Understanding associations between sexual identity change and the mental health of lesbian, gay, and bisexual adults in the United Kingdom through longitudinal survey

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A B S T R A C T

While the existence of poorer mental health among lesbian, gay and bisexual (LGB) populations is well-established, most research does not acknowledge sexual identity shifts when quantifying disparities. This study begins to fill this gap by examining associations between sexual identity change from 2011 to 2023 and current psychological wellbeing and mental health diagnoses self-reported between 2021 and 2023 in the United Kingdom.

We utilized a nationally-representative sample of 25,141 respondents aged 16 and older who completed Understanding Society, a longitudinal household survey, in the 2021–2023 wave and responded to the sexual identity question in at least one wave. Using weighted linear and logistic regression, we examined associations between changes in reporting of sexual identity between heterosexual, LGB, and other identities and psychological distress and mental health diagnoses in Wave 13.

Sexual identity change was associated (p < .05) with psychological distress and odds of reporting any mental health condition, depression, panic attacks, and anxiety, but not post-traumatic stress disorder. Changes towards LGB identities and consistently identifying as bisexual were significant predictors of poorer mental health across outcomes (increased distress range across groups:1.61–2.58, Adjusted Odds Ratio(AOR) range across items/groups:1.91–4.27). Those who changed from LGB to straight also had higher distress (1.65(95 % CI:0.40–2.91)) and odds of reporting any mental health diagnosis (AOR:1.99(1.34–2.96)) and depression (AOR:2.25(1.48–3.42)) than consistently-heterosexual respondents. Currently LGB-identifying groups, excluding those consistently reporting "other", also had higher odds of reporting any mental health condition (AOR range:1.90–3.71) and depression (AOR range:2.15–3.76). These insights can improve services to reduce mental health disparities among LGB populations.

1. Introduction

A large and mounting body of evidence has demonstrated that lesbian, gay, and bisexual (LGB) people have worse mental health outcomes than their heterosexual peers, including higher rates of depression, anxiety, substance misuse, and suicidal behaviour (King et al., 2008; Mongelli et al., 2019; Semlyen et al., 2016). However, much research to date takes sexual identity as a stable category, overlooking evidence of changes across the lifespan (Hu and Denier, 2023; Srivastava et al., 2022). Additionally, survey-based measures on mental health often do not include details about specific mental health diagnoses. To better respond to the mental health needs of LGB populations, policymakers need a deeper understanding of associations between changes in sexual identity and mental health outcomes. This study helps to fill this research gap in the United Kingdom (UK) by exploring data from Understanding Society, a nationally-representative household panel survey, to understand associations between changes in sexual identity and psychological wellbeing and self-reported diagnoses of specific mental health conditions.

1.1. Minority stress theory

Meyer's minority stress theory, a foundational theory in LGB mental health research, provides a framework to understand mental health disparities among sexual minority populations. Minority stress refers to excess stress that individuals with stigmatized identities experience because of that identity (Meyer, 2003). According to Meyer (2003), LGB individuals experience both distal and proximal factors that induce

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stress related to their identity. Distal factors include experiences of prejudice and discrimination, such as school-based victimization, violence, harassment, and employment discrimination (Meyer, 2003). These factors can cause LGB individuals to expect negative attitudes from the dominant culture (i.e. heterosexism), inducing the proximal factors of concealment and internalized homophobia (Meyer, 2003). Concealment, while a potential form of individual coping, can backfire to sever individuals from group-level coping resources, like social environments where they are not stigmatized and support of other marginalized people, and lead to increased hypervigilance and fear of discovery (Hatzenbuehler, 2009; Meyer, 2003).

We anticipated that the interplay of distal and proximal factors for individuals whose reporting of sexual identity changes would have potentially conflicting impacts on mental health. For example, fewer experiences of discrimination may improve the mental health of individuals who previously identified as LGB and now identify as straight, but if this change represents concealment, then mental health outcomes could be worse. Some authors have theorized that changes in sexual identity could induce unique stressors, such as loss of social support from previous identities, which would harm the mental health of those who experience change, regardless of direction (Srivastava et al., 2022). Additionally, in the short term, coming out as LGB may be associated with new experiences of discrimination (Meyer, 2003). On the other hand, Meyer (2003) theorized that coming out is an important step towards integration of a stigmatized identity into a larger sense of self, so shifts towards LGB identities may associate with improved mental health. Given these conflicting factors, this study is crucial to elucidating the impact of minority stress on those who shift reporting of sexual identity across their lifespan.

There is already compelling evidence of differential mental health outcomes among LGB subpopulations. Bisexual individuals often have worse mental health outcomes than other sexual minority groups, with the largest disparities observed for bisexual women (Mongelli et al., 2019; Plöderl and Tremblay, 2015; Pompili et al., 2014; Ross et al., 2018). Researchers have theorized that negative stereotypes from both heterosexual and lesbian/gay people lead to expectations of rejection and higher rates of concealment which contribute to these worse outcomes for bisexual individuals (Feinstein and Dyar, 2017; Persson and Pfaus, 2015). These findings demonstrate nuances within LGB identities and the importance of uncovering other dimensions that shape differential outcomes.

1.2. Sexual identity

Sexuality researchers have defined sexual orientation to include experiences of attraction, sexual behaviour, and sexual identity, or one's own sense of self (Haseldon and Joloza, 2009; Salomaa and Matsick, 2019). The dimension which researchers choose to study has a large effect on estimated sizes of sexual minority populations (Geary et al., 2018). Understanding Society's main sexuality question centres on sexual identity, and although the survey collects data on partnership, it does not ask further questions about attraction and sexual behaviour (Institute for Social and Economic Research, 2024). Additionally, while public health researchers often focus on sexual behaviour to define sexual minority populations, social scientists have critiqued this approach for overlooking cultural and social dimensions of sexual identity and undermining sexual minority people's self-determination (Young and Meyer, 2005). For these reasons, this research focuses on changes in self-reported sexual identity, rather than other dimensions of sexual orientation.

1.3. Changes in sexual identity and sexual fluidity

Evidence about sexual orientation changes across the lifetime is growing, increasing the relevance of accounting for these changes in public health research (MacCarthy et al., 2020; Ott et al., 2011;

Savin-Williams et al., 2012; Srivastava et al., 2022). While studies differ in operationalization of sexual orientation change, with some using discrete categories of lesbian/gay, bisexual, and straight and others using Likert scales for attraction, Srivastava et al. (2022)'s systematic review of changes in sexual orientation among young people identified clear evidence of change, with change more likely among women and those who identified as non-heterosexual at baseline.

Much of the research on sexual identity changes focuses on young adults, but there are some studies that have looked at other parts of the lifespan (Hu and Denier, 2023; Kinnish et al., 2005; Mock and Eibach, 2012; Urwin et al., 2021). Hu and Denier (2023)'s study that utilized Understanding Society data found that 6.6 % of adult participants reported different sexual identities in Wave 3 (2011–2013) and Wave 9 (2017–2019) with change more likely among people ages 16–24 and 65+, women, and ethnic minorities. These studies indicate the importance of including individuals across the life course in research on sexual identity changes.

Given the harmful history of homophobic attempts to coerce orientation changes in sexual minority individuals (Fish and Russell, 2020; Higbee et al., 2022), we intentionally ground this study in the theory of sexual fluidity to prevent interpretation of these findings as indicating sexuality is a "choice." Diamond, a leading researcher on sexual fluidity, defines the term as "a capacity for situation-dependent flexibility in sexual responsiveness" which allows for changes in desire over both long- and short-term time periods (Diamond, 2016, p. 249). According to Diamond (2016), sexual fluidity varies from person-to-person, with some people showing more stable patterns of attraction. Diamond argues that fluidity is another component of sexuality that works alongside sexual orientation to shape desire, behaviour, and identity across the lifespan (Diamond, 2008). Within this framework, sexual orientation is still outside an individual's control, but with some experiencing changes in desire and sexual behaviour over their lifetime that may or may not manifest in changes in sexual identity (Diamond, 2008). Importantly, fluidity in sexual desire does not map directly onto sexual identity change (Diamond, 2016), meaning that Understanding Society's data on categorical sexual identity cannot fully encompass sexual fluidity. However, these data can still shed light on how moves in and out of sexual identities, shaped partly by sexual fluidity but also by changes in self-understanding and experiences of minority stress, associate with mental health outcomes.

By focusing on structural factors that shape LGB mental health, we oppose interpretation of these findings as indicating that some sexual identities are better or worse for individuals. Rather, this research provides insight into structural limitations that harm the mental health of LGB individuals and those who experience sexual fluidity.

1.4. Associations between sexual identity change and mental health outcomes

Few studies have reported on the impact of sexual identity changes on mental health outcomes, either cross-sectionally or longitudinally, a noted direction for future research (Srivastava et al., 2022). The evidence that does exist suggests non-heterosexual orientation and shifts towards non-heterosexuality are associated with higher likelihoods of depression symptoms, suicidality, and substance use (Srivastava et al., 2022).

A 2021 study by Urwin et al. using Understanding Society data provided insights into this question, which we build on here. The authors found that individuals who changed sexual identity had worse mental health, physical health, and life satisfaction scores across the study period from 2011 to 2019 than heterosexual individuals with no change (Urwin et al., 2021). When the authors looked at directionality of change, heterosexual to LGB, vice versa, and LGB to prefer not to say individuals had lower life satisfaction, heterosexual to LGB, vice versa, and between LGB individuals had worse mental health outcomes, and heterosexual to prefer not to say, vice versa, and LGB to heterosexual

individuals had worse physical health (Urwin et al., 2021). This research builds on these findings by incorporating additional data on sexual identity collected more frequently for young adults, ages 16–21, and expands the analysis to include new data on specific mental health diagnoses from Wave 13.

With insights presented here, we begin to unpick how minority stress impacts the mental health of individuals whose reporting of sexual identity changes across their lifetime.

2. Methodology

2.1. Study sample

This study focused on participants in Wave 13 (2021–2023) of Understanding Society, a nationally-representative survey that collects yearly data on topics such as health, family, education, and social life from the same individuals (University Of Essex, Institute for Social and Economic Research, 2023). Sampling methodologies of Understanding Society have been described extensively elsewhere ("Study design," n. d.).

All participants in this study were aged 16 and older in Wave 13 and had answered the sexual identity question at least once in a current or previous wave. Participants reported complete information on the socio-demographic characteristics listed below, in the current wave or carried forward from previous waves, and the outcome of interest for each analysis in Wave 13. This led to sample sizes of 24,769 for the psychological distress model and 25,141 for the mental health diagnoses analyses, out of 27,998 total participants in Wave 13.

2.2. Data availability and ethics statement

This study is a secondary analysis of data collected by the Institute for Social and Economic Research (ISER) at the University of Essex. The University of Essex Ethics Committee has approved all of Understanding Society's data collection and informed consent procedures ("Ethics," n. d.).

Data were accessed on 12 December 2023 through the UK Data Service under a Special License. Given the sensitive nature of sexuality data, the UK Data Service approved the data security plan for the secondary analysis before granting access. All research was conducted on institutional laptops in private (non-overlooked), pre-specified locations. Raw data files were stored on the researchers' university's One-Drive Cloud in line with institutional policies and only accessed via R-scripts. Outputs were carefully checked for the possibility of statistical disclosure by both researchers, who had completed the Office of National Statistics' (ONS) Research Accreditation training course ("Become an accredited researcher - Office for National Statistics," n.d.).

2.3. Sexual identity change

In Waves 3 and 9, all participants aged 16 and older were asked "Which of the following options best describes how you think of yourself?" with the possible response options of "Heterosexual or Straight", "Gay or Lesbian", "Bisexual", "Other" and "Prefer not to say" ("Main survey variable: sexuor," n.d.). Young adult participants (aged 16–21 at the time of interview) were also asked this question in Waves 5, 7, 11, and 13.

We analysed all sexual identity observations from each participant present in Wave 13 and recorded whether they consistently reported the same response in all waves of available data or changed their reporting at some point within the study period. The sexual identity change measure used is outlined in Table 1. This measure is mostly based on the categories utilized by Urwin et al. (2021), but with the addition of a multiple changes category to account for young adults who reported, and changed, sexual identity at more than two time points.

While Lesbian/Gay, Bisexual, and Other participants who did not change their sexual identity reporting are in distinct categories, the numbers of changes in and out of these categories was too small to analyse separately, hence the categories in Table 1. Given the role of concealment in minority stress theory and to align with existing literature, we coded "Prefer not to say" as a separate group from LGB/other and heterosexual participants in both no change and change categories (Meyer, 2003; Urwin et al., 2021).

Participants who only answered the sexual identity question once were coded as "No change." Excluding them entirely would have systematically excluded participants from an immigrant and ethnic minority boost sample added in Wave 6 and participants who turned 16 between Waves 11 and 13. This approach assumes that participants would not have changed their sexual identity had they been asked again, which could be incorrect. However, this assumption also applies to participants who were only asked this question twice, as there was no opportunity for these individuals to report multiple changes. To support the validity of this approach, we completed a sensitivity analysis where participants who had only one sexual identity observation were excluded. We also conducted a sensitivity analysis using a measure that grouped all participants who experienced any change, without accounting for directionality.

2.4. Psychological wellbeing

GHQ-12 score, a short-form version of the General Health Questionnaire which has been validated as a measure of overall mental health and psychiatric morbidity, was used to measure psychological wellbeing (Goldberg et al., 1997; Hardy et al., 1999; Lundin et al., 2016). Each of the 12 questions score on a Likert scale from 0 to 3 to create an overall score ranging from 0 to 36, with higher scores indicating more distress (Goldberg et al., 1997).

Table 1
Categories of sexual identity change variable.

Sexual Identity Change Measure
No change: Heterosexual or Straight
No change: Lesbian or Gay
No change: Bisexual
No change: Other
No change: Prefer not to say
Straight to LGB/other
Straight to Prefer not to say
Between LGB/other
LGB/other to Straight
LGB/other to Prefer not to say
Prefer not to say to LGB/other
Prefer not to say to Straight
Multiple Changes

2.5. Mental health conditions

In Wave 13, Understanding Society introduced a question on self-reported diagnosis of mental health conditions, listed in Table 2 ("Main survey - Mental Health Conditions module," n.d.). All questions included in Understanding Society undergo a rigorous testing procedure, described in the survey documentation, before they are added to the questionnaire ("Questionnaire development and fieldwork," n.d.).

2.5.1. Preliminary analysis

The number of participants who reported each condition, along with weighted national prevalence were assessed. To ensure adequate sample sizes, we focused on conditions that more than 500 participants had reported and had a weighted prevalence of >2 %, which were depression, panic attacks, post-traumatic stress disorder (PTSD), and any other anxiety disorder. These were coded as binary variables. We also created a binary variable for whether an individual had reported any mental health condition, excluding ADHD/ADD, post-natal depression, and dementia due to strong age, genetic, or sex-based determination of these conditions (Faraone and Larsson, 2019; Paulson and Igo, 2011).

2.6. Other covariates

Age (5-year age bands, from 16 to 19 to 85+), gender (male/female), race/ethnicity (White, Asian, Black African/Caribbean, Other, and Mixed), education (no higher education degree, higher education degree, and not asked at baseline), and partnership status (no cohabiting/married partner, same-sex cohabiting/married partner, and different-sex cohabiting/married partner) were included as controls in all models since they have been shown to affect mental health and likelihood of changing sexual identity (Eylem et al., 2020; Halpern-Manners et al., 2016; Hu and Denier, 2023; Kessler et al., 2010; Kiekens et al., 2021; Rosenfield and Mouzon, 2013; Wilson et al., 2022). We also included measures of urbanity (urban/rural), immigration status (born in the UK/not born in the UK), and government office region, given their theoretical impact on sexual identity disclosure and LGB wellbeing (Lee and Quam, 2013; Silva and Evans, 2020; Stanton et al., 2019).

2.6.1. Notes on education

For issues related to data collection, some participants were never asked about their education status when they joined the study ("Main survey variable: hiqual_dv," n.d.). Instead of coding these individuals' education status as missing, and therefore systematically excluding

them, we utilized information about a participant's eligibility for the initial question to create another level called "Not asked at baseline" ("Main survey variable: qfhighfl_dv," n.d.). This includes all participants with no new qualifications reported in the study period and flagged as non-eligible for the baseline question. We conducted an extreme-case sensitivity analysis where these participants were coded as "No higher education degree" to explore potential impact.

2.6.2. Notes on gender

A very small number of participants change their gender reporting across waves (<10 in sample, suppressed for statistical disclosure control) and are recorded as "inconsistent" for gender. We excluded these participants from the main analysis but conducted a sensitivity analysis where we re-ran the analysis without gender and partnership status (partially determined by gender) both on the main sample and a sample with "inconsistent" gender participants to ensure that trans respondents are included as fully as possible.

2.6.3. Notes on other confounders

We did not include employment status or income in the models, despite their inclusion in similar studies (Booker et al., 2017; Perales, 2016; Urwin et al., 2021). Bartram (2023) argues that certain variables, like income and employment, that are often included as confounders in LGB mental health research should be considered mediators, since they do not affect sexual identity but instead lie on the casual pathway to lower life satisfaction for LGB populations. Meyer (2003)'s theory of minority stress also provides support for not including these variables, as a key minority stressor is societal discrimination which can affect employment. To test this assumption, we conducted a sensitivity analysis where the log of equivalized household income is included.

2.6.4. Notes on partnership

Since discrimination in relationships can act as a minority stressor for bisexual individuals and partnership status could be collinear with sexual identity, we ran a sensitivity analysis where this control was excluded.

2.7. Statistical analysis

All analysis was performed using R Statistical Software, version 4.3.3 (R Core Team, 2021). Code from the "Introduction to Understanding Society" course was used to assist with data cleaning and analysis (Institute for Social and Economic Research (ISER), n.d.).

Table 2

Question about self-reported mental health conditions included in Wave 13 of Understanding Society.

Question: Has a doctor or other health professional ever told you that you have any of these conditions?
Conditions:
A phobia
Panic attacks
Post-traumatic stress disorder
Generalised anxiety disorder
Attention deficit hyperactivity disorder (ADHD) or Attention deficit disorder (ADD)
Bipolar disorder (or 'manic depression')
Depression
Post-natal depression
Dementia (including Alzheimer's)
An eating disorder
Nervous breakdown
A personality disorder
Psychosis or schizophrenia
Obsessive compulsive disorder (OCD)
Seasonal affective disorder
Alcohol or drug dependence
Any other anxiety disorder
Any other emotional, nervous or psychiatric problem or condition
None of these

Note. Outcomes analysed separately are bolded. Outcomes excluded from analysis of "any mental health condition" are italicized.

Using the *survey* package in R, we calculated descriptive statistics for the GHQ-12 analysis sample and conducted survey-weighted linear regressions for GHQ-12 score and survey-weighted logistic regressions for self-reported mental health conditions (Lumley, 2004). Coefficient estimates for change in GHQ-12 score and adjusted odds ratios (AORs) for self-reporting mental health conditions were thus generated for models adjusted for the covariates described above. Use of weighted analysis accounted for the complex survey design of Understanding Society and non-response rates of participants ("Why use weights?", n.d.). Cross-sectional analysis weights for Wave 13 adult self-completion interviews for all participants present from Wave 6 onwards, including the immigrant and ethnic minority boost sample, (weight name: m_indscui_xw) were applied according to the approach recommended by the Understanding Society survey team ("Selecting the correct weight for your analysis," n.d.).

Further supplemental longitudinal analyses of GHQ-12 using linear mixed models were carried out. Full methods for these analyses are detailed in supplementary materials.

2.7.1. Overall P-value and multiple testing correction

To obtain an overall p-value for the sexual identity change measure, we utilized a Rao-Scott working likelihood ratio test (LRT), a method for hypothesis testing within regression models that utilize complex survey data (Lumley and Scott, 2014; Rao and Scott, 1984). To account for multiple testing, a Benjamini-Hochberg correction with a False Discovery Rate controlled to 5 % was applied to both Rao-Scott LRT p-values and p-values for each level of the sexual identity change variable (Benjamini and Hochberg, 1995; Chen et al., 2017).

2.7.2. Effect modification

While we considered exploring effect modification by both race/ethnicity and gender, there were only adequate sample sizes to look at the latter. Analyses stratified by gender for GHQ-12 score were conducted but had mostly overlapping 95 % confidence intervals for male and female models. Therefore, we proceeded with a non-stratified, adjusted analysis for all models.

3. Results

3.1. Sample size and characteristics

Table 3 shows sample sizes of the analyses. The smallest group (LGB to Prefer not to say) had at least 37 participants for every analysis.

Table 3 also summarizes characteristics of the full GHQ-12-analysis sample, as well as by sexual identity change group. Around 10 % of the population reported an identity other than heterosexual at some point in the study period.

Mean age of the "Multiple changes" groups is much lower than in other groups, which is expected given that only young adult participants had more than two sexual identity observations; this is accounted for with model adjustments in multivariable analyses. Considering gender, No change (Bisexual), No change (Other), Straight to LGB, Between LGB, LGB to straight, and Multiple changes groups all have under 40 % men, while No change (Lesbian or gay) and LGB to Prefer not to say have around 60 % men. With the exception of No change (Lesbian or gay), a smaller percentage of the non-reference groups report white ethnicity than the No Change (Straight) reference (see Supplementary Table 3 for further breakdown of race/ethnicity).

About a fifth to quarter of the No Change (Other), No Change (Prefer not to say), and LGB to Prefer not to say groups are foreign-born, compared with 9 % of the population overall. No change (Lesbian or gay), Prefer not to say to LGB, and Straight to LGB had the highest proportion of participants with a higher education degree.

All groups had lower cohabitation/marriage rates than the ~60 % in the No change (Straight) group. No change (Lesbian or gay) participants had the highest percentage of same sex partnerships at about 40 %, with

the next highest, Between LGB and LGB to Prefer not to say, at ~10 %.

3.2. Main results

Table 4 shows results from the weighted linear regression of GHQ-12 and weighted logistic regressions for selected mental health condition, with p-values after performing the Benjamini-Hochberg correction reported. Adjusted p-values for the Rao-Scott working likelihood ratio tests show that for every outcome, except odds of PTSD diagnosis, outcomes in the LGB/sexual identity change groups significantly differ from the "No change: Straight" reference group (adj. p < .05). Three groups, No change (Bisexual), Straight to LGB, and Prefer not to say to LGB, had consistently higher scores or odds across all models where sexual identity change was significant.

After adjusting for relevant covariates, those who consistently report their identity as bisexual, changed from straight to LGB or vice versa, or changed from Prefer not to say to LGB had significantly higher GHQ-12 scores than those who consistently reported their identity as straight (see Table 4). The increase in distress ranged from 1.61 to 2.58 across these groups, which represents a large change when contextualized against the full sample's inter-quartile GHQ-12 range of 8–14. Even the lower bound of this range (1.61) constitutes ~27 % of the sample's IQR, a notable shift in psychological distress relative to the distribution of scores in the population. These same groups had significantly higher odds of reporting any mental health condition.

More groups also showed elevated risk of self-reporting any mental health condition, including those who consistently reported a lesbian/gay identity or responded Prefer not to say, those who changed between LGB, and those who had multiple changes (see Table 4). The same groups with elevated odds of any mental health condition also had elevated odds of depression, specifically.

Most groups who had significantly elevated odds for any condition also had higher odds of panic attacks, but those who changed between LGB identities, from LGB to Straight, or had multiple changes did not (see Table 4). In addition to the three groups with consistently higher odds across the models, No change (Other) participants had significantly elevated odds of an unlisted anxiety condition.

3.3. Gender effect modification

We explored effect modification by gender through weighted linear regressions of GHQ-12 score stratified into male and female groups. The confidence intervals for the sexual identity change coefficients in these models, however, mostly overlapped or were very wide (see Supplementary Fig. 3). Therefore, we did not proceed with stratified analyses.

3.4. Sensitivity analyses

To assess coding assumptions, several sensitivity analyses using the GHQ-12 model were conducted.

With a broad measure of sexual identity change, coefficients for this variable still significantly differed from 0 (p-value <0.001). GHQ-12 score for those with any change and those who consistently reported their identity as bisexual were significantly higher than those who consistently reported their identity as straight (see Fig. 1), in line with the main results. However, the estimate for the "Any change" group underestimates some groups and overestimates others, as seen in the comparison with the main analysis, indicating the importance of accounting for directionality.

The other sensitivity analyses of excluding gender "inconsistent" participants, including those with only one observation of sexual identity, addressing data collection issues around education, including partnership status in models, and excluding income as a control were mostly consistent with the main analysis (see Supplementary Table 4 and Fig. 4).

The supplementary longitudinal analyses of GHQ-12 are presented in

Table 3

Summary of samples utilized in analyses of selected mental health outcomes in Wave 13 (2021–2023) of Understanding Society.

Sexual Identity Change Group	Sample Sizes		Population Prevalence	Age	Male	White	Urban	Foreign-born	Has higher degree	Different-sex partnership	Same-sex partnership	Equivalized household income*
	Mental Health Conditions	GHQ-12	Weighted %	Mean (SD)	Weighted %	Weighted %	Weighted %	Weighted %	Weighted %	Weighted %	Weighted %	Mean (SD)
Full Sample	**25,141**	**24,769**		**52.3 (18.7)**	**47.0**	**89.2**	**75.0**	**9.0**	**42.5**	**57.7**	**0.8**	**£2143.4 (£2327.8)**
No change (Straight)	22,864	22,550	90.66	53.1 (18.4)	47.3	89.8	74.6	8.5	43.1	60.5	0.0	£2163.7 (£2392.4)
No change (Lesbian or gay)	340	341	1.52	44.4 (16.6)	61.2	93.8	76.5	10.0	48.8	1.5	40.9	£2322.8 (£1347.4)
No change (Bisexual)	283	281	1.08	31.3 (15.9)	30.4	83.4	76.7	11.6	32.7	24.2	5.9	£2010.6 (£1050.8)
No change (Other)	81	78	0.28	38.8 (19.4)	36.0	75.6	79.2	20.5	32.1	47.0	1.2	£1498.0 (£940.7)
No change (Prefer not to say)	370	344	1.17	47.0 (21.0)	47.4	75.6	78.0	23.1	29.2	38.7	0.4	£1651.1 (£999.7)
Straight to LGB	229	224	1.18	36.9 (17.2)	38.3	88.6	73.0	6.5	46.5	30.2	2.8	£2044.1 (£1531.4)
Straight to Prefer not to say	280	268	1.13	53.1 (19.7)	44.1	78.2	84.6	17.1	34.7	45.5	0.2	£1793.1 (£1216.8)
Between LGB	54	53	0.25	33.1 (15.9)	38.2	86.8	80.8	7.7	42.4	8.1	10.0	£2150.0 (£1091.9)
LGB to Straight	176	176	0.69	50.8 (19.6)	36.6	83.3	79.9	16.1	25.6	52.2	0.2	£2222.0 (£3763.3)
LGB to Prefer not to say	39	37	0.21	45.9 (18.2)	53.5	78.4	85.5	19.4	38.6	30.7	11.7	£2188.5 (£1694.1)
Prefer not to say to LGB	66	63	0.31	41.7 (23.4)	57.5	89.5	76.5	9.4	50.2	14.4	1.1	£1876.4 (£854.7)
Prefer not to say to Straight	283	282	1.22	57.2 (20.4)	48.9	80.0	80.0	17.8	25.9	48.5	0.0	£1655.0 (£767.3)
Multiple changes	76	72	0.30	24.1 (2.6)	29.0	83.2	88.4	7.4	32.7	12.5	0.0	£1825.1 (£780.0)

Note. Total sample sizes for each analysis, along with the number in each sexual identity group, are shown. For the GHQ-12 analysis sample, weighted mean and standard deviation of age and equivalized household income, along with the weighted proportion of other characteristics, were calculated for each sexual identity change group using the svymean, svyvar, and svyby functions in R.

Table 4
Results from the weighted linear regression of GHQ-12 score and weighted logistic regressions of diagnosis of selected mental health conditions in Wave 13 (2021–2023) of Understanding Society.

	GHQ-12		Any Mental Health Condition		Depression		PTSD		Panic Attacks		Other Anxiety	
	Estimate	Adjusted P-value	AOR	Adjusted P-value	AOR	Adjusted P-value	AOR	Adjusted P-value	AOR	Adjusted P-value	AOR	Adjusted P-value
Rao-Scott P-Value		**0.004****		**<0.001*****		**<0.001*****		0.222		**<0.001*****		**<0.001*****
Sexual Identity Change Group												
No change (Straight)	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
No change (Lesbian or gay)	0.83 (−0.41 - 2.06)	0.278	**1.90 (1.26–2.88)**	**0.008****	**2.48 (1.60–3.84)**	**<0.001*****	1.64 (0.49–5.53)	0.516	**2.07 (1.11–3.87)**	**0.050***	1.69 (0.96–2.99)	0.126
No change (Bisexual)	**1.82 (0.81–2.83)**	**0.002****	**2.91 (2.07–4.09)**	**<0.001*****	**2.95 (2.06–4.22)**	**<0.001*****	**2.93 (1.50–5.70)**	**0.006****	**3.30 (2.23–4.89)**	**<0.001*****	**3.08 (2.06–4.60)**	**<0.001*****
No change (Other)	1.82 (−0.32 - 3.96)	0.169	1.64 (0.83–3.23)	0.243	1.88 (0.89–3.97)	0.169	1.08 (0.22–5.22)	0.935	2.78 (1.12–6.89)	0.057	**4.97 (2.43–10.16)**	**<0.001*****
No change (Prefer not to say)	0.65 (−0.30 - 1.59)	0.270	**1.64 (1.16–2.31)**	**0.015***	**1.73 (1.18–2.52)**	**0.015***	1.60 (0.70–3.67)	0.352	**1.89 (1.13–3.14)**	**0.037***	1.54 (0.85–2.80)	0.243
Straight to LGB	**1.61 (0.48–2.74)**	**0.016***	**2.04 (1.46–2.85)**	**<0.001*****	**2.15 (1.50–3.08)**	**<0.001*****	**2.21 (1.16–4.22)**	**0.038***	**2.25 (1.38–3.64)**	**0.004****	**1.91 (1.20–3.02)**	**0.017***
Straight to Prefer not to say	−0.21 (−1.18 - 0.75)	0.700	1.20 (0.80–1.82)	0.478	1.21 (0.75–1.93)	0.520	2.12 (0.82–5.49)	0.204	0.68 (0.35–1.31)	0.336	1.50 (0.80–2.83)	0.295
Between LGB	2.66 (0.07–5.25)	0.089	**3.71 (1.99–6.93)**	**<0.001*****	**3.76 (1.98–7.15)**	**<0.001*****	3.14 (0.96–10.22)	0.108	1.32 (0.39–4.44)	0.700	2.90 (1.15–7.30)	0.051
LGB to Straight	**1.65 (0.40–2.91)**	**0.026***	**1.99 (1.34–2.96)**	**0.003****	**2.25 (1.48–3.42)**	**0.001*****	2.28 (0.65–7.93)	0.283	1.59 (0.72–3.52)	0.336	0.63 (0.22–1.77)	0.480
LGB to Prefer not to say	4.70 (−0.01 - 9.42)	0.097	1.43 (0.62–3.28)	0.494	1.09 (0.41–2.91)	0.880	2.61 (0.34–20.08)	0.466	0.97 (0.19–4.87)	0.972	1.42 (0.30–6.79)	0.700
Prefer not to say to LGB	**2.58 (0.43–4.73)**	**0.043***	**2.64 (1.30–5.35)**	**0.020***	**2.58 (1.16–5.71)**	**0.044***	1.80 (0.36–9.03)	0.563	**4.27 (1.79–10.20)**	**0.004****	**3.65 (1.36–9.80)**	**0.026***
Prefer not to say to Straight	0.21 (−0.61 - 1.03)	0.691	0.72 (0.46–1.13)	0.243	0.70 (0.42–1.16)	0.258	0.64 (0.10–4.11)	0.698	1.19 (0.61–2.30)	0.691	0.87 (0.41–1.81)	0.729
Multiple changes	1.19 (−0.77 - 3.14)	0.326	**2.50 (1.34–4.66)**	**0.013***	**2.45 (1.27–4.72)**	**0.020***	0.61 (0.12–3.02)	0.632	0.80 (0.33–1.93)	0.691	2.20 (1.00–4.84)	0.097

Note. Coefficients and adjusted odd ratios for the sexual identity change variable after controlling for relevant covariates are shown, along with a 95 % confidence interval and p-values after adjusting for multiple testing. Bolded p-values indicate significant results.
*p < .05. **p < .01. ***p < .001.

Coefficient Comparison for Broad Sexual Identity Change Measure and
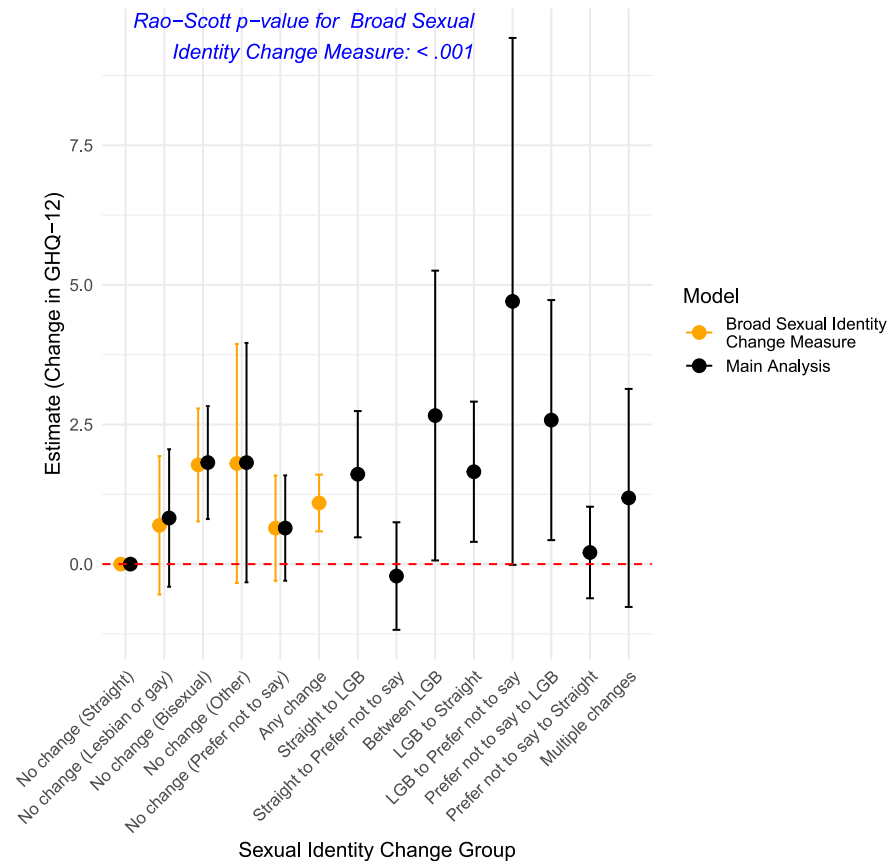Main Analysis of Cross−sectional GHQ−12 (with 95% Confidence Interval)

Fig. 1. Results of sensitivity analysis comparing a broad sexual identity change measure with the main analysis measure that incorporates direction of change. Coefficient estimates and their 95 % confidence intervals are shown for the weighted linear regression of GHQ-12 score using each measure.

a Supplementary Results section and are consistent with the results presented here.

4. Discussion

These findings contribute to the literature on LGB mental health disparities with additional evidence to expand Meyer's minority stress theory. Sexual identity change had significant associations with psychological distress and all mental health conditions, except PTSD. All groups currently identifying as LGB, except those with a stable "Other" identity, had higher odds of reporting any mental health condition and depression than those consistently identifying as straight, in line with existing evidence (Mongelli et al., 2019; Plöderl and Tremblay, 2015; Semlyen et al., 2016). Those who consistently reported their identity as bisexual or changed to an LGB identity after previously responding straight or "Prefer not to say", though, were the only groups with consistent disparities across all models where sexual identity change was significant. Additionally, those who previously reported their identity as LGB but now identify as straight had higher levels of distress and higher odds of reporting any mental health condition and depression than those who consistently reported their identity as straight, a new insight not captured in previous research.

The finding that only certain LGB subpopulations had consistent disparities across models indicates how trajectories of mental health might differ across the LGB community. Our findings align with existing literature showing worse mental health outcomes for bisexual individuals (Mongelli et al., 2019; Pompili et al., 2014; Ross et al., 2018) and highlight the role unique minority stressors, like negative stereotypes from both heterosexual and lesbian/gay people and higher

concealment rates, might play in shaping disparities for those with attraction to multiple genders (Feinstein and Dyar, 2017; Persson and Pfaus, 2015).

Worse mental health outcomes for groups who experience change points to the possible role of community support disruption as a stressor (Srivastava et al., 2022). This hypothesis is also supported by the fact that groups that shifted from minority to dominant groups (i.e. LGB to Straight) still had higher GHQ-12 scores and odds of self-reporting a mental health condition than those who consistently identified as straight. Concealment and other proximal stressors like expectations of rejection and internalized homophobia could also play a role in shaping disparities for this group (Meyer, 2003). These findings highlight subpopulations at risk of worse mental health that might have been missed in previous research.

Like Urwin et al. (2021), these results show worse GHQ-12 scores for those changing from straight to LGB and for bisexual participants with no change but, unlike Urwin et al. (2021), not for consistently lesbian/gay-identifying people. Additionally, we identified GHQ-12 disparities among those who changed from Prefer not to say to LGB and LGB to straight that were not found in Urwin et al. (2021)'s study. We did not find gender differences in the main analysis, while Urwin et al. (2021) found GHQ-12 disparities for women who shifted from straight to LGB or "Prefer not to say" to straight that did not exist for their male counterparts. The difference in methods, i.e. longitudinal vs cross-sectional outcomes, as well as the fewer controls included in this study's model help to explain these differences in findings. Both these results and Urwin et al. (2021)'s, though, confirm the importance of accounting for sexual fluidity in LGB mental health research. This research provides more detail about specific self-reported mental health

diagnoses, contributing additional nuance that builds on Urwin et al. (2021).

4.1. Policy and clinical implications

Researchers have called for LGB-centred mental health services and policies acknowledging nuances within LGB identities, including for people who are bisexual, women, and people of colour (Balsam et al., 2011; Feinstein and Dyar, 2017; Pachankis et al., 2020). The evidence presented here supports these calls, emphasizing the needs of those whose sexual identity shifts over time.

GHQ-12 has been validated in a range of clinical settings, with the Likert scoring approach used in this study providing useful insight into severity of distress (Goldberg et al., 1997). While clinical cut-points for potential mental health problems can differ between populations, when compared to the validated threshold of 11/12 from Goldberg et al. (1997) 's study, the 1.61–2.58 point increase seen across groups with significant results is concerning. Clinicians should heed the importance of not only responding to the mental health needs of LGB populations but understanding nuances like sexual identity shift when doing so. Therapy models that focus on minority-stress processes have been proven effective (Pachankis et al., 2015, 2020). Future research could expand these models for sexually fluid individuals and those who identified as LGB later in life, taking into account the results on condition disparities for these subpopulations.

These findings also point to the need to record sexual identity more often. A more frequent measure could better pinpoint when survey participants change their reporting and its impacts. Policymakers and public health professionals should push for more national data collection on sexuality, while researchers should consider sexual identity shifts when designing longitudinal surveys.

4.2. Strengths

This research advances understanding of sexual fluidity and LGB mental health disparities in the UK. Employing multiple waves of sexuality data allowed for acknowledgement of sexual identity changes. The use of a large dataset, with consideration for minimizing missing data, permitted a metric of change that incorporated directionality, providing new insights into minority stress theory for specific subpopulations. Utilizing Understanding Society's nationally-representative sample provided valuable information for policymakers working at a national level. Additionally, this study is among the first to incorporate the new mental health conditions module in Understanding Society, linking disparities in psychological wellbeing to specific mental health conditions.

4.3. Limitations and directions for further research

There are a few key limitations of this study that can inform directions for future research.

4.3.1. Prefer not to say/other participants
A large percentage of participants who reported "Prefer not to say" or "Other" at some point were born outside of the UK. Further research is needed to understand why participants might have chosen these options, with particular attention to experiences of stigma from multiple identities of immigrants who choose "Prefer not to say". The Office of National Statistics (ONS) has reported that when testing the sexual identity question, both queer participants and heterosexual individuals who did not understand the terminology chose the "Other" option (Haseldon and Joloza, 2009). Therefore, coding "Other" as LGB could conflate misunderstanding of the question and other sexual identities such as "pansexual", "asexual," and "demisexual." The importance of not excluding the latter groups led us to keep "Other" respondents in the sample, but future research might utilize paradata, such as time spent on

question and interviewer observations, to better understand why people respond as such. Similar research has proved useful for elucidating why people respond "Don't know" in other surveys (Purdam et al., 2020).

4.3.2. Transgender participants
This research cannot speak to the mental health of transgender participants who shift sexual identity over time. Understanding Society limits gender options to male or female and collects this information from one household member rather than individuals themselves, likely obscuring the presence of transgender individuals ("Main survey variable: sex_dv," n.d.). The sensitivity analysis of gender "inconsistent" participants did not show significant differences, but data collection issues likely prevent accurate identification of transgender participants.

Transgender people have some of the worst mental health outcomes in the LGBT community, so this is a crucial area for future research (Ellis et al., 2015; Smalley et al., 2016). Researchers should identify survey data that includes more nuanced metrics of gender, collected in self-completion settings directly from participants and more frequently than Understanding Society. With such data, researchers could identify individuals whose sexual identity changes due to shifts in gender identity and how their experiences differ from those of cis-gender people, though sample size limitations could hinder generalizability.

4.3.3. Self-report of mental health diagnoses
The mental health conditions module of Understanding Society relies on individuals self-reporting diagnoses, which could introduce biases in terms of self-diagnoses, misremembering, and underreporting of stigmatized conditions. Underreporting might be more prevalent in those who experience stigma from other identities, making it particularly relevant for this study. Even so, results obtained in this study with available data provide actionable insights for clinicians that future research can build on. Data linkages with medical records could improve accuracy of future data collection.

4.3.4. Limited recording of sexual identity
Utilizing young adult data with more frequent sexual identity information allowed for larger sample sizes for change groups and the addition of a multiple changes group. However, since there were only two waves with sexual identity data for older adults, changes in older populations between these waves were obscured. Adjusting for age mitigated the analytical impact of age differences in change frequency. In the future, more frequent data collection on sexuality could identify more participants with multiple changes later in life.

4.3.5. Differences by race/ethnicity
Small sample sizes prevented an exploration of effect modification by race/ethnicity. Given nuances for other LGB subpopulations already uncovered in this research and literature on unique stressors experienced by LGB people of colour (Balsam et al., 2011; Cyrus, 2017; Sarno et al., 2021), there is a pressing need for future research on people of colours' experiences with sexual identity changes. This research could involve smaller studies in communities with large ethnic minority populations or qualitative research on minority stressors for sexually fluid people of colour.

5. Conclusion

This research demonstrates the relevance of sexual identity change as another dimension of LGB mental health disparities. The findings of persistent disparities for those who consistently identify as bisexual and those who change reporting of sexual identity to LGB provides new insight into LGB subpopulations that might experience unique minority stressors. These results also reveal how sexually fluid populations might still experience minority stress even if they currently identify as straight. By acknowledging the possibility and relevance of shifts in sexual identity, this research provides insight for mental health providers and

policymakers looking to address ongoing disparities for sexual minority populations.

CRediT authorship contribution statement

Veena Muraleetharan: Writing – original draft, Visualization, Methodology, Investigation, Formal analysis, Data curation, Conceptualization, Writing – review & editing. **Catherine L. Saunders:** Writing – review & editing, Supervision, Methodology, Conceptualization.

Ethics approval statement

This study is a secondary data analysis of the Understanding Society dataset. The University of Essex Ethics Committee has approved all data collection on Understanding Society main study, COVID-19 surveys and innovation panel waves, including asking consent for all data linkages except to health records. All procedures were performed in compliance with relevant laws and institutional guidelines. Full details of the Understanding Society Ethics approvals are given online https://www.understandingsociety.ac.uk/documentation/mainstage/user-guides/main-survey-user-guide/ethics/

Declaration of generative AI and AI-assisted technologies in the writing process

During the preparation of this work the authors used ChatGPT in order to improve readability. After using this tool/service, the authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

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Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.socscimed.2025.118276.

Data availability

The data that has been used is confidential.

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