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Sexual orientation differences in psychological treatment outcomes for depression and anxiety: National cohort study

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Abstract

Objective: This study investigates whether sexual minority patients have poorer treatment outcomes than heterosexual patients in England's Improving Access to Psychological Therapies (IAPT) services. These services provide evidence-based psychological interventions for people with depression or anxiety. **Method:** National routinely collected data were analyzed for a cohort who had attended at least two treatment sessions and were discharged between April 2013-March 2015. Depression, anxiety and functional impairment were compared for 85,831 women (83,482 (97.2%) heterosexual; 1285 (1.5%) lesbian; 1064 (1.2%) bisexual) and 47,092 men (44,969 (95.5%) heterosexual; 1734 (3.7%) gay; 389 (0.8%) bisexual). Linear and logistic models were fitted adjusting for baseline scores, sociodemographic and treatment characteristics. **Results:** Compared to heterosexual women, lesbian and bisexual women had higher final-session severity for depression, anxiety and functional impairment and increased risk of not attaining reliable recovery in depression/anxiety or functioning (aORs 1.3-1.4) and reliable improvement in depression/anxiety or functioning (aORs 1.2-1.3). Compared to heterosexual and gay men, bisexual men had higher final-session severity for depression, anxiety and functioning and increased risk of not attaining reliable recovery for depression/anxiety or functioning (aORs 1.5-1.7) and reliable improvement in depression/anxiety or functioning (aORs 1.3-1.4). Gay and heterosexual men did not differ on treatment outcomes. Racial minority lesbian/gay or bisexual patients did not have significantly different outcomes to their white lesbian/gay or bisexual counterparts. **Conclusions**: The reasons for treatment outcome inequities for bisexual patients and lesbian women (e.g. 30-70% increased risk of not recovering) need investigation. Health services should address these inequalities.

Keywords

Sexual orientation; therapy; treatment; disparities; healthcare inequalities.

Public Health Significance

Lesbian, gay, bisexual, queer and other sexual minority (LGBQ+) individuals have greater mental health needs than heterosexual people. This study found that compared to heterosexual patients, bisexual men and women showed less benefit from psychological treatments such as cognitive behavior therapy (CBT). In addition, lesbian women benefitted less than heterosexual women. In line with public health priorities to reduce inequities of healthcare provision for all, health services need to provide different or additional psychological treatment for bisexual people and lesbian women.

People identifying as lesbian, gay or bisexual (LGB), sometimes referred to as sexual minority individuals, have elevated rates of depression and anxiety relative to heterosexual people (King et al., 2008; Plöderl & Tremblay, 2015). Sexual minority individuals are approximately 1.5 times as likely to report such problems as heterosexuals.

Minority stress theories (Meyer, 2003; Hatzenbuehler, 2009) propose that societal stigma causes the excess of mental health problems in these groups through chronic stress and minority-specific factors such as prejudice events, internalized stigma, expectations of rejection and sexual orientation concealment (Pachankis, Sullivan, Feinstein & Newcomb, 2018; Robinson et al., 2013; Woodhead et al., 2016). There is some evidence consistent with Hatzenbuehler's (2009) suggestion that minority stressors increase general psychological processes associated with increased risk of psychopathology, such as unhelpful coping behaviors (Feinstein, Davila & Dyar, 2017), emotion dysregulation (Hatzenbuehler, Dovidio, Nolen-Hoeksema & Philis, 2009), interpersonal difficulties (Feinstein, McConnell, Dyar, Mustanski, & Newcomb, 2018) and cognitive factors such as negative beliefs about the self, world or future (Feinstein, Davila & Yoneda, 2012). Furthermore, sexual minorities are more likely to experience childhood abuse and this is associated with higher rates of mental health problems (Boroughs et al., 2015). Risk of mental health problems is often reported to be higher in bisexual people than lesbian or gay individuals (Feinstein & Dyar, 2017; Ross et al., 2018). This may be a result of different experiences of minority stressors by this group including greater concealment, invisibility and victimization, as well as stigmatization from lesbian and gay individuals in addition to that from heterosexuals (Dodge et al., 2016; Feinstein & Dyar, 2017). However, most studies are cross-sectional and any causal role of stigma and victimization processes on sexual orientation mental health disparities requires further investigation.

Although sexual minorities have greater need for treatment for depression and anxiety (Bränström, Hatzenbuehler, Tinghog, & Pachankis, 2018; Cochran, Björkenstam & Mays, 2017), relatively little is known about whether they benefit from psychological interventions for these problems to the same extent as heterosexual patients. It is possible that the processes hypothesized to contribute to the elevated rates of mental illness in sexual minority individuals also negatively impact on their ability to benefit from psychological interventions for depression and anxiety, or may even have adverse effects. For example, sexual minority patients can anticipate or experience prejudice, discrimination or lack of understanding from healthcare providers which can add to distress and sexual orientation concealment (King, Semlyen, Killaspy, Nazareth & Osborn, 2007; Smith & Turell, 2017). Sexual minority

participants are more likely to report unfavorable healthcare experiences and lower satisfaction than heterosexual patients (Blosnich, 2017; Elliot et al, 2014). Sexual minority stressors outside of healthcare may also reduce the likelihood of symptomatic improvement after treatment due to the ongoing negative impact on mental health (Rimes et al., 2017).

A study of four psychological intervention services providing treatment for depression or anxiety in London, UK found poorer treatment outcomes for lesbian and bisexual women than heterosexual women, after adjusting for age, race, employment, baseline symptoms, number of sessions and type of intervention (Rimes et al., 2017). In contrast, bisexual and gay men exhibited similar outcomes to heterosexual men, although the bisexual comparison was underpowered. Evidence that some sexual minority subgroups may be particularly at risk for poorer treatment outcomes was reported by Beard et al. (2017). Overall they found comparable effectiveness for people attending a partial hospital program in New England involving cognitive behavior therapy and dialectical behavior therapy (DBT) for sexual minority participants experiencing a range of psychiatric disorders including mood, anxiety, personality and psychotic disorders. However, subgroup analysis indicated that bisexual individuals had higher levels of self-injurious and suicidal thoughts at discharge and higher rates of rehospitalization than other sexual orientation groups (although the latter was nonsignificant after adjustment for baseline characteristics). Plöderl et al. (2017) found comparable improvement in sexual minority and heterosexual individuals who attended a suicide prevention inpatient program in Salzburg, Austria, but they did not investigate bisexual individuals separately from lesbian, gay or other sexual minority subgroups. Neither of the hospital studies analyzed separately by gender.

None of the three previous treatment studies investigated possible interactions between sexual orientation and race or ethnicity on treatment outcomes. According to minority stress theory, one might expect the poorest treatment outcomes in people experiencing the most minority stress, i.e. both in relation to sexual orientation and race/ethnicity and their interaction. Previous analysis of national clinical data from psychological therapies services in the UK indicate that racial and ethnic minority patients have poorer treatment outcomes than white patients (NHS Digital, 2017). Research is needed investigating whether sexual minority patients who are also racial/ethnic minorities have poorer outcomes than white sexual minority patients.

The previous three studies were all limited by their focus on a single hospital program or a small number of mental health services. The current study expands on previous research by analyzing routinely collected national data from Improving Access to Psychological

Therapies (or IAPT) services in England. These are public mental health services present in every local health area in England. Individuals may self-refer to or be referred by their general practitioner or another healthcare professional. These services provide evidence-based psychological interventions for depression or anxiety consistent with stepped care clinical guidelines from the UK's National Institute for Health and Care Excellence (NICE). The predominant treatment approach is CBT, which is recommended for all anxiety disorders. For depression, other psychological interventions include interpersonal psychotherapy (IPT), behavioral activation (BA), couple therapy for depression, brief psychodynamic therapy and counselling. A stepped-care approach is generally applied in which the least resource intensive ('low intensity') treatments are delivered first, with patients then 'stepped up' to 'high intensity' interventions if clinically required. The IAPT training curricula addresses cultural competence including developing an ability to recognize one's reactions to people perceived to be different in relation to sexual orientation, age, ethnicity, disability or in other ways, to be able to work effectively with them. The UK's Equality Act 2010 requires public organizations to eliminate unlawful discrimination and foster equality of opportunity for people with protected characteristics (age; disability; gender reassignment; marriage or civil partnership; pregnancy and maternity; race; religion or belief; sex; sexual orientation). All major UK therapy bodies support a consensus document stating that attempts to change or alter sexual orientation through psychological therapies are unethical and potential harmful (Memorandum of Understanding of Conversion Therapy in the UK, 2015).

This study compares outcomes for sexual minority patients relative to heterosexual patients, investigating the effect of adjusting for key confounders such as age, employment status, whether the patient is living in a more or less socially deprived neighborhood (e.g. in relation to income and housing), number of therapy sessions and treatment intensity (high / low). Given the evidence of particularly elevated rates mental illness and stigma processes experienced by bisexual individuals, and previous preliminary evidence of poorer treatment outcomes for bisexual people, it was predicted that psychological treatment outcomes would be worse for bisexual patients than those for heterosexual patients. In line with evidence from the only previous study that separated by sex (Rimes et al., 2017), it was expected that lesbian women would show poorer outcomes than heterosexual women, whereas gay men would show similar outcomes to heterosexual men. The possibility that sexual minority patients who were from a racial minority group would have poorer treatment outcomes than white sexual minority patients due to higher levels of minority stress was also investigated.

Thus the objectives of the study were to investigate the effects of minority sexual orientation, the interaction between minority sexual orientation and sex, and interaction between minority sexual orientation and racial minority status, on treatment outcomes.

Method

Study design

This prospective clinical cohort study reports from the routinely collected National Health Service (NHS) data from first and last psychological treatment sessions for a consecutive cohort of patients attending all Improving Access to Psychological Therapies (IAPT) services in England, over a two-year period (April 2013 to March 2015).

Treatment provision

Evidence-based psychological interventions were provided by all national health service Improving Access to Psychological Therapies (IAPT) services in England (Clark, 2018). They provide evidence-based psychological treatments specified in clinical guidelines (NICE, 2018) produced by the UK's National Institute for Health and Care Excellence (NICE). For some disorders (e.g. post-traumatic stress disorder), NICE recommends that high intensity treatment is provided because there is not a strong evidence base for low intensity interventions. Low intensity treatments include workshops, groups, guided self-help using workbooks or online packages. High intensity interventions usually involve weekly one-to-one sessions. Sessions were recorded in relation to occasions of therapist contact, e.g. an individual session (either face-to-face or by telephone or online), a group session, a therapist review of progress with a self-help manual or a workshop were recorded as single sessions. The teams consist of low-intensity practitioners and high-intensity therapists who together provide a range of interventions within the stepped-care model. Therapists providing high intensity interventions have undertaken a postgraduate qualification in the interventions they offer. Low intensity interventions are typically provided by 'Psychological Wellbeing Practitioners' (PWPs) who complete a postgraduate qualification in delivering interventions such as guided self-help and psychoeducational workshops. There are national training curricula for low and high intensity therapists specified by the UK's Department of Health. Therapists are trained in evidence-based treatment protocols.

Data collection

This study used routinely collected, non-identifiable data, that is sent by all IAPT services to National Health Service (NHS) Digital, a national information and technology partner to the health system in England (https://digital.nhs.uk/). An application was made to

NHS Digital (then called the Health and Social Care Information Centre) for this specific dataset. Patients are informed that their data are collected and reported nationally and they are given the option of declining consent to their information being used in this way, without this decision affecting their treatment in any way. They are aware that it is not possible to identify them from national data analyses. Consultation with the local ethics committees (equivalent to Institutional Review Boards) indicated that under these conditions, ethical approval was not required.

Participants

Patients were included if they had attended at least two treatment sessions, with outcomes available for both, had been discharged from the service and if data were available for their gender, sexual orientation, race, age, employment status, deprivation indicator, number of treatment sessions and treatment intensity. Patients were not included in the main analyses if they indicated that they were unsure about their sexual orientation or had declined to report their sexual orientation.

Measures

Treatment outcomes

Patients completed three validated questionnaires at every clinical contact; depressive symptoms, anxiety and functional impairment. IAPT services have scores recorded on depression and anxiety at the beginning and end of treatment for 98% of patients, including those with unplanned endings, i.e. where the treatment was incomplete (Clark, 2017). Depressive symptoms over the past two weeks were assessed with the Patient Health Questionnaire Depression Scale (PHQ-9) which has established reliability and validity (Kroenke et al., 2001). This is a nine-item, four-point Likert (0 to 3) scale; higher scores indicate greater symptom severity. Scores over nine are likely to correspond to 'caseness' for depression (Lowe et al., 2004). The seven-item Generalized Anxiety Disorder Scale (GAD-7) was used to assess anxiety symptoms (Spitzer et al., 2006). This uses a four-point Likert scale from 0 to 3; higher scores indicate greater symptom severity. Scores greater than 7 are typically regarded as corresponding to 'caseness'. The GAD-7 was originally designed to measure generalized anxiety disorder but gives elevated scores in other anxiety disorders, has good internal consistency and is sensitive to change (Kroenke et al., 2007). The Work and Social Adjustment Scale (WSAS) measures functional impairment in work, home management, social and private activities and relationships (Mundt et al., 2002). It is a five-item scale with responses from 0 ("not at all impaired") to 8 ('very severely impaired") with

established reliability and validity. Scores of ten or above indicate significant functional impairment to a clinical degree (Mundt et al., 2002).

In addition to final session scores on the three measures being used as outcomes, *reliable improvement* for depression/anxiety was investigated, in line with standard reporting for these health services (Clark, 2018). This was indicated by scores on depression or anxiety, or both, having reduced by a reliable amount and with neither measure showing a reliable increase, using Jacobson & Truax's (1991) reliable change index. Reliable change means that the difference between pre-and post-outcome measures is larger than the measurement error of the questionnaire, to help ensure that any change reflects more than fluctuations in an imprecise measuring tool. Reliable improvement for impairment was indicated by improvement on the Work and Social Adjustment Scale exceeding the measurement error for this scale (Zahra et al., 2014). Reliable improvement (yes/no) for depression/anxiety and functional impairment were calculated per patient.

Reliable recovery was also investigated. This defined in IAPT services as having occurred if the patient met caseness criteria (10 or more on the PHQ-9; 8 or more on the GAD-7) at the beginning of treatment, showed reliable improvement and did not meet caseness criteria on either the PHQ-9 or GAD-7 at the last treatment session (Clark, 2018). For the present study, recovery in functioning was also investigated. A patient was considered to have met reliable recovery for functional impairment if they scored at least 10 on the WSAS in session 1, showed reliable improvement on this measure and were below cut-off at the last session. Failure to meet recovery criteria for depression/anxiety and functional impairment were used as two binary outcome variables.

Other measures

Sociodemographic information (age, sex, sexual orientation, ethnicity, employment status) was recorded according to national procedures for these IAPT services. Sexual orientation information had been coded in the dataset using the following categories: heterosexual; homosexual/gay/lesbian; bisexual; person asked and does not know or is not sure; person asked but declined to provide a response; and unknown. Patients were asked about their sexual orientation either in a registration form, in person or on the telephone. The different ethnic subgroups were combined into white versus black or other minority group, to indicate race. Deprivation according to the Index of Multiple Deprivation (Department of Communities and Local Government, 2015) was coded as top 50% and bottom 50%. This measure of relative social deprivation includes domains such as income, employment, education, skills and training, barriers to services and crime. Therapists documented

treatment sessions and whether treatment was "high" or "low" intensity; the latter information was taken from the last treatment session.

Data analysis

A complete-case analysis was carried out using IBM SPSS Statistics v24. Continuous outcomes (depression, anxiety and functional impairment) were summarized with a mean and SD, whereas dichotomous outcomes (failure of reliable improvement and recovery) were summarized with a proportion. Baseline continuous data were analyzed with a one-way analysis of variance (ANoVA) or Student *t*-test, then post-hoc comparisons were investigated using Bonferroni-adjustment. Student *t*-tests and chi-square analyses were used to compare the characteristics of people who indicated their sexual orientation with those who said they were unsure or declined to say. We analyzed the extent of missing data for the outcomes as well as all covariates and compared data from patients with and without missing data on these variables. All inferential analyses were carried out using a complete-case analysis due to the anticipated low proportion of missing data (Jakobsen, Gluud, Wetterslve, Wingkel, 2017).

For the continuous outcomes, general linear models were fitted, and firstly compared the outcomes with sexual orientation (with heterosexual as the reference category, compared separately to bisexual and to lesbian/gay), sex, sex by sexual orientation interaction, and baseline score (Model 1). Fully adjusted linear models (Model 2) additionally adjusted for: age; race; employment status; deprivation; number of therapy sessions; and treatment intensity (high/low). An *a priori* planned set of comparisons were conducted investigating outcomes for lesbian and bisexual women compared to heterosexual women and for gay men and bisexual men compared to heterosexual men. *Post hoc* comparisons were also conducted comparing lesbian women with bisexual women and comparing gay men with bisexual men. Adjusted mean differences (aMD), standard errors, confidence intervals and *p*-values are presented from the general linear models. Similar general linear models with *post hoc* comparisons were used to the investigate race by sexual orientation interactions, adjusting for baseline scores (Model 1) and additionally adjusting for age, sex, employment status, deprivation, number of therapy sessions and treatment intensity (Model 2).

Dichotomous outcomes (failure of improvement and recovery) were analyzed with logistic regression analyses with the same comparisons and adjusting for the same covariates described above in the models for the continuous outcomes. Adjusted odds ratios (aOR), with associated 95% confidence intervals and *p*-values are presented.

Results

Sample

There were 265,221 patients who had attended two or more treatment sessions, had first and last treatment data and had been discharged. Of these, 181,761 had sexual orientation information available, i.e. indicated that they were heterosexual, lesbian, gay or bisexual. 132,923 participants had data available for all the other study variables and were included in this study. Therefore the study sample consisted of 44,969 (33.8%) heterosexual men, 83,482 (62.8%) heterosexual women, 1734 (1.3%) gay men, 1285 (1.0%) lesbian women, 389 (0.3%) bisexual men and 1064 (0.8%) bisexual women. Within female participants, the proportions of lesbian and bisexual women were 1.5% and 1.2% respectively. Within male participants, the proportions of gay and bisexual men were 3.7% and 0.8% respectively. See Supplementary Table 1 for a) information about the proportions of missing data for the covariates and outcome variables; b) treatment outcome comparisons between those with and without missing data. All outcomes were complete due to the nature of the cohort data collection protocols; only employment status and deprivation covariates were found to have missing data greater than 5% (Supplementary Table 1). To check for the impact of missing employment and deprivation data, supplementary analyses were performed in which cases with missing values on these variables were included as a separate category within the modelling procedure (Burton & Altman, 2004). These analyses showed the same pattern of significant results to the original analyses with one exception (see Supplementary Table 1). Supplementary analyses were also conducted with patients who preferred not to disclose their sexual orientation (n=3,168) or were unsure (n=13,837) are described in the next section and in Supplementary Table 2. The remainder of the patients, not used for this study, had sexual orientation or other study data missing (e.g. they had not been asked, or if they had been asked, the information had not been recorded).

Association between patient characteristics and sexual orientation data

To investigate possible bias, the characteristics of people who indicated their sexual orientation were compared with those who declined to disclose their sexual orientation or who stated they were unsure (Supplementary Table 2). All overall group effects were significant (p<0.05) although the effect sizes were very small (<0.05). Those who were unsure of their sexual orientation were younger and were more likely to be male, unemployed, from a minority racial group, living in a higher deprivation area and had higher baseline symptomatology and fewer treatment sessions than those who stated their sexual orientation. People who declined to report their sexual orientation were not significantly

different from those who indicated their sexual orientation except that they were more likely to live in a higher deprivation area. For further information see Supplementary Table 2.

Sociodemographic, clinical and treatment characteristics of heterosexual, lesbian, gay and bisexual patients

Sociodemographic characteristics of sexual orientation by sex groups

There were baseline differences between groups divided by sexual orientation and sex for: age; race; employment; and deprivation (p values < 0.001; see Table 1). Lesbian, gay and bisexual patients were younger and more likely to live in a deprived area than those heterosexual, and bisexual patients were less likely to be in paid employment (p values < 0.003).

---Table 1---

Baseline clinical characteristics

Baseline depression, anxiety and functional impairment differed across the groups (p-values < 0.001; see Table 1). Bisexual patients and lesbian women had higher baseline depression, anxiety and functional impairment than heterosexual patients (p-values < 0.003). Gay men had higher baseline functional impairment than heterosexual patients and higher depression than heterosexual women but had lower depression than lesbian women (Table 1).

Treatment characteristics

The number of treatment sessions and the proportion who had a high intensity treatment differed across the groups (p-values < 0.001; see Table 1). Heterosexual patients were less likely to receive a high intensity intervention than lesbian or gay patients (p-values < 0.0003). For the number of treatment sessions there was no clear pattern of difference between heterosexual and sexual minority patients. For full details see Table 1.

Sociodemographic, clinical and treatment characteristics of white and racial minority groups by sexual orientation

For the groups divided by sexual orientation and race, there were significant differences on all baseline variables but with small effect sizes (see Supplementary Table 3 for further details). There were no clear patterns of differences between white and racial minority patients within each of the three sexual orientation groups.

Symptom severity and impairment at final session

The unadjusted means at first and last session for depression, anxiety and functional impairment are shown in Figure 1 for groups divided by sexual orientation and sex. Adjusted estimated marginal means are shown in Supplementary Table 4.

For final session scores for depression, there were consistently higher scores in bisexual relative to heterosexual patients adjusted for baseline scores (aMD 1.28 (95% CI .6, 1.86), p=0.009; Model 1, Table 2), and intensity of therapy, number of treatment sessions, age, race, employment status and deprivation (aMD 0.75 (95% CI .1, 1.30), p=0.009; Model 2, Table 2). Higher scores were also apparent for anxiety and functional impairment, with the largest effects of all three outcomes being those for functional impairment. Relative to lesbian/gay patients, bisexual patients also had higher final-session depression, anxiety and functional impairment scores, again with the largest effects for functional impairment; for anxiety, differences were only significant prior to adjustment for all confounders. Some of the main effects for bisexual patients found after adjustment for baseline scores only (Model 1, Table 2) were reduced after full adjustment in Model 2 (Table 2).

Sexual orientation group comparisons for male and female patients

As predicted, there was also a sex-by-lesbian/gay interaction in Models 1 and 2 for depression, anxiety and functional impairment (Table 2). Planned comparisons indicated that relative to heterosexual women, lesbian women had significantly higher final session scores for depression (Model 1 aMD .75 (95% CI .43, 1.07); Model 2 aMD .58 (95% CI .27,.89)); anxiety (Model 1 aMD .72 (95% CI .44, 1.01; Model 2 aMD .55 (95% CI .28, .83)) and functional impairment (Model 1 aMD 1.23 (95% CI .76, 1.69); Model 2 aMD 1.31 (95% CI .86, 1.76)) all p-values < 0.001. In contrast, gay men did not differ significantly from heterosexual men for depression, anxiety or functional impairment (p-values > 0.20).

Although the sex-by-bisexual interaction was not significant, planned comparisons were also conducted comparing bisexual women with land heterosexual women, and comparing bisexual men with gay men and heterosexual men.

Relative to heterosexual women, bisexual women had significantly higher final session scores for depression (Model 1 aMD 1.44 (95% CI 1.08, 1.79); Model 2aMD .83 (95% CI .49, 1.17)), anxiety (Model 1 aMD 1.24 (95% CI .92, 1.55); Model 2 .66 (95% CI .36, .97)) and functional impairment (Model 1 aMD 1.86 (95% CI 1.36, 2.37); Model 2 aMD 1.14 (95% CI .64, 1.63)).

Relative to lesbian women, bisexual women had significantly higher final session scores for Model 1 depression (aMD .69 (95% CI .22, 1.16)) and anxiety (aMD .51 (95% CI .09, .94)) but they were not significantly different in Model 1 functional impairment (aMD .34 (95% CI -.33,-1.03; p=0.32)). There were no significant differences between bisexual and lesbian women for any of the fully adjusted Model 2 analyses; depression (aMD .24 (95% CI

-.21, .70), *p*=0.28); anxiety (aMD .11 (95% CI -.30, .52), *p*=0.60) or functional impairment (aMD -.17 (95% CI -.84, .50), *p*=0.41).

Compared to heterosexual men, bisexual men had significantly higher final session scores for depression (Model 1 aMD 1.27 (95% CI .69, 1.86), *p*<0.001; Model 2 aMD .62 (95% CI .28, .96), *p*<0.001), anxiety (Model 1 aMD 1.02 (95% CI .50, 1.54), *p*<0.001; Model 2 aMD .51 (95% CI .01, 1.01), *p*=0.044) and functional impairment (Model 1 aMD 2.33 (95% CI 1.49, 3.16), *p*<0.01; Model 2 aMD 1.65 (95% CI .83, 2.47), *p*<0.001).

Compared to gay men, bisexual men had significantly higher final session scores for depression (Model 1 aMD 1.32 (95% CI .68, 1.96); Model 2 aMD .85 (95% CI .23, 1.46)) and for functional impairment (Model 1 aMD 2.06 (95% CI 1.14, 2.98); Model 2 aMD 1.49 (95% CI .59, 2.39)), all *p*-values < 0.005. For anxiety, bisexual men had higher scores than gay men in Model 1 (aMD .93 (95% CI .36, 1.51) but the differences were not significant in Model 2 (aMD .48 (95% CI -.06, 1.04); *p*=0.083).

---Figure 1---

---Table 2---

Interactions between race and sexual orientation

The unadjusted means at first and last session for depression, anxiety and functional impairment are shown in Supplementary Figure 1 for groups divided by sexual orientation and race. Adjusted estimated marginal means are shown in Supplementary Table 5.

For Model 1 (adjusting for baseline), there were significant interactions for race by lesbian/gay orientation for post-treatment anxiety and functional impairment; see Supplementary Table 6. Racial minority heterosexual patients had significantly higher post-treatment anxiety scores than white heterosexual patients (aMD .91 (95% CI .80, 1.02); *p*<0.01) and white lesbian or gay patients (aMD .50 (95% CI .26, .74); *p*<001); none of the other differences were significant. Racial minority heterosexual patients had significantly higher post-treatment functional impairment scores than white heterosexual patients (aMD 1.19 (95% CI 1.03, 1.35); *p*<0.01). White lesbian or gay patients had significantly higher post-treatment functional impairment than white heterosexual patients (aMD .98 (95% CI .67,1.30); *p*<0.001). None of the other comparisons were significant.

In the fully adjusted models (Model 2), none of the race by lesbian/gay or bisexual interactions were significant; see Supplementary Table 6.

Clinical measures at first and last session by sexual orientation, sex and race

Although this study was not designed to investigate three-way interactions between sexual orientation, sex and race, for information the unadjusted pre- and post-scores on measures of depression, anxiety and functional impairment are provided in Supplementary Table 7.

Reliable improvement and recovery

The proportions of patients who failed to attain reliable improvement for depression/anxiety ranged from 36.3% of heterosexual women to 44.2% of bisexual men. For the failure to reliably recover for depression/anxiety, the proportions range from 50.7% for heterosexual women to 64.5% for bisexual men. The proportions showing failure to reliably improve in functioning ranged from 57.3% of gay men to 64.3% of bisexual men. Failure to recover in functional impairment range from 66.7% of heterosexual women to 78.0% of bisexual men. See Table 3 for full results.

---Table 3---

The failure to improve (or recover) analyses had similar findings to the symptom severity above (Table 2 and Table 4). After adjustment for baseline score only, there were increased odds of 40% for failure to improve in depression/anxiety for bisexuals (aOR 1.40 (95% CI 1.14, 1.72), *p*<0.001; Model 1, Table 4), however after adjustment for all covariates the odds of failure to improve were reduced (aOR 1.23 (95% CI .99, 1.53), *p*=0.06; Model 2, Table 4). In the fully adjusted models the bisexual patients were more likely to show failure to recover from depression/anxiety (aOR 1.43 (95% CI 1.13, 1.80)), failure to improve in functional impairment (aOR 1.43 (95% CI 1.14, 1.80)) and failure to recover from functional impairment (aOR 1.49 (95% CI 1.15, 1.93); Model 2, Table 4).

For the comparisons between bisexual and lesbian/gay patients, the adjusted odds ratios were similar to those for the bisexual/heterosexual comparisons (Table 4). Again, the odds ratios were greater in the Model 1 analyses, adjusted for only baseline scores (aOR from 1.43 to 1.58) than in the fully adjusted models (Model 2; aOR from 1.25 to 1.44).

---Table 4---

Lesbian women and gay men compared to heterosexual men and women

As predicted, there was a sex-by-lesbian/gay interaction in Models 1 and 2 for the failure to improve and recover (Table 3). Planned comparisons indicated that relative to heterosexual women, lesbian women had increased risk of failure to reliably improve in depression/anxiety (Model 1 aOR 1.23 (95% CI 1.10-1.38), *p*<0.001; Model 2 aOR 1.18 (95% CI 1.05-1.33), *p*=0.008), to show reliable recovery for depression/anxiety (Model 1 aOR 1.33 (95% CI 1.27-1.61), *p*<0.001; Model 2 aOR 1.30 (95% CI 1.15-1.47), *p*<0.001), to reliably improve in functional impairment (Model 1 aOR 1.33 (95% CI 1.17-1.50), *p*<0.001;

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Model 2 aOR 1.31 (95% CI 1.16-1.48), *p*<0.001) and reliably recover for functional impairment (aOR 1.43 (95% CI 1.25-1.64), *p*<0.001; Model 2 aOR 1.38 (95% CI 1.21-1.59), *p*<0.001). For similar comparisons between gay men and heterosexual men, no group differences were significant (*p*-values > 0.41).

Bisexual men and women compared to other groups

Although the sex-by-bisexual interaction was not significant, planned comparisons were undertaken to compare bisexual patients with heterosexual and lesbian/gay patients for improvement and recovery rates.

Relative to heterosexual women, planned comparisons indicated that bisexual women had increased risk of failure to reliably improve in depression/anxiety (Model 1 aOR 1.52 (95% CI 1.34-1.72), *p*<0.001; Model 2 aOR 1.31 (95% CI 1.16-1.49), *p*<0.001), to show reliable recovery for depression/anxiety (Model 1 aOR 1.59 (95% CI 1.40-1.82), *p*<0.001; Model 2 aOR 1.32 (95% CI 1.15-1.52), *p*<0.001), to reliably improve in functional impairment (Model 1 aOR 1.40 (95% CI 1.23-1.60), *p*<0.001; Model 2 aOR 1.25 (95% CI 1.09-1.43), *p*=0.001) and reliably recover for functional impairment (aOR 1.42 (95% CI 1.22-1.65), *p*<0.001; Model 2 aOR 1.25 (95% CI 1.07-1.45), *p*=0.004).

Relative to lesbian women, planned comparisons indicated that bisexual women had increased risk of failure to reliably improve in depression/anxiety in Model 1 (aOR 1.22 (95% CI 1.03-1.44), *p*=0.021) but there was no significant difference in the fully adjusted model (Model 2 aOR 1.08 (95% CI .90-1.29), *p*=0.440). For reliable recovery for depression / anxiety and reliable improvement or recovery in functional impairment there were no significant differences between lesbian and bisexual women in Models 1 or 2 (*p*-values>0.05).

Relative to heterosexual men, planned comparisons indicated that bisexual men had increased risk of failure to reliably improve in depression/anxiety (Model 1 aOR 1.40 (95% CI 1.14-1.72), *p*=0.001; Model 2 aOR 1.31 (95% CI 1.03-1.68), *p*=0.027), to show reliable recovery for depression/anxiety (Model 1 aOR 1.63 (95% CI 1.31-2.03), p<0.001; Model 2 aOR 1.41 (95% CI 1.12-1.78), *p*=0.004), to reliably improve in functional impairment (Model 1 aOR 1.57 (95% CI 1.26-1.96), *p*<0.001; Model 2 aOR 1.39 (95% CI 1.11-1.75), *p*=0.004) and reliably recover for functional impairment (aOR 1.65 (95% CI 1.28-2.13), *p*<0.001; Model 2 aOR 1.47 (95% CI 1.14-1.91), *p*=0.004).

Relative to gay men, planned comparisons indicated that bisexual men had increased risk of failure to reliably improve in depression/anxiety (Model 1 aOR 1.52 (95% CI 1.20-1.93), *p*=0.001; Model 2 aOR 1.43 (95% CI 1.12-1.83), *p*=0.05), to show reliable recovery

for depression/anxiety (Model 1 aOR 1.64 (95% CI 1.28-2.08), p<0.001; Model 2 aOR 1.52 (95% CI 1.52-1.96), p=0.002), to reliably improve in functional impairment (Model 1 aOR 1.52 (95% CI 1.20-1.93), p=0.001; Model 2 aOR 1.43 (95% CI 1.11-1.83), p=0.005) and reliably recover for functional impairment (aOR 1.57 (95% CI 1.19-2.07), p=0.002; Model 2 aOR 1.51 (95% CI 1.13-2.01), p=0.005).

Interactions between race and sexual orientation

There was a significant race by lesbian/gay sexual orientation interaction for the failure to improve in depression or anxiety, in Model 1 (adjusted for baseline) but not in the fully adjusted model. In Model 1, compared to white heterosexual patients, failure to improve was significantly more likely for racial minority heterosexual patients (aOR 1.30 (95% CI 1.25, 1.36), p<0.001) and white gay or lesbian patients (aOR 1.17 (95% CI 1.08, 1.27), p<0.001). Racial minority heterosexual patients were more likely to fail to improve than white gay or lesbian patients (aOR 1.11 (95% CI 1.01,1.21), p=0.023). There was no significant difference between racial minority gay or lesbian patients compared to white or racial minority heterosexual patients or white gay or lesbian patients (p-values > 0.05).

None of the other logistic regression analyses indicated significant interactions between race and sexual orientation for reliable recovery in depression/anxiety or reliable improvement or recovery in functioning. See Supplementary Table 8 for the proportions reaching improvement and recovery criteria in each group and Supplementary Table 9 for results of the race by sexual orientation interaction tests.

Discussion

This is the first study to compare psychological intervention outcomes across different sexual orientation groups using national routinely collected data from a clinical cohort. As predicted, bisexual patients exhibited poorer treatment outcomes than heterosexual patients, in terms of symptom severity, reliable improvement and reliable recovery, after adjustment for baseline symptom severity and key treatment and sociodemographic variables. Bisexual men also had poorer treatment outcomes than gay men. In contrast, none of the comparisons between bisexual and lesbian women were significant in the models adjusting for confounders. In line with the second prediction, lesbian women had poorer outcomes than heterosexual women, while treatment outcomes for gay men did not differ significantly from those of heterosexual men. The effect sizes were generally largest for the bisexual men. For example, bisexual men had increased risk of failure to recover for depression/anxiety or functional impairment of 1.5-1.7 in the fully adjusted models compared to heterosexual or gay men; for bisexual and lesbian women compared to heterosexual women, the odds ratios were 1.3-1.4. Therefore the

risk of failure to recover is approximately 30-40% higher for sexual minority women and 50-70% higher for bisexual men, indicating important treatment outcome disparities.

The poorer treatment outcomes for three of the sexual minority groups are consistent with results of a previous study of four services in South East London, UK (Rimes et al., 2017), but the current study is much larger and involves national cohort data. The findings of poorer outcomes for bisexual patients in the current study are consistent with some subgroup analyses by Beard et al.'s (2017) study of a hospital-based program. Plöderl et al. (2017) did not find significant differences in treatment outcomes in a hospital-based suicide prevention program for sexual minority patients versus heterosexual individuals, but they did not investigate bisexual patients separately. Multiple factors varied across these two studies and the current one, making it impossible to draw any firm conclusions. In addition to being hospital-based and being in different countries (US and Austria), the two previous studies involved patients with a higher level of treatment needs such as personality disorders or psychosis, who had received a greater amount of psychological treatment alongside psychiatric input rather than psychological intervention alone. Further, those smaller studies did not investigate outcomes by sex, and the current findings highlight the importance of considering both sex differences and variations across sexual minority sub-groups.

It had already been demonstrated that white patients in IAPT services have better treatment outcomes than racial minority patients, but this is the first study to investigate the interaction between sexual orientation and racial minority status. Contrary to expectations, there was no evidence that racial minority lesbian/gay patients had poorer treatment outcomes than white lesbian/gay patients, or that racial minority bisexual patients had poorer outcomes than white bisexual patients. In contrast, within heterosexual patients, differences between white and racial minority patients were larger and sometimes significant. This may indicate that racial and sexual minority statuses have relatively separate rather than interacting effects on treatment outcomes and that sexual minority status has a more dominant effect than racial minority status. Although the study was not sufficiently powered to investigate the three-way interaction between sexual orientation, sex and race statistically, inspection of unadjusted final session symptom severity scores indicates that white gay men had consistently lower symptom severity than lesbians or bisexual patients who were white or racial minority. However, caution is warranted in drawing firm conclusions. The sample is predominantly white, with a smaller proportion of racial minority patients (8.9%) than the proportion of racial minority individuals recorded in the 2011 Census in England (14%), indicating that racial minority individuals may be under-accessing IAPT services. Also people with missing

ethnicity data were excluded from the present analyses, although this was only a small proportion of the cohort population.

Research is required into the reasons for the poorer treatment outcomes for bisexual people and lesbian women. There was no evidence that this was due to group differences in age, race, employment status, deprivation, baseline symptom severity, number of treatment sessions or 'intensity' of treatment as these were all adjusted for in the analyses. Future studies should include examination of their treatment experiences, including factors influencing engagement, the therapeutic alliance, treatment completion or onward referral. Research should investigate the possible role of lack of understanding, stigma or discrimination within health services (King, 2015). Although therapists in these health services will have received some cultural competences training, it is possible that many have received little specific education about working sexual minority patients. Research indicates that outpatient psychotherapy patients are more likely to terminate treatment prematurely if they perceive their therapist to be low in multicultural competence (Anderson, Bautista, & Hope, 2019). Sexual minority patients may have had previous negative experiences in mental health services which could have influenced therapeutic engagement or trust in their therapist, with subsequent impact on outcomes. For example, although all UK therapy bodies recently stated that conversion therapy should not be provided, a UK survey in 2002-2003 found that 17% of therapists reported having provided treatment to reduce same-sex attractions or behavior (King, 2015).

Past or ongoing stigma and other stressors outside of the treatment setting may play a role in poorer treatment outcomes for the bisexual patients and lesbian women. Although gay men experience social disadvantages associated with being a sexual minority, bisexual individuals experience greater stigma, sexual orientation concealment and invisibility than lesbian/gay people (Dodge et al., 2016; Ross et al., 2018). These may have direct effects on mental health or factors that affect mental health such as partner relationships (Dyar, Feinstein, Schick, & Davila, 2017). Furthermore, sexual minority women are more likely than heterosexual women to report childhood trauma (Austin et al., 2008) and interpersonal violence in adulthood (Szalacha et al., 2017). There is evidence that daily heterosexism experienced by sexual minority women can maintain symptoms of post-traumatic stress disorder in sexual minority women (Dworkin et al., 2018). In addition to heterosexism, sexual minority women will have experienced lifelong gender-based prejudice and discrimination which may contribute to the increased prevalence in common mental health problems in women relative to men in general population (Playy, Prins, Bates, & Keyes,

2016). The interacting influences of heterosexism and sexism may help explain why sexual minority women experienced worse treatment outcomes than heterosexual women whereas there were no significant differences for gay versus heterosexual men. Reduced social support in sexual minority subgroups may also affect mental health (Bränström, 2017; Pollitt et al., 2017) and treatment outcomes. Assessment of sexual minority individuals should include the possible mental health impact of stigma or victimization, disclosure and social support.

The bisexual and lesbian patients were younger than the other groups, consistent with some previous evidence of earlier age at onset for psychopathology in sexual minority individuals (Cochran & Mays, 2000). However, they also had higher presenting levels of depression, anxiety and functional impairment than the heterosexual patients and gay men. Future research could investigate whether these individuals are more likely to delay treatment-seeking than heterosexual individuals or gay men. These three groups were also more likely to be living in a high deprivation area than heterosexual individuals, and bisexual patients were more likely to be unemployed than all groups except heterosexual women. Although the group differences remained after adjustment for the confounding effects of race, baseline symptoms/impairment, unemployment, deprivation and so on, it is likely that they are markers for unmeasured negative influences on mental health and recovery. Multiple and intersecting social disadvantages and stigma can act as both etiological agents and chronic stressors that are likely to make it harder to benefit from psychological interventions.

In line with their higher baseline scores, bisexual men and lesbian women were more likely to receive high intensity treatment than their heterosexual counterparts, but they did not have the corresponding greater number of treatment sessions that would be expected. Bisexual women were not more likely than heterosexual women to receive a higher intensity treatment and did not receive more treatment sessions, despite their greater need. The reasons for these findings should be urgently explored. It may be that bisexual and lesbian patients were more likely to choose to end treatment early, perhaps due to reduced likelihood of establishing a trusting therapeutic alliance, or lower treatment satisfaction or benefit. Minority sexual orientation has been found to be associated with higher rates of premature therapy termination (Anderson, Bautista & Hope, 2019).

Limitations and Future Research

The post hoc comparisons regarding bisexual versus lesbian / gay participants and white compared to racial minority participants require replication in other samples, especially as the latter may have been underpowered. Limitations of sexual orientation recording in the present

study and comparison datasets mean that it is difficult to compare the proportions of our sexual minority patients to general population rates. Of the women who indicated their sexual orientation 1.5% were lesbian and 1.2% were bisexual; for the men, the figures were 3.7% gay and 0.8% bisexual. General population estimates from the UK Office for National Statistics (ONS, 2014) were 0.8% lesbian women, 0.6% bisexual women, 1.5% gay men, 0.4% bisexual men.

(https://www.ons.gov.uk/peoplepopulationandcommunity/culturalidentity/sexuality/datasets/sexualidentityuk). Higher treatment access is to be expected for sexual minorities given their increased rates of mental illness. However, the proportion in the ONS who say that they don't know or refuse to answer was 4% compared to 11% in the current study, and the ONS study had no completely missing sexual orientation data, making direct comparisons more difficult. Sexual orientation data collection in IAPT services only began in 2012 and the proportion of missing data has been decreasing over time as more therapists/services collect and input the data. The ONS study also includes an 'other' category (0.3%); at the time of the data collection, the data standard for IAPT services did not include a sexual orientation category such as "other sexual orientation not listed". Future research should investigate treatment outcomes for individuals who do not identify as heterosexual, lesbian, gay or bisexual, including those identifying as asexual. Younger people often have more diverse sexual identities or resist labels.

Future research should also investigate treatment outcomes for people who say that they are unsure of their sexual orientation, who may have specific therapeutic needs. In the present study those who stated that they did not know or were unsure of their sexual orientation were younger and were more likely to be male, unemployed, from a minority racial group, living in a higher deprivation area and had higher baseline symptomatology and fewer treatment sessions than those who stated their sexual orientation. The effect sizes were very small, but some of these findings are consistent with previous reports that more socially disadvantaged individuals can be less likely to state a sexual orientation (Aspinall, 2009). Some of these factors are associated with poorer treatment outcomes, so people who are unsure of their sexual orientation may require additional or different treatment. There is also evidence that subgroups such as 'mostly heterosexual' individuals may have distinct characteristics (Savin-Williams & Vrangalova, 2013) and could be researched as a separate group.

The paper presents findings for patients with data for all the study variables. Participants with missing data had smaller reductions in symptom levels than those with data

present, so the first-to-last session changes presented here should not be viewed as representative as all patients receiving IAPT interventions. Deprivation and employment data exceeded 5%, so the primary analyses were repeated including participants with missing deprivation or employment data. A similar pattern of significant group effects and interactions were found with just one exception (for failure to recover in functional impairment, the sex-by lesbian / gay interaction now had limited statistical significance). However, future research should further investigate the impact of missing data. In addition, the results may not generalize outside of English IAPT psychological intervention services that are free at the point of delivery. Future studies should adjust for additional confounders not included in the present study such as the duration of the presenting problem, medication or amount of previous therapy. Information about gender minority status was not recorded in the dataset and therefore could be reported or analyzed here. Future research should also compare treatment outcomes in sexual minority people with and without additional socially disadvantaged statuses such as lower socioeconomic status, disabilities or long-term physical health conditions.

Clinical implications

The present findings of treatment inequities highlight the importance of sexual orientation data collection and audit in healthcare settings. Health professionals should be encouraged to support the recording of sexual orientation data; this should be carefully repeated for any subsequent treatment episodes to allow people to report different sexual identities over time (Diamond, Dickenson & Blair, 2017; Everett, Talley, Hughes, Wilsnack & Johnson, 2016).

Although the present study cannot identify reasons for the poorer treatment outcomes in bisexual people and lesbian women, these are likely to be multi-faceted. Some therapists may require more training in working with bisexual patients, such as not making assumptions about a monosexual orientation based on the patient's current or previous partner history and understanding that biphobia may be experienced from lesbian or gay as well as heterosexual individuals. Therapists should also consider how issues relating to minority sexual orientation may be different for lesbian women and may interact with gender-based social disadvantages. Training about working with sexual minorities should be provided to everyone in the health service as previous negative experiences with receptionists, administrators, nurses and general practitioners may all set up negative expectations in sexual minority patients that may adversely impact on the therapeutic relationship. Training guidelines for everyone working with mental health patients should require learning about the specific needs of sexual minority patients. For therapists, this should include being trained in asking sensitively about

sexual orientation and assessing and treating any lasting impact of stigma-related experiences. Service managers should be advised to analyze treatment outcomes to investigate whether they are providing an equitable service for sexual minority patients. However, societal-level interventions are needed to reduce sexism, biphobia and homophobia to help prevent the associated adverse mental health consequences rather than merely trying to repair them.

The role of what the patient brings to the treatment should also be investigated in relation to treatment outcomes. For example, internalized societal stigma about minority sexual orientation and previous or ongoing stigma experiences could influence not only the presenting mental health problem and recovery, but the patient's willingness to disclose about sexual orientation itself, or discuss related issues. Concerns about possible negative attitudes from the therapist about sexual orientation could also reduce trust in the therapist and therapy engagement more generally. For those receiving a group intervention, similar factors could affect interactions with other group members and group engagement.

Until we know more about the reasons for these poorer treatment outcomes, mental health professionals should consider the possibility that sexual minority women and bisexual men may require additional treatment sessions or different interventions. For example, there is promising preliminary evidence from an uncontrolled study of group CBT for people with depression (Ross, Doctor, Dimito, Kuehl & Armstrong, 2018) and a randomized trial of LGB-affirmative CBT, although the latter only included sexual minority young men (Pachankis et al., 2015). A novel CBT intervention to address trauma symptoms and sexual risk taking in sexual minority men with childhood sexual abuse is also being investigated (Taylor, Goshe, Marquez, Safren, O'Cleirigh, 2018). Providing interventions as early as possible is important prevention work, and there is promising evidence from a feasibility study for a brief affirmative CBT intervention for sexual and gender minority youth (Craig & Austin 2016). There is very little LGB-specific service provision in England's national health service mental healthcare, such as group interventions for LGB patients.

Conclusions

The findings highlight the importance of researching mental health outcomes separately by type of sexual orientation (e.g. bisexual versus lesbian/gay) in interaction with sex and race. Further research is needed into the reasons for poorer psychological treatment outcomes for depression and anxiety in bisexual men and women, and lesbian women. Therapists should be aware that sexual minority patients may have different or additional treatment needs.

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Fig. 1. Depression, anxiety and functional impairment at first and final session (unadjusted means)
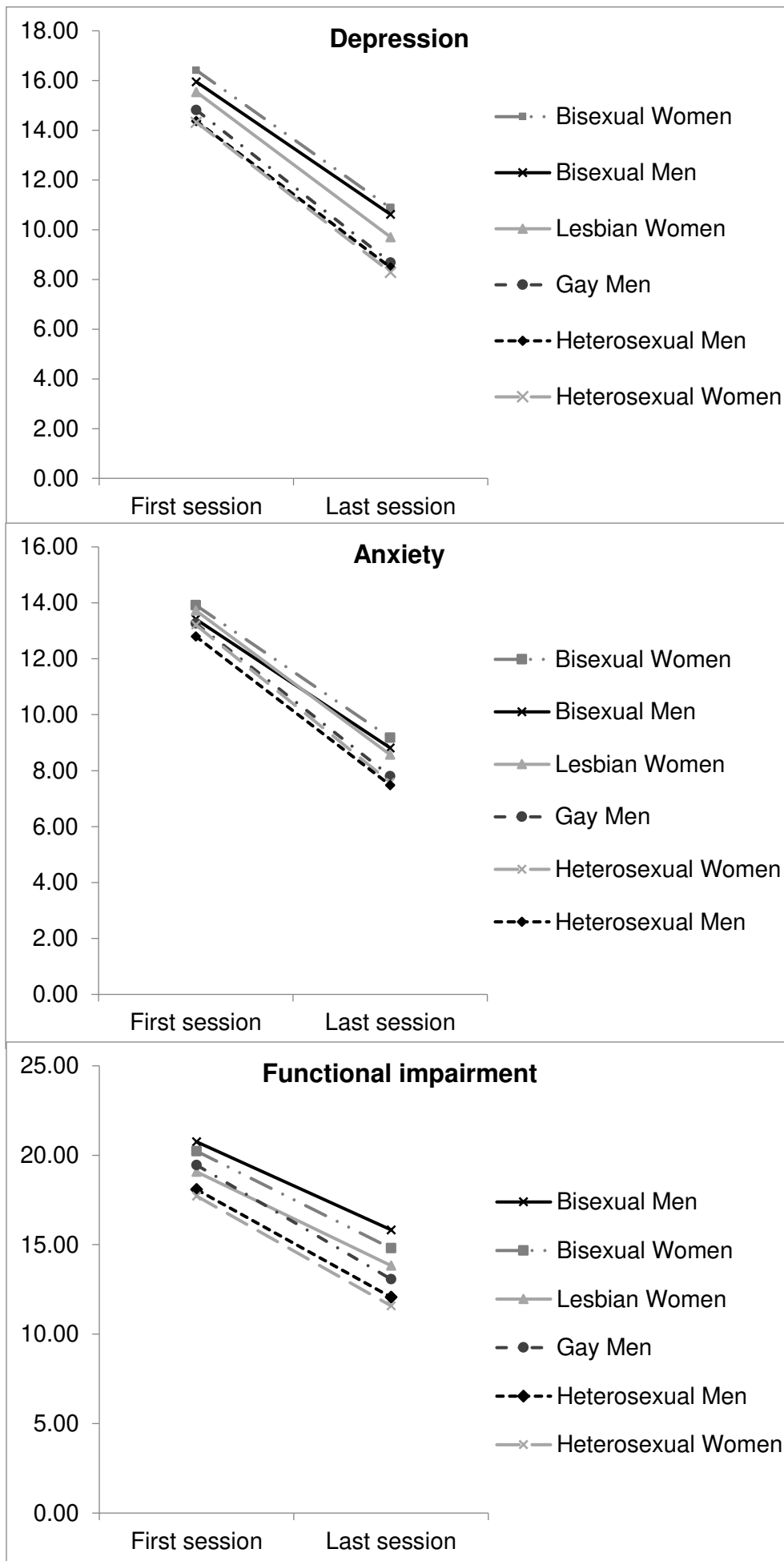
Table 1. *Sociodemographic characteristics, baseline clinical measures, and treatment characteristics (n=132,923)*

	Heterosexual Men (*n*=44,969)	Heterosexual Women (*n*=83,482)	Gay Men (*n*=1,734)	Lesbian Women (*n*=1,285)	Bisexual Men (*n*=389)	Bisexual Women (*n*=1,064)	Statistical test and *p* value
Sociodemographic characteristics							
Age – M (SD)	42.5 (14.8)	41.4 (15.3)	36.9 (12.8)	34.5 (12.4)[a]	32.9 (13.5)[a]	28.2 (10.6)	$F_{(5,132917)}$ = 316.9, *p* < .001
Age range	16-90	16-90	16-90	16-83	16-70	16-73	
Racial minority – N (%)	3857 (8.6)[a]	7621 (9.1)[b]	135 (7.8)[a,b,c]	71 (5.5)[c]	47 (12.1)[a,b]	100 (9.4)[a,b]	$\chi^2_{(5)}$ = 37.1, *p* < .001
Ethnic groups							
White	41112 (91.4)	75861 (90.9)	1599 (92.2)	1214 (94.5)	342 (87.9)	1214 (94.5)	
Mixed ethnicity	758 (1.7)	1657 (2.0)	47 (2.7)	30 (2.3)	14 (3.6)	30 (2.3)	
Black / Black British	1738 (3.9)	2976 (3.6)	28 (1.6)	11 (.9)	12 (3.1)	11 (.9)	
Asian or Asian British	858 (1.9)	2005 (2.4)	30 (1.7)	18 (1.4)	12 (3.1)	18 (1.4)	
Other ethnic groups	503 (1.1)	983 (1.2)	30 (1.7)	12 (.9)	9 (2.3)	12 (.9)	
Paid employment – N (%)	27144 (60.4)[a]	48295 (57.9)[b]	1107 (63.8)[a]	817 (63.6)[a]	196 (50.4)[c]	565 (53.1)[c]	$\chi^2_{(5)}$ = 132.2, *p* < .001
High deprivation – N (%)	22580 (50.2)[a]	41191 (49.3)[b]	1006 (58.0)[c]	789 (61.4)[c]	220 (56.6)[a,c]	639 (60.1)[c]	$\chi^2_{(5)}$ = 176.4, *p* < .001
Baseline clinical measures							
Depression (PHQ-9) - M (SD)	14.4 (6.3)[a,b]	14.3 (6.2)[a]	14.8 (6.3)[b]	15.5 (6.0)[c]	15.9 (5.5)[c,d]	16.4 (5.7)[d]	$F_{(5,132917)}$ = 39.4, *p* < .001
- Range	0-27	0-27	0-27	0-27	0-27	0-27	
Anxiety (GAD-7) - M (SD)	12.8 (5.2)[a]	13.2 (5.1)[b]	13.3 (5.0)[b,c]	13.7 (4.9)[c,d]	13.4 (4.8)[a,b,c,d]	13.9 (4.9)[d]	$F_{(5,132917)}$ = 48.5, *p* < .001
- Range	0-21	0-21	0-21	0-21	0-21	0-21	
Functional impairment (WSAS) -M (SD) & Range	18.1 (9.5) 0-40	17.7 (9.5) 0-40	19.5 (9.1)[a,b] 0-40	19.1 (8.8)[a] 0-40	20.8 (8.6)[b] 0-40	20.2 (8.6)[b] 0-40	$F_{(5,132917)}$ = 42.7, *p* < .001
Treatment characteristics							
Number of treatment sessions – M (SD) & Range	5.5 (3.4)[a] 2-34	5.6 (3.5)[b] 2-39	5.9 (3.7)[c] 2-24	5.7 (3.8)[a,b,c] 2-32	5.6 (3.7)[a,b,c] 2-23	5.5 (3.6)[a,b] 2-24	$F_{(5,132917)}$ = 9.8, *p* < .001
High-intensity treatment- N (%)	23672 (52.6)[a]	45677 (54.7)[b]	1014 (58.5)[c]	761 (59.2)[c]	239 (61.4)[b,c]	587 (55.2)[a,b,c]	$\chi^2_{(5)}$ = 87.1, *p* < .001

[a,b,c,d] Values on the same row sharing a superscript are not significantly different from each other, based on Bonferroni-corrected comparisons.
PHQ-9 Patient Health Questionnaire Depression Scale; GAD-7 Generalized Anxiety Disorder Scale; WSAS Work and Social Adjustment Scale

Table 2. *Severity of depression, anxiety and functional impairment at final session; mean difference*

	Reference group	Model 1. Adjusted for baseline score[a]				Model 2. Fully adjusted[b]			
				Mean difference (MD)					
Depression		MD	SE	95% CI	*p* value	MD	SE	95% CI	*p* value
Bisexual	Heterosexual	1.28	0.30	(0.69, 1.86)	<0.001	0.75	0.28	(0.19, 1.30)	0.009
Bisexual	Lesbian / gay	1.32	0.33	(0.68,1.96)	<0.001	0.85	0.14	(-0.17,0.37)	0.007
Lesbian or gay	Heterosexual	-0.04	0.14	(-0.32, 0.24)	0.77	-0.10	0.14	(-0.37, 0.17)	0.47
Sex-by-bisexual		0.17	0.35	(-0.52, 0.84)	0.64	0.08	0.33	(-0.57, 0.73)	0.81
Sex-by-lesbian / gay		0.79	0.22	(0.37, 1.22)	<0.001	0.68	0.21	(0.27, 1.09)	0.001
Anxiety									
Bisexual	Heterosexual	1.02	0.27	(0.50, 1.54)	<0.001	0.51	0.26	(0.01, 1.02)	0.04
Bisexual	Lesbian / gay	0.93	0.29	(0.36, 1.51)	0.001	0.49	0.28	(-0.06, 1.04)	0.083
Lesbian or gay	Heterosexual	0.09	0.13	(-0.17, 0.34)	0.50	0.03	0.12	(-0.22, 0.27)	0.83
Sex-by-bisexual		0.22	0.31	(-0.40, 0.83)	0.49	0.15	0.30	(-0.44, 0.73)	0.62
Sex-by-lesbian / gay		0.64	0.20	(0.26, 1.02)	0.001	0.53	0.19	(0.16, 0.89)	0.005
Functional impairment									
Bisexual[c]	Heterosexual	2.33	0.43	(1.49, 3.17)	<0.001	1.65	0.42	(0.83, 2.47)	<0.001
Bisexual	Lesbian / gay	2.01	0.47	(1.14, 2.98)	<0.001	1.49	0.46	(0.58, 2.39)	0.001
Lesbian or gay	Heterosexual	0.27	0.21	(-0.14, 0.67)	0.20	0.16	0.20	(-0.23, 0.56)	0.41
Sex-by-bisexual		-0.46	0.50	(-1.44, 0.52)	0.35	-0.51	0.49	(-1.47, 0.44)	0.29
Sex-by-lesbian / gay		1.25	0.31	(0.64, 1.86)	<0.001	1.14	0.31	(0.54, 1.74)	<0.001

Depression assessed by PHQ-9; Anxiety assessed by GAD-7; Functioning assessed by WSAS

[a] Adjusted for baseline score on outcome measure; [b] Adjusted for intensity of therapy, number of treatment sessions, age, race, employment status, and deprivation

Table 3 *Failure to reliably improve and reliably recover*

	Heterosexual Men	Heterosexual Women	Gay Men	Lesbian Women	Bisexual Men	Bisexual Women
	n (%)	*n* (%)	*n* (%)	*n* (%)	*n* (%)	*n* (%)
Depression & anxiety						
Failure to reliably improve	17436 (38.8)	30264 (36.3)	650 (37.5)	502 (39.1)	172 (44.2)	455 (42.8)
Failure to reliably recover[a]	20610 (51.7)	38123 (50.7)	817 (52.5)	711 (59.6)	234 (64.5)	643 (63.9)
Functional impairment						
Failure to reliably improve	26899 (59.8)	49843 (59.7)	994 (57.3)	809 (63.0)	250 (64.3)	657 (61.7)
Failure to reliably recover[b]	24405 (67.5)	44060 (66.7)	1022 (68.9)	811 (74.3)	273 (78.0)	696 (74.6)

[a] Reliable recovery analyses for depression / anxiety involved 119,108 (89.6%) patients who met baseline caseness criteria for the PHQ-9 or GAD-7.
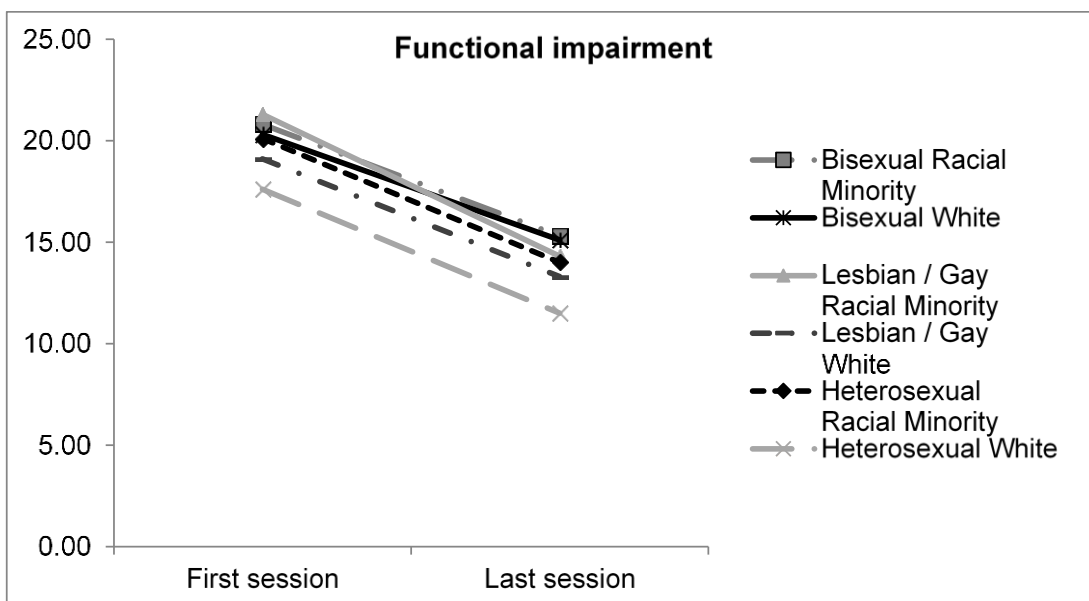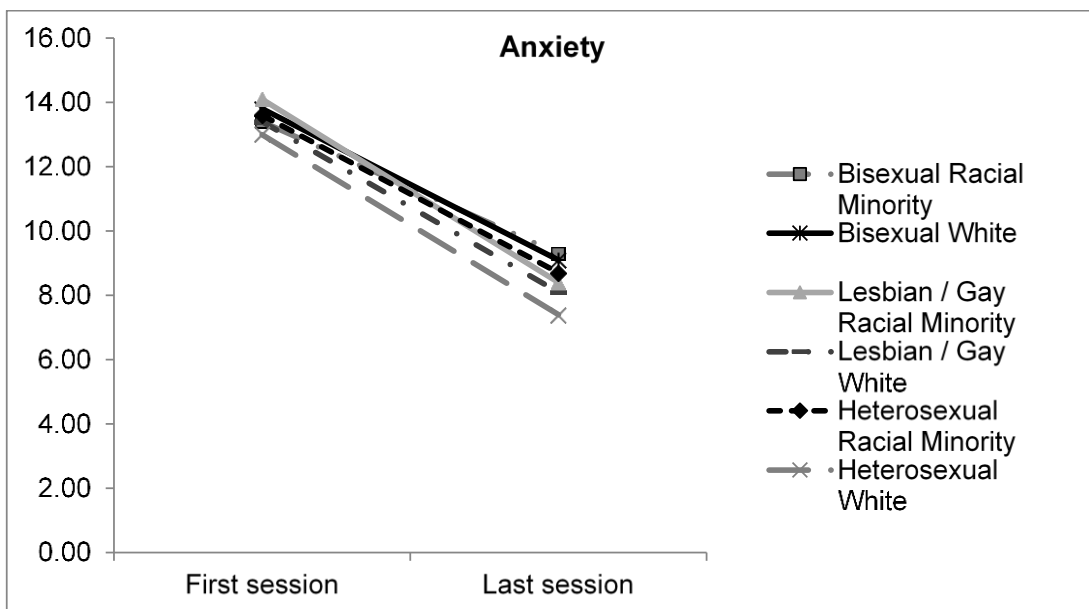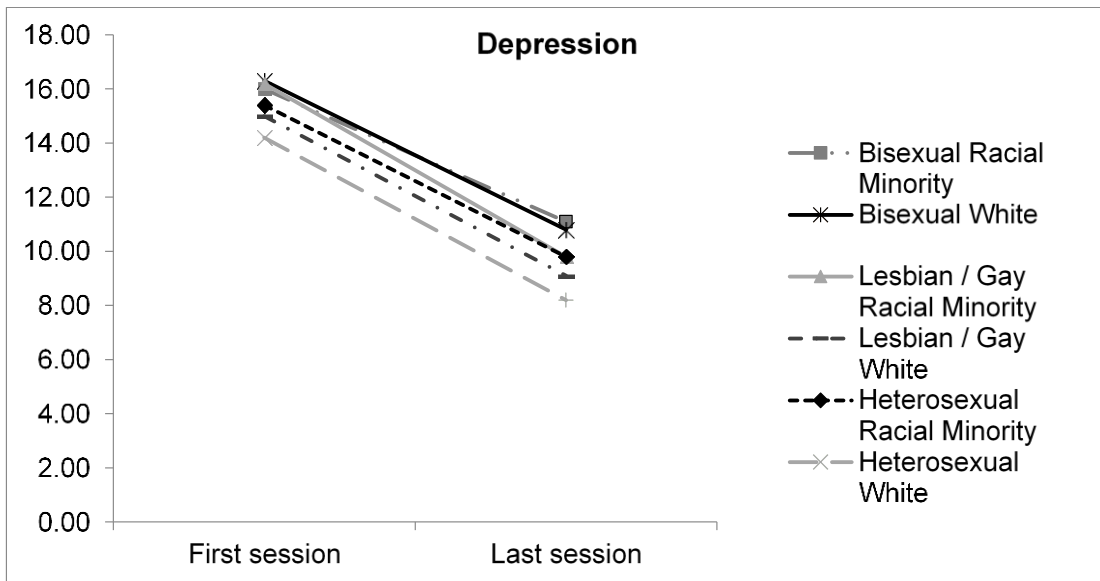
[b] Reliable recovery analyses for functional impairment involved 106,115 (79.8%) patients who met baseline caseness criteria on the Work and Social Adjustment Scale.

Table 4. *Risk of failure to reliably improve and reliably recover, adjusted odds ratio (aOR) of failure to improve/recover*

		Depression & anxiety						Functional impairment					
		Failure to improve (*N*=132,923)			Failure to recover (*N*=119,108)			Failure to improve (*N*=132,923)			Failure to recover (*N*=106,115)		
Model 1. Adjusted for baseline.													
	Ref[a]	aOR	(95% CI)	*p*	aOR	(95% CI)	*p*	aOR	(95% CI)	*p*	aOR	(95% CI)	*p*
Bisexual	Het	1.40	(1.14, 1.72)	0.001	1.63	(1.31, 2.03)	<0.001	1.59	(1.27, 1.99)	<0.001	1.65	(1.28, 2.14)	<0.001
Bisexual	L/G	1.43	(1.14, 1.79)	0.002	1.64	(1.28, 2.08)	<0.001	1.58	(1.24, 2.02)	<0.001	1.58	(1.19, 2.08)	0.001
Lesbian/gay	Het	0.99	(0.89, 1.09)	0.77	1.00	(0.90, 1.11)	0.94	1.01	(0.91, 1.12)	0.91	1.05	(0.94, 1.18)	0.40
Sex-by-bisexual		1.08	(0.85, 1.38)	0.52	0.98	(0.76, 1.27)	0.87	0.88	(0.68, 1.13)	0.31	0.86	(0.64, 1.15)	0.31
Sex-by-lesbian/gay		1.25	(1.07, 1.46)	0.004	1.37	(1.17, 1.61)	<0.001	1.32	(1.12, 1.55)	<0.001	1.36	(1.14, 1.63)	<0.001
Model 2. Fully adjusted for baseline score on relevant outcome measure, treatment intensity, number of sessions, age, race, deprivation, employment													
Bisexual	Het	1.23	(0.99, 1.53)	0.06	1.43	(1.13, 1.80)	0.003	1.43	(1.14, 1.80)	0.002	1.49	(1.15, 1.93)	0.002
Bisexual	L/G	1.25	(0.99, 1.59)	0.07	1.46	(1.14, 1.89)	0.003	1.43	(1.11,1.83)	0.005	1.44	(1.09, 1.91)	0.011
Lesbian / gay	Het	0.98	(0.89, 1.09)	0.77	0.97	(0.87, 1.08)	0.63	1.01	(0.91, 1.12)	0.91	1.04	(0.92, 1.16)	0.55
Sex-by-bisexual		1.06	(0.83, 1.37)	0.64	0.93	(0.71, 1.21)	0.57	0.86	(0.66, 1.12)	0.27	0.83	(0.62, 1.12)	0.23
Sex-by-lesbian/gay		1.21	(1.03, 1.42)	0.02	1.34	(1.14, 1.58)	<0.001	1.30	(1.10, 1.53)	0.002	1.34	(1.12, 1.60)	0.001

[a] Reference category: Het = heterosexual, L / G = lesbian or gay. Depression assessed by PHQ-9; Anxiety assessed by GAD-7; Functional impairment assessed by WSAS

Depression

Legend:
- ■ Bisexual Racial Minority
- ✳ Bisexual White
- ▲ Lesbian / Gay Racial Minority
- Lesbian / Gay White
- ◆ Heterosexual Racial Minority
- ✕ Heterosexual White

Anxiety

Legend:
- ■ Bisexual Racial Minority
- ✳ Bisexual White
- ▲ Lesbian / Gay Racial Minority
- Lesbian / Gay White
- ◆ Heterosexual Racial Minority
- ✕ Heterosexual White

Functional impairment

Legend:
- ■ Bisexual Racial Minority
- ✳ Bisexual White
- ▲ Lesbian / Gay Racial Minority
- Lesbian / Gay White
- ◆ Heterosexual Racial Minority
- ✕ Heterosexual White

Supplementary Table 1: Proportions of missing data for study variables[a]

Study variable	Number with missing data	Proportion (%)
Age	66	<0.1
Race	4233	2.3
Sex	136	<0.1
Employment	26989	14.8
Deprivation	15633	8.6
Number of treatment sessions	0	0
Intensity of intervention	8184	4.5
Depression (PHQ-9 first & last session)	0	0
Anxiety (GAD-7 first & last session)	0	0
Functioning (WSAS first & last session)	0	0

[a] For the 181,761 patients who reported their sexual orientation, had had a treatment episode and been discharged in the study period.

Independent t-tests were conducted comparing change in depression, anxiety and functional impairment between those with and without each form of missing data. Patients with missing age data had significantly smaller reductions in anxiety and functional impairment (t values >1.7) than people without missing age data. People with missing race data had significantly smaller reductions in depression and anxiety (t values >3.0, p<0.01) compared to those with race data present. People with sex data missing had significantly smaller reductions in depression and functional impairment (t values <2.0, p values <0.05) than those with sex data present (no significant difference for anxiety). People with missing employment or treatment intensity data had significantly smaller reductions in depression, anxiety and functional impairment (t values >5.0, p values < 0.01) than those without such missing data. People with missing deprivation data did not show significantly different reductions in the three outcomes compared to people with deprivation data present.

Additionally, the impact of missingness in the two variables where missingness exceeded 5% was investigated (deprivation and employment). For those variables, missing values were recoded as a third category so that when the covariate was included in the analysis, all participants with missing deprivation or employment data were now included. All the primary analyses were repeated using these two new variables, i.e. both continuous and categorical outcomes with sexual orientation, sex and sexual orientation by sex interactions under investigation. These all showed a similar pattern of significant results as the original analyses reported in the paper, with one exception. When people with missing deprivation and employment data were included in the logistic regression investigating failure to improve in functional impairment, the sex-by-lesbian/ gay interaction had evidence of limited statistical significance (p=0.07).

Supplementary Table 2. *Characteristics of patients who provided sexual orientation data (n=132,923) compared to patients who said that they were unsure (n=3,168) or who declined to disclose (n=13,837) ***

	Patients indicating sexual orientation	Patients who stated that they were unsure of their sexual orientation	Patients who declined to disclose their sexual orientation	Statistical test and *p* value	Effect size
Sociodemographic characteristics					
Age – M (SD)	41.5[a] (15.2)	40.1 (15.3)	41.3[a] (15.3)	$F(2,149925)=13.8$, $p<0.001$	Partial eta squared <0.001
Female – N (%)	85831[a] (64.6)	1979 (62.5)	8976[a] (64.9)	$X^2 = 6.6$, $p<0.001$	Phi=0.007
Black, Asian or other racial minority group – N (%)	11831[a] (8.9)	431 (13.6)	1221[a] (8.8)	$X^2= 84.1$, $p<0.001$	Phi=0.024
Not in paid employment – N (%)	54799 (41.2)	1494[a] (47.2)	6432[a] (46.5)	$X^2= 180.1$, $p<0.001$	Phi=0.035
Higher deprivation – N (%)	66425 (50.0)	1818 (57.4)	7400 (53.5)	$X^2= 123.9$, $p<0.001$	Phi=0.029
Baseline clinical measures					
Depression – M (SD)	14.4 (6.3)	14.7[a] (6.4)	14.6[a] (6.3)	$F(2, 149925)= 11.4$, $p<0.001$	Partial eta squared <0.001
Anxiety – M (SD)	13.1[a] (5.1)	13.3 (5.2)	13.1[a] (5.2)	$F(2, 149925)=3.8$, $p=0.022$	Partial eta squared <0.001
Functional impairment – M (SD)	17.9 (9.5)	18.6[a] (9.9)	18.3[a] (9.7)	$F(2, 149925)=22.6$, $p<0.001$	Partial eta squared =0.001
Treatment characteristics					
Number of treatment sessions – M (SD)	5.6[a] (3.5)	5.5[b] (3.6)	5.4[a,b] (3.6)	$F(2,149925)= 26.0$, $p<0.001$	Partial eta squared < 0.001
High-intensity intervention – N (%)	71950[a] (54.1)	1749[a,b] (55.2)	7719[b] (55.8)	$X^2= 14.9$, $p=0.001$	Phi=0.010

* Patients were included for these analyses if they also had data for all other variables of interest

[a, b] Values that share a superscript are not significantly different from each other, based on Bonferroni-corrected comparisons

Depression assessed by PHQ-9; Anxiety assessed by GAD-7; Functional impairment assessed by WSAS

Supplementary Table 3. *Sociodemographic characteristics, baseline clinical measures, and treatment characteristics by sexual orientation and race (n=132,923)*

	Heterosexual White (*n*=116,973)	Heterosexual Racial minority (*n*=11,478)	Gay or Lesbian White (*n*=2,813)	Gay or Lesbian Racial minority (*n*=206)	Bisexual White (*n*=1,306)	Bisexual Racial Minority (*n*=147)	Statistical test, *p* value, effect size
Sociodemographic characteristics							
Age – M (SD)	42.2 (15.3)	37.7 (12.6)	36.1 (12.8)	33.6 (10.6)[a]	29.9 (11.6)[b]	30.8 (11.9)[a,b]	$F(5,132917) = 464.9$, $p < .001$
Age range	16-90	16-88	16-90	17-72	16-73	17-65	Partial eta squared = 0.017
Female N (%)	75861[a] (64.9)	7621[b] (66.4)	1214 (43.2)	71 (34.5)	964 (73.8)	100[a,b] (68.0)	$\chi^2(5) = 715.8$, $p < .001$, phi=0.073
Male N (%)	41112 (35.1)	3857 (33.6)	1599 (56.8)	135 (65.5)	342 (26.2)	47 (32.0)	
Paid employment – N (%)	69282 (59.2)[a]	6257 (53.6)[b]	1814 (64.5)	110 (53.4)[a,b]	684 (52.4)[b]	77 (52.5)[a,b]	$\chi^2(5) = 199.7$, $p < .001$, phi=0.039
High deprivation – N (%)	56018 (47.9)	7753 (57.7)[a]	1658 (58.9)[b]	137 (66.5)[a,b]	753 (57.7)[b]	106 (72.1)[a]	$\chi^2(5) = 1793.6$, $p < .001$, phi=0.12
Baseline clinical measures							
Depression - M (SD)	14.2 (6.3)	15.4[a] (6.2)	15.0[b] (6.1)	16.2[a,c] (6.1)	16.3[c] (5.6)	16.0[a,b,c] (5.7)	$F(5,132917) = 111.5$, $p < .001$,
- Range	0-27	0-27	0-27	0-27	0-27	0-27	Partial eta squared=0.004
Anxiety - M (SD)	13.0[a] (5.1)	13.6[b] (5.1)	13.4[c] (5.0)	14.1[b,c] (5.1)	13.8[b] (5.9)	13.4[a,b,c] (5.2)	$F(5,132917) = 40.1$, $p < .001$
- Range	0-21	0-21	0-21	0-21	0-21	0-21	Partial eta squared=0.002
Functional impairment -M(SD)	17.6 (9.4)	20.1[a] (10.0)	19.1 (9.0)	21.3[a] (9.3)	20.3[a] (8.4)	20.8[a] (9.9)	$F(5,132917) = 174.2$, $p < .001$
& Range	0-40	0-40	0-40	0-40	0-40	0-40	Partial eta squared = 0.007
Treatment characteristics							
Number of treatment sessions	5.5 (3.5)	5.6 (3.5)	5.8 (3.8)	6.0 (3.6)	5.4 (3.6)	6.2 (4.0)	$F(5,132917) = 3.7$, $p < .001$,
– M (SD) & Range	2-39	2-34	2-32	2-17	2-24	2-21	Partial eta squared<0.005
High-intensity intervention – N (%)	62849 (53.7)[a]	6500 (56.6)[b,c]	1640 (58.3)[b,d,e]	135 (65.5)[c,d,f]	732 (56.0)[a,c,e]	94 (63.9)[a,e,f]	$\chi^2(5) = 74.6$, $p < .001$, phi=0.024

[a,b,c,d,e,f] Values on the same row sharing a superscript are not significantly different from each other, based on Bonferroni-corrected comparisons.

Depression assessed by PHQ-9; Anxiety assessed by GAD-7; Functional impairment assessed by WSAS

Supplementary Table 4. *Estimated marginal means of final session depression, anxiety, and functional impairment*

	Heterosexual men (n=44,969)	Heterosexual women (n=83,482)	Gay men (n=1,734)	Lesbian women (n=1,285)	Bisexual men (n=389)	Bisexual women (n=1,064)
Model 1[a]						
Depression						
M	8.48	8.32	8.44	9.07	9.76	9.76
(95% CI)	(8.43, 8.54)	(8.28, 8.36)	(8.17, 8.72)	(8.75, 9.39)	(9.18, 10.34)	(9.41, 10.11)
SE	.03	.02	.14	.16	.30	.18
Anxiety						
M	7.63	7.52	7.71	8.25	8.65	8.76
(95% CI)	(7.58, 7.68)	(7.49, 7.56)	(7.47, 7.96)	(7.96, 8.53)	(8.13, 9.17)	(8.44, 9.07)
SE	.02	.02	.13	.15	.27	.16
Functional impairment						
M	11.97	11.69	12.24	13.20	14.30	13.55
(95% CI)	(11.90, 12.05)	(11.63, 11.74)	(11.84, 12.63)	(12.74, 13.66)	(13.47, 15.13)	(13.04, 14.05)
SE	.04	.03	.20	.23	.43	.26
Model 2[b]						
Depression						
M	8.86	8.65	8.76	9.23	9.61	9.48
(95% CI)	(8.79, 8.93)	(8.59, 8.71)	(8.50, 9.03)	(8.92, 9.54)	(9.05, 10.17)	(9.14, 9.82)
SE	.03	.03	.14	.16	.28	.17
Anxiety						
M	7.99	7.85	8.02	8.40	8.51	8.51
(95% CI)	(7.93, 8.06)	(7.80, 7.90)	(7.78, 8.26)	(8.13, 8.68)	(8.01, 9.01)	(8.21, 8.82)
SE	.03	.03	.12	.14	.25	.16
Functional impairment						
M	12.49	12.12	12.65	13.42	14.14	13.25
(95% CI)	(12.39, 12.59)	(12.03, 12.20)	(12.26, 13.04)	(12.97, 13.88)	(13.32, 14.95)	(12.75, 13.75)
SE	.05	.04	.20	.23	.42	.25

Depression assessed by PHQ-9; Anxiety assessed by GAD-7; Functional impairment assessed by WSAS

[a]Adjusted for baseline score on outcome measure

[b]Adjusted for intensity of therapy, number of treatment sessions, age, race, employment status, and deprivation

Supplementary Table 5. *Estimated marginal means of final session depression, anxiety, and functional impairment*

	Heterosexual White (*n*=116,973)	Heterosexual Racial Minority (*n*=11,478)	Gay or Lesbian White (*n*=2,813)	Gay or Lesbian Racial Minority (*n*=206)	Bisexual White (*n*=1,306)	Bisexual Racial Minority (*n*=147)
Model 1[a]						
Depression						
M	8.29	9.21	8.70	8.79	9.71	10.18
(95% CI)	(8.26, 8.32)	(9.10, 9.31)	(8.49, 8.92)	(8.00, 9.59)	(9.40, 10.03)	(9.24, 11.12)
SE	0.02	.05	.11	.41	.16	.47
Anxiety						
M	7.48	8.41	7.94	7.94	8.69	9.08
(95% CI)	(7.45, 7.50)	(8.32, 8.51)	(7.75, 8.14)	(7.22, 8.65)	(8.41, 8.97)	(8.23, 9.92)
SE	.02	.05	.10	.36	.14	.43
Functional impairment						
M	11.67	12.87	12.66	12.52	13.76	13.76
(95% CI)	(11.63, 11.73)	(12.71, 13.02)	(12.35, 12.97)	(11.37, 13.66)	(13.30, 14.21)	(12.40, 15.11)
SE	.02	.08	.16	.58	.23	.69
Model 2[b]						
Depression						
M	8.48	9.04	8.73	8.53	9.28	9.92
(95% CI)	(8.45, 8.52)	(8.93, 9.14)	(8.52, 8.93)	(7.77, 9.29)	(8.97, 9.58)	(9.01, 10.82)
SE	.02	.05	.11	.39	.16	.46
Anxiety						
M	7.63	8.22	7.95	7.66	8.25	8.78
(95% CI)	(7.60, 7.66)	(8.13, 8.31)	(7.76, 8.13)	(6.98, 8.35)	(7.99, 8.53)	(7.97, 9.60)
SE	.02	.05	.09	.35	.14	.41
Functional impairment						
M	11.68	12.87	12.66	12.51	13.76	13.76
(95% CI)	(12.39, 12.59)	(12.71, 13.02)	(12.35, 12.97)	(11.37, 13.66)	(13.30, 14.21)	(12.40, 15.11)
SE	.02	.08	.16	.58	.23	.69

Depression assessed by PHQ-9; Anxiety assessed by GAD-7; Functioning assessed by WSAS
[a]Adjusted for baseline score on outcome measure
[b]Adjusted for intensity of therapy, number of treatment sessions, age, sex, employment status, and deprivation

Supplementary Table 6. *Interactions between race and sexual orientation for severity of depression, anxiety and functional impairment at final session*

	Model 1. Adjusted for baseline score[a]				Model 2. Fully adjusted[b]			
	Mean difference (MD)							
	MD	SE	95% CI	*p* value	MD	SE	95% CI	*p* value
Depression								
Race-by-lesbian / gay	-0.82	0.42	(-1.65, 0.01)	0.05	-.20	0.40	(-0.98, 0.60)	0.63
Race-by-bisexual	-0.44	0.51	(-1.44, 0.55)	0.38	0.64	0.49	(-0.31, 1.59)	0.19
Anxiety								
Race-by-lesbian / gay	-0.94	0.38	(-1.7, -0.20)	0.01	-0.28	0.36	(-0.99, 0.61)	0.44
Race-by-bisexual	-0.55	0.46	(-1.45, 0.35)	0.23	0.53	0.44	(-0.33, 1.38)	0.23
Functional impairment								
Race-by-lesbian / gay	-1.34	0.61	(-2.53, -0.14)	0.03	-0.55	0.59	(-1.71, 0.61)	0.35
Race-by-bisexual	-1.19	0.73	(-2.63, 0.25)	0.11	0.12	0.71	(-1.28, 1.52)	0.87

Reference categories: heterosexual and white. Depression assessed by PHQ-9; Anxiety assessed by GAD-7; Functional impairment assessed by WSAS

[a] Adjusted for baseline score on outcome measure

[b] Adjusted for intensity of therapy, number of treatment sessions, age, sex, employment status, and deprivation

Supplementary Table 7. *Clinical measures at first and last session, by sexual orientation, race and sex (n=132,923); Unadjusted means and standard deviations*

	Heterosexual White (*n*=75,861 women, 41,112 men)	Heterosexual Racial minority (*n*=7,621 women, 3,857 men)	Gay or Lesbian White (*n*=1,214 women, 1,599 men)	Gay or Lesbian Racial minority (*n*=71 women, 135 men)	Bisexual White (*n*=964 women, 342 men)	Bisexual Racial Minority (*n*=100 women, 47 men
Depression [a] – First session	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)
Women	14.2 (6.2)	15.3 (6.2)	15.4 (6.0)	17.1 (5.0)	16.5 (5.7)	16.0 (5.5)
Men	14.3 (6.3)	15.5 (6.2)	14.7 (6.3)	15.7 (6.5)	15.9 (5.5)	16.2 (6.2)
Depression – Final session						
Women	8.1 (6.6)	9.6 (7.1)	9.7 (6.9)	10.1 (6.2)	10.8 (7.3)	11.1 (6.7)
Men	8.3 (6.8)	10.0 (7.4)	8.6 (6.6)	9.6 (7.4)	10.6 (6.6)	11.0 (6.8)
Anxiety [b] – First session						
Women	13.1 (5.1)	13.7 (5.1)	13.7 (4.9)	14.5 (4.9)	14.0 (4.9)	13.3 (5.2)
Men	12.7 (5.2)	13.6 (5.2)	13.2 (5.0)	13.9 (5.2)	13.4 (4.8)	13.8 (5.2)
Anxiety – Final session						
Women	7.5 (5.8)	8.6 (6.1)	8.6 (5.9)	8.6 (5.4)	9.2 (6.1)	9.2 (6.2)
Men	7.4 (5.8)	8.8 (6.3)	7.8 (5.8)	8.4 (6.1)	8.7 (5.8)	9.4 (6.3)
Functioning [c] – First session						
Women	17.5 (9.4)	20.7 (8.1)	19.0 (8.8)	20.7 (8.1)	20.2 (8.4)	20.3 (9.9)
Men	17.9 (9.4)	20.3 (10.1)	19.3 (9.0)	21.6 (9.8)	20.6 (8.4)	21.8 (9.8)
Functioning – Final session						
Women	11.4 (9.6)	13.8 (10.5)	13.8 (9.9)	14.8 (10.0)	14.8 (10.0)	14.9 (10.5)
Men	11.8 (9.8)	14.4 (10.9)	13.0 (9.9)	14.1 (11.0)	15.8 (9.8)	16.1 (10.2)

[a] Depression assessed by PHQ-9; [b] Anxiety assessed by GAD-7; [c] Functioning assessed by WSAS

Supplementary Table 8 *Failure to reliably improve and reliably recover*

	Heterosexual White	Heterosexual Racial minority	Gay or Lesbian White	Gay or Lesbian Racial minority	Bisexual White	Bisexual Racial minority
	n (%)	*n* (%)	*n* (%)	*n* (%)	*n* (%)	*n* (%)
Depression & anxiety						
Failure to reliably improve	42930 (36.7)	4770 (41.6)	1082 (38.5)	70 (34.0)	562 (43.0)	65 (44.2)
Failure to reliably recover[a]	52615 (50.3)	6118 (58.4)	1414 (55.3)	114 (59.7)	790 (64.0)	87 (64.9)
Functional impairment						
Failure to reliably improve	69907 (59.8)	6835 (59.5)	1687 (60.0)	116 (56.3)	815 (62.4)	92 (62.6)
Failure to reliably recover[b]	61520 (66.4)	6945 (72.2)	1699 (71.0)	134 (72.8)	869 (75.1)	100 (79.4)

[a] Reliable recovery analyses for depression / anxiety involved 119,108 (89.6%) patients who met baseline caseness criteria for the PHQ9 or GAD7.

[b] Reliable recovery analyses for functional impairment involved 106,115 (79.8%) patients who met baseline caseness criteria on the Work and Social Adjustment Scale.

Supplementary Table 9. *Interactions between race and sexual orientation for risk of failure to reliably improve and reliably recover, adjusted odds ratio (aOR) of failure to improve/recover*

	Depression & anxiety						**Functional impairment**					
	Failure to improve (*N*=132,923)			Failure to recover (*N*=119,108)			Failure to improve (*N*=132,923)			Failure to recover (*N*=106,115)		
Model 1. Adjusted for baseline.												
	aOR	(95% CI)	*p*	aOR	(95% CI)	*p*	aOR	(95% CI)	*p*	aOR	(95% CI)	*p*
Race-by-lesbian / gay	0.66	(0.48, 0.86)	0.008[a]	0.86	(0.63, 1.17)	0.859	0.82	(0.60, 1.14)	0.200	0.86	(0.63, 1.17)	0.335
Race-by-bisexual	0.76	(0.53, 1.08)	0.757	0.80	(0.54, 1.17)	0.248	0.85	(0.60, 1.25)	0.415	0.80	(0.54, 1.17)	0.248
Model 2. Fully adjusted for baseline score on relevant outcome measure, treatment intensity, number of sessions, age, sex, deprivation, employment												
Race-by-lesbian / gay	0.89	(0.65, 1.24)	0.496	0.50	(0.89, 0.65)	0.496	0.81	(0.59, 1.11)	0.185	0.89	(0.65, 1.24)	0.496
Race-by-bisexual	0.95	(0.64, 1.42)	0.815	0.95	(0.64, 1.42)	0.815	0.96	(0.65, 1.42)	0.833	0.95	(0.64, 1.42)	0.815

[a] The significant race-by lesbian / gay interaction for reliable improvement (adjusted for baseline PHQ9 / GAD7only) was explored further using additional logistic regression analyses. Compared to white heterosexual patients, failure to improve was significantly more likely for racial minority heterosexual patients (aOR 1.30 (95% CI 1.25, 1.36); p<0.001) and white gay or lesbian patients (aOR 1.17 (95% CI 1.08, 1.27), p<0.001). Racial minority heterosexual patients were more likely to fail to improve than white gay or lesbian patients (aOR 1.11 (95% CI 1.01,1.21); p=0.023). There was no significant difference between racial minority gay or lesbian patients compared to white or racial minority heterosexual patients or white gay or lesbian patients (p values >0.05).