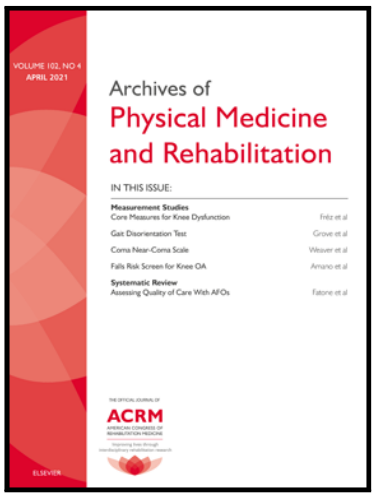

Sexual orientation and functional limitations: Cross-sectional analyses from the Adult Psychiatric Morbidity Survey

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PII: S0003-9993(21)00332-4
DOI: https://doi.org/10.1016/j.apmr.2021.04.005
Reference: YAPMR 58214

To appear in: *Archives of Physical Medicine and Rehabilitation*

Received date: 9 February 2021
Revised date: 8 March 2021
Accepted date: 2 April 2021

Please cite this article as: Louis Jacob PhD , Guillermo F. López-Sánchez PhD , Karel Kostev PhD , Alexis Schnitzler MD, PhD , Josep Maria Haro MD, PhD , Ai Koyanagi MD, PhD , Daragh T. McDermott , Jae Il Shin MD, PhD , Lee Smith PhD , Sexual orientation and functional limitations: Cross-sectional analyses from the Adult Psychiatric Morbidity Survey, *Archives of Physical Medicine and Rehabilitation* (2021), doi: https://doi.org/10.1016/j.apmr.2021.04.005

Sexual orientation and functional limitations: Cross-sectional analyses from the Adult Psychiatric Morbidity Survey

Running title: Sexual orientation and functional limitations

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Conflict of interest: None.

Funding: None.

Acknowledgments: We would like to thank the National Center for Social Research and the University of Leicester who were the Principal Investigators of this survey. In addition, we would also like to thank the UK Data Archive, the National Center for Social Research, and other relevant bodies for making these data publically available. They bear no responsibility for this analysis or interpretation of this publically available dataset.

Sexual orientation and functional limitations: Cross-sectional analyses from the Adult Psychiatric Morbidity Survey

Abstract

Objective: To assess the association between sexual orientation and functional limitations in a large representative sample of the English population.

Design: Cross-sectional.

Setting: Data were from the 2007 Adult Psychiatric Morbidity Survey (APMS).

Participants: 7,403 adults aged 16-95 years (51.4% females, mean [standard deviation] age 46.3 [18.6] years) were included in the present study.

Interventions: Not applicable.

Main Outcome Measures: Sexual orientation was assessed using two items adapted from the Kinsey scale, and was dichotomized into heterosexual and sexual minority orientation. Functional limitations were assessed using seven activities of daily living (ADL) and instrumental activities of daily living (IADL). Functional limitations were defined as at least one difficulty in one of seven ADL and IADL. Adjusted logistic regression analyses were conducted to investigate the association between sexual orientation (independent variable) and functional limitations (dependent variable).

Results: The level of sexual minority orientation and prevalence of functional limitations in the sample was 7.1% and 32.9%, respectively. After adjusting for several potential confounders, sexual minority orientation was positively and significantly associated with

functional limitations (OR = 1.51, 95% CI: 1.18-1.95; reference group: heterosexual orientation).

Conclusions: Based on the findings of this study, interventions aiming to prevent against and/or manage/reduce functional limitations in sexual minorities are needed. More research is also warranted to better understand mediators (e.g., obesity, cognitive complaints, and psychiatric disorders) involved in the sexual orientation-functional limitation relationship.

Keywords: sexual orientation; functional limitations; nationally representative study; United Kingdom

Introduction

The proportion of the UK population identifying as lesbian, gay or bisexual (defined here on as "sexual minorities") has increased from 1.5% in 2012 to 2.0% in 2017, though actual prevalence levels are presumed to be higher, owing to some individuals choosing not to report their true sexual orientation.[1] There is a growing body of literature that suggests those who identify as sexual minorities are at increased risk of several physical and mental health conditions, including, for example, cardiovascular disease,[2] HIV,[3] depression, suicidal thoughts, self-harm and alcohol and substance misuse.[4] An increased risk in terms of cardiovascular disease and HIV may be explained by lifestyle choices such as higher rates of alcohol[5] and illicit drug consumption,[6] as well as risky sexual behavior in the case of HIV and men who have sex with men.[7] The increased risk of mental health problems may result from factors such as isolation, discrimination, homophobia, and conversion therapies.[4,8–11]

Due to a higher prevalence of physical and mental health complications it is plausible to assume that those who identify as sexual minorities are an increased risk of disability/functional limitations. Based on the World Health Organization, disability is an umbrella term including impairments, activity limitations and participation restrictions experienced by an individual with a physical or psychiatric condition when interacting with his/her environment.[12] In one US study, using data from 82,531 adults obtained between 2003 and 2009, it was found that the prevalence of disability among sexual minority adults was high compared with their heterosexual counterparts (35.5%-36.2% versus 24.9% in female participants and 26.2%-40.1% versus 22.5% in male participants).[13] The higher rate of disability in sexual minorities than in the heterosexual population may be explained by more frequent unhealthy behaviours,[5,6] chronic physical and psychiatric conditions[2–4] as well as more frequent discrimination.[14] There are few other studies investigating the prevalence of disability in sexual minorities, but all these studies were conducted in the US.[15–18] It is thus important to identify whether a higher prevalence of disability/functional limitations exists in sexual minority groups in nationally representative samples in other countries owing to difference in social and political contexts between countries, such as different health care pathways and health care stigmatization towards sexual minorities groups.[19–21]

Therefore, after identifying potential differences by sexual orientation and functional limitation status in a wide range of factors (e.g., sociodemographic and behavioural), the first aim of the present study was to compare the prevalence of functional limitations between sexual minorities and heterosexual individuals from a large representative sample of the English population. The second aim was to assess the association between sexual orientation and functional limitations after adjusting for several potential confounding factors. The

hypothesis was that those who identify as a sexual minority are at a greater risk of functional limitations compared to their heterosexual counterparts.

Methods

Study participants

This study used data from the 2007 Adult Psychiatric Morbidity Survey (APMS). Details of the survey have been published previously.[22–24] Briefly, this was a nationally representative survey of the English adult population (aged≥16 years) living in private households. The National Center for Social Research and Leicester University undertook the survey fieldwork in October 2006 to December 2007 using a multistage stratified probability sampling design where the sampling frame consisted of the small user postcode address file, while the primary sampling units were postcode sectors. All data were obtained through face-to-face interviews apart from sexual orientation, alcohol dependence and childhood adversity that were obtained with self-completed questionnaires directly following face-to-face interviews. Sampling weights were constructed to account for non-response and the probability of being selected so that the sample was representative of the English adult household population. Each participant was given a £5 high street gift voucher. The survey response rate was 57%. Ethical permission for the study was obtained from the Royal Free Hospital and Medical School Research Ethics Committee. All participants provided informed consent before their inclusion.

Measures

Sexual orientation (independent variable)

Sexual orientation was assessed using two items adapted from the Kinsey scale, a scale initially developed to assess sexual orientation as a continuum rather than as a dichotomous concept:[25] (1) "Which statement best describes your sexual orientation? This means sexual feelings, whether or not you have had any sexual partners."; and (2) "Please choose the answer below that best describes how you currently think of yourself...". One of the original goals of these two items was to investigate the effects of question wording and format on the level of sexual minority orientation in this population, and item (1) and item (2) were therefore randomly allocated to participants. Answers to these items are listed in **Table 1** and, following a previous publication,[26] sexual orientation was dichotomized into heterosexual and sexual minority orientation.

Functional limitations (dependent variable)

Functional limitations were defined as at least one difficulty in one of seven activities of daily living (ADL) and instrumental activities of daily living (IADL). These ADL and IADL included personal care (e.g., dressing, bathing, washing, or using the toilet), getting out and about or using transport, medical care (e.g., taking medicines or pills, having injections, or changes of dressing), household activities (e.g., preparing meals, shopping, laundry, or housework), practical activities (e.g., gardening, decorating, or doing household repairs), dealing with paperwork (e.g., writing letters, sending cards, or filling forms), and managing budget (e.g., budgeting for food or paying bills).

Control variables

Control variables were selected using previous literature,[13,27] and included sex (male and female), age, ethnicity (British White or other), marital status (married/cohabiting and single/separated/divorced/widowed), having a qualification (having a qualification [degree,

non-degree, advanced level, General Certificate of Secondary Education, other]: yes or no), employment (yes or no), income (high ≥£29,826, middle £14,057–<£29,826 and low <£14,057; equivalized income tertiles), smoking status (never and quit/current), alcohol dependence (yes or no), the number of chronic physical conditions, and childhood adversity. Equivalized income was calculated by dividing the total household income by the household McClement score (i.e., a score taking into account the age of each member of the household). Excessive alcohol consumption was assessed with the Alcohol Use Disorders Identification Test (AUDIT),[28] and alcohol dependence was screened using the Severity of Alcohol Dependence Questionnaire (SADQ-C) in participants with an AUDIT score ≥10.[29] SADQ-C ≥4 indicated alcohol dependence in the last six months. Only alcohol dependence was included in the analyses. Chronic physical conditions included all physical disorders documented in the APMS dataset, and these disorders were allergies, arthritis, asthma, bladder problems/incontinence, bone/back or joint/muscle problems, bowel/colon problems, bronchitis/emphysema, cancer, cataract/eyesight problems, dementia, diabetes, ear/hearing problems, epilepsy, heart attack/angina, high blood pressure, infectious disease, liver problems, migraine, skin problems, stomach ulcer/digestive problems, and stroke. Finally, childhood adversity corresponded to the presence of sexual talk, sexual touching, sexual intercourse, or physical abuse before the age of 16 years.

Statistical analyses

Differences in the sample characteristics by sexual orientation and functional limitation status were tested using chi-squared tests for all variables except age and the number of chronic physical conditions (t-tests). Furthermore, the distribution of the number of difficulties in ADL and IADL was compared using a chi-squared test between heterosexual and sexual minority participants. In addition, differences by sexual orientation and functional limitations

in the prevalence of chronic physical conditions, and differences by sexual orientation in difficulties in individual ADL and IADL were also assessed using chi-squared tests. Finally, an adjusted logistic regression analysis was conducted to investigate the association between sexual orientation (independent variable) and functional limitations (dependent variable). Independent variables included in this logistic regression model were sexual orientation, sex, age, ethnicity, marital status, qualification, employment, income, smoking status, alcohol dependence, the number of chronic physical conditions, and childhood adversity. Given that there was more than 20% of missing data for income, a missing income category was included in the regression analyses. All variables were included in the regression models as categorical variables except age and the number of chronic physical conditions (continuous variables). Interaction analyses were further conducted by including three product terms in three distinct regression models: sexual orientation X sex, sexual orientation X age, and sexual orientation X wording of the initial sexual orientation item ("Which statement best describes your sexual orientation? This means sexual feelings, whether or not you have had any sexual partners." or "Please choose the answer below that best describes how you currently think of yourself..."). These interaction analyses aimed to assess the impact of sex, age and sexual orientation item wording on the association between sexual orientation and functional limitations. In addition, a sensitivity analysis excluding participants identifying as bisexual was conducted to assess the replicability of the findings among sexual minorities other than bisexual individuals. Results from the logistic regression analyses are presented as odds ratios (ORs) and 95% confidence intervals (CIs). The sample weighting and the complex study design (i.e., strata and primary sampling units) were taken into account in all analyses, while a quasibinomial distribution was used in the logistic regression models. The level of statistical significance was set at p-value<0.05. The statistical analysis was performed using R 3.6.2 (The R Foundation).[30]

Results

Descriptive analyses

This study included 7,403 adults aged 16-95 years (51.4% females, mean [standard deviation] age 46.3 [18.6] years; **Table 2**). The level of sexual minority orientation and prevalence of functional limitations in the sample was 7.1% and 32.9%, respectively, and functional limitations were significantly more common in the sexual minority than in the heterosexual group (39.9% versus 32.1%; p-value=0.001). There was no significant difference in the level of sexual minority orientation by wording of the initial sexual orientation item (7.5% with item 1 versus 6.6% with item 2; p-value=0.174), while the proportion of people with functional limitation was similar between the item 1 and item 2 group (33.3% with item 1 versus 32.2% with item 2; p-value=0.314). Younger age, ethnicity other than British White, single/separated/divorced/widowed, alcohol dependence, and childhood adversity were more frequent in sexual minorities than heterosexual people, although effect sizes were most of the time relatively small. Differences by sexual orientation and functional limitations in the prevalence of each chronic condition are further displayed in **Supplementary Table 1**, and two disorders (i.e., asthma and epilepsy) were more frequent in both the sexual minority and the functional limitation group with small-to-medium effect sizes. The distribution of the number of difficulties in ADL and IADL by sexual orientation is shown in **Figure 1**. The proportion of individuals with 1-2 (26.8% versus 20.9%) and ≥3 difficulties (13.0% versus 11.2%) was significantly higher in the sexual minority than in the heterosexual group (p-value=0.002). In terms of individual ADL and IADL, the prevalence of difficulties with dealing with paperwork (18.8% versus 12.4%; p-value<0.001) and difficulties with managing

money (14.7% versus 9.1%; p-value<0.001) was significantly higher in the sexual minority than in the heterosexual group (small effect sizes; **Supplementary Table 2**).

Inferential analyses

The results of the adjusted logistic regression model are shown in **Table 3**. After adjusting for potential confounders (sex, age, ethnicity, marital status, qualification, employment, income, smoking status, alcohol dependence, the number of chronic physical conditions, and childhood adversity), sexual minority orientation was positively and significantly associated with functional limitations (OR = 1.51, 95% CI: 1.18-1.95; reference group: heterosexual orientation). Interestingly, the control variable displaying the strongest association with functional limitations was the number of chronic physical conditions (OR = 2.13, 95% CI: 1.99-2.29). Interaction analyses showed that sex, age and wording of the initial sexual orientation item were not significant interacting factors in the sexual orientation-functional limitations relationship. Moreover, the sensitivity analysis revealed that the findings were replicable in sexual minorities other than bisexuals (OR = 1.50, 95% CI: 1.16-1.95; reference group: heterosexual orientation).

Discussion

In this large sample of the English public, the prevalence of functional limitations was more common in sexual minorities than in heterosexual adults (39.9% versus 32.1%). Moreover, sexual minorities were significantly more likely to report a higher number of ADL/IADL difficulties than heterosexuals. Finally, there was a positive and significant association between sexual minority orientation and functional limitations in the adjusted regression model (OR = 1.51, 95% CI: 1.18-1.95).

Findings from the present study support previous literature that has identified a high rate of disability among the sexual minority US population, after controlling for sociodemographic characteristics (e.g., education and income) and health-related covariates (e.g., asthma and obesity,).[13] Moreover, the present study adds to the existing literature by demonstrating that this is not a US specific problem since the present paper identified a similar pattern in a nationally representative sample of the UK population. There are several plausible pathways that may explain a high prevalence of disability/functional limitations in sexual minorities. First, as previously explained, sexual minorities are at a higher risk of some physical and mental health complications,[2–4] as well as unhealthy behaviours (e.g., excessive alcohol consumption and illicit drug use), as also identified in the present study.[5,6] Individually and combined these factors likely substantially increase one's risk of functional limitations. For example, a cross-sectional study including 3,567 older adults from the United States revealed that sexual minorities were more likely to report cognitive impairment than their heterosexual counterparts after adjusting for a variety of factors such as gender, age, smoking status, and physical comorbidity.[31] Interestingly, it was also observed in a longitudinal study of 4,290 older adults living in Japan that cognitive impairment was a risk factor for incident disability.[32] In terms of diabetes, a cohort of 94,250 women residing in the United States found that those identifying as lesbian or bisexual had a 1.27-fold increase in the risk of developing type 2 diabetes compared to those identifying as heterosexual, and this association was particularly strong at younger age.[33] Meanwhile, a systematic review and meta-analysis of 26 studies further identified diabetes as a risk factor for mobility, ADL and IADL disability.[34] Finally, previous research has indicated that around one fifth of the older sexual minority population reports high-risk drinking,[5] and problematic drinking predicts impairments in ADL and IADL.[35] Second, it is commonly reported that sexual minorities

experience discrimination within the health care system[36,37] and fear of discrimination in the health care system has been shown to result in a significant proportion (14%) of this population avoiding seeking healthcare.[14] Avoiding healthcare is also likely to increase one's risk of functional limitations since underlying conditions that can lead to disability will likely not be appropriately managed. Moreover, literature suggests that sexual minorities are less likely to comply to chronic disease management guidelines, potentially owing to stigma and discrimination they face from clinical providers and healthcare staff.[38] The association between sexual minority orientation and functional limitations is likely explained by a combination of all of these factors. Finally, the present study showed that the prevalence of asthma was higher in sexual minorities and people with functional limitations, and the higher prevalence of asthma in sexual minorities may be explained by high rates of smoking and perceived stress in this population.[39]

It is important to highlight that the APMS survey was conducted in 2007, and it is possible that the association between sexual orientation and functional limitations has strengthened or weakened in recent years compared to the present findings. Indeed, the level of sexual minority orientation and prevalence of functional limitations have increased in the past decade,[1,40] while legal measures have been taken to protect UK sexual minorities from discrimination (e.g., the 2010 Equality Act).[41] However, despite this there has been a lack of research and public health response since 2007 to suggest a different sexual orientation-functional limitation relationship to that observed here.

Strengths and Limitations

This is the first UK-based study to investigate the association between sexual orientation and functional limitations. The large and nationally representative sample are clear strengths; however, findings must be interpreted in light of the study limitations. First, the study was cross-sectional in nature and thus direction of the association cannot be established. However, it is indeed highly unlikely that functional limitations per se influences one's sexual orientation. Second, all survey questions were self-reported so self-report and recall bias cannot be ruled out. Third, interviews were carried out in English, and this may have impacted the study results and their generalizability, highlighting the need for further research conducted in other populations of different language and culture. Fourth, given that this study included people living in private households only, the findings may not be extrapolated to those living in institutionalized settings. Fifth, although the survey response rate was similar to response rates obtained in other surveys,[42] it was around 57% and this may have impacted the study results. Finally, there may be some degree of residual confounding influencing the results, and data on gender and not only on sex would also have allowed more accurate analyses.

Conclusions

In conclusion, in this large sample of UK adults those who identify as sexual minorities were significantly more likely to suffer from functional limitations and were much more likely to report a higher number of difficulties than heterosexuals. Taken together with findings from previous literature it is important that this issue is addressed. Based on the findings of this study, interventions aiming to prevent against and/ or manage/reduce functional limitations in sexual minorities are needed. Several intervention considerations may be explored. First, by addressing unhealthy behaviours in this population that can lead to functional limitations such

as smoking,[43] excessive alcohol[44] and illicit drug consumption[45] and second by addressing discrimination in the healthcare system[46] and thus ensuring this group accesses the appropriate care when required. Finally, more research of longitudinal nature is also warranted to better understand mediators (e.g., obesity, cognitive complaints, and psychiatric disorders) involved in the sexual orientation-limitation relationship.

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Figure Legend

Figure 1. Number of difficulties in ADL and IADL by sexual orientation

Abbreviations: ADL activities of daily living; IADL instrumental activities of daily living.

The number of difficulties in ADL and IADL was analyzed as a categorical variable (i.e., 0, 1-2 and ≥3 difficulties).

The distribution in the number of difficulties in ADL and IADL was significantly different between heterosexual and sexual minority individuals (chi-squared test p-value=0.002).

Bar represents upper end of 95% confidence interval.

Table 1. Items adapted from the Kinsey scale and dichotomized sexual orientation variable included in the analyses

Items	Answers	Dichotomized sexual orientation variable
Item 1: Which statement best describes your sexual orientation? This means sexual feelings, whether or not you have had any sexual partners.	Entirely heterosexual (attracted to persons of the opposite of sex)	Heterosexual
	Mostly heterosexual, some homosexual feelings	Sexual minority
	Bisexual (equally attracted to men and women)	
	Mostly homosexual, some heterosexual feelings	
	Entirely homosexual (attracted to persons of the same sex)	
	Other	
Item 2: Please choose the answer below that best describes how you currently think of yourself...	Completely heterosexual	Heterosexual
	Mainly heterosexual	Sexual minority
	Bisexual	
	Mainly gay or lesbian	
	Completely gay or lesbian	
	Other	

Table 2. Sample characteristics (overall and by sexual orientation, functional limitation status and number of difficulties in ADL and IADL)

Characteristics	Category	Overall (N=7,403)	Sexual orientation				Functional limitation				Number of difficulties in ADL and IADL				
			Heterosexual (N=6,811)	Sexual minority (N=502)	P-value[a]	Effect size[b]	No (N=4,608)	Yes (N=2,795)	P-value[a]	Effect size[b]	0 (N=4,608)	1-2 (N=1,719)	≥3 (N=1,076)	P-value[a]	Effect size[b]
Sex	Male	48.6	48.8	47.4	0.596	0.00	49.6	46.4	0.019	0.04	49.6	48.5	42.6	0.002	0.05
	Female	51.4	51.2	52.6			50.4	53.6			50.4	51.5	57.4		
Age	Mean (standard deviation)	46.3 (18.6)	46.7 (18.5)	40.8 (18.0)	<0.001	0.32	42.5 (16.8)	54.2 (19.7)	<0.001	-0.70	42.5 (16.8)	51.4 (19.6)	59.4 (18.8)	<0.001	0.11
Ethnicity	British White	85.1	85.8	78.5	<0.001	0.06	84.2	87.1	0.018	0.04	84.2	87.1	87.0	0.064	0.04
	Other	14.9	14.2	21.5			15.8	12.9			15.8	12.9	13.0		
Marital status	Married/cohabiting	62.9	64.3	46.2	<0.001	0.08	66.0	56.4	<0.001	0.16	66.0	59.0	51.5	<0.001	0.18
	Single/separated/divorced/widowed	37.1	35.7	53.8			34.0	43.6			34.0	41.0	48.5		
Qualification	No	23.9	23.8	22.7	0.605	0.01	17.1	38.1	<0.001	0.26	17.1	31.3	50.6	<0.001	0.28
	Yes	76.1	76.2	77.3			82.9	61.9			82.9	68.7	49.4		
Employment	No	39.5	39.1	38.8	0.875	0.01	29.3	60.2	<0.001	0.34	29.3	50.4	78.3	<0.001	0.37
	Yes	60.5	60.9	61.2			70.7	39.8			70.7	49.6	21.7		
Income	High	35.8	36.0	35.1	0.366	0.02	42.2	22.4	<0.001	0.26	42.2	26.7	14.0	<0.001	0.20
	Middle	32.6	32.8	30.0			33.2	31.6			33.2	31.6	31.5		
	Low	31.6	31.2	34.8			24.7	46.0			24.7	41.7	54.5		
Smoking status	Never	34.8	34.9	32.1	0.272	0.01	37.1	30.0	<0.001	0.07	37.1	30.6	28.9	<0.001	0.07
	Quit/current	65.2	65.1	67.9			62.9	70.0			62.9	69.4	71.1		
Alcohol dependence	No	92.3	92.8	84.9	<0.001	0.06	92.2	92.4	0.888	0.01	92.2	91.4	94.1	0.129	0.02
	Yes	7.7	7.2	15.1			7.8	7.6			7.8	8.6	5.9		
Number of chronic physical conditions	Mean (standard deviation)	1.3 (1.5)	1.3 (1.5)	1.3 (1.5)	0.356	0.03	0.9 (1.1)	2.2 (1.9)	<0.001	-0.93	0.9 (1.1)	1.8 (1.6)	2.9 (2.0)	<0.001	0.21
Childhood adversity	No	84.0	84.9	71.7	<0.001	0.09	86.4	79.1	<0.001	0.08	86.4	80.1	77.3	<0.001	0.08
	Yes	16.0	15.1	28.3			13.6	20.9			13.6	19.9	22.7		

Abbreviations: ADL activities of daily living; IADL instrumental activities of daily living; ANOVA analysis of variance.

Data are percentages unless otherwise stated.

Functional limitation corresponded to at least one difficulty in seven types of ADL and IADL.

[a] P-values were based on chi-squared tests except for age and the number of chronic physical conditions (t-tests for differences by sexual orientation and functional limitation, and ANOVA for differences by number of difficulties in ADL and IADL).

[b] Effect sizes corresponded to Phi coefficient and Cramer's V for categorical variables and Cohen's d and eta squared for continuous variables.

Table 3. Association between sexual orientation and functional limitations in adults living in the United Kingdom

Characteristics	Category	Standardized coefficient	Standard error	Odds ratio	95% confidence interval	P-values
Sexual orientation	Heterosexual	Reference				
	Sexual minority	0.414	0.129	1.51	[1.18, 1.95]	0.001
Sex	Male	Reference				
	Female	-0.183	0.070	0.83	[0.73, 0.96]	0.009
Age	Per one-SD increase	0.309	0.038	1.36	[1.26, 1.47]	<0.001
Ethnicity	British White	Reference				
	Other	0.064	0.109	1.07	[0.86, 1.32]	0.556
Marital status	Married/cohabiting	Reference				
	Single/separated/divorced/widowed	0.438	0.066	1.55	[1.36, 1.76]	<0.001
Qualification	No	Reference				
	Yes	-0.415	0.078	0.66	[0.57, 0.77]	<0.001
Employment	No	Reference				
	Yes	-0.497	0.077	0.61	[0.52, 0.71]	<0.001
Income	High	Reference				
	Middle	0.219	0.088	1.25	[1.05, 1.48]	0.014
	Low	0.648	0.091	1.91	[1.60, 2.28]	<0.001
Smoking status	Never	Reference				
	Quit/current	0.194	0.069	1.21	[1.06, 1.39]	0.005
Alcohol dependence	No	Reference				
	Yes	0.297	0.135	1.35	[1.03, 1.75]	0.029
Number of chronic physical conditions	Per one-SD increase	0.757	0.035	2.13	[1.99, 2.29]	<0.001
Childhood adversity	No	Reference				
	Yes	0.504	0.089	1.66	[1.39, 1.97]	<0.001

Abbreviations: SD standard deviation; ADL activities of daily living; IADL instrumental activities of daily living.

Functional limitation was included as a dichotomous dependent variable in the logistic regression model, and corresponded to at least one difficulty in seven types of ADL and IADL.

The regression model was adjusted for sex, age, ethnicity, marital status, qualification, employment, income, smoking status, alcohol dependence, the number of chronic physical conditions, and childhood adversity. All independent variables were included in the regression models as categorical variables apart from age and the number of chronic physical conditions (continuous variables).

Figure