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Disparities in psychological distress impacting lesbian, gay, bisexual and transgender cancer survivors

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Abstract

Objective—Recent studies have highlighted disparities in cancer diagnosis between lesbian, gay, bisexual and transgender (LGBT) and heterosexual adults. Studies have yet to examine disparities between LGBT and heterosexual cancer survivors in prevalence of psychological distress.

Methods—Data for the current study were drawn from the LIVESTRONG dataset, a US national survey that sampled 207 LGBT and 4899 heterosexual cancer survivors (all cancer types, 63.5% women, mean age 49) in 2010. Symptoms of psychological distress were assessed with dichotomous yes/no items in three symptom clusters (depression related to cancer, difficulties with social relationships post-cancer, fatigue/energy problems). We selected a sample of 621 heterosexual survivors matched by propensity score to the 207 LGBT survivors and assessed disparities in count of symptoms using Poisson regression. We also performed subgroup analyses by self-reported sex.

Results—Relative to heterosexuals, LGBT cancer survivors reported a higher number of depression and relationship difficulty symptoms. Exploratory analyses revealed that disparities in number of symptoms were visible between gay, bisexual, and transgender versus heterosexual men but not between lesbian, bisexual, and transgender versus heterosexual women.

Conclusions—This study highlights several disparities in psychological distress that exist between LGBT and heterosexual survivors. A need remains for interventions tailored to LGBT survivors and for studies examining disparities within subgroups of LGBT survivors.

Background

Lesbian, gay, bisexual, and transgender (LGBT) cancer survivors are a significant but under-represented population in cancer-related research. Based on population estimates, between 455,000 to 1,000,000 LGBT cancer survivors are currently living in the USA [1,2]. A recent epidemiological study conducted in the USA indicated that gay men were 1.9 times more

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likely to report a lifetime history of cancer diagnosis than heterosexual men, and therefore, the actual number of LGBT cancer survivors may be closer to the high end of this range [3]. Despite these considerable numbers, LGBT cancer survivors have rarely been the focus of cancer-related research.

The few studies that have specifically sampled this population have indicated that LGBT persons may experience poorer health outcomes post-cancer diagnosis and treatment than their heterosexual counterparts. Boehmer and colleagues have demonstrated in multiple studies that lesbian women with breast cancer experienced poorer mental health and health-related quality of life than their heterosexual counterparts [3,4]. Kamen et al. found that gay men (N = 373) who had been diagnosed with cancer reported a higher number of days of poor mental health per month than their heterosexual counterparts (N = 13,981) [5]. These findings are consonant with disparities observed in other underserved and minority groups. For example, Black cancer survivors reported higher levels of distress than White cancer survivors, specifically with regard to pain [6], while lower income cancer survivors reported more distress than higher income cancer survivors [7].

There are several reasons to be concerned about rates of psychological distress among LGBT cancer survivors. Psychological distress, defined here as any unpleasant emotional, psychological, or social experience associated with cancer diagnosis or treatment [8], may persist for years after diagnosis and may have a profound impact on well-being and quality of life [9,10]. Psychological distress also has long-term effects on morbidity and mortality. Cancer survivors who report clinically diagnosable levels of psychological distress are more likely to be diagnosed with a comorbid medical condition [11], more likely to experience poor self-reported health [12], and have an almost twofold increase in chance of mortality [13]. Therefore, addressing disparities in psychological distress in the context of cancer is a public health priority [14], but interventions to reduce distress have not yet been tested among LGBT survivors.

Disparities in psychological distress among LGBT cancer survivors may be the result of minority stress or chronic stress arising from experiences of prejudice and discrimination based on sexuality or gender identity [15,16]. As a result of minority stress, LGBT adults in the population in general report rates of mental health and substance use disorders that are between 1.5 and 3 times higher than those reported by heterosexual adults [17–20]. These stress-related disparities may persist post-cancer diagnosis and may be compounded by experiences of minority stress during the process of cancer care. For example, LGBT cancer survivors report stress related to disclosing their LGBT identity to cancer care providers [21], and lack of disclosure among LGBT patients in general can lead to poor health outcomes, including higher rates of psychological distress [22].

Existing studies of LGBT populations have also indicated differences in health outcomes between self-identified males and females [15]. In the limited literature on LGBT cancer-related outcomes and side-effects, males and females have reported different engagements in health behaviors [23] and different levels of health-related quality of life [3]. Much of the work on psychological distress among LGBT cancer survivors has focused specifically on

lesbian and bisexual females [4,24]; more research is needed on gay and bisexual males [25], as well as trans-gender survivors [26].

The current study

Given the lack of definitive data on rates and correlates of psychological distress among LGBT cancer survivors and the importance of assessing this side effect among both self-identified male and female LGBT survivors [27,15], the current study aims to examine symptoms of psychological distress reported by LGBT and heterosexual cancer survivors in a large, national dataset collected by the LIVESTRONG Foundation. Previous studies of psychological distress among LGBT cancer survivors have been limited by the strictures of national, non-cancer-specific datasets [3,5], have focused on survivors of only one sex [5,4], or have not assessed psychological distress specifically [3]. The current study addresses all three of these shortcomings. The current study tested both a primary hypothesis and an exploratory hypothesis.

Primary Hypothesis—LGBT cancer survivors will be more likely than heterosexual cancer survivors to endorse experiencing symptoms of psychological distress, as measured by symptom clusters in the LIVESTRONG dataset.

Exploratory Hypotheses—Disparities in endorsement of psychological distress between LGBT and heterosexual cancer survivors will differ for those self-identifying as male and those self-identifying as female.

Methods

Procedures

Data for the current study were drawn from the 2010 LIVESTRONG Foundation national survey [28]. This survey was opened from June 20, 2010 until March 31, 2011, exclusively through LIVESTRONG's online survey portal [29,30]. Participation was solicited both online and through LIVESTRONG constituent clinics. Detailed survey methodology has been published elsewhere [28]. Approval of all survey-related procedures was obtained through the Western Institutional Review Board.

Participants

A total of 5106 cancer survivors who reported a personal history of cancer diagnosis (820 receiving active treatment and 4286 post-treatment) provided responses to the LIVESTRONG survey and were included in analyses. All were residents of the USA.

Participants were identified as heterosexual, lesbian, gay, bisexual, or transgender via a single self-report item. This item asked, "Do you consider yourself to be one or more of the following: Straight; Gay or Lesbian; Bisexual; Transgender; or Other." The sample of 5106 cancer survivors included 4899 heterosexual and 207 LGBT survivors.

Measures

Items for the 2010 LIVESTRONG survey were drawn from established questionnaires and surveys, areas of concern for cancer experts, and areas of interest among those directing LIVESTRONG services. The 2010 survey was divided into five sections. The first three sections assessed physical, emotional, and practical concerns following cancer treatment and were answered only by cancer survivors, while the last two sections asked more general questions. For the purpose of this study, only items included in the emotional concerns section were evaluated as a measure of psychological distress.

The emotional concerns section included 35 dictomous (yes/no) screening items assessing nine LIVESTRONG-defined clusters of symptoms that participants might have experienced. Each screening item in a cluster asked whether participants had experienced a particular emotional or distress-related symptom ‘since treatment for cancer’. For example, screening items in the LIVESTRONG-defined ‘depression related to cancer’ cluster asked whether ‘any of the following statements [have] been true for you as a result of your experience with cancer’. The survey then listed seven symptoms of sadness and depression (e.g. ‘I have felt blue or depressed’).

We conducted categorical principal components analysis on the 35 screening items to extract clusters of related symptoms, then compared these empirically derived clusters to the symptom clusters defined by LIVESTRONG. We conducted analyses to compare heterosexual and LGBT cancer survivors on the empirically derived symptom clusters, as described in the succeeding texts.

Data analysis

We first examined demographic factors using descriptive statistics. Differences between LGBT and heterosexual participants were calculated using χ^2 and independent sample *t*-tests for dichotomous and continuous demographic characteristics, respectively.

We then used a propensity matching approach to identify a sample of heterosexual cancer survivors matched on all relevant demographic, socioeconomic, diagnostic and treatment variables to the full sample of LGBT cancer survivors [31,32]. The propensity score attempts to reduce bias from potential confounding variables using a logistic regression model with LGBT identity as the dependent variable [32]. This model considered age (continuous); self-reported sex (male vs female); race, income, level of education, employment status, relationship status, insurance status, state of residence, and type of cancer (dummy-coded categorical); age at diagnosis (continuous); and time since treatment (on active treatment, years’ post-treatment) as relevant confounding variables. Heterosexual cancer survivors were then matched 3:1 to LGBT cancer survivors using a nearest neighbor search (i.e. selecting the three heterosexual survivors with the closest possible propensity score match to an LGBT survivor). We compared covariates included in the propensity score between matched groups to ensure that the observed covariates were balanced. Refer to Table 1 for demographic and clinical variables.

Clusters were then extracted from the 35 dichotomous screening items included in the LIVESTRONG emotional concerns section using categorical principal components analysis.

This technique avoids the difficulty associated with inflated shared variance between non-continuous items based on shared distribution of limited response options, rather than shared content [33]. We set the minimum eigenvalue for factor extraction at 1 and used quartimax rotation. We compared the empirical clustering of items from this technique to the clustering of items established by LIVESTRONG. We observed the Cronbach's alpha associated with each cluster and summed the items in each cluster to obtain a count of symptoms per cluster.

For our primary hypothesis, to assess prevalence of psychological distress in LGBT and propensity-matched heterosexual cancer survivors, we conducted a series of Poisson regression analyses to examine differences between LGBT and heterosexual cancer survivors in the count of symptoms in each empirically derived cluster. We also checked for overdispersion and model fit, finding that overdispersion was not an issue in these data.

For our exploratory hypothesis, we stratified the sample by self-reported sex (male vs female) and conducted a series of Poisson regression analyses, again predicting the count of symptoms in each empirically derived cluster. This approach contrasted gay/bisexual/transgender men with heterosexual men and lesbian/bisexual/transgender women with heterosexual women.

All statistical procedures and descriptive analyses were performed with SPSS (version 20.0).

Results

Differences in demographic and clinical characteristics between LGBT and heterosexual survivors

In terms of demographic characteristics, LGBT cancer survivors were significantly more likely to report being of mixed or 'other' race than heterosexuals (4.3%, $N = 9$, and 2.1%, $N = 102$, respectively; $\chi^2 = 4.79$, $p = 0.03$) and to report being in the lowest annual income category ($0–$40,000) than heterosexuals (22.2%, $N = 46$, and 16.0%, $N = 786$, respectively; $\chi^2 = 5.56$, $p = 0.02$).

In terms of clinical characteristics, LGBT cancer survivors were significantly less likely to report having been treated with radiation than heterosexuals (40.1%, $N = 83$, and 48.5%, $N = 2376$, respectively; $\chi^2 = 4.79$, $p = 0.03$) and significantly more likely to report having been treated with immunotherapy than heterosexuals (6.3%, $N = 13$, and 3.4%, $N = 167$, respectively; $\chi^2 = 4.82$, $p = 0.03$).

Propensity score matching

Following 3:1 nearest neighbor propensity score matching without replacement, the aforementioned differences between LGBT and heterosexual cancer survivors were no longer significant (all $p > 0.05$). Examination across demographic and clinical characteristics indicated that propensity score matching had been successful, as there were no significant differences between LGBT and heterosexual cancer survivors for any demographic or clinical characteristic that had been included in the model.

Because of the political and legal issues surrounding same-sex marriages in 2010, marital status was not included in the propensity matching model. LGBT survivors who might have been living in marriage-like relationships might not have reported these relationships as a result of lack of legal recognition. Therefore, even after propensity matching, LGBT survivors were significantly less likely to report being married ($\chi^2 = 16.96$, $p < 0.001$) and significantly more likely to report being single ($\chi^2 = 56.93$, $p < 0.001$) than heterosexuals.

Participant demographics after propensity score matching

Demographic statistics are presented on the propensity-matched sample of 828 cancer survivors. All provided responses to ≥75% of demographic items on the 2010 survey [29]. Refer to Tables 1 and 2 for detailed demographic and clinical characteristics, respectively.

Consistent with similar surveys of cancer survivors, including the Surveillance Epidemiology and End Results (SEER) registry, the majority of the 828 participants were female (59%) and Caucasian (87%), with smaller percentages of Hispanic/Latino (5.5%), Black/African American (2%), and other racial group (4.5%) participants. Mean age was 48.26 (standard deviation = 12.33). Most participants had a college degree (34%) or some college education (30%). The majority of participants (68%) reported that they were employed full-time, part-time, or self-employed. Modal annual household income was $41,000–$80,000 per year (29%). Most participants (75%) had health insurance through their own or a family member's employer; only 2.3% of participants reported being uninsured.

In terms of cancer-related and treatment-related characteristics, breast cancer was the most commonly reported cancer diagnosis (22%), followed by testicular (8%), prostate (8%), and colorectal (7%) cancers. The majority of participants had been treated with surgery (72%), chemotherapy (65%), and/or radiation (41%). The mean age at diagnosis was 43 years. A total of 33% of participants had completed treatment 1–5 years previously, 13% had completed treatment less than 1 year previously, 21% of participants had completed treatment more than 5 years previously, and 21% were currently undergoing treatment.

Categorical principal components analysis

Using categorical principle components analysis with variable principal normalization, quartimax rotation, and retaining clusters with an eigenvalue >1, nine clusters were extracted, explaining 62.9% of the total variance. These nine factors mapped onto the LIVESTRONG-established clusters, with some slight item-by-item variation. Three of the clusters had eigenvalues >2 and explained a total of 38.3% of the total variance. The remaining six clusters had eigenvalues around 1 and markedly high cross-loadings. Accordingly, we focused our analyses on the three empirically strongest clusters. As shown in Table 3, the three selected clusters mapped on to LIVESTRONG's depression related to cancer cluster, social/relationship concern cluster, and fatigue/energy problems cluster. Six, five, and four items were retained in the factors, respectively; all items had factor loadings greater than 0.4 with no cross-loadings greater than 0.4. The factors showed high internal consistency, with a Cronbach's α of 0.82 for depression related to cancer, 0.88 for social/relationship concerns, and 0.85 for fatigue/energy problems.

Symptoms of psychological distress

As overdispersion was not present in these data, we report results from the Poisson regression analyses. Refer to Table 4 for details. In terms of depression related to cancer, LGBT cancer survivors reported an average of 2.39 out of 6 symptoms, while propensity-matched heterosexual cancer survivors reported an average of 2.02 symptoms. The overall Poisson regression model was significant, and LGBT identity was a significant predictor (β = 0.16, 95% confidence interval [CI] = 0.03–0.30, Wald's χ^2 = 5.98, p = 0.01), indicating that LGBT identity was associated with a significant increase in symptoms of depression.

In terms of social/relationship concerns post-cancer, LGBT cancer survivors reported an average of 1.24 out of 5 symptoms, while propensity-matched heterosexual cancer survivors reported an average of 0.94 symptoms. The overall Poisson regression model was significant, and LGBT identity was a significant predictor (β = 0.28, 95% CI = 0.02–0.53, Wald's χ^2 = 4.47, p = 0.04), indicating that LGBT identity was associated with a significant increase in social/relationship concerns.

In terms of fatigue/energy problems, LGBT cancer survivors reported an average of 2.16 out of 4 symptoms, while propensity-matched heterosexual cancer survivors reported an average of 1.97 symptoms. The overall Poisson regression model was non-significant, and LGBT identity was not a significant predictor (Wald's χ^2 = 1.95, p = 0.16), indicating no significant difference between LGBT and heterosexual cancer survivors in number of fatigue/energy problems.

Subgroup analyses by self-reported sex

Results for symptoms of depression related to cancer differed by sex. Among those identifying as male, gay, bisexual, and transgender (GBT) cancer survivors reported an average of 2.23 out of 6 symptoms, while propensity-matched heterosexual cancer survivors reported an average of 1.70 symptoms. The overall Poisson regression model was significant, and GBT identity was a significant predictor of increased symptoms of depression (β = 0.27, 95% CI = 0.05–0.50, Wald's χ^2 = 5.63, p = 0.02). Among those identifying as female, lesbian, bisexual, and trans-gender (LBT) cancer survivors reported an average of 2.50 out of 6 symptoms, while propensity-matched heterosexual cancer survivors reported an average of 2.34 symptoms. The overall Poisson regression model was non-significant, and LBT identity was not a significant predictor of increased symptoms of depression (Wald's χ^2 = 0.70, p = 0.41).

Results for social/relationship concerns also differed by sex. GBT cancer survivors reported an average of 1.17 out of 5 symptoms, while propensity-matched heterosexual cancer survivors reported an average of 0.69 symptoms. The overall Poisson regression model was significant, and GBT identity was a significant predictor of increased symptoms of depression (β = 0.52, 95% CI = 0.09–0.94, Wald's χ^2 = 5.70, p = 0.02). LBT cancer survivors reported an average of 0.96 out of 5 symptoms, while propensity-matched heterosexual cancer survivors reported an average of 1.23 symptoms. The overall Poisson regression model was non-significant, and LBT identity was not a significant predictor of increased symptoms of depression (Wald's χ^2 = 3.15, p = 0.08). Results for fatigue/energy

problems did not differ by sex; differences in number of symptoms between LGBT and heterosexual survivors were non-significant for both men and women.

Conclusions

This study highlights several important disparities that exist between LGBT and heterosexual cancer survivors. All of the participants in the current study had been diagnosed with cancer. This study shows that even in the context of cancer, a disease known to produce distress among patients and survivors, LGBT survivors experienced a higher number of certain symptoms of distress. The disparities in distress observed in LGBT populations more broadly may persist in specific medically ill subpopulations and may compromise health, quality of life, and longevity.

Disparities in depression have been reported consistently in the literature comparing the mental health of LGBT and heterosexual populations. The current study replicated this disparity in the context of cancer, showing that LGBT cancer survivors reported more depression symptoms than their heterosexual counterparts even on a measure that asked specifically about cancer-related depression. The existing literature on disparities in depression affecting LGBT survivors have pointed to minority stress as an explanatory factor. The current study indicates that disparities in depression may transcend minority stress factors and be seen even on disease-specific measures. Data from larger samples using established measures of depression would be needed to replicate this finding. In addition, the LIVESTRONG survey did not ask specifically about minority stress (e.g. experiences of discrimination and prejudice). Future studies should assess these factors and begin to disentangle the relative contributions of minority stress and cancer-related stress to distress among LGBT cancer survivors.

We found a significant disparity in prevalence of relationship difficulties among LGBT survivors relative to their heterosexual counterparts. Previous research has highlighted the importance of social support for LGBT persons [5,34,35] as well as the unique social support systems on which LGBT cancer survivors rely when facing diagnosis, treatment, and survivorship [36,37]. Given the importance, the unique nature, and the invisibility of these systems in the context of cancer care [21], it may be that any disruption in support is felt more strongly by LGBT persons than by heterosexual survivors. Targeted data collection would be needed to explore this potential explanation.

Although exploratory in nature, the analyses by sex are important for several reasons. First, the LGBT health disparity literature increasingly calls for separate analyses by sex and gender identity. For decades, researchers have grouped LGBT individuals together, when in fact variability within the group of LGBT persons may be just as great as variability between LGBT and heterosexual persons. While the LIVESTRONG dataset is not adequately powered to stratify by both sexual and gender identity, stratified analyses by self-reported sex do contribute some additional nuance to the current findings. Second, the significant differences between GBT and heterosexual men, and the lack of significant differences between LBT and heterosexual women, lead to speculations about the interaction between sex and LGBT identity in the reporting of psychological distress. Looking across groups,

heterosexual male survivors appeared to report distress at the lowest levels, while GBT men and LBT and heterosexual women all reported distress at fairly similar levels. Male gender role expectations may act most strongly on heterosexual men, preventing them from reporting distress; alternately, discrimination and disempowerment may work in similar ways on GBT men and women of all sexualities, increasing their report of distress. Further research is necessary to parse this interaction.

Future directions

The field of cancer-related disparities affecting LGBT patients and survivors of cancer is only now burgeoning. There is a need to build an empirical base, using well-designed studies and comprehensive data collection methods, in order for this new area of health disparities research to thrive. These studies could lead to disseminable, data-driven clinical recommendations addressing the needs of this underserved population. Adding items assessing sexual orientation and gender identity to national and state-level cancer registries, such as SEER, would be a major step forward in this endeavor. Once we have consistent and high-quality data on cancer prevalence among LGBT persons, we can begin looking specifically at disparities in side effects and toxicities, including psychological distress. Such disparity research could examine the relative contribution of minority stress predating cancer diagnosis, minority stress encountered during the process of seeking cancer care, and general cancer-related stress to the development of psychological distress. Given the disparity in social/relationship concerns highlighted in the current study, future research might also examine the structure of the social networks on which LGBT patients rely and the involvement and integration of care partners of LGBT survivors in cancer care.

However, describing the scope of the problem is only the first step in addressing health disparities affecting LGBT persons. There is also a need for tailored interventions designed to alleviate known disparities. While a well-designed and empirical database will aid LGBT cancer survivors in the future, there are LGBT survivors currently struggling with psychological distress and in need of efficacious and culturally competent interventions. Hopefully, this study and studies like it can serve as a foundation for developing such interventions.

Study limitations

There are several limitations to the current study. First, LIVESTRONG data are drawn from a cross-sectional survey, which limits the ability to make assertions of causality or longitudinal associations between variables. Second, although data used are collected nationwide across the USA, which enhances generalizability, it may be that LGBT cancer survivors who choose not to respond to internet-based surveys have different experiences of cancer than those who do respond to such surveys. Third, the SEER registry is the gold standard for epidemiological studies of cancer, but unfortunately, the SEER registry does not assess sexual orientation as part of its demographic questionnaire. The prevalence of certain types of cancers (e.g. testicular) also differs between the LIVESTRONG dataset and SEER. This may reflect the methodology used by the LIVESTRONG survey; because the survey was administered online, it may have attracted a younger and more internet-savvy group of survivors, such as testicular cancer survivors. Fourth, the current study was a

secondary data analysis of the LIVESTRONG dataset and was thus limited in the variables available for examination. Future research will be needed to replicate the results of this study while including LGBT-specific measures. Fifth, the LIVESTRONG survey used self-reported sexual orientation, cancer diagnoses, and psychological distress symptom measures. Other studies have used survey methodologies to collect data on sexual orientation [38]; however, it is unknown how adequately survey screening methodologies assess sexual orientation [39], and so, the LIVESTRONG survey may have under-represented the number of LGBT cancer survivors in the sample. Finally, we conducted a number of statistical tests without adjusting for multiple comparisons, as a result both of the limited data in this area and the exploratory nature of some of our hypotheses. Findings should be interpreted with this limitation in mind, and replication is necessary. While these limitations prevent causal inference for the relationship among variables and restrict generalizability of findings, the current study addresses a gap in the literature by examining disparities in a range of psychological distress factors among LGBT and heterosexual cancer survivors using a large, national dataset.

Conclusion

This is one of the first studies to examine disparities in psychological distress affecting LGBT cancer survivors. Several disparities emerged in prevalence of psychological distress and number of symptoms of distress. A need remains for further research examining mechanisms leading to disparities in distress and for tailored interventions to address the needs of LGBT survivors seeking care for their distress.

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Table 1

Demographic characteristics of propensity-matched samples (n = 828) in the LIVESTRONG dataset

Characteristic	LGBT, n = 207	Matched heterosexual, n = 621	p
Sex, *n* (%)			
Male	86 (41.5)	252 (40.6)	>.05
Female	121 (58.5)	369 (59.4)	>.05
Race/ethnicity, *n* (%)			
Hispanic/Latino	11 (5.3)	36 (5.8)	>.05
Asian/Pacific Islander	1 (0.5)	3 (0.5)	>.05
Non-Hispanic Black	6 (2.9)	7 (1.1)	>.05
Non-Hispanic White	180 (87.0)	543 (87.4)	>.05
Other	9 (4.3)	28 (4.5)	>.05
Age, mean (SE)	47.62 (11.78)	48.48 (12.51)	>.05
Education, *n* (%)			
High school or less	19 (9.1)	47 (7.6)	>.05
Some college	60 (29.0)	195 (31.3)	>.05
Bachelor's degree	67 (32.4)	212 (34.1)	>.05
Graduate degree	56 (27.1)	168 (27.1)	>.05
Other/unknown	5 (2.4)	14 (2.2)	>.05
Employment status, *n* (%)			
Employed part/full time	140 (67.6)	424 (68.3)	>.05
Unemployed/student	30 (14.5)	76 (12.2)	>.05
Retired	17 (8.2)	63 (10.1)	>.05
Other/unknown	20 (9.6)	58 (9.3)	>.05
Yearly income, *n* (%)			
$0–$40,000	46 (22.2)	124 (20.2)	>.05
$41,000–$80,000	59 (28.5)	183 (29.5)	>.05
$81,000–$120,000	42 (20.3)	124 (20.0)	>.05
$121,000+	31 (15.0)	83 (13.4)	>.05
Other/unknown	29 (14.0)	107 (17.2)	>.05
Marital status, *n* (%)			
Married/domestic partner	106 (51.2)	417 (67.1)	<.001
Separated/widowed	9 (4.4)	91 (14.6)	>.05
Single/never married	88 (42.5)	105 (16.9)	<.001
Other/unknown	4 (1.9)	8 (1.3)	>.05
Insurance status, *n* (%)			
Employer/self	156 (76.4)	450 (72.4)	>.05
Government/public aid	28 (13.5)	94 (15.1)	>.05
Uninsured	5 (2.4)	14 (2.3)	>.05
Other/unknown	26 (12.6)	66 (10.6)	>.05
Sexual/gender identity, *n* (%)			
Lesbian/gay	154 (3.0)		

Characteristic	LGBT, *n* = 207	Matched heterosexual, *n* = 621	*p*
Bisexual	51 (1.0)		
Transgender	6 (0.1)		

Table 2

Clinical, cancer-related characteristics of propensity-matched samples (n = 828) in the LIVESTRONG dataset

Characteristic	LGBT, n = 207	Matched heterosexual n = 621	p
Common cancers, n (%)			
Breast	42 (20.3)	142 (22.9)	>.05
Testicular	19 (9.2)	50 (8.1)	>.05
Prostate	15 (7.2)	52 (8.4)	>.05
Colorectal	15 (7.2)	46 (7.4)	>.05
Type of treatment, n (%)			
Chemotherapy	137 (66.2)	406 (65.4)	>.05
Radiation	83 (40.1)	259 (41.7)	>.05
Surgery	143 (69.1)	452 (72.8)	>.05
Hormone therapy	37 (17.9)	113 (18.2)	>.05
Age at diagnosis			
Mean (SE)	41.94 (13.99)	43.35 (21.24)	>.05
Survivorship time, n (%)			
Currently on treatment	44 (21.3)	128 (20.6)	>.05
Less than 1 year	27 (13.0)	85 (13.7)	>.05
1 to 5 years	68 (32.9)	208 (33.5)	>.05
More than 5 years	45 (21.7)	130 (20.9)	>.05
Other/unknown	23 (11.1)	70 (11.3)	>.05

Table 3

Items and cluster loadings for the three highest eigenvalue clusters (n = 828)

Cluster and items with original item numbering		1.	2.	3.
Cluster 1. Depression (6 items, eigenvalue = 8.44, α = .82)				
147.	Felt blue or depressed	.77	.13	.15
148.	Bothered by mood swings	.75	.13	.16
150.	Felt constant worry	.68	.17	.15
149.	Felt anxious	.66	.09	.18
151.	Dates (e.g. diagnosis date) remind me about cancer	.60	.22	.07
153.	Diagnosis of depression	.54	.08	−.01
Cluster 2. Social/relationship (5 items, eigenvalue = 2.60, α = .88)				
187.	Did not want to participate in social gatherings	.25	.82	.14
190.	Reluctant to meet new people	.16	.82	.10
189.	Did not want to be around friends	.24	.78	.08
191.	Don’t go to events used to enjoy	.26	.75	.17
186.	Reluctant to start new relationships	.14	.69	.05
Cluster 3. Fatigue/energy problems (4 items, eigenvalue = 2.31, α = .85)				
139.	Felt tired	.23	.14	.81
140.	Trouble getting rest	.25	.12	.80
138.	Did not have energy	.22	.19	.77
141.	Trouble sleeping	.25	.11	.72

Table 4

Means, standard deviations, and Poisson regression statistics for count of psychological distress symptoms among LGBT and heterosexual cancer survivors (n = 828)

	LGBT, n = 207		Heterosexual, n = 621					
	M	SD	M	SD	β	95% CI	Wald's χ^2	p
Depression related to cancer	2.39	1.75	2.02	1.73	0.16	0.03–0.30	5.98	0.01
Social/relationship difficulties	1.24	1.75	0.94	1.58	0.28	0.02–0.53	4.47	0.04
Fatigue/energy problems	2.16	1.63	1.97	1.63	0.10	−0.04–0.23	1.95	0.16