the Melbourne Institute of Applied Economic and Social Research, University of Melbourne.

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1. Introduction

Beginning with the seminal works of Myrdal (1944) and Becker (1957), economists have long been interested in the issue of discrimination, especially as it operates within labor markets. Most of the empirical research that followed focused on the differential treatment of women, racial minorities and older people. Only relatively recently have economists paid any attention to discrimination based on an individual's sexual preferences, behavior or identity. This apparent disinterest almost certainly reflected, at least in part, laws and attitudes that legitimized discrimination against, and victimization of, sexual minorities. Indeed, homosexual behaviour between males had been illegal in most countries (and still is in many African and Asian nations). But with gradual changes in both laws, including the introduction of laws that explicitly prohibit discrimination on the basis of sexual identity, and in public attitudes towards homosexuality (e.g., Smith, 2011; Park and Rhead, 2013), has come an increased interest in the extent to which discriminatory practices still exist and how such practices affect lesbian, gay and bisexual (LGB) populations. Among economists most attention was again paid to the labor market, and especially wages, but discrimination against sexual minorities is not just restricted to the labor market, and can manifest in many other ways. This includes institutionalized forms of discrimination, such as differences in the legal rights extended to same-sex as compared to opposite-sex couples, as well as the many other outcomes and behaviors that can arise from the stigmatization of minorities (e.g., differential access to quality health care and housing, social exclusion, and higher rates of victimization as a result of violence and other forms of aggression and abuse).

Assessing the extent of discrimination against sexual minorities thus requires use of either a wide array of outcome variables, rather than a single outcome focused on one domain, as is the case with wages, or some outcome that better measures overall well-being. It is, for example, common to assess overall well-being with some global cognitive

evaluation of life satisfaction (Cummins, 2013). Certainly this has been the approach most favored by economists (Dolan et al., 2008). However, and despite the vast number of studies that have examined determinants of global life satisfaction measures, there has been relatively little research quantifying differences in life satisfaction between LGB and heterosexual populations. Sexuality is not mentioned in the review by Dolan et al. (2008), and we could only identify two published studies that used a broad population sample to analyze some global measure of subjective well-being (SWB) while controlling for sexual orientation (Blanchflower and Oswald, 2004; Chakraborty et al., 2011).

We thus know very little about how differential treatment of sexual minorities could potentially influence subjective reports of overall well-being. Filling this research gap is one of the aims of this study. Specifically, we use data from two large surveys that provide nationally representative samples for two different countries – Australia and the UK – and contain similar self-reported measures of both sexual identity and overall life satisfaction to estimate the relationship between these two measures. Further, we estimate a structural model of the predictors of life satisfaction that distinguishes the multiple channels through which SWB might be affected. This is an important contribution and sets our work apart from most previous research into SWB. We are thus interested in not just whether sexual minorities report being more or less satisfied with their lives, but in identifying the relative importance of the different predictors of well-being (and ill-being) that might contribute to any differential between sexual minorities and the heterosexual population.

2. Conceptual framework and related research

The framework guiding this research is very straightforward. We hypothesize that discrimination against sexual minorities will be reflected in lower levels of SWB among

members of those minority groups. The relationship, however, will be mediated through other intermediate outcomes that are known to influence SWB and also vary with sexual orientation. A simple diagrammatic representation of this framework is provided in Figure 1. Note that our framework is only predictive and is not meant to represent causal relationships between different variables.

As can be seen, seven specific intermediate outcomes are nominated here: (i) income; (ii) employment; (iii) marriage and other forms of partnerships; (iv) children; (v) health; (vi) friendship networks; and (vii) education. We do not pretend that this is an exhaustive list of all possible mediating influences. Rather this choice reflects in part what the separate literatures on SWB and on sexual minorities suggest are likely to be the most important channels, and in part what is available in the datasets at our disposal. There is, for example, considerable evidence that sexual minorities are at greater risk of being victims of physical and sexual violence and other forms of aggression and abuse (e.g., Moracco et al., 2007; Conron et al., 2010; Rothman et al., 2011), which could then lead to lower levels of well-being independent of any effects through other channels, such as a deterioration in health. We, however, are unable to include any useful measure of victimization in our analysis.

We now briefly summarize relevant research on the seven intermediate outcomes listed in Figure 1.

2.1 Income (and Wages)

Measures of income, and more specifically family or household income, are routinely included in models of SWB, with the general consensus being that SWB is positively associated with income but the magnitude of the relationship declines with income and, on average, may be quite small (see Clark et al., 2008). Thus one possible source of lower SWB among sexual minorities is discriminatory practices that result in lower incomes.

As already noted, previous research by economists into discrimination faced by sexual minorities has focused primarily on discrimination in the workplace, and especially on wage differentials. The pioneering work here is Badgett (1995) who used pooled data from the 1989, 1990 and 1991 rounds of the General Social Survey in the US to estimate regression models of the determinants of pre-tax annual employment earnings of full-time workers, with the key variable of interest being a dummy variable identifying sexual orientation constructed from questions about same-sex behavior. She found that behaviorally gay and bisexual men earned between 11% and 27% less than comparable heterosexual men. Lesbian and bisexual women were also found to earn less, but the results were imprecise and so mostly not statistically significant.

Subsequent research, both in the US and other Western countries, confirms the earnings penalty for gay / bisexual men, but in contrast to Badgett mostly reports earnings premiums for lesbian / bisexual women. This is reflected in a meta-analysis of 26 published studies by Klawitter (forthcoming). She reports a mean penalty for gay and bisexual men of 12% and a mean premium for lesbian and bisexual women of 12%. However, this same analysis also shows that the variance in estimates across studies (and especially in the estimated lesbian premium) is large and varies systematically with both the dataset used and the measure used to proxy sexual orientation.

But does it follow that these wage differentials will automatically translate into systematic differences in household incomes? Surprisingly, relatively little research into this question has been conducted. Further, the research that has been undertaken delivers conflicting results. Using data from the 1990 US Census, for example, Klawitter and Flatt (1998) found that despite the presence of a strong pay penalty for men in same-sex couple relationships, the incomes of male same-sex couples, after controlling for a range of demographic characteristics, were little different to married couples, but significantly larger

than the incomes of unmarried different-sex couples. Conversely, and despite the presence of a large pay premium for women in same-sex relationships, female same-sex couples had household incomes that were significantly lower than both married couples and unmarried different-sex couples. In contrast, Carpenter (2004), using data from the US Centers for Disease Control, found that both male and female same-sex couples have significantly lower household incomes than married couples (13% lower in the case of same-sex male couples and 20% lower in the case of female same-sex couples), but not when compared to cohabiting couples of different sex. The findings of Carpenter (2004) suggest that it is marriage that is driving the observed differences in household income, whereas the results of Klawitter and Flatt (1998) suggest that gender wage differentials are a more likely source.

More recently, research reports published by the Williams Institute (Albeda et al., 2009; Badgett et al., 2013), drawing on data from a range of different US data sources, reach the conclusion that LGB-identified persons "are at greater risk for being in poverty and are more likely to receive support from government assistance programs than their heterosexual counterparts" (Badgett et al., 2013, p. 24). Similar conclusions are reached by Uhrig (2014) using population data for the UK. That said, the differences are often small, and not always statistically significant. It is thus difficult, on the basis of the existing evidence, to form strong expectations about the relationship between sexual orientation and income.

2.2 Employment

Previous research also consistently demonstrates that unemployment has a large negative effect on SWB (Dolan et al., 2008). Thus if sexual minorities are discriminated against in the hiring process, reducing the probability of employment, SWB should be adversely affected. Again research is limited, but what has been conducted gives rise to strikingly consistent results. Specifically, evidence from experiments consistently demonstrates that homosexuals are discriminated against in the hiring process where there is a disclosure of the potential

employee's sexual identity. Weichselbaumer (2003) sent out fake resumes to a sample of employers in Austria with vacancies for accountants and secretaries (1226 applications were sent in response to 613 advertised job vacancies) and found that women who declared themselves as lesbians on the application form were, other things constant, 12 to 13% less likely to receive a call-back than heterosexual women. Subsequent research using this same type of correspondence test experiment, and conducted in a range of different countries (Greece, Sweden and the US), reaches similar conclusions, though the size of differentials are often larger (Drydakis, 2009, 2011; Tilcsik, 2010; Ahmed et al., 2013).

2.3 Marriage and partnering

It has long been found that marriage is positively associated with SWB (e.g., Wilson, 1967; Dolan et al., 2008). This distinction is potentially critical for analyses of differences between heterosexual populations and sexual minorities, with same-sex marriage illegal in most parts of the world. Over time, however, research is increasingly suggesting that it may not be marriage per se that is critical, but living in a stable and secure intimate relationship (e.g., Brown, 2000; Powdthavee, 2009). Furthermore, in most Western nations laws now exist that are intended to ensure that persons in same-sex partnerships are entitled to the same rights and responsibilities as married persons. In the UK, for example, this was reflected in the introduction of the Civil Partnership Act of 2004 (and indeed from 29th March 2014 same-sex marriages became legal). In Australia, while same-sex marriage remains proscribed, the federal government together with all state governments passed laws in the 2000s to recognize same-sex de facto partnerships as equal to opposite-sex partnerships. At the federal level, most significant here are the same-sex reforms introduced in 2008 and 2009 in the wake of a report of the Australian Human Right and Equal Opportunities Commission into discrimination against people in same-sex relationships (HREOC, 2007).

No longer, therefore, are there any legal obstacles to the formation of same-sex unions in countries like Australia and the UK. Nevertheless, retrospective history data for a UK sample show that same-sex cohabitations are of much shorter duration than both marriages and different-sex cohabitations (Lau, 2012), while in Australia population survey data indicate that LGB persons are still far less likely to be living in couple relationships than heterosexuals (ABS, 2013).

2.4 Children

The impact of children is one area where the evidence from SWB research is very uncertain, but it is also the dimension where the constraints faced by heterosexual persons and LGB persons are most different. Biological constraints, together with the financial and legal obstacles to adoption that are faced by all couples, inevitably mean that same-sex couples will have far fewer children than comparable heterosexual couples (for US evidence, see Black et al., 2007).

2.5 Health

The influence that past research has consistently shown to exhibit the strongest relationship with SWB is health. At the same time, there has long been a concern that LGB populations are at much greater risk of health problems, including both physical problems and mental health disorders. King et al. (2008), for example, report results from a meta-analysis of previous studies showing that the risks of depression and anxiety disorders, and of alcohol and substance dependence, are at least 1.5 times higher within LBG populations, and suicide attempts around twice as likely, than in heterosexual populations. Subsequent research mostly confirms this finding of marked difference in mental health disorders (e.g., Cochran and Mays, 2009; Bolton and Sareen, 2011; Chakraborty et al. 2011). Similarly, there is a sizeable literature suggesting that LGB persons are, relative to heterosexuals, at greater

risk of suffering a range of poor physical health outcomes. Much of this literature has focused on outcomes related to HIV infection, but there is now considerable evidence that LGB persons are at greater risk of experiencing many adverse health outcomes (e.g., an increased risk of being diagnosed with asthma, cancer, cardiovascular disease, diabetes, and other chronic conditions) that are unconnected to HIV infection (for reviews, see National Research Council, 2011; Lick et al., 2013).

Very differently, recent research using large population samples in the US, but using measures of self-assessed health, suggest that while same-sex cohabitors report poorer health than opposite-sex married couples, there are no systematic differences between same-sex cohabitors and either opposite-sex cohabitors or single persons (Denney et al., 2013; Liu et al., 2013). A key feature of these studies is the inclusion of controls for socio-economic status. Sizeable differences between same-sex and opposite-sex cohabitants were initially found, but disappear once controls for variables such as education, employment status, and income / poverty are included. It thus may be that at least some of the differences in health outcomes observed in earlier research were the result of differences in socio-economic status, rather than in sexuality. Alternatively, these findings may reflect the use of subjective assessments as compared with more direct measures of physical health. Sandfort et al. (2006), for example, in their study of a random sample of the Dutch population, could find no significant differences between LGB and heterosexual populations using the self-assessed measure of general physical health from the SF-36, even though LGB persons were more likely to report both chronic health conditions and acute physical symptoms.

2.6 Friendship networks

It is widely accepted that friendship networks promote SWB (see Powdthavee, 2008), and this will be no less true of LGB populations (e.g., Masini and Barrett, 2008; Keleher et al., 2010). Indeed, strong social support mechanisms may be even more vital to LGB

populations given their greater exposure to stress as a result of stigma-related prejudice and discrimination (Kwon, 2013). Far less clear is whether LGB populations have relatively lesser or greater access to supportive friendship networks, but what can be expected is that access will be highly variable across individuals.

2.7 Education

Despite evidence of considerable victimization at school, LGB populations, at least in the US (see Black et al., 2007) and the UK (see Arabsheibani et al., 2005), invest much more heavily in education that heterosexual populations. How this might feed into SWB, however, is far less clear, with previous research on SWB providing very mixed and contradictory findings about the role of education (see Powdthavee et al., 2013).

3. Data and empirical strategy

3.1. Data

This analysis uses two data sets: wave 3 of the UK Household Longitudinal Study (UKHLS) (see Buck and McFall, 2012) and wave 12 of the Household, Income and Labour Dynamics in Australia (HILDA) Survey (see Watson and Wooden, 2012). Both are panel surveys that commenced with large nationally representative samples of households, and conduct interviews on an annual basis with all adult members of those households. Both are also broad omnibus surveys, but with a focus on income, work, family, and health and well-being. The focus here on one specific wave of data from each study reflects the fact that it is only in wave 3 of the UKHLS and wave 12 of the HILDA Survey that any measure of sexual orientation or identification is available. Note further that these two survey waves were conducted roughly at the same time; wave 3 of the UKHLS was conducted over the two-year

period 2011-2012, while wave 12 of the HILDA Survey was mostly conducted during the second half of 2012.

The responding sample for wave 3 of the UKHLS comprises 49,739 persons aged 16 years or older. This, however, includes 3836 persons interviewed by proxy (that is, another household member answered on their behalf), who we exclude. In addition, we are forced to exclude any respondent who did not complete the computer-administered self-completion instrument that most interviewees are given, since it is through this instrument that data on both sexual identity and life satisfaction are collected. This resulted in the exclusion of a further 5197 cases. Given employment is one of our intermediate variables, we also exclude all persons aged 65 years or older (thus restricting the sample to persons of working age). Finally, we exclude any further cases with missing data on any of our intermediate outcome or control variables, leaving us with a final sample comprising 32,964 persons.

The responding sample for wave 12 of the HILDA Survey numbers 17,476 persons aged 15 years or over. Again we are forced to exclude persons that did not complete (or return) the self-completion instrument that all interviewees are given (n=2096). Restricting the sample to persons aged 16 to 64 years reduces the usable sample to 12,682 cases, and after removal of further cases with missing data on relevant outcome or control variables we are left with a final sample for analysis numbering 12,388.

3.2. Measuring sexual identity

Sexual orientation encompasses at least three dimensions of sexuality: attraction, behavior and identity (Laumann et al., 1994). The measures available in both the UKHLS and HILDA Survey are restricted to just one of these dimensions – sexual identity. The form of the relevant question included in both surveys is guided by a recommendation from the UK Office of National Statistics (Haseldon and Joloza, 2009). Further, and as noted earlier, while

both surveys rely mainly on face-to-face interviews, both also include a self-completion instrument and it is this instrument in which the sexual identity question was included.

In wave 3 of the UKHLS the relevant question reads: "*Which of the following options best describe how you think of yourself?*" Five pre-coded response options are provided: (i) Heterosexual or straight; (ii) Gay or lesbian; (iii) Bisexual; (iv) Other; and (v) Prefer not to say. An almost identically worded question was included in wave 12 of the HILDA Survey, but with the notable difference that the HILDA Survey provided for an additional response option: Unsure / Don't know.[1]

As reported in Table 1, proportionally-speaking there are slightly more LGB individuals in the Australian sample compared to the UK sample. Approximately 1.4% of the UK sample population report being gay or lesbian, compared to 1.6% of the Australian sample, while bisexuals make up another 1.1% of the UK sample and 1.5% of the Australian sample. There are another 1.1% and 0.7% of the UK and Australia samples, respectively, that selected the option "Other". Finally, 2.9% of the UK sample and 2.0% of the Australian sample preferred not to disclose their sexual identity.

3.3. Outcome variables

Our main dependent variable comes from responses to single-item questions about overall life satisfaction. While single-item measures of life satisfaction are generally regarded as statistically inferior to multi-item scales, they are now routinely included in large national and international surveys, and have formed the basis for a very large number of studies, including within economics.[2]

[1] In addition, in both surveys there are cases that are missing because respondents elected not to answer this question. Separate indicator variables to represent these don't know / unsure and missing cases are included in our regression analyses, though we do not report the coefficients and nor do we estimate the indirect effects associated with these cases.

[2] Dolan et al. (2008), in their review of the primarily economics literature, identified 19 major data sets that contained single-item measure of global life satisfaction or happiness.

In the UKHLS, respondents are asked, again as part of the self-completion instrument, to rate, on a 7-point scale, how satisfied they are with their "*life overall*". All scale points are labelled and range from "very dissatisfied" to "very satisfied". In the HILDA Survey a similar question is asked: "*All things considered, how satisfied are you with your life?*" But unlike the UKHLS, this question is interviewer administered. Respondents are also given an 11-point (0 to 10) scale, with only the extreme points labeled.

Turning to the potential mediating variables, our income variable in both data sets is represented by the log of gross equivalized annual household income.[3] Both data sets contain a household income variable that is constructed by summing the personal incomes of all household members, with missing data for any income components imputed. The variable in the HILDA survey is constructed for the financial year preceding interview (i.e., the year ended 30 June 2012). The household income variable from the UKHLS, on the other hand, is based only on income received during the 30 days prior to interview, which we have multiplied by 12 to obtain an annual estimate. Employment is a binary variable representing whether the person was employed or not during the week preceding interview. Partnered is also a binary variable, and indicates whether or not the person is currently married, where marriage is defined to include both registered and de facto unions and, in the case of the UK, civil partnerships. Health is represented by a self-assessed measure (which in both surveys is included within the self-completion instrument), with possible responses ranging from 1 "poor" to 5 "excellent". Number of children is the total number of children the respondent has, including children that no longer live at home. Size of friendship networks is measured differently across the two data sets. In the UKHLS it is represented by the number of friends using the question: "*How many close friends would you say you have?*" In the HILDA

[3] Equivalized household income is calculated using the following formula: annual household income / [1 + 0.5*(number of adult household members minus 1) + 0.3*(number of children aged less than 15 in the household)].

Survey it is captured using the following subjective question: "*The following statements have been used by many people to describe how much support they get from other people. How much do you agree or disagree with each? ... I seem to have a lot of friends.*" The potential responses are on a 7-point scale that ranges from "strongly disagree" to "strongly agree". Finally, education is represented by a dummy variable indicating whether or not the individual had completed a university degree (or equivalent level qualification).

3.4. Empirical strategy

We adopt the multiple mediation analysis method (Baron and Kenny, 1986; Hayes, 2009) to study the indirect effects of sexual identity on life satisfaction through our seven selected indirect channels (Figure 1). We estimate a structural equations model (SEM) that takes the form:

$$
\begin{aligned}
LS_i &= \alpha_0 + \beta_s \sum_{s=1}^{7} X'_{si} + \gamma_0 SI_i + Z_i + u_{0i}, \\
X_{1i} &= \alpha_1 + \gamma_1 SI_i + Z_i + u_{1i}, \\
&\vdots \\
X_{7i} &= \alpha_7 + \gamma_7 SI_i + Z_i + u_{7i}.
\end{aligned}
$$

where i = 1, 2, …, N; LS_i denotes respondent i's life satisfaction; X_{si} represents the set of seven potential pathways through which sexual identity influences life satisfaction; SI_i is an indicator of individual i's sexual identity; and Z_i is a vector of exogenous control variables, including age, age-squared and age-cubed, race dummies (only in the UKHLS sample), country of origin dummies (only in the HILDA Survey sample), a variable representing how long the person has been in the panel (and its squared value), a dummy representing whether there were other people present during the interview (only in the HILDA Survey), and regional dummies. The error terms μ_{i0}, μ_{i1}, …, μ_{i7} are assumed to be randomly distributed, as well as allowed to be correlated across all eight regression equations.

Based on the equations above, the indirect effect of SI_i on LS_i through X_{si} for each s is given by $\beta_s \times \gamma_s$ (Baron and Kenny, 1986). As recommended by Hayes (2009), bootstrapping (with 500 replications) is used to estimate the standard errors for all of the estimated indirect effects. The model is estimated using the *sem* command in STATA 13. Note that all of the outcome variables are standardized, and thus have a mean of 0 and a standard deviation of 1.

4. Results

Tables 2 and 3 report the SEM estimates for the UK and Australian samples, respectively. Each column represents each different regression equation, starting from life satisfaction as the dependent variable in the first column, then log of equivalized household income, whether in employment, whether partnered, number of children, self-assessed health, number of friends, and whether completed a university degree.

Column 1 of Table 2 shows that, in the UK, LGB individuals, as well as individuals with "other" sexual identities and those who prefer not to disclose their sexual identity, are ceteris paribus significantly less satisfied with their life overall. Bisexuals are the least satisfied (β = -.289), followed by those reporting having an "other" sexual identity (β = -.237), then gays and lesbians (β = -.138), and finally those who "prefer not to say" (β = -.064, which is only weakly significant). Consistent with previous studies on the determinants of life satisfaction (Dolan et al., 2008; Powdthavee, 2010), the log of equivalized household income employment, being partnered, self-assessed health, the number of close friends, and possessing a university degree, all enter the life satisfaction equation in a positive and statistically significant manner. The coefficient on the number of children is also positive and statistically well determined, but this finding contrasts with most previous research which has usually reported either a negative or insignificant relationship. One possible explanation here

is that most previous research has defined children to mean children living in the household (Dolan et al., 2008, p. 107), whereas our measure includes all children the respondent has, including adult children who have left the home. A one standard deviation increase in self-assessed health is associated with the largest increase in life satisfaction (β = .288), followed by being partnered (β = .088), the log of equivalized household income (β = .065), friends (β = .051), employment (β = .029), the number of children (β = .026), and completion of a degree (β = .024).

What about the relationships between different sexual identities and life satisfaction in Australia? Looking at column 1 of Table 3, we observe that, by comparison with individuals in the UK, differences in life satisfaction between heterosexuals and sexual minorities are mostly smaller and, with the exception of bisexuals are, not significantly significant. With respect to the potential mediating factors, we find all but two coefficients to be both positive and statistically significant at the 5% level. In order of magnitude, these are: self-assessed health (β = .292), friends (β = .200), being partnered (β = .162), the log of equivalized household income (β = .044), employment (β = .027), and number of children (β = .022). The main difference with the UK results is the size of the coefficient on the variable measuring friends, which is four times larger in the Australian results. This most likely reflects the different measures used to capture the effects of friends; the subjective measure of friends available in the HILDA Survey data may be more subject to reporting bias and thus causing the association between friends and SWB to be overstated. Finally, we find that education (i.e., completing a degree) in Australia is, in contrast to the UK results, negatively and significantly associated with life satisfaction (β = -.027). While this difference may seem odd, it should be borne in mind that findings from previous research on the association with education have been very mixed. Further, the estimated coefficients on the education variable, while of opposite signs, are both quite small.

Columns 2 to 8 in each of these tables report estimates of the extent to which individuals with different sexual identities perform better or worse in terms of each of our intermediate outcome variables. Thus we can see from Table 2 that sexual minority adults in the UK tend to be from lower income households and are less likely to be employed than an average heterosexual. These differentials, however, are neither large nor statistically significant for gay or lesbian individuals. As might be expected, gay men and lesbian women, as well as bisexuals and individuals who preferred not to state their sexual identity, are much more likely to be single. Also as expected, gay men and lesbian women, as well as bisexuals, are much less likely than others to have children, and report relatively worse health on average. Gay men and lesbian women do not report having fewer or more friends than an average heterosexual. Finally, while being gay or lesbian does not seem to have prevented individuals from completing a university degree (in fact, gay or lesbians are more likely to have completed a university degree), persons who report either having an "other" sexual identity or a preference not to state their sexual identity are less likely to have completed a higher education qualification.

Comparing columns 2 to 8 in Table 3 with those in Table 2, we can see that there are many similarities in the regression equation results for the two samples. For example, as in the UK sample, there is no evidence to suggest that, in 2012, gay men or lesbian women in Australia received lower gross equivalized household income than otherwise comparable heterosexual individuals, but there is strong statistical evidence that bisexual adults, as well as individuals with "other" sexual identities or who "prefer not to say", tend to be from lower income households, on average. Gay or lesbian individuals in Australia are also both significantly less likely to be living in a formal relationship with a partner and to have many children. They are also more likely to report poorer health than heterosexuals. And like LGB persons in the UK, they are much more likely to have completed a university degree.

We next calculated the implied 'indirect effects' on life satisfaction that are associated with membership of different sexual minority groups.[4] This is done by multiplying, for example, the coefficient on (standardized) log of equivalized household income in the (standardized) life satisfaction equation by the coefficient on "gay or lesbian" in the (standardized) log of equivalized household income equation to obtain the indirect effect of being gay or lesbian on life satisfaction through the income channel. The indirect effect for each of the seven hypothesized channels can then be summed to obtain a total indirect effect.

A summary of these indirect effects (together with the direct effects) is presented in Table 4 for the UK and in Table 5 for Australia. Thus we can see that the lower probabilities of being in a formal relationship, having high levels of self-assessed health, and having children among gay men and lesbian women in the UK reported earlier (in Table 2) all contribute significantly to lower life satisfaction. Two of these channels – partnering and health – are also statistically important in contributing to lower life satisfaction of gay men and lesbian women in Australia. There is also a small negative, but significant, indirect effect that operates in Australia, but not in the UK, through the relatively high incidence of university education.

The total indirect effects and direct effects, as well as the combined effects (the sum of the direct and indirect effects), are presented in the last three rows of the two tables. In both countries, the total indirect effect is negative and significant for all four sexual minority groups. As a result, the combined effects for all four groups, and in both samples, are considerably larger than the estimated direct effects. This implies that single-equation regressions will underestimate the association between being a member of a sexual minority group and life satisfaction.

[4] Although we are calling the product of two coefficients the "indirect effect", it is nothing more than just a simple indirect association between sexual identity and life satisfaction via a mediating variable of interest. It does not imply causality. However, the term is used here for the sake of consistency with previous research on mediation analysis (Baron and Kenny, 1986).

There is also an obvious marked difference in the results across the two population samples we use. While the combined effects associated with sexual minority identity are broadly similar in both countries, with the negative differential largest among bisexuals, followed by persons who selected the "other" response, and then gay or lesbian individuals, the relative importance of indirect and direct effects is very different. The indirect effects are mostly much more important, both relatively and absolutely, in the Australian sample. For example, the size of the estimated total indirect effect of being a bisexual in Australia is approximately 25% of the standard deviation of life satisfaction, which is more than twice the size of the estimated total indirect effect of being a bisexual in the UK. The exception to this is gay and lesbian individuals. For this group the differential with the heterosexual majority is relatively modest in both samples but slightly larger (in absolute terms) in the UK.

To this point we have been conducting our analysis based on the assumption that there are no gender differences in the implications of being gay, lesbian or bisexual for life satisfaction. However, this might be an unrealistic assumption, especially given that previous studies have found significant evidence of negative pay discrimination for gay workers but a pay premium for lesbian workers. Hence the same technique we used to calculate the indirect effects is applied to gender sub-samples. Tables 6 and 7 report the set of implied indirect effects, together with the direct effects, of different sexual identities on life satisfaction by gender for the UK and for Australia, respectively.

A number of important gender differences are suggested by this analysis. Most obviously there is relatively little evidence that lesbian women in the UK have lower levels of life satisfaction than heterosexual women; there is no direct effect and only a very modest negative net indirect effect. This stands in marked contrast to both gay men in the UK and lesbian women in Australia. Among gay men in the UK both indirect and direct effects contribute to a very sizeable differential in SWB, equal to more than one third of a standard

deviation in the life satisfaction score. The direct effect, however, accounts for the majority (69%) of the gap between heterosexual men and gay men. In Australia, both gay men and lesbian women have significantly lower levels of life satisfaction of roughly similar magnitudes. The route by which this is achieved, however, is very different, with indirect effects (mainly via lower rates of partnering and fewer children) accounting for all of the differential for lesbian women, but accounting for none of it among gay men.

The relative size of direct and indirect effects for bisexuals and those that chose the "other" category mostly do not differ much with gender, though the relative importance of the indirect channels does. Finally, among those that preferred not to reveal their identity the relative size of indirect and direct effects are similar for men and women in the UK data but not in the Australian data. Notably there is a very large negative direct effect for Australian men in this category, but not for Australian women.

One final potential concern is that our results are based on the assumption that what matters for life satisfaction does not vary in a systematic way with sexual identity. Although there are no reasons to believe that an LGB person would, for example, derive more or less satisfaction from being employed than an average heterosexual person, it is still worth checking whether this is confirmed empirically. We thus estimated a fully interactive model of life satisfaction, where sexual identity is interacted with all of the mediating factors. The estimates are reported in Appendix Table A1. With only few exceptions, most of the interaction terms are, as anticipated, statistically insignificantly different from zero at conventional statistical levels. This leads us to reject the hypothesis that the magnitudes of the determinants of life satisfaction vary systematically and significantly across people of different sexual identities.

5. Conclusion

This paper uses a measure of SWB to empirically investigate the extent of potential discrimination against sexual minorities in the UK and Australia. Using a structural equation modelling approach, we are able to show that LGB individuals are significantly less satisfied with their lives than the heterosexual majority. Also, by estimating a structural equation model, the direct association between being a member of an LGB group and life satisfaction can be separated from the set of indirect effects resulting from different observable individual characteristics, thereby adding extra information to what has been lacking in the estimation of single-equation models.

Overall, we find evidence in the life satisfaction data that is consistent with the hypothesis of discrimination against sexual minorities in both the UK and Australia. Not only do individuals from sexual minorities report significantly lower levels of life satisfaction than an average heterosexual (other things held constant), being a member of a sexual minority, which also includes those who preferred not to reveal their sexual identity, is indirectly associated with lower well-being through other determinants of life satisfaction. An important implication of our results is that single-equation models of life satisfaction will almost certainly underestimate the total effect of being a member of an LGB group on the overall life satisfaction of these individuals. The importance of this insight is highlighted by the results for Australia. With the exception of bisexuals, the direct differences between sexual minorities and heterosexuals in the Australian sample were statistically insignificant. Once indirect effects were accounted for, however, the differences with all four sexual minority groups considered here became considerably larger and statistically significant.

A feature of our analysis is the use of data collected using similar methods and containing comparable measures that are representative of populations for two countries. We have thus been able to test the extent to which our results are replicable across different data

sets covering different populations, and while important differences are found, it is the similarities that are most striking. Of course, it is true that Australia and the UK have many features in common, including a common language and similar legal institutions. It remains to be seen whether our results would extend to other nations with very different socio-economic customs and institutions.

The analyses presented here are also not without limitations. Most obviously the measure of sexual orientation used is based on self-identification, which can be problematic given the stigma that has traditionally been associated with sexual minority status and hence the incentive for some respondents to not reveal their sexual preferences. Nevertheless, alternative approaches are not obviously superior. Some studies, for example, use same-sex cohabitation as their indicator of sexual minority status, which has the consequence of restricting the sample for analysis to persons living in couple relationships. This seems a major weakness given the evidence presented here that the lesser propensity of LGB persons to form partnerships is a major contributor to lower SWB.

A further criticism of our paper is that the associations between sexual identity, intermediate outcomes and life satisfaction are subject to a variety of endogeneity biases, including, but not limited to, potential selection bias (e.g., LGB persons may select themselves into environments that are not the typical choices for heterosexuals), and as a result no causal inferences can be drawn from this study. This is a fair objection. Ideally what policy makers need is a fully causal model. This, however, is no simple task given sexual preferences is not amenable to experimental manipulation. Nevertheless, the current study is one of the first to empirically identify candidate areas for development when it comes to the possible channels through which an LGB person might be most affected by pre-existing inequality and prejudice.

References

Ahmed, A.M., Anderssen, L., Hamarstedt, M. 2013. Are gay men and lesbian women discriminated against in the hiring process. *Southern Economic Journal* 79, 565-585.

Albeda, R., Badgett, M.V.L., Schneebaum, A., Gates, G.J. 2009. *Poverty in the Lesbian, Gay, and Bisexual Community*. Report published on-line. Los Angeles: The Williams Institute, UCLA. [http://williamsinstitute.law.ucla.edu/wp-content/uploads/Albelda-Badgett-Schneebaum-Gates-LGB-Poverty-Report-March-2009.pdf: Last accessed 26 March 2014.)

Arabsheibani, G.R., Marin, A., Wadsworth, J. 2005. Gay pay in the UK. *Economica* 72, 333-347.

Australian Bureau of Statistics (ABS). 2013. *Australian Social Trends, July 2013* (ABS cat. no. 4102.0). Canberra: ABS.

Badgett, M.V.L. 1995. The wage effects of sexual-identity discrimination. *Industrial and Labor Relations Review* 48, 726-739.

Badgett, M.V.L., Durso, L.E., Schneebaum, A. 2013. *New Patterns of Poverty in the Lesbian, Gay, and Bisexual Community*. Report published on-line. Los Angeles: The Williams Institute, UCLA. [http://williamsinstitute.law.ucla.edu/wp-content/uploads/LGB-Poverty-Update-Jun-2013.pdf: Last accessed 26 March 2014.)

Baron, R.M., Kenny, D.A. 1986. The moderator-mediator variable distinction in social psychological research: conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology* 51, 1173-1182.

Becker, G.S. 1957. *The Economics of Discrimination*. Chicago: University of Chicago Press.

Black, D.A., Sanders. S.G., Taylor, L.J. 2007. The economics of lesbian and gay families *Journal of Economic Perspectives* 21, 53-70.

Blanchflower, D.G., Oswald, A.J. 2004. Money, sex, and happiness: an empirical study. *Scandinavian Journal of Economics* 106, 393-416.

Bolton, S.-L., Sareen, J. 2011. Sexual orientation and its relation to mental disorders and suicide attempts: findings from a nationally representative sample. *The Canadian Journal of Psychiatry* 56, 35-43.

Brown, S.L. 2000. The effect of union type on psychological well-being: depression among cohabitators versus married. *Journal of Health and Social Behavior* 41, 241-255.

Buck, N., McFall, S. 2012. Understanding Society: design overview. *Longitudinal and Life Course Studies* 3, 5-17.

Carpenter, C.S. 2004. New evidence on gay and lesbian household incomes. *Contemporary Economic Policy* 22, 78-94.

Chakraborty, A., McManus, S., Brugha, T.S., Bebbington, P., King, M. 2011. Mental health of the non-heterosexual population of England. *The British Journal of Psychiatry* 198, 143-148.

Clark, A.E., Frijters, P., Shields, M.A. 2008. Relative income, happiness, and utility: an explanation for the Easterlin Paradox and other puzzles. *Journal of Economic Literature* 46, 95-144.

Cochran, S.D., Mays, V.M. 2009. Burden of psychiatric morbidity among lesbian, gay, and bisexual individuals in the California Quality of Life Survey. *Journal of Abnormal Psychology* 118, 647-658.

Conron, K.J., Mimiaga, M.J., Landers, S.J. 2010. A population-based study of sexual identity identity and gender differences in adult health. *American Journal of Public Health* 100, 1953-1960.

Cummins, R.A. 2013. Measuring happiness and subjective well-being. In: David, S.A., Boniwell, I, Conley Ayers, A. (Eds.), *The Oxford Handbook of Happiness*. Oxford: Oxford University Press, 185-200.

Denney, J.T., Gorman, B.K., Barrera, C.B. 2013. Families, resources, and adult health: where do sexual minorities fit? *Journal of Health and Social Behavior* 54, 46-63.

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

Drydakis, N. 2009. Sexual identity discrimination in the labor market. *Labour Economics* 16, 364-372.

Drydakis, N. 2011. Women's sexual orientation and labor market outcomes in Greece. *Feminist Economics* 17, 89-117.

Haseldon, L., Joloza, T. 2009. *Measuring Sexual Identity: A Guide for Researchers*. Newport (UK): Office for National Statistics.

Hayes, A.F. 2009. Beyond Baron and Kenny: statistical mediation analysis in the new millennium. *Communication Monographs* 76, 408-420.

Human Rights and Equal Opportunities Commission (HREOC). 2007. *Same-Sex: Same Entitlements. National Inquiry into Discrimination against People in Same-Sex Relationships: Financial and Work-Related Entitlements and Benefits.* Sydney: Human Rights and Equal Opportunities Commission.

Keleher, J., Wei, M., Liao, K.Y. 2010. Attachment, positive feelings about being a lesbian, perceived general support, and well-being. *Journal of Social and Clinical Psychology* 29, 847-873.

King, M., Semlyen, J., Tai, S.S., Killaspy, H., Osborn, D., Popelyuk, D., Nazareth, I. 2008. A systematic review of mental disorder, suicide, and deliberate self harm in lesbian, gay and bisexual people. *BMC Psychiatry* 8(70).

Klawitter, M.M. Forthcoming. Meta-analysis of the effects of sexual identity on earnings. *Industrial Relations*.

Klawitter, M.M., Flatt, V. 1998. The effects of state and local anti-discrimination policies for sexual identity. *Journal of Policy Analysis and Management* 17, 658-686.

Kwon, P. 2013. Resilience in lesbian, gay, and bisexual individuals. *Personality and Social Psychology Review* 17, 371-383.

Lau, C.Q. 2012. The stability of same-sex cohabitation, different-sex cohabitation, and marriage. *Journal of Marriage and Family* 74, 973-988.

Laumann, E.O., Gagnon, J.H., Michael, R.T., Michaels, S. 1994. *The Social Organization of Sexuality: Sexual Practices in the United States*. Chicago: University of Chicago Press.

Lick, D.J., Durso, L.E., Johnson, K.L. 2013. Minority stress and physical health among sexual minorities. *Perspectives on Psychological Science* 8, 521-548.

Liu, H., Reczek, C., Brown, D. 2013. Same-sex cohabitors and health: the role of race-ethnicity, gender, and socioeconomic status. *Journal of Health and Social Behavior* 54, 25-45.

Masini, B.E., Barrett, H.A. 2008. Social support as a predictor of psychological and physical well-being and lifestyle in lesbian, gay, and bisexual adults aged 50 and over. *Journal of Gay & Lesbian Social Services* 20, 91-110.

Moracco, K.E., Runyan, C.W., Bowling, J.M., Earp, J.A. 2007. Women's experience with violence: a national study. *Women's Health Issues* 17, 3-12.

Myrdal, G. 1944. *An American Dilemma: The Negro Problem and Modern Democracy.* New York: Random House.

National Research Council. 2011. *The Health of Lesbian, Gay, Bisexual, and Transgender People: Building a Foundation for Better Understanding*. Washington, DC: The National Academies Press.

Park, A., and Rhead, R. 2013. Changing attitudes towards sex, marriage and parenthood. In: Park, A., Bryson, C., Clery, E., Curtice, J., Phillips, M. (Eds.). *British Social Attitudes: The 30th Report*. London: NatCen Social Research, 1-32.

Powdthavee, N. 2008. Putting a price tag on friends, relatives, and neighbors: using surveys of life satisfaction to value social relationships. *Journal of Socio-Economics* 37, 1459-1480.

Powdthavee, N. 2009. I can't smile without you: spousal correlation in life satisfaction. *Journal of Economic Psychology* 30, 675-689.

Powdthavee, N. 2010. *The Happiness Equation: The Surprising Economics of Our Most Valuable Asset*. London: Icon Books.

Powdthavee, N., Lekfuangfu, W.N., Wooden, M. 2013. The marginal income effect of education on happiness: estimating the direct and indirect effects of compulsory schooling on well-being in Australia. Melbourne Institute Working Paper Series no. 16/13. Melbourne: Melbourne Institute of Applied Economic and Social Research, University of Melbourne.

Rothman, E.F., Exner, D., Baughman, A.L. 2011. The prevalence of sexual assault against people who identify as gay, lesbian, or bisexual in the United States: a systematic review. *Trauma, Violence, and Abuse* 12, 5-66.

Sandfort, T.G.M., Bakker, F., Vanwesenbeeck, I., Schellevis, F.G. 2006. Sexual orientation and mental and physical health: Findings from a Dutch population survey. *American Journal of Public Health* 96, 1119-1125.

Smith, T.W. 2011. *Public Attitudes Towards Homosexuality*. Report published on-line. Chicago: National Opinion Research Centre, University of Chicago. [http://www.norc.org/PDFs/2011%20GSS%20Reports/GSS_Public%20Attitudes%20Toward%: Last accessed 4 March 2014.)

Tilscik, A. 2011. Pride and prejudice: employment discrimination against openly gay men in the United States. *American Journal of Sociology* 117, 586-626.

Uhrig, S.C.N. 2014. An examination of poverty and sexual orientation in the UK. ISER Working Paper Series no. 2014-2. Colchester: Institute for Social and Economic Research, University of Essex.

Watson, N., Wooden, M. 2012. The HILDA Survey: a case study in the design and development of a successful household panel study. *Longitudinal and Life Course Studies* 3, 369-381.

Weichselbaumer, D. 2003. Sexual identity discrimination in hiring. *Labour Economics* 10, 629-642.

Wilson, W. 1967. Correlates of avowed happiness. *Psychological Bulletin* 67, 294-306

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Table 1

Sexual identity and life satisfaction: raw data summary

Sexual identity		UKHLS			HILDA		
		Persons	Men	Women	Persons	Men	Women
Hetero-sexual	Mean LS	5.067	5.067	5.068	7.894	7.882	7.904
	(std. dev.)	(1.509)	(1.481)	(1.530)	(1.378)	(1.369)	(1.385)
	N	30,788	13,388	17,400	11,738	5,528	6,210
	%	93.43	93.25	93.56	92.59	94.27	91.99
Gay or lesbian	Mean LS	4.737	4.543	4.995	7.642	7.654	7.628
	(std. dev.)	(1.699)	(1.697)	(1.671)	(1.456)	(1.454)	(1.466)
	N	452	258	194	201	107	94
	%	1.37	1.80	1.04	1.58	1.80	1.39
Bisexual	Mean LS	4.492	4.458	4.516	7.361	7.397	7.346
	(std. dev.)	(1.657)	(1.691)	(1.636)	(1.487)	(1.413)	(1.523)
	N	372	155	217	191	58	133
	%	1.13	1.08	1.17	1.51	0.98	1.97
Other	Mean LS	4.519	4.486	4.542	7.584	7.590	7.580
	(std. dev.)	(1.774)	(1.911)	(1.673)	(2.038)	(1.888)	(2.167)
	N	345	144	201	89	39	50
	%	1.05	1.00	1.08	0.70	0.66	0.74
Prefer not to say	Mean LS	4.759	4.820	4.716	7.494	7.269	7.660
	(std. dev.)	(1.689)	(1.698)	(1.682)	(1.827)	(1.672)	(1.921)
	N	948	395	553	255	108	147
	%	2.88	2.76	2.97	2.02	1.84	2.18

Samples restricted to persons aged 16 to 64 years.
LS denotes life satisfaction.

Figure 1

A structural equation model of sexual identity and life satisfaction

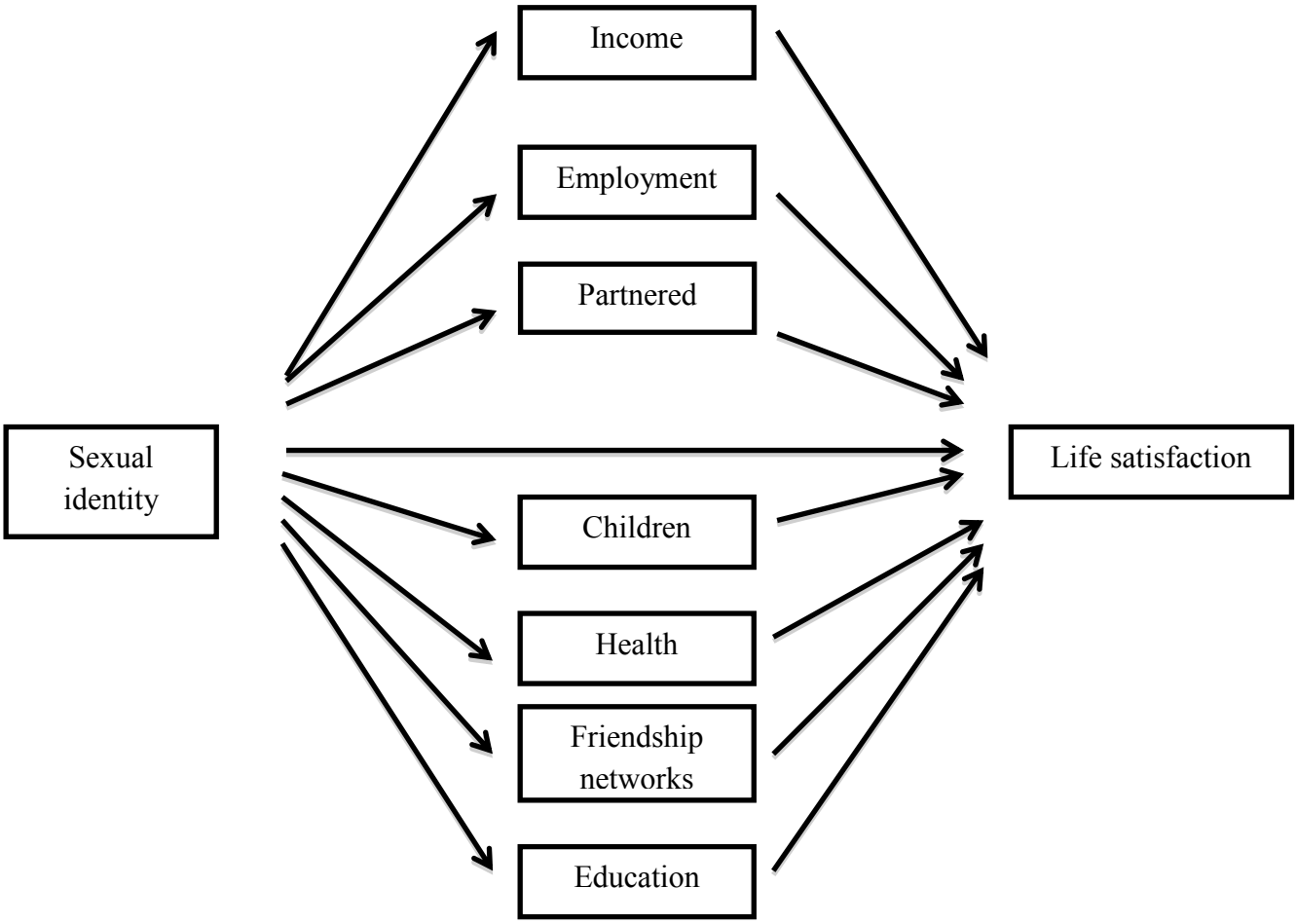

Table 2
Structural equation model of the effects of sexual identity on life satisfaction, UKHLS 2011-2012

	Life satisfaction (1)	Log of equivalized household income (2)	Employed (3)	Partnered (4)	Number of children (5)	Self-assessed health (6)	Number of friends (7)	Completed a university degree (8)
Gay or lesbian	-.138***	-.017	-.011	-.505***	-.136***	-.364***	.051	.160***
	(.049)	(.051)	(.045)	(.040)	(.046)	(.029)	(.035)	(.046)
Bisexual	-.289***	-.187***	-.156***	-.147***	-.292***	-.116**	-.019	.062
	(.055)	(.062)	(.047)	(.042)	(.052)	(.047)	(.042)	(.047)
Other	-.237***	-.289***	-.289***	-.055	-.266***	.022	.069	-.263***
	(.062)	(.048)	(.052)	(.048)	(.054)	(.051)	(.081)	(.040)
Prefer not to say	-.064*	-.245***	-.186***	-.114***	-.211***	.082**	-.018	-.149***
	(.036)	(.038)	(.033)	(.029)	(.033)	(.034)	(.039)	(.028)
Mediating factors								
Log of equivalized household income	.065***							
	(.006)							
Employed	.029***							
	(.006)							
Partnered	.088***							
	(.006)							
Self-assessed health	.288***							
	(.006)							
Number of children	.026***							
	(.006)							
Number of friends	.051***							
	(.005)							
Completed a university degree	.024***							
	(.006)							
Var(e)	-.138***	-.017	-.011	-.505***	-.136***	-.364***	.051	.160***
	(.049)	(.051)	(.045)	(.040)	(.046)	(.029)	(.035)	(.046)

***, ** and * denote significance at the 1%, 5% and 10% levels respectively. Robust standard errors are in parentheses. Control variables include gender, age, age-squared, age-cubed, race dummies, length of the person having been present in the panel (and its squared value), and regional dummies. N=32,964.

Table 3
Structural equation model of the effects of sexual identity on life satisfaction, HILDA Survey 2012

	Life satisfaction (1)	Log of equivalized household income (2)	Employed (3)	Partnered (4)	Number of children (5)	Self-assessed health (6)	Number of friends (7)	Completed a university degree (8)
Gay or lesbian	-.107	.024	.004	-.295***	-.037	-.676***	.055	.235***
	(.067)	(.080)	(.058)	(.066)	(.070)	(.043)	(.068)	(.078)
Bisexual	-.166**	-.337***	-.229***	-.133*	-.416***	-.053	-.446***	-.159***
	(.073)	(.088)	(.069)	(.069)	(.079)	(.059)	(.076)	(.061)
Other	-.045	-.637***	-.472***	-.416***	-.333***	-.025	-.151	-.266***
	(.139)	(.086)	(.110)	(.102)	(.115)	(.097)	(.127)	(.091)
Prefer not to say	-.078	-.438***	-.355***	-.369***	-.342***	-.119**	-.120*	-.314***
	(.073)	(.053)	(.064)	(.062)	(.067)	(.057)	(.072)	(.055)
Mediating factors								
Log of equivalized household income	.044***							
	(.011)							
Employed	.027***							
	(.011)							
Partnered	.162***							
	(.011)							
Self-assessed health	.292***							
	(.010)							
Number of children	.022*							
	(.012)							
Number of friends	.200***							
	(.009)							
Completed a university degree	-.027***							
	(.008)							
Var(e)	.738***	.771***	.740***	.688***	.881***	.552***	.959***	.963***
	(.014)	(.021)	(.008)	(.008)	(.011)	(.013)	(.010)	(.010)

***, ** and * denote significance at the 1%, 5% and 10% levels respectively. Robust standard errors are in parentheses. Control variables include gender, age, age-squared, age-cubed, country of origin dummies, length of the person having been present in the panel (and its squared value), a dummy representing whether there were other people present during the interview, and regional dummies. N=12,388.

Table 4

Implied indirect effects of sexual identity on life satisfaction, UKHLS 2011-2012

	Sexual identity			
Mediating variable	Gay or lesbian	Bisexual	Other	Prefer not to say
Log of equivalized household income	-.001 (.004)	-.012*** (.004)	-.019*** (.004)	-.016*** (.003)
Employed	-.000 (.001)	-.004** (.002)	-.008*** (.002)	-.005*** (.002)
Partnered	-.045*** (.005)	-.013*** (.004)	-.005 (.004)	-.010*** (.003)
Number of children	-.039*** (.013)	-.084*** (.015)	-.076*** (.016)	-.061*** (.010)
Self-assessed health	-.010*** (.002)	-.003** (.001)	.001 (.002)	.002** (.001)
Number of friends	-.003 (.002)	-.001 (.002)	.004 (.004)	-.001 (.002)
Completed a university degree	-.004*** (.001)	.001 (.001)	.006*** (.002)	-.004*** (.001)
Total indirect effect	-.088*** (.017)	-.116*** (.017)	-.110*** (.016)	-.094*** (.011)
Direct effect	-.138*** (.048)	-.289*** (.055)	-.237*** (.060)	-.064*** (.037)
Combined effect (total indirect effect + direct effect)	-.226*** (.053)	-.405*** (.056)	-.347*** (.062)	-.158*** (.037)

***, ** and * denote significance at the 1%, 5% and 10% levels respectively. Bootstrapped standard errors (500 repetitions) are in parentheses.

Table 5

Implied indirect effects of sexual identity on life satisfaction, HILDA Survey 2012

	Sexual identity			
Mediating variable	Gay or lesbian	Bisexual	Other	Prefer not to say
Log of equivalized household income	.001 (.004)	-.015** (.006)	-.028*** (.008)	-.019*** (.005)
Employed	.000 (.002)	-.006** (.003)	-.013** (.006)	-.010** (.004)
Partnered	-.048*** (.011)	-.022* (.011)	-.067*** (.017)	-.060*** (.010)
Number of children	-.011 (.022)	-.121*** (.020)	-.097** (.038)	-.100*** (.019)
Self-assessed health	-.015* (.008)	-.001 (.002)	-.001 (.002)	-.003 (.002)
Number of friends	.011 (.014)	-.089*** (.015)	-.030 (.026)	-.024 (.015)
Completed a university degree	-.006** (.003)	.004** (.002)	.007** (.003)	.009*** (.003)
Total indirect effect	-.068** (.029)	-.250*** (.035)	-.229*** (.052)	-.207*** (.031)
Direct effect	-.107 (.065)	-.166** (.078)	-.045 (.143)	-.078 (.069)
Combined effect (total indirect effect + direct effect)	-.175*** (.068)	-.416*** (.082)	-.274* (.156)	-.285*** (.076)

***, ** and * denote significance at the 1%, 5% and 10% levels respectively. Bootstrapped standard errors (500 repetitions) are in parentheses.

Table 6

Implied indirect effects of sexual identity on life satisfaction by gender, UKHLS 2011-2012

	Sexual identity			
Mediating variable	Gay or lesbian	Bisexual	Other	Prefer not to say
A) Men (N=14,222)				
Log of equivalized household income	-.006 (.004)	-.015*** (.007)	-.014*** (.004)	-.023*** (.006)
Employed	-.006* (.003)	-.007* (.004)	-.014*** (.005)	-.010*** (.003)
Partnered	-.047*** (.007)	-.017*** (.006)	-.005 (.004)	-.011*** (.004)
Number of children	-.055*** (.018)	-.040* (.021)	-.073*** (.024)	-.053*** (.015)
Self-assessed health	-.001 (.001)	.001 (.002)	-.000 (.001)	.000 (.001)
Number of friends	.001 (.002)	-.002 (.004)	.003 (.006)	-.006** (.002)
Completed a university degree	.002 (.002)	.001 (.001)	-.004 (.003)	-.002 (.002)
Total indirect effect	-.113*** (.022)	-.079*** (.024)	-.108*** (.028)	-.104*** (.017)
Direct effect	-.246*** (.066)	-.339*** (.091)	-.280*** (.104)	-.020 (.055)
Combined effect (total indirect effect + direct effect)	-.358*** (.070)	-.418*** (.094)	-.388*** (.107)	-.124** (.057)
B) Women (N=18,472)				
Log of equivalized household income	.006 (.005)	-.009* (.005)	-.022*** (.005)	-.010*** (.003)
Employed	.002 (.001)	-.002 (.002)	-.004 (.003)	-.002 (.001)
Partnered	-.035*** (.007)	-.010** (.005)	-.005 (.006)	-.009** (.004)
Number of children	-.018 (.019)	-.112*** (.021)	-.080*** (.022)	-.066*** (.013)
Self-assessed health	-.018*** (.006)	-.004** (.002)	.000 (.002)	.002 (.001)
Number of friends	.004 (.003)	.000 (.003)	.004 (.006)	.002 (.003)
Completed a university degree	.006* (.003)	.002 (.001)	-.008*** (.003)	-.005*** (.002)
Total indirect effect	-.054** (.024)	-.136*** (.024)	-.115*** (.024)	-.088*** (.014)
Direct effect	-.001 (.072)	-.248*** (.071)	-.207*** (.075)	-.100** (.048)
Combined effect (total indirect effect + direct effect)	-.052 (.078)	-.385*** (.074)	-.322*** (.078)	-.188*** (.049)

***, ** and * denote significance at the 1%, 5% and 10% levels respectively. Bootstrapped standard errors (500 repetitions) are in parentheses.

Table 7

Implied indirect effects of sexual identity on life satisfaction by gender, HILDA Survey 2012

	Sexual identity			
Mediating variable	Gay or lesbian	Bisexual	Other	Prefer not to say
A) Men (N=5,777)				
Log of equivalized household income	-.001 (.005)	-.018* (.011)	-.020** (.009)	-.015** (.007)
Employed	-.007 (.006)	-.009 (.008)	-.024** (.012)	-.025*** (.009)
Partnered	-.049*** (.017)	-.041** (.017)	-.045** (.022)	-.067*** (.014)
Number of children	.031 (.027)	-.118*** (.042)	-.133*** (.050)	-.066*** (.025)
Self-assessed health	-.011 (.012)	-.001 (.004)	.002 (.004)	-.003 (.004)
Number of friends	.047*** (.017)	.087*** (.028)	-.062* (.036)	-.017 (.023)
Completed a university degree	-.003 (.003)	.004 (.003)	.004 (.003)	.005 (.003)
Total indirect effect	.009 (.022)	-.269*** (.060)	-.277*** (.080)	-.188*** (.041)
Direct effect	-.180** (.088)	-.073 (.136)	-.011 (.149)	-.268** (.106)
Combined effect (total indirect effect + direct effect)	-.171* (.093)	-.342** (.142)	-.289 (.188)	-.456*** (.115)
B) Women (N=6,561)				
Log of equivalized household income	.000 (.006)	-.014** (.006)	-.033** (.013)	-.021** (.009)
Employed	.001 (.002)	-.003 (.004)	-.005 (.007)	-.003 (.004)
Partnered	-.040*** (.015)	-.016 (.016)	-.080*** (.024)	-.048*** (.015)
Number of children	-.062** (.030)	-.122*** (.031)	-.070* (.024)	-.125*** (.029)
Self-assessed health	-.015 (.012)	-.002 (.002)	-.003 (.004)	-.002 (.003)
Number of friends	-.028 (.020)	-.084*** (.020)	-.011 (.033)	-.030 (.018)
Completed a university degree	-.009* (.005)	.005* (.003)	.009 (.006)	.011** (.004)
Total indirect effect	-.153*** (.046)	-.234*** (.041)	-.193*** (.068)	-.218*** (.048)
Direct effect	-.032 (.101)	-.211** (.088)	-.067 (.205)	.067 (.096)
Combined effect (total indirect effect + direct effect)	-.185* (.110)	-.445*** (.093)	-.260 (.213)	-.151 (.109)

***, ** and * denote significance at the 1%, 5% and 10% levels respectively. Bootstrapped standard errors (500 repetitions) are in parentheses.

Table A1

Life satisfaction regressions (OLS) with interactions between sexual identities and other adult outcome variables

	UKHLS			HILDA Survey		
	All persons	Men	Women	All persons	Men	Women
Gay or lesbian	-.158**	-.008	-.069	.035	-.011	.046
	(.067)	(.066)	(.086)	(.118)	(.178)	(.144)
Bisexual	-.324***	-.125	-.327***	-.158**	-.112	-.153
	(.062)	(.109)	(.083)	(.079)	(.142)	(.107)
Other	-.205***	.031	-.187**	.196	.352**	.257
	(.063)	(.113)	(.090)	(.125)	(.159)	(.216)
Prefer not to say	-.063*	-.094	-.086*	-.061	-.302***	.092
	(.037)	(.128)	(.051)	(.070)	(.117)	(.089)
Mediating factors						
(A) Log of equivalized household income	.061***	.058***	.062***	.046***	.039***	.048***
	(.007)	(.010)	(.009)	(.011)	(.015)	(.017)
(B) Employed	.030***	.055***	.012	.025**	.066***	.004
	(.006)	(.009)	(.008)	(.011)	(.019)	(.013)
(C) Partnered	.091***	.080***	.098***	.163***	.139***	.175***
	(.006)	(.010)	(.008)	(.011)	(.016)	(.015)
(D) Self-assessed health	.287***	.289***	.287***	.292***	.282***	.297***
	(.006)	(.009)	(.008)	(.010)	(.014)	(.014)
(E) Number of children	.026***	.038	.021***	.018	.015	.018
	(.006)	(.035)	(.007)	(.012)	(.018)	(.017)
(F) Number of friends	.053***	.053***	.053***	.198***	.207***	.189***
	(.006)	(.007)	(.009)	(.009)	(.014)	(.013)
(G) Completed a university degree	.022***	.016*	.029***	-.029***	-.018	-.035***
	(.006)	(.009)	(.008)	(.008)	(.011)	(.011)
Interaction effects						
Gay or lesbian × A	.091	.126*	.053	-.021	-.090	.123
	(.058)	(.074)	(.074)	(.064)	(.080)	(.115)
Gay or lesbian × B	.006	-.039	.027	-.058	-.084	-.085
	(.057)	(.070)	(.091)	(.097)	(.121)	(.149)
Gay or lesbian × C	.053	.098	-.030	-.026	.042	-.135

	UKHLS			HILDA Survey		
	All persons	Men	Women	All persons	Men	Women
	(.056)	(.077)	(.083)	(.071)	(.089)	(.117)
Gay or lesbian × D	.083	.063	.100	.041	.066	.041
	(.053)	(.069)	(.082)	(.087)	(.102)	(.123)
Gay or lesbian × E	-.119	.477***	-.196	.169	.125	.195
	(.126)	(.152)	(.129)	(.108)	(.185)	(.130)
Gay or lesbian × F	-.015	.157*	-.153	-.049	-.015	-.084
	(.080)	(.087)	(.109)	(.074)	(.107)	(.113)
Gay or lesbian × G	-.046	-.051	-.016	.022	-.023	.063
	(.044)	(.056)	(.069)	(.059)	(.071)	(.096)
Bisexual × A	-.045	-.082*	-.013	-.084**	-.064	-.060
	(.038)	(.046)	(.059)	(.040)	(.075)	(.058)
Bisexual × B	-.062	-.145	-.006	.030	-.084	.027
	(.057)	(.092)	(.072)	(.079)	(.139)	(.093)
Bisexual × C	-.105	-.019	-.186**	-.019	.072	-.054
	(.065)	(.100)	(.085)	(.068)	(.117)	(.084)
Bisexual × D	.021	-.016	.055	-.058	.058	-.098
	(.061)	(.108)	(.074)	(.093)	(.174)	(.112)
Bisexual × E	.069	.603***	.067	.084	.049	.132
	(.057)	(.215)	(.061)	(.071)	(.098)	(.117)
Bisexual × F	.102	.146	.064	-.023	-.237	.061
	(.066)	(.123)	(.075)	(.075)	(.170)	(.089)
Bisexual × G	.120**	.118	.097	.134*	.120	.146*
	(.052)	(.082)	(.068)	(.070)	(.159)	(.079)
Other × A	.083	.215	.045	.314	.759***	.276
	(.094)	(.139)	(.095)	(.217)	(.218)	(.334)
Other × B	-.018	-.015	-.000	.116	.017	.301
	(.068)	(.113)	(.082)	(.137)	(.244)	(.189)
Other × C	-.156**	-.267**	-.084	.015	.292*	-.133
	(.063)	(.105)	(.077)	(.126)	(.158)	(.199)
Other × D	-.019	-.054	.005	.208	.145	.261
	(.064)	(.107)	(.080)	(.161)	(.151)	(.301)
Other × E	.035	.713***	.003	.098	.048	.160
	(.051)	(.243)	(.055)	(.134)	(.106)	(.243)

	UKHLS			HILDA Survey		
	All persons	Men	Women	All persons	Men	Women
Other × F	-.070	-.089	-.060	-.163	-.007	-.323
	(.057)	(.117)	(.067)	(.139)	(.180)	(.209)
Other × G	.090	.139	.029	.015	-.497**	.102
	(.078)	(.101)	(.118)	(.105)	(.201)	(.184)
Prefer not to say × A	.045	.028	.107	.033	-.011	.038
	(.030)	(.033)	(.068)	(.092)	(.136)	(.121)
Prefer not to say × B	-.012	-.093*	.034	.012	-.028	.081
	(.037)	(.056)	(.049)	(.075)	(.119)	(.098)
Prefer not to say × C	-.038	.008	-.068	-.023	-.069	-.008
	(.036)	(.055)	(.049)	(.070)	(.109)	(.094)
Prefer not to say × D	-.025	-.026	-.023	-.059	-.027	-.072
	(.037)	(.057)	(.049)	(.068)	(.121)	(.082)
Prefer not to say × E	-.023	-.169	-.001	.061	-.030	.094
	(.034)	(.304)	(.039)	(.072)	(.105)	(.097)
Prefer not to say × F	-.030	-.070	-.017	.173**	.055	.245**
	(.026)	(.064)	(.031)	(.075)	(.103)	(.102)
Prefer not to say × G	-.034	-.065	-.010	-.024	.036	-.072
	(.041)	(.062)	(.055)	(.065)	(.115)	(.082)
N	32,695	14,223	18,472	12,338	5,777	6,561
R-squared	.120	.126	.119	.213	.226	.211

***, ** and * denote significance at the 1%, 5% and 10% levels respectively. Robust standard errors are in parentheses. Control variables include gender, age, age-squared, age-cubed, race dummies (only in UKHLS), country of origin dummies (only in HILDA Survey), a variable representing how long the person has been in the panel (and its squared value), a dummy representing whether there were other people present during the interview (only in HILDA Survey), and regional dummies.

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