The Measurement of Sexual Identity in Wave 12 of the HILDA Survey (and associations with mental health and earnings)

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Introduction

An important characteristic of individuals, and one that is the subject of anti-discrimination laws in many countries, including Australia, but which was not measured during the first 11 waves of the HILDA Survey, is sexual orientation. In wave 12, however, this gap was filled, in part, through the inclusion in the self-completion instrument, of a single question about sexual identity.

Sexual orientation encompasses sexual behaviour, attraction and identity (e.g., Laumann et al. 1994), and hence would require a suite of survey questions that is both potentially quite long and detailed, and might be seen as very invasive by some sample members, especially given the sample for the HILDA Survey covers, and is representative of, the entire Australian population. It was, however, decided that the narrower concept of sexual identity could be identified within the HILDA Survey. This is a concept that is relatively easy to measure, requiring just the one question, and has recently been included in a number of large population-wide surveys conducted by official statistical agencies, both in Australia and elsewhere. Included here are the 2007 Survey of Mental Health and Well-being (SMHWB) conducted by the Australian Bureau of Statistics (ABS) and, since 2009, the UK Integrated Household Survey conducted by the UK Office for National Statistics (ONS). A question on sexual identity was also included in wave 3 of the UK Household Longitudinal Study (UKHLS), conducted in 2011-2012, a study that has very similar design features to the HILDA Survey.

The broad aim of this paper is to introduce users and potential users of the HILDA Survey data to the question on sexual identity that was included in wave 12 with a view to highlighting the strengths and weaknesses of the data collected. More specifically, the paper seeks to achieve four main tasks:

(i)   describe the genesis, construction and administration of the sexual identity question included in wave 12;

(ii)   show how the data collected can be used to construct population estimates of the size of the lesbian, gay and bisexual (LGB) community in Australia, and then compare these estimates with estimates from other sources and for other countries;

(iii) examine and report on item non-response, the main weakness with self-reported data on sexual identity; and

(iv)   present preliminary evidence on associations between sexual identity and measures of both mental health and labour earnings, two outcomes where previous research has demonstrated clear and large differences between heterosexual and LBG sub-populations.

The Survey Question

The format of the question used to measure sexual identity differs across surveys. The SMHWB, which employs personal interviews, uses a showcard and simply asks: "Which of these categories best describes your current sexual orientation?" The showcard provides just three options: heterosexual; homosexual; and bisexual.

Very differently, the ONS (see Haseldon and Joloza 2009) recommends the following question be used in face-to-face administration: "Which of the options on this card best describes how you think of yourself? Please just read out the number next to the description.

(The numbers on each card are different for each person.)" The listed options are: Heterosexual / Straight; Gay / Lesbian; Bisexual; and Other.

The inclusion of an "Other" category is defended on the grounds that some respondents may: (i) feel no sense of sexual identity, such as those that are asexual; (ii) reject the categorisation system being used; or (iii) may not understand the terminology used (Joloza et al. 2010).

For some respondents answering such questions honestly can be awkward, especially if others persons are present at the time of interview, and potentially embarrassing. It is for this reason that respondents are requested to only read out the number corresponding to their answer, and why numbers differ on the showcards given to people within the same household. Nevertheless, for these same reasons, self-administration may be preferable. While the ONS has not implemented self-completion methods in its own surveys, it nevertheless recommends the following variant for surveys that do use this method: "Which of the following describes how you think of yourself?" with the options provided being: Heterosexual or Straight; Gay or Lesbian; Bisexual; Other; and Prefer not to say (Haseldon and Joloza 2009). The main difference with the face-to-face version is the inclusion of the 'Prefer not to say' option. While survey respondents always have the right to refuse to answer a particular question, explicitly providing an option indicating that it is perfectly acceptable not to answer may help diffuse any hostility that might arise from what some respondents perceive as inappropriate questions. Of course this comes at the cost of an increase in item non-response (i.e., the proportion of respondents whose self-reported sexual identity cannot be determined).

The HILDA Survey collects data using both face-to-face and self-completion methods, and it was decided that the self-completion option was the most appropriate vehicle for administering the sexual identity question. This decision reflected both the well-established difficulty with interviewing all respondents in complete privacy (indeed, the household nature of the HILDA Survey means survey participation is a joint activity in some households) and the concern that asking about sexual identity may be awkward for some interviewers in some situations, especially bearing in mind that the same interviewers often interview the same respondent year after year. Like the HILDA Survey, the UKHLS also provides for a self-completion component, and it too opted to include the sexual identity question in the self-completion instrument (see Uhrig 2014).

The sexual identity question included in wave 12 of the HILDA Survey was thus very close to that recommended by the ONS for administration by self-completion methods. There was, however, one notable difference: the question used in the HILDA Survey also provided an "Unsure / Don't know" option. This was thought important given the likelihood that some respondents, and especially younger respondents, may be uncertain about their sexuality.

Response Frequencies

As documented elsewhere (Summerfield et al. 2013), interviews were obtained from 17,476 persons aged 15 years or older (13,537 from the main sample and 3939 from the top-up sample first introduced at wave 11) in wave 12 of the HILDA Survey. All of these interviewed respondents are also given a self-completion questionnaire (SCQ), either in person or by mail in the case of telephone respondents (1383 persons [7.9%] were interviewed by telephone in wave 12). These are then either collected by the interviewed, often at a subsequent visit to the household, or returned by mail (as will be the case for all telephone respondents). Completed forms were received from 15380 persons (88% of the interviewed sample).

A summary of response to the sexual identity question is provided in Table 1. In addition we also provide comparative data from both wave 3 of the UKHLS[1] and a recent round (April 2009 to March 2010) of the UK Integrated Household Survey (IHS) (Joloza et al. 2010).

A major concern with the inclusion of the sexual identity question is that some respondents may be unwilling to answer it, and indeed may even see it as an invasion of privacy. Such fears appear to be partly confirmed by the data presented in Table 1, with 4.6 per cent of SCQ respondents not providing a usable answer. About one-fifth of this group, however, are giving the response "unsure" or "don't know", which may have nothing to do with the desire to answer, and a lot more to do with their inability to answer; for some young people, for example, sexual preferences may still be developing. Further, about another quarter of this group (1.2% of SCQ respondents) returned forms without any response to this question (despite the provision of the 'prefer not to say' option). There is, however, item non-response to all SCQ questions (averaging around 2.5% per question), and hence it is not obvious that all of these latter refusals are a direct reflection of an unwillingness to answer the sexual identity question per se.

Table 1: Sexual Identity Response Frequencies: Wave 12 HILDA Survey, Wave 3 UKHLS and UK IHS Compared

	HILDA Survey, Wave 12 (2012)		UKHLS, Wave 3 (2011-2012)		UK IHS, Apr 2009-Mar 2010
	N	%	N	%	%
Heterosexual or straight	14133	91.9	38008	93.4	94.2
Gay or lesbian	218	1.4	476	1.2	0.9
Bisexual	208	1.4	406	1.0	0.5
Other	117	0.8	424	1.0	0.5
Prefer not to say	379	2.5	1296	3.2	
Unsure / Don't know	136	0.9			
Don't know / Refusal			44	0.1	3.2
Missing	189[a]	1.2	42	0.1	0.6
Total	15380	100.0	40696	100.0	100.0

a   Included here are 8 cases where answers were not usable because multiple responses were provided.

Sources: HILDA Survey -- Confidentialised unit record data release 12.0; UKHLS – Uhrig (2014); UK IHS – Joloza et al. (2010).

The proportion of non-usable responses to both of the UK surveys reported on in Table 1 was also quite high – 3.4% for the UKHLS and 3.8% for the IHS – but still lower than that recorded in the HILDA Survey. The lower rate for the IHS is most likely due to the survey mode difference; as noted earlier, interviewer-administered surveys are expected to be associated with lower rates of item non-response. Differences in interview collection method

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[1] Raw frequency data for the UKHLS can be accessed from their website at:
https://www.understandingsociety.ac.uk/documentation/mainstage/dataset-documentation.

might also partly explain differences with the UKHLS. Notably the self-completion form is administered in the UKHLS using audio computer-assisted technology. This may provide respondents with a greater sense of confidentiality and privacy than the paper form used in the HILDA Survey.

The Prevalence of Different Forms of Sexual Identity

The frequency data collected in the HILDA Survey data can now be used to generate population estimates for Australia. This requires the application of population weights that adjust for non-random response and attrition (bearing in mind that the HILDA Survey is a longitudinal study) and for features of the sample design (essentially differences across individuals in the initial probability of selection). Such weights are provided with the data set, though it should be noted that these do not adjust for variations across sample members in the probability of returning the SCQ, which is potentially problematic given the data on sexual identity are collected in the SCQ.

As it turns out, the application of weights has very little impact on the estimated proportion of the population of Australians (aged 15 years or older) who identify as lesbian, gay or bisexual. From a total population of 15.8 million, an estimated 215,300 persons self-identify as gay or lesbian and a further 164,200 identify as bisexual. This represents an estimated 2.4% of the population. If we exclude from the population all cases that are unable or unwilling to answer, then this proportion rises to 2.6%. This, however, will be an under-estimate if there a tendency for homosexual and bisexual persons to either misreport their sexual identity as heterosexual, or to not disclose their sexual identity, as I strongly suspect is the case. Unfortunately, we cannot know how much misreporting has occurred, and hence I would describe these estimates as providing lower bounds.

These estimates, however, do lie within the range reported in population surveys conducted in other countries. Gates (2011) summarises evidence from nine different surveys covering five different countries, with estimates ranging from a low of 1.2% (in Norway in 2010) to 5.6% in one US survey (the 2009 National Survey Sexual Health and Behavior). Gates (2011) himself concludes that the best estimate for the US is that about 3.5% of adults identify as LGB.

The population estimates derived from the HILDA Survey are also consistent with estimates from other Australian population surveys. The 2007 National Survey of Mental Health and Well-being reported (after presumably excluding persons who were undecided and preferred not to answer) that 1.8% of Australians aged between 16 and 85 identified as homosexual or bisexual (ABS 2008). The comparable estimate from the HILDA Survey is 2.6%. A lower estimate in the ABS Survey is to be expected given the question on sexual identity was posed in a face-to-face interview and hence likely to be associated with greater misreporting of sexual identity by LGB persons.

Comparisons can also be made with estimates from a national population survey conducted a decade earlier – the 2001-02 Australian Study of Health and Relationships (ASHR). A telephone survey, the ASHR used random-digit dialling methods to obtain a sample of over 19,000 Australians aged between 16 and 59 years. Smith et al. (2003a) present summary data from this survey, including reporting that 2.5% of men and 2.2% of women identified as either homosexual or bisexual. A distinctive feature of this study is the very small (even negligible) proportions reporting that they were undecided about, or unwilling to reveal, their sexual identity. The most comparable proportions from the HILDA Survey (i.e., after restricting the sample to persons aged 16 to 59, and depending on how missing cases are treated) are between 3.0 and 3.1% of males and between 2.6 and 2.8% of females. Again

the higher proportions in the HILDA Survey should perhaps not be surprising, and most likely reflecting changes over time in the extent of tolerance towards sexual minorities in Australia. Differences in survey administration might also be relevant, though that said it might have been expected that the explicit focus of the ASHR on sexual experience and activity might have led to selection biases, with people less willing to talk about their sexual experiences being less inclined to participate[2], while at the same time doing better at eliciting truthful responses from those that do respond (meaning less under-reporting of homosexuality). Both of these factors would contribute to higher estimates of the prevalence of the LGB population in the ASHR relative to the HILDA Survey.

Item Non-response

An important issue for users of the data is how to treat non-responding cases. As shown above, of the 17,476 persons that were interviewed in wave 12, only 14,559 provide an answer in the SCQ that enables the clear identification of a specific sexual identity. The main source of item non-response (accounting for 72% of all non-response to this data item) is non-completion or non-return of the SCQ. If such non-response is random then it can be ignored. Analysis of SCQ response, however, reveals that non-response is far from random, with SCQ non-respondents, other things held constant, being more likely (among other things) to:

- be single;
- have been born overseas and from a non-English speaking background, with the difference especially pronounced if English language skills are poor;
- have completed relatively little education;
- be unemployed; and
- have a severe long-term health condition or disability.

This still might not be a problem provided these non-respondent characteristics are not correlated with sexual identification. That, however, is not the case, with most of the variables identified above correlated with LGB identification. Data users, therefore, need to give consideration to how to deal with item non-response when using responses to the sexual identity question. Options here include (but are not restricted) to: (i) explicitly modelling the process of SCQ response and incorporating the estimated probabilities into subsequent analyses; (ii) constructing weights that adjust for the probability of SCQ response; and (iii) ensuring that the correlates of SCQ response are controlled for when modelling other outcomes.

Then there are the 821 cases that completed the SCQ but either responded that they were uncertain about their sexual identity, that they preferred not to provide an answer, or simply skipped the question entirely. Some users might be tempted to roll the four types of non-response options into a single non-responding category. The results from a very simple model of response choice, however, rejected this pooling restriction. More specifically, I estimated a multinomial logit model where the outcome was a categorical variable identifying six different states – heterosexual (the reference category); lesbian, gay or bisexual[3]; other; unsure / don't know; prefer not to say; and missing (i.e., no box ticked). For control variables, I chose a small number of personal characteristics – sex, age, presence of a long-term health condition interacted with the severity of that condition; origin; English speaking ability; and

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[2] A response rate of 73.1% response was reported. Further, persons in full-time employment, in high status occupations with post-secondary education were over-represented in the sample (see Smith et al. 2003b).

[3] For simplicity, the categories "Gay or lesbian" and "Bisexual" were merged, though this pooling restriction was also rejected (χ^2=96.7; d.f.=33).

education level – and a handful of variables describing the interview experience – number of times ever interviewed, and interviewer reported measures of respondent cooperation and suspicion. The results are reported in Table A1. The key message from this simple analysis is that the different types of item non-respondent groups have different characteristics. This was supported by a likelihood ratio test (proposed by Cramer & Ridder 1991) which, as already noted, rejected the pooling of these four states (χ^2=178.1; df=99).

Further tests for pooling specific sub-groups of responses also typically reject the hypothesis of pooling. The only slight exception to this is pooling the two options "don't know" and "other". In this case the pooling assumption can only be weakly rejected, at the 90% confidence level (χ^2=46.6; df = 33).

In conclusion, the easiest way to handle responses to the sexual identity, at least when sexual identity is being used as an explanatory or control variable, is to represent each type of response by a unique dummy variable. This, for example, is the approach adopted by Uhrig (2014) in some preliminary analyses of both health outcomes and hourly earnings among employees.

Mental Health and Sexual Identity

Data sources that include measures of both mental illness symptoms and of sexual identity (or orientation) almost invariably find evidence indicating that LGB populations have higher rates of symptoms of depression and anxiety disorders, and / or higher incidence of other outcomes typically associated with poor mental health, such as alcohol and drug dependence, self-harm and suicide. King et al. (2008), for example, report on a systematic review of prior research, with a meta-analysis producing the finding that the risks of depression and anxiety disorders, and of alcohol and substance dependence, are at least 1.5 times higher within the LBG population, and suicide attempts around twice as likely.

Australian data sources produce broadly similar findings, though have obvious weaknesses. Jorm et al. (2002), using data from the Path Through Life Project (a study of adults living in Canberra), and after controlling for both age and sex, find evidence of significantly higher levels of anxiety and depression symptoms, suicidal thoughts, and negative affect (but not alcohol misuse) among homosexual people, though with the exception of suicidality, the size of these differences were quite modest. Much larger risks, however, were reported for bisexual persons. The small size of the LBG sub-sample together with the restriction of the sample to Canberra, however, makes it difficult to confidently generalise from these findings.

Very different is the 2007 SMHWB which, as noted previously, is based on a large random sample of the Australian population aged 16 to 85. It is reported that persons that identify as LBG had much higher levels of anxiety disorders, affective disorders (e.g., depressive episodes and bipolar disorder) and substance use disorders than the heterosexual population, with the differences being very similar to those reported in the international literature (ABS 2008, Table 5).[4] The ABS, however, only reports population aggregates, and there is no adjustment for differences in the characteristics of the two sub-populations.

Like most social surveys, measurement of mental health in the HILDA Survey is difficult. Most obviously there is no measure based on clinical assessment. But unlike some more specialised surveys (e.g., the SMHWB) neither does the HILDA Survey attempt to identify in detail the presence of symptoms associated with mental disorders. Instead, the HILDA Survey relies on self-reported conditions and on short subjective scales which are often used

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[4] The reported incidence rates (for persons aged 16 to 85) were as follows: anxiety disorders – 31.5% for LBG vs 14.1% for heterosexuals; affective disorders – 19.2% vs 6.0%; and substance use disorders – 8.6% vs 5.0%.

to screen populations for mental disorders, but which are not in themselves diagnostic tools. The two main tools included that measure mental health outcomes are the SF36 and the K10.

Discussed at greater length in Wooden (2009), the Short Form 36 (or SF-36) health questionnaire has been administered in every wave of the HILDA Survey as part of the SCQ. Described in more detail in Ware et al. (2000), the SF-36 comprises 36 items which can then be combined to produce eight sub-scales measuring different health concepts, one of which is mental health. This sub-scale, also known as the Mental Health Inventory (MHI-5) comprises five items that assess frequency (on a 6-point scale) of symptoms of anxiety and mood disturbance over the 4-week period preceding survey administration. The response options range from "all of the time" to "none of the time", with all response options fully labelled. Like all SF36 sub-scales, raw scores on each item are summed and then standardized so that the scale values range from 0 to 100. Relatively low scores are indicative of a poor mental health state.

The K10 is a 10-item measure of non-specific psychological distress created by Ron Kessler and Dan Mroczek from the Harvard Medical School for use in the redesigned United States National Health Interview Survey (see Kessler et al. 2002, 2003). It was first included in the HILDA Survey, also within the SCQ, in wave 7 and has been repeated every second wave since. The K10 is very similar to the MHI-5 – they both measure of frequency of symptoms measured over a 4-week period – and as a result the correlation between the two is very high (-0.80) but does decline for persons with relatively high levels of psychological distress (see Wooden 2009).

Here I only examine the scores from the MHI-5, if only for the very pragmatic reason that the K10 was not administered in wave 12. I begin by first reporting, in the first two columns of Table 2, simple population means disaggregated by reported sexual identity and sex. As can be seen, there are clear and sizeable differences, with homosexuals reporting lower scores on the MHI-5 than heterosexuals, and with bisexuals reporting even lower scores (and especially among men). Further these differences between the heterosexual population, on the one hand, and the LGB population, on the other, are statistically significant (men: t=4.42, p<.001; women: t=5.18, p<.001).

Table 2: MHI-5 outcomes by sexual identity and sex (weighted)

Sexual identity	Mean MHI-5 score		% scoring 52 or less		% scoring 60 or less	
	Men	Women	Men	Women	Men	Women
Heterosexual	76.2	73.8	10.8	13.9	18.5	22.9
Lesbian or Gay	72.0	67.3	17.4	23.0*	31.1	40.5
Bisexual	66.8	66.0	25.9*	24.0	34.5	34.3
Other	66.4	64.9	32.1*	25.8*	44.6	41.9
Don't know	67.1	62.0	28.2	32.8	35.2	54.0
Prefer not to say	67.8	69.1	21.3	18.7	33.5	31.0
Missing	71.9	71.2	20.0*	13.6*	26.7*	32.7
ALL PERSONS	75.6	73.2	11.8	14.6	19.7	24.1

Table 2 also reports the proportion of each group that score below selected cut-off points. The rationale here is that it may not be differences in mean MHI5 scores that matter most, but differences in the proportion of respondents with severe depression and anxiety symptoms, who in turn will have scores towards the bottom of the distribution. Following Yamakazi, Fukuhara and Green (2005), I chose cut-off points of 52 or less to identify severe depressive symptoms and 60 or less to identify moderate or severe symptoms.[5] Around 11% of Australian heterosexual men and 14% of Australian heterosexual women score 52 or less on the MHI-5. The comparable proportions among homosexuals are, at 17% and 23%, much higher. And again the situation is worse for bisexuals, and especially male bisexuals.

Also of interest, we can see that persons unable or unwilling to provide a clear answer to the question on sexual identity typically both have much lower mean MHI-5 scores and more likely to score in the tail of the distribution, than those reporting to be heterosexual.

Simply adjusting for differences in the age composition of the different population sub-groups, however, sees the difference in mean scores between heterosexual men and gay men decline to less than 3 points and become statistically insignificant. This is shown in specification I in Table 3, where I report results from regressing MHI-5 on sexual identity and age (5-year age dummies). There are quite large differences in the mental health of bisexuals and heterosexuals, but the difference between heterosexuals and homosexuals is much smaller (consistent with the Australian research of Jorm et al. 2002) and only significant for women.

Also we again can see that the other available responses provided on the questionnaire form (Other, Unsure / Don't know, and Prefer not to say) also attract large negative and significant coefficients, suggesting that such forms of response may also be associated with mental disorders. In contrast, persons who simply skipped past the question (the 'missing' cases) have MHI-5 scores that are actually higher than, but not significantly different from, the heterosexual population, suggesting that these cases can be ignored, at least when analysing MHI-5 scores.

I next augmented this specification with controls for a range of personal characteristics in addition to age. These identify: whether the respondent is married or living in a de facto relationship; the presence of an own child in the household; the presence of a long-term health condition, differentiated by whether it is work limiting or not (3 dummies identifying 4 categories); origin (with three dummy variables included identifying whether the respondents is an Indigenous Australian, born overseas with English as their first language, and born overseas but with English not their first language); education (seven dummies identifying different levels of education attainment); and location of residence (three dummies identifying four broad categories remoteness of location based on the major categories used in the Accessibility / Remoteness Index of Australia). The results are reported as specification II, again in Table 3. The broad thrust of the results is unaffected, though the magnitude of the differential between the lesbian or gay population on the one hand, and the bisexual population on the other hand, narrows. The large negative coefficients for persons who report a preference not to reveal their sexual identity also decline in absolute size, but remain highly significant.

I then extended the list of controls to include: labour force status (three dummies identifying whether respondent is employed [the reference group], unemployed, outside the labour force but with a preference to work, and outside the labour force and no preference to work); the

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[5] Choice of cut-off points varies across studies, but choice of 52 seems to be both the lowest cut-off used and widely preferred when attempting to identify persons suffering severe depression (see Strand et al. 2003).

log of equivalised disposable household income; and measures of the frequency of social interaction with friends of relatives (6 dummies identifying 7 possible response options ranging from "every day" to "less often than once every 3 months").[6] Some of these additional controls are arguably endogenous. Most obviously, employment, income and social interaction can all be expected to be influenced by the outcome variable, mental health. Nevertheless, even the inclusion of these variables has relatively little effect on the magnitude of the key parameters of interest. They become slightly smaller, but it remains the case that persons who identify as lesbian / gay or bisexual also report significantly lower MHI-5 scores. Whether the estimated effects are judged large is very much in the eye of the beholder, but as a point of comparison I note that the estimated coefficients on the variable identifying unemployed persons are only -4.5 and -5.8 for men and women respectively.

Table 3: Regressions of MHI-5 on sexual identity (standard errors in parentheses)

Sexual identity	Weighted least squares (MHI-5)						Logit (MHI-5 $\leq$52)	
	I		II		III		IV	
	Men	Women	Men	Women	Men	Women	Men	Women
Lesbian or Gay	-3.73* (1.47)	-6.08** (1.75)	-3.96** (1.42)	-5.52** (1.67)	-2.94* (1.39)	-5.01** (1.89)	.605* (.245)	.525 (.301)
Bisexual	-9.25** (2.20)	-7.00** (1.74)	-7.78** (2.11)	-5.45** (1.66)	-6.76** (2.10)	-4.99** (1.64)	.950** (.321)	.384 (.255)
Other	-9.91** (2.25)	-9.11** (2.20)	-8.54* (2.17)	-6.87** (2.12)	-6.26** (2.20)	-5.41* (2.12)	1.181** (.316)	.528 (.313)
Don't know	-9.12** (2.00)	-11.79** (2.16)	-8.56** (1.93)	-8.84** (2.06)	-7.20** (1.91)	-7.95** (2.06)	1.134** (.284)	.818** (.290)
Prefer not to say	-8.65** (1.15)	-5.08** (1.04)	-5.70** (1.12)	-2.18* (1.01)	-3.47** (1.14)	-0.78 (1.02)	.403* (.186)	-.018 (.171)
Missing	4.01 (2.44)	0.94 (1.93)	2.30 (2.35)	-0.35 (1.85)	3.10 (2.70)	-1.04 (2.00)	.171 (.394)	-.033 (.331)
Controls	Age only		Demographics		Demographics + Labour force status + Household income + Frequency of social interaction		Demographics	
Adjusted / Pseudo R^2	.023	.024	.104	.123	0.140	0.152	.124	.114
N	7387	7745	7374	7727	7254	7627	7374	7727

* p < .05; ** p <.01. For logit model results the reported R^2 is the Nagelkerke pseudo R^2.

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[6] The measure of frequency of social interaction comes from a question asked each survey wave in the SCQ. It reads: "In general, about how often do you get together socially with friends or relatives not living with you?"

Finally, I also report in Table 3 results from estimation of logistic regression models where the dependent variable is a binary variable indicating whether the respondent reported a very low MHI-5 score – 52 or less. For men we obtain results that are consistent with those obtained with linear regression of MHI-5. Both gay and bisexual men are significantly more likely to report very low MHI-5 scores (indicative of severe depression and anxiety) than heterosexual men, with the implied odds ratios being 1.8 and 2.6 respectively. The reported model only controls for demographic variables. Inclusion of further controls for labour force status, household income and frequency of social interaction, sees the size of these effects reduced (odds ratios of 1.6 and 2.3, respectively), but remain significant.

For women on the other hand the estimated magnitude of the differential between lesbian / bisexual women and bisexual women are smaller (and much smaller in the case of bisexuals). While the estimated odds ratios, of 1.6 and 1.5, are still sizeable, the estimates are highly imprecise and as a result are not statistically significant at conventional levels (the estimate for lesbian women is weakly significant, at the 90% confidence level). And the estimated magnitudes again decline further if labour force status, household income and frequency of social interaction are also controlled for.

Labour Earnings and Sexual Identity

Another outcome where the relationship with sexual orientation or identity has been much studied, at least in recent years, is earnings from paid employment (or wages), with researchers interested in identifying evidence of discrimination against sexual minorities within the workplace.

Possibly the first study to apply econometric methods to survey data to analyse this issue was Badgett (1995). She used data pooled from the 1989-1991 rounds of General Social Survey in the US to estimate regression models of the determinants of pre-tax annual employment earnings, with the key variable of interest being a dummy variable identifying sexual identity constructed from questions about same sex behaviour (e.g., whether the number of same sex partners is greater than or equal to the number of opposite sex partners since the age of 18). She found that behaviourally gay and bisexual men earned between 11% and 27% less than heterosexual men. Lesbian and bisexual women were also found to earn less but the results were imprecise and so mostly not statistically significant.

Subsequent US research appeared to mostly confirm the large earnings penalty for gay / bisexual men, but in contrast to Badgett (1995) often reported substantial earnings premiums for lesbian / bisexual women. Further such findings have been reported using not only same-sex behaviour as the indicator of sexual orientation (e.g., Berg & Lien 2002; Black et al. 2003; Blandford 2003; Cushing-Daniels & Yeung, 2009) but also in studies using cohabitation status (e.g., Klawitter & Flatt 1998; Clain & Leppel 2001; Antecol, Jong & Steinberger 2008). The size of these differentials, however, may be declining over time (Cushing-Daniels & Yeung, 2009).

Research using self-reported measures of sexual identity is less common and also suggests quite different conclusions. Carpenter (2005), for example, could find no clear evidence of a significant independent effect of gay or lesbian sexual orientation on hourly earnings, at least once marital status was controlled for. Less clear is whether these different results reflect the measure of sexual orientation used or the population – residents of California – studied.

Most recently, Sabia (2014), analysed data from a large sample of young adults (persons aged 26 to 34) in the US that included multiple measures of sexual orientation, including both self-reported identity and behavioural measures. He reported results that were robust across

measures, finding evidence of a substantial gay penalty, though not as large as found in many earlier studies. He also found no evidence for a premium for lesbian or bisexual women. Indeed, they earned less, though the estimated differentials were not statistically significant.

Research using data from other countries has also tended to report findings that are more or less consistent with US research. Included here are studies of: a sample of recent college graduates in The Netherlands (Berg & Berkhout 2004); pooled data from different waves of the Labour Force Survey in the UK (Arabsheibani Marin & Wadsworth 2005); a national sample of Canadians aged 18 to 55 (Carpenter 2008a); and register data on homosexuals living in civil unions in Sweden and a sample of married heterosexuals (Ahmed & Hammarstedt 2010). That said, the estimated size of the gap pay penalty in both the UK and Dutch studies are arguably quite small, and there no significant differential between lesbian women and married heterosexual women in the Swedish study.

For Australia there is only one published study (Carpenter 2008b), and that drew on the Australian Longitudinal Study of Women's Health, and hence was restricted to women (and more specifically to young women). Further this study was only able to analyse personal income, rather than labour earnings. In contrast to most (if not all previous research), it was found that lesbian women face a marked income penalty – in the order of 30% – relative to heterosexual women.

The inclusion of sexual identity in the HILDA Survey, which provides very detailed data on wages, hours of work, and other job characteristics, thus has the potential to significantly advance our understanding of wage discrimination for sexual minorities in Australia. Here I report results from some tentative first steps in this direction. Specifically, I use the data from wave 12 to estimate simple cross-sectional wage equations that take the form:

$$\ln W_i = X_i'\beta + Z_i'\gamma + \varepsilon_i$$

where the dependent variable is the log of the hourly wage (W), constructed here as gross estimated usual weekly labour earnings divided by usual weekly hours of work[7], X is a vector of individual characteristics assumed to be related to earnings, and Z is self-reported sexual identity.

For purposes of this estimation, the sample is restricted to employees aged between 15 and 64 years (where a person who is an employee of their own business is defined to be self-employed and hence out of scope). Any employees who are full-time students at the time of interview are also excluded. I further excluded any cases where the value on the dependent variable seemed extreme. These boundaries, which admittedly are somewhat arbitrary, are $8 and $300 per hour. This resulted in the loss of 65 and 4 cases respectively from the sample, as just defined.[8]

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[7] In the HILDA Survey the questions on hours of work specifically request respondent to include all hours of work, including both paid and unpaid overtime. Further, if queried, interviewers are instructed to advise respondents that this include work performed both in the home and at home, and that time "on call" is not considered usual work hours.

[8] At the time wave 12 of the HILDA Survey was conducted the Federal Minimum Wage (FMW) was $15.96 per hour. The presence of employees reporting much lower hourly rates of pay in the HILDA Survey data reflects: (i) the presence of substantially lower minima for junior employees, apprentices / trainees and workers with a disability; (ii) the construction of hourly pay here using all reported working hours and not the standard weekly hours as specified in awards or agreements; (iii) non-compliance with award regulations; and (iv) reporting and measurement errors.

The list of variables for inclusion in the X vector is potentially quite long given the richness of the HILDA Survey data. In the most detailed specification, controls are included for:

- sex;
- age (five-year age categories);
- marital status;
- the presence of a long-term health condition differentiated by whether it is work limiting or not;
- origin (with three dummy variables included identifying whether the respondents is an Indigenous Australian, born overseas with English as their first language, and born overseas but with English not their first language);
- English language speaking ability (dummies which separate persons who speak a language other than English at home into three categories based on their self-assessed ability to speak in English);
- location of residence (three dummies identifying four broad categories remoteness of location based on the major categories used in the Accessibility / Remoteness Index of Australia);
- education (seven dummies identifying different levels of attainment);
- three measures of cognitive ability (see Wooden 2013);
- length of tenure (years) with the current employer (and its square);
- years of experience in the current occupation (and its square);
- union membership;
- contractual employment status (with two dummies identifying casual and fixed-term contract employment, respectively);
- employment through a labour-hire firm;
- occupation (dummies identifying 47 sub-major occupation groups are included);[9]
- industry of employer (dummies identifying 81 industry subdivisions are included);[10]
- sector of employer (with dummies included for public sector and private non-commercial); and
- size of employer (with dummies included to identify firms with less than 20 employees and firms with 500 or more employees); and

The estimated coefficients on the sexual identity variables from a series of different specifications are reported in Table 4. Following Uhrig (2014), we begin with a simple specification where the only control is age. The results from this indicate that there is no wage penalty for gay men but there is for bisexual men (15.2%), while for women there is large premium for lesbians (16.9%) but not for bisexuals. Such findings are very much in line with US findings (as well as the UKHLS analysis reported by Uhrig). However, once we begin adding controls for other influences on wages, the apparent premium for lesbian women and penalty for bisexual men decline in magnitude and eventually become statistically insignificant. Thus one of the reasons for the large premium for lesbian women is their relatively high rates of educational attainment. Once this (and performance on cognitive ability tests) are controlled, the estimated premium declines to about 10%, still substantial.

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[9] Occupations are classified using the Australian and New Zealand Standard Classification of Occupations, 2006. Due to sample sizes, two groups had to be merged for this analysis.

[10] Industries are classified using the Australian and New Zealand Standard Industrial Classification, 2006. There are 86 industry subdivisions in this classification, but due to small sample sizes, the industry subdivisions within the broader Agriculture, forestry and fishing division have been combined to create the one industry category.

Table 4: Regressions of Ln Hourly Earnings on Sexual Identity (standard errors in parentheses)

Dependent variable = Ln of usual gross weekly earnings divided by usual weekly hours of work
Estimation method = Ordinary least squares

Sexual identity	I		II		III		IV	
	Men	*Women*	*Men*	*Women*	*Men*	*Women*	*Men*	*Women*
Lesbian or Gay	.004	.169**	.010	.145**	-.007	.099*	.046	.050
	(.055)	(.049)	(.054)	(.049)	(.052)	(.046)	(.047)	(.044)
Bisexual	-.152*	-.005	-.098	-.010	-.078	-.029	-.098	.022
	(.077)	(.050)	(.075)	(.049)	(.072)	(.047)	(.068)	(.045)
Other	-.234*	-.196*	-.203#	-.179*	.010	-.089	-.039	.018
	(.109)	(.091)	(.106)	(.090)	(.132)	(.093)	(.125)	(.089)
Don't know	-.157#	-.109	-.102	-.067	-.091	.025	-.087	.066
	(.095)	(.089)	(.093)	(.087)	(.095)	(.084)	(.086)	(.078)
Prefer not to say	-.209**	-.212**	-.106#	-.191**	-.033	-.151**	-.039	-.116*
	(.060)	(.049)	(.060)	(.049)	(.059)	(.048)	(.057)	(.049)
Missing	.155	-.176#	.052	.162#	.043	.216*	-.037	.190*
	(.121)	(.091)	(.118)	(.090)	(.119)	(.090)	(.113)	(.091)
Controls	Age only		Demographics		Demographics + Education + Ability		Demographics + Education + Ability + Work experience + Job / Firm characteristics	
Adjusted R^2	.142	.106	.185	.135	.308	.299	.492	.422
N	3563	3694	3558	3683	3126	3233	2984	3013

Notes

# $p < .10$; * $p < .05$; ** $p < .01$.

1. Sample restricted to employees (and exclude any owner managers of incorporated enterprises) aged 15 to 64. Also excluded are full-time students, and any cases with outlying values on the dependent variable.
2. All equations include controls for:

Inclusion of controls for work experience and job and firm characteristics (such as detailed occupation and industry) then sees this decline to about 5%, no longer statistically significant and no longer much higher than for gay men.

I emphasise again, however, that the estimates reported here are very preliminary. The estimation approach used is very simple – linear least squares regression. It would, for instance, be fairly straightforward to pool observations across all 12 available survey waves and estimate panel data models, but which still allow for time-invariant regressors (e.g., random effects models). Additionally, no attempt has been made here to account for the potential selection bias arising from the fact that wages are only observable for persons in employment. The conventional approach to this problem is to estimate a selection model which simultaneously estimates an equation for the probability of employment. This, however, is not straightforward since it can often be difficult to identify variables that will satisfy the necessary exclusion restrictions. The results reported on here thus do not necessarily generalise to the wider population. Further, no accounting has been taken of the possible channels which might contribute to differences in pay between persons with differing sexual identities.

Conclusions

The identification of sexual identity / orientation is very uncommon in data sets in Australia, and especially data sets employing population samples. This is perhaps surprising given the ongoing debates about inequality in the treatment of sexual minorities in this country (e.g., Maddison & Partridge 2007). As a result, there is a dearth of high quality evidence on inequality in socio-economic outcomes that arise because of sexual orientation. The inclusion of a measure of sexual identity in wave 12 of the HILDA Survey should thus be highly welcome.

There are, however, good reasons why the identification of sexuality is not routinely included in population surveys. First, and most obviously, the target population is relatively rare and hence large samples are required to ensure target population sub-samples are of sufficient size to enable meaningful population inferences to be drawn. This problem is clearly evident in the case of the HILDA Survey, with only a little more than 400 respondents identifying as LGB. As a result, highly detailed analyses of this sub-population will be precluded. Further, many population estimates for this group will be subject to considerable sampling error.

Second, the credible identification of sexuality within surveys, especially broad omnibus population surveys, is a challenge. The HILDA Survey has opted for a very simple self-identification approach, which we believe is least problematic in terms of operationalization in field, but which may be criticised by many researchers in this area. As Uhrig (2014) notes, self-identification would be preferred were it not for the fact that sexual minority status is stigmatised and concealable. Disclosure will be both incomplete and subject to misreporting. As has been shown here, the HILDA Survey data are clearly affected by these reporting problems.

Despite this, simple analyses of the associations between sexual identity and both mental health and hourly earnings generate results that are in line with both other research and a priori expectations, though it is true that the estimates (especially in the case of earnings) are very imprecise. My hope is that researchers will be able to use these data to explore these and other outcomes more fully. Uhrig (2014), for example, when discussing the like sexual identity measured included in wave 3 of the UKHLS, points to the potential for examining sexual minority differences in many outcomes, including not just mental health and wages, but also poverty and household income, savings and wealth, retirement, housing, physical health, education, and employment.

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Table A1: Multinomial logit estimates of response to sexual identity (base outcome = heterosexual)

Response category	Variable	Coeff.	Std. err.	Prob.
Lesbian, Gay or Bisexual	Sex = female	.173	.101	.086
	Age	-.022	.003	.000
	Long-term health condition (ref. cat. = No condition)			
	Mild disability	.408	.171	.017
	Moderate	.322	.152	.033
	Severe	.781	.310	.012
	Origin (ref. cat. = Australian-born, non-indigenous)			
	Indigenous Australian	.199	.284	NS
	OS born: English language	.246	.155	NS
	OS born: Other language	.234	.237	NS
	English speaking ability (Re. cat. = Speaks only English at home)			
	Very well	-.471	.249	.058
	Well	-.592	.411	NS
	Not well / Not at all	-.233	.631	NS
	Highest education level (ref. cat. = Year 11 or less)			
	Higher degree / qualification	.753	.177	.000
	Bachelor degree	.228	.177	NS
	Diploma	.252	.213	NS
	Certificate III/IV	.409	.152	.007
	Year 12	.453	.156	.004
	Region of residence (ref. cat. = Major city)			
	Inner regional	-.402	.133	.003
	Outer regional	-.144	.171	NS
	Remote	.162	.393	NS
	Constant	-2.767	.275	.000
Other	Sex = female	-.025	.192	NS
	Age	.005	.006	NS
	Long-term health condition (ref. cat. = No condition)			
	Mild disability	.193	.338	NS
	Moderate	.520	.242	.032
	Severe	.347	.534	NS
	Origin (ref. cat. = Australian-born, non-indigenous)			
	Indigenous Australian	-16.177	1964.6	NS
	OS born: English language	-.959	.467	.040
	OS born: Other language	.318	.373	NS
	English speaking ability (Re. cat. = Speaks only English at home)			

Response category	Variable	Coeff.	Std. err.	Prob.
	Very well	.842	.368	.022
	Well	1.430	.444	.001
	Not well / Not at all	1.909	.546	.000
	Highest education level (ref. cat. = Year 11 or less)			
	Higher degree / qualification	-1.207	.446	.007
	Bachelor degree	-1.014	.364	.005
	Diploma	-.814	.413	.049
	Certificate III/IV	-.199	.247	NS
	Year 12	-.332	.287	NS
	Region of residence (ref. cat. = Major city)			
	Inner regional	-.360	.262	NS
	Outer regional	.084	.296	NS
	Remote	-.458	1.015	NS
	Constant	-5.351	.766	.000
Don't know	Sex = female	-.012	.177	NS
	Age	-.000	.005	NS
	Long-term health condition (ref. cat. = No condition)			
	Mild disability	.336	.291	NS
	Moderate	.246	.234	NS
	Severe	.276	.482	NS
	Origin (ref. cat. = Australian-born, non-indigenous)			
	Indigenous Australian	1.062	.368	.004
	OS born: English language	-.528	.401	NS
	OS born: Other language	.334	.369	NS
	English speaking ability (Re. cat. = Speaks only English at home)			
	Very well	.598	.383	NS
	Well	2.273	.395	.001
	Not well / Not at all	1.322	.697	.058
	Highest education level (ref. cat. = Year 11 or less)			
	Higher degree / qualification	-1.082	.368	.000
	Bachelor degree	-1.823	.438	.000
	Diploma	-1.324	.433	.002
	Certificate III/IV	-.874	.255	.001
	Year 12	-.472	.247	.056
	Region of residence (ref. cat. = Major city)			
	Inner regional	.334	.206	NS
	Outer regional	-.140	.322	NS
	Remote	-15.985	2284.1	NS
	Constant	-5.296	.754	.000

Response category	Variable	Coeff.	Std. err.	Prob.
Prefer not to say	Sex = female	.079	.109	NS
	Age	.013	.003	.000
	Long-term health condition (ref. cat. = No condition)			
	Mild disability	.203	.189	NS
	Moderate	.506	.135	.000
	Severe	1.044	.224	.000
	Origin (ref. cat. = Australian-born, non-indigenous)			
	Indigenous Australian	1.192	.235	.000
	OS born: English language	-.156	.198	NS
	OS born: Other language	.395	.228	.083
	English speaking ability (Re. cat. = Speaks only English at home)			
	Very well	.570	.240	.017
	Well	1.756	.262	.000
	Not well / Not at all	1.945	.338	.000
	Highest education level (ref. cat. = Year 11 or less)			
	Higher degree / qualification	-1.089	.236	.000
	Bachelor degree	-1.315	.228	.000
	Diploma	-1.000	.237	.000
	Certificate III/IV	-.699	.151	.000
	Year 12	-.460	.165	.005
	Region of residence (ref. cat. = Major city)			
	Inner regional	.253	.130	.052
	Outer regional	.159	.173	NS
	Remote	.070	.465	NS
	Constant	-4.108	.337	.000
Missing	Sex = female	.537	.164	.001
	Age	.028	.005	.000
	Long-term health condition (ref. cat. = No condition)			
	Mild disability	.761	.221	.001
	Moderate	.534	.191	.005
	Severe	.330	.410	NS
	Origin (ref. cat. = Australian-born, non-indigenous)			
	Indigenous Australian	.951	.405	.019
	OS born: English language	.049	.245	NS
	OS born: Other language	.565	.296	.056
	English speaking ability (Re. cat. = Speaks only English at home)			
	Very well	.872	.297	.003
	Well	.737	.406	.070

Response category	Variable	Coeff.	Std. err.	Prob.
	Not well / Not at all	1.008	.521	.053
	Highest education level (ref. cat. = Year 11 or less)			
	Higher degree / qualification	-.770	.310	.013
	Bachelor degree	-.731	.281	.009
	Diploma	-.962	.357	.007
	Certificate III/IV	-.189	.202	NS
	Year 12	-.746	.292	.011
	Region of residence (ref. cat. = Major city)			
	Inner regional	-.150	.193	NS
	Outer regional	.066	.237	NS
	Remote	-16.237	1962.7	NS
	Constant	-6.425	.650	.000

NS denotes not statistically significant at the 90% confidence level.

Not reported, but also included are controls for the number of times of interviewed during the life of the panel and interviewer reported measures of the degree of respondent cooperation during the interview and of suspicion about the study.