Original article

Gender identity and sexual orientation affect health care satisfaction, but not utilization, in persons with Multiple Sclerosis

Shahin Khayambashi[a], Amber Salter[b], Tuula Tyry[c], Gary R. Cutter[d], Robert J. Fox[e], Ruth Ann Marrie[a,f,*]

[a] *Department of Internal Medicine, Max Rady College of Medicine, Rady Faculty of Health Sciences, University of Manitoba, Winnipeg, Canada*
[b] *Department of Biostatistics, Washington University in St. Louis, St. Louis, MO, United States*
[c] *Dignity Health, St. Joseph's Hospital and Medical Center, Phoenix, AZ, United States*
[d] *Department of Biostatistics, University of Alabama at Birmingham, Birmingham, AL, United States*
[e] *Mellen Center for Multiple Sclerosis, Neurological Institute, Cleveland Clinic, Cleveland, OH, United States*
[f] *Department of Community Health Sciences, Max Rady College of Medicine, Rady Faculty of Health Sciences, University of Manitoba, Winnipeg, Canada*

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ABSTRACT

Objective: We aimed to determine the association between gender identity and sexual orientation on health care utilization in persons with multiple sclerosis (MS), as well as satisfaction with their doctor and comfort discussing sexual health with their doctor.
Methods: We surveyed participants from the North American Research Committee on Multiple Sclerosis (NARCOMS) Registry regarding their gender identity and sexual orientation in 2017. Participants also reported their sociodemographic characteristics, disability status, health behaviors and health care utilization, including whether any hospitalizations or emergency room (ER) visits occurred or any disease-modifying therapy (DMT) was used within the last six months. We compared the likelihood of hospitalizations, ER visits and DMT use between (i) cisgender and transgender participants; and (ii) heterosexual, homosexual, and "other sexual orientation" participants using multivariable logistic regression models adjusting for potential confounding factors.
Results: Of the 5,604 eligible responders, 1168 (20.8%) reported their sex at birth as male and 4436 reported their sex at birth as female (79.2%). Twenty-five (0.45%) participants identified as transgender and 260 (4.6%) as non-heterosexual individuals. As compared to participants who reported their sexual orientation as heterosexual, non-heterosexual participants were younger, with an earlier age at MS symptom onset, more likely to have a post-secondary education, and more likely to be single. The frequency of any ER visits, any hospital admissions, and DMT use did not differ according to gender identity did not differ according to gender identity or sexual orientation. As compared to cisgender participants, transgender participants reported less comfort ($p < 0.042$) discussing sexual health with their doctor; findings were similar for non-heterosexual participants as compared to heterosexual participants. Participants reporting other sexual orientation also reported lower satisfaction ($p < 0.039$) with their doctor than other participants.
Conclusion: Gender identity and sexual orientation were not associated with differences in healthcare utilization in persons with MS. However, health care experiences and satisfaction with care may be altered by gender identity and sexual orientation.

1. Introduction

Multiple sclerosis (MS) is a disease of the central nervous system in which sex, the biological and physiological attributes that distinguish males from females (Short et al., 2013), influences susceptibility to disease and disease outcomes. MS more commonly affects females, but males have worse disability progression (Bove and Chitnis, 2013).

Furthermore, the increased risk of depression in males with MS compared to males without MS exceeds the increased risk of depression in females with MS compared to females without MS (Marrie et al., 2015). Several sex-related mechanisms have been proposed to explain the disparities in MS risk and disability progression, such as differences in estradiol levels and Vitamin D-related immunomodulary effects (Seifert et al., 2017; Krementsov et al., 2018). Less is known regarding

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the influence of gender, the socially and societally constructed roles, behaviors, and relationships that differentiate men from women (Short et al., 2013), on MS-related outcomes. However, gender differences in outcomes and management are recognized in other neurologic disorders such as stroke (Petrea et al., 2009).

Like gender, sexual orientation also affects health outcomes. Gay or lesbian individuals are more likely to suffer from poorer overall health, have worse health care experiences, and are less likely to obtain needed medical care than heterosexual counterparts (Ward et al., 2014; Elliott et al., 2015). Limited work has assessed the effects of sexual orientation on health care and outcomes in MS. One study showed that gay persons with MS were less likely to receive psychological services and were more likely to report switching MS centers than heterosexual persons with MS because of experiences of homophobic behaviors (Lavorgna et al., 2017).

We assessed the joint effects of gender and sexual orientation in persons with MS on health care utilization. Given previously reported stigmatization, discrimination and other unfavorable experiences with health care in sexual minorities (Socías et al., 2014; Ward et al., 2014; Elliott et al., 2015; Steele et al., 2017; Bell and Purkey, 2019), we hypothesized that transgender and non-heterosexual persons with MS would have lower health care utilization compared to cisgender and heterosexual persons. Furthermore, we hypothesized that transgender and non-heterosexual MS participants would have lower satisfaction with their care providers.

2. Methods

2.1. Study population

We conducted this study using data from the North American Research Committee on Multiple Sclerosis (NARCOMS) Registry. At enrollment, participants report sociodemographic and clinical information which is updated semi-annually. Questionnaires are completed on paper or online according to participant preference. Diagnoses of MS have been validated in a random sample of participants (Marrie et al., 2007). The institutional review board of Washington University at St. Louis approves the NARCOMS Registry.

2.2. Participant characteristics

Participant characteristics were drawn from the enrollment and Fall 2017 questionnaires. Specifically, the enrollment questionnaire provided information regarding date of birth, race, education level, age at MS symptom onset, and age at MS diagnosis. Age at symptom onset and age at diagnosis were used to calculate the diagnostic delay. We categorized race as white or non-white. Education level was categorized as ≤high-school/GED or post-secondary (Associate's Degree, Bachelor's Degree, Post-graduate education, and Technical degree). The Fall 2017 questionnaire provided information regarding state of residence, annual household income, marital status, health behaviors, disability status, and relapses and any disease-modifying therapy (DMT) use in the prior six months. We categorized states of residence as west, midwest, south and eastern according to the United States census bureau; non-US residence was a separate category. Annual household income was reported as ≤$15,000, $15,001–$30,000, $30,001–$50,000, $50,001–$100,000, > $100,000 and "I do not wish to answer" but subsequently collapsed to < $50,000, ≥$50,000 or I do not wish to answer. Marital status was categorized as single (never married, divorced, widowed, or separated) and married (married or co-habiting). Health behaviors captured included current smoking (yes/no); any physical activity in the prior month (yes/no); and body mass index (BMI) calculated via self-reported height and weight. Alcohol intake was reported as never, monthly or less, two to four times per month, two to three times per week, or four or more times per week, and was collapsed as never; two to four times per month or less; or two or more times per week. Disability status was reported using the Patient-Determined Disease Steps (PDDS)

scale, a validated measure that is highly correlated with the physician-assessed Expanded Disability Status Scale score (Marrie and Goldman, 2007; Learmonth et al., 2013). The PDDS scale is scored from 0 (no disability) to 8 (bedridden). We grouped PDDS 0–1 as mild disability (no limitations in mobility), 2–4 as moderate disability (moderate limitations in mobility), and 5–8 as severe disability (significant limitations in mobility) (Marrie et al., 2017).

2.3. Sex, gender identity and sexual orientation

We included questions regarding gender identity and sexual orientation in the Fall 2017 update survey derived from the 2013 National Health Interview Survey (Ward et al., 2014). Participants reported the sex they were assigned at birth (male, female, decline to answer), and their gender identity with the provided options being male; female; female-to-male (FTM); male-to-female (MTF); gender queer, neither exclusively male nor female; additional gender category (specify); and decline to answer (specify why). Those who answered FTM, MTF, gender queer, or additional category were classified as transgender given the small cell sizes. Participants who identified with their sex assigned at birth were classified as cisgender. Participants also reported their sexual orientation as straight (heterosexual), lesbian or gay, bisexual, something else, or don't know. Those who answered something else were given the options of: "you are not straight, but identify with another label such as queer, trisexual, omnisexual or pan-sexual"; "you are transgender or transsexual; you have not or are in the process of figuring out your sexuality"; "you do not think of yourself as having a sexuality"; "you personally reject all labels of yourself"; "you made a mistake and did not mean to pick this answer"; "you mean something else (specify)". Those who answered don't know were given the options of: "you don't understand the words"; "you understand the words, but you have not or are in the process of figuring out your sexuality"; "you mean something else (specify)". Lesbian or gay individuals were grouped as "homosexual" and the bisexual/something else/don't know were grouped as "other sexual orientation".

Participants reported whether the doctor who provides most of their MS care was aware of their (i) gender identity; and (ii) sexual orientation (yes/no). If they responded yes, participants were asked to report how their doctor knew with response options being: I disclosed without being asked; I disclosed because my doctor asked; S/he probably assumes it; and Someone else told him/her.

2.4. Outcomes

Health care utilization outcomes of interest included (i) any emergency room visits (ER) in the prior six months; (ii) any hospital admissions in the prior six months; and (iii) any DMT use in the prior six months. Additional outcomes included participants' overall satisfaction with their doctor, and comfort discussing sexual health with their doctor. For these questions we indicated that we were interested in the doctor who provided most of their MS care. Participants were asked "How comfortable are you with discussing sexual health with your doctor?" and "How satisfied are you with your doctor?", with possible responses being very satisfied/comfortable, satisfied/comfortable, unsatisfied/uncomfortable, and very unsatisfied/uncomfortable (Mosack et al., 2013). The very satisfied and satisfied individuals were grouped as satisfied, and the unsatisfied and very unsatisfied were grouped as unsatisfied. Similarly, the very comfortable and comfortable individuals were grouped as comfortable, and the uncomfortable and very uncomfortable were grouped as uncomfortable.

2.5. Analysis

We excluded individuals who did not report a confirmed diagnosis of MS (Fig. 1), and respondents who did not answer the sex they were assigned at birth, or declined to provide their gender identity or sexual orientation, as these were our independent variables of interest. We summarized the demographic and clinical characteristics of participants using means, standard
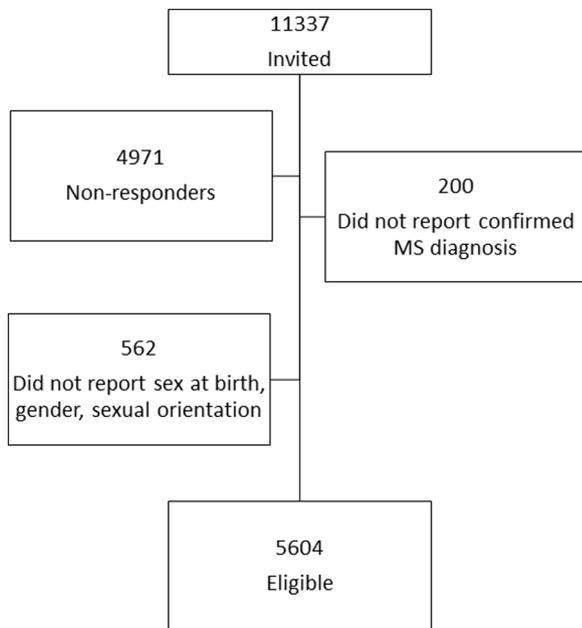
11337
Invited

4971
Non-responders

200
Did not report confirmed MS diagnosis

562
Did not report sex at birth, gender, sexual orientation

5604
Eligible

Fig. 1. Flowchart of participant selection.

deviations (SD), frequencies, and percentages, as appropriate. Comparisons between groups were made using chi-squared tests, Wilcoxon tests, Kruskal-Wallis tests, and student's *t*-tests, as appropriate.

We constructed logistic regression models to determine the effects of gender identity and sexual orientation on the five outcomes described above. All models included covariates of age, race (white as reference group), education (post-secondary as reference group), income (> $50,000 as reference group), marital status (married as reference group), current smoking (no as reference group), any physical activity (no as reference group), alcohol intake (never as reference group), disability status (mild disability as reference group), any relapses in the prior six months (no as reference group). Because model assumptions were not met, age was categorized as < 55 (reference), 55–64, and ≥ 65 years based on the distribution of our sample. We report the strength of the associations using odds ratios (OR) and 95% confidence intervals. Model fit was assessed using the Hosmer-Lemeshow goodness of fit test.

Statistical analyses were conducted using SAS V9.4 (SAS Institute Inc., Cary, NC) and SPSS V25 (IBM, Armonk, NY).

3. Results

3.1. Participants

Of the 11,337 participants to whom the survey was distributed,

Table 1
Participant characteristics according to gender identity.

Characteristic	Total ($n = 5604$)	Cisgender ($n = 5579$)	Transgender ($n = 25$)	P-value
Age (years), mean (SD)	60.5 (10.3)	60.6 (10.3)	57.3 (11.7)	0.12
Age at MS symptom onset (years), mean (SD)	31.3 (10.1)	31.1 (10.3)	28.6 (8.9)	0.26
Sex assigned at birth, *n* (%)				0.06
Female	4436 (79.2)	4420 (79.2)	16 (64.0)	
Male	1168 (20.8)	1159 (20.7)	9 (36.0)	
Sexual orientation, n (%)				< 0.0001
Heterosexual	5344 (95.4)	5340 (95.7)	7 (28.0)	
Homosexual	143 (2.5)	136 (2.4)	4 (16.0)	
Other orientation	117 (2.1)	103 (1.8)	14 (56.0)	
White race, n (%)	4906 (87.5)	4887 (87.6)	19 (76.0)	0.08
Education level, *n* (%)				0.55
High school/GED	1445 (26.7)	1437 (26.7)	8 (32.0)	
Post-secondary	3957 (73.2)	3940 (73.3)	17 (68.0)	
Income, *n* (%)				0.82
< $50,000	1895 (33.8)	1888 (33.8)	7 (28.0)	
≥$50,000	2522 (45.0)	2510 (45.0)	12 (48.0)	
I do not wish to answer	1187 (21.2)	1181 (21.2)	6 (24.0)	
Marital status, *n* (%)				0.50
Married/Common law	3875 (70.6)	3857 (70.6)	18 (78.3)	
Single/Widowed/Divorced	1613 (29.4)	1608 (29.4)	5 (21.7)	
United States (US) Census Region, *n* (%)				0.12
West	1481 (26.4)	1477 (26.5)	4 (16.0)	
Midwest	1340 (23.9)	1336 (23.9)	4 (16.0)	
South	1550 (27.7)	1544 (27.7)	6 (24.0)	
East	1151 (20.5)	1140 (20.4)	11 (44.0)	
Non-US	82 (1.5)	82 (1.5)	0 (0)	
Delay from symptom onset to diagnosis (years), median (IQR)	5 (2–11)	5 (2–11)	5 (2–10)	0.95
PDDS, *n* (%)				0.008
Mild (0–1)	1641 (29.6)	1638 (29.6)	3 (12.0)	
Moderate (2–4)	1878 (33.8)	1862 (33.7)	16 (64.0)	
Severe (5–8)	2034 (36.6)	2028 (36.7)	6 (24.0)	
Any relapses in the last 6 months, *n* (%)	793 (29.2)	786 (14.2)	7 (29.2)	0.11
Current smoker, *n* (%)	463 (8.4)	459 (8.4)	4 (16.0)	0.15
BMI (kg/m^2)[a], mean (SD)	30.0 (6.3)	27.1 (11.9)	27.3 (5.8)	0.55
BMI category[a], *n* (%)				0.76
Underweight/normal	2454 (44.5)	2444 (44.5)	10 (40.0)	
Overweight	1648 (29.9)	1641 (29.9)	7 (28.0)	
Obese	1413 (25.6)	1405 (25.6)	8 (32.0)	
Physical activity (yes), *n* (%)	3347 (60.4)	3334 (60.5)	13 (52.0)	0.39
Alcohol intake, *n* (%)				0.98
Never	1866 (33.6)	1858 (33.6)	8 (32.0)	
Two to four times a month or less	2367 (42.6)	2356 (42.6)	11 (44.0)	
Two or more times per week	1323 (23.8)	1317 (23.8)	6 (24.0)	

[a] Two people with implausible values excluded; PDDS = Patient Determined Disease Steps, BMI = body mass index.

6366 (56.1%) responded. As compared to responders, non-responders were younger at MS symptom onset (mean [SD] 30.4 [10.4] vs. 31.1 [10.4], $p < 0.0001$), more likely to be non-white (1075 [21.6%] vs. 838 [13.2%], $p < 0.0001$), more likely to be women (4033 [81.5%] v. 5034 [79.1%], $p = 0.0013$) and were more likely to have ≤ high school education (1304 [31.2%] vs. 1624 [27.1%], $p < 0.0001$). After applying the exclusion criteria, 5604 (88.0%) responders were eligible for the analyses (Fig. 1). Eligible participants were more likely to have attained > high school education, and had a lower level of disability than those who were ineligible (all $p < 0.003$); age, gender and race did not differ.

3.2. Gender identity & sexual orientation

Of the 5604 eligible responders, 1168 (20.8%) reported their sex at birth as male and 4436 reported their sex at birth as female (79.2%). The distribution with respect to gender differed slightly, with 1159 (20.7%) participants reporting their gender as male, 4420 (78.9%) as female, and 25 (0.45%) as transgender. Nearly three-quarters of participants reported some post-secondary education, most reported white race, and two-thirds reported having moderate or severe disability (Table 1). Transgender participants were less likely to report being heterosexual than cisgender participants, and they were more likely to report moderate or severe disability than cisgender participants (Table 1). Other demographic and clinical characteristics did not differ between groups.

Of the 5604 responders, 5344 (95.4%) reported their sexual orientation as heterosexual, 143 (2.5%) as homosexual, and 117 (2.1%) as something else. As compared to participants who reported their sexual orientation as heterosexual, non-heterosexual participants were younger, with an earlier age at MS symptom onset, more likely to have a post-secondary education, more likely to be single and more likely to live in west and east US regions than in the midwest (Table 2).

3.3. Satisfaction with physician

A lower proportion of the transgender participants reported that their doctor was aware of their gender identity (62.5%) compared to the cisgender participants (99.7%, $p < 0.0001$). The transgender participants were also less likely to report being comfortable discussing sexual health with their doctor than cisgender participants (Table 3). The likelihood of being satisfied with their doctor did not differ according to gender identity (Table 3). However, satisfaction differed according to whether the doctor knew their gender identity. Individuals whose doctor knew their gender identity had a higher frequency of being satisfied (96.1%) than individuals whose doctor did not know their identity (89.6%, $p = 0.0008$).

Participants reporting a heterosexual orientation were more likely to report being satisfied with their physician than those in the other sexual orientation group ($p = 0.011$, Table 3). Homosexual and other sexual orientation participants were less comfortable discussing sexual health with their doctor compared to the heterosexual participants (Table 3). As compared to participants reporting a heterosexual orientation (95.3%), those reporting a homosexual orientation (79.0%) were less likely to report that their doctor was aware of their sexual orientation; those reporting other sexual orientation were even less likely to report that their doctor was aware of their sexual orientation than the other two groups (35.1%, $p < 0.0001$).

3.4. Health care utilization

The frequency of any ER visits, any hospital admissions, and DMT use did not differ according to gender identity (Table 3). Similarly to gender identity, the frequency of ER visits, hospital admissions and DMT use in the last six months did not differ according to sexual orientation.

Due to the small number of participants describing themselves as transgender, we did not include this characteristic in the multivariable models with sexual orientation so we included sex at birth. On multivariable logistic regression, sexual orientation was not associated with ER visits, hospital admissions or DMT use (Table 4). Older age, lower income, any relapse in the last six months, and higher levels of disability were associated with increased odds of ER visits and hospital admissions. Higher levels of alcohol intake were associated with reduced odds of ER visits and hospital admissions. In contrast, older age, lower income, higher levels of disability, and smoking were associated with reduced odds of DMT use. After adjustment, sexual orientation was not associated with being satisfied with their doctor. As compared to participants reporting a heterosexual orientation, those reporting a homosexual or other sexual orientation reported reduced odds of being comfortable discussing their sexual health with their doctor (Table 4). Sex at birth did not modify the association of sexual orientation with any outcome.

4. Discussion

In this large study of persons with MS, we found that 0.45% of respondents reported being transgender. This estimate falls within the confidence intervals of the 0.58% (95%CI: 0.36%-0.95%) reported in a 2016 population-based survey in the United States (Flores et al., 2016), where most NARCOMS participants reside. Our older population may be a contributing factor to the slightly lower proportion of participants identifying as transgender, since older individuals are less likely to identify as transgender (Flores et al., 2016). Within the NARCOMS population, 95.4% of respondents reported their sexual orientation as heterosexual, 2.6% as homosexual, and 2.1% as something else, similar to findings reported in the general US population. In the Massachusetts Behavioral Risk Factor Surveillance Surveys conducted in 2001–2008, 97% of respondents identified as heterosexual, 2% as homosexual, and 1% as bisexual (Conron et al., 2010). Men were more likely to identify as homosexual than women (Conron et al., 2010), consistent with our findings.

We found no difference between ER visits, hospital admissions and DMT use between transgender and cisgender participants, although this finding should be interpreted cautiously given the small number of transgender participants, and the short, 6-month reference study period. We expected lower utilization in the transgender population given previous studies showing worse experience with health care due to discriminatory behaviors, stigmatization, and lack of physician experience addressing unique transgender-related health issues as well as reported avoidance of health care (Roberts and Fantz, 2014; Socías et al., 2014). However, other studies suggest that transgender individuals have worse physical and mental health compared to cisgender counterparts (Fredriksen-Goldsen et al., 2014), and transgender participants in our study reported more moderate or severe disability than cisgender participants, likely increasing health care use.

We found no differences in ER visits, hospital admissions, or DMT use according to sexual orientation. This finding is discordant with previous reports that homosexual and bisexual individuals are less likely to access health care due to poor experiences and lower quality of care compared to their heterosexual counterparts (Elliott et al., 2015). However, homosexual and bisexual individuals also report overall poorer health, particularly with respect to psychiatric illness, and are more likely to smoke and use alcohol compared to their heterosexual counterparts (Ward et al., 2014; Elliott et al., 2015; Simoni et al., 2017). Thus, it is possible the overall worse health and health-related behaviors in homosexual and other sexual orientation groups could counterbalance a tendency to seek less care, particularly among persons with a serious chronic condition such as MS. Although we did not observe differences in health behaviors according to sexual orientation in our sample, consistent with the sole prior study examining sexual orientation and health care in MS (Lavorgna et al., 2017), relapses were more common among those reporting as other sexual orientation. The six-month look-back period may also have been too short to detect a

Table 2

Participant characteristics according to sexual orientation.

Characteristic	Heterosexual (n = 5344)	Homosexual (n = 143)	Other sexual orientation (n = 117)	P-value
Age (years), mean (SD)	60.7 (10.2)	58.4 (9.2)	53.5 (11.3)	0.0001[a]
Age at MS symptom onset (years), mean (SD)	31.2 (10.3)	30.2 (9.8)	27.5 (9.6)	0.0001[b]
Sex assigned at birth, n (%)				0.015[c]
Female	4239 (79.3)	100 (69.9)	97 (82.9)	
Male	1105 (20.7)	43 (30.1)	20 (17.1)	
White race, n (%)	4683 (87.6)	125 (87.4)	98 (83.8)	0.45
Education level, n (%)				0.009[d]
High school/GED	1398 (27.1)	29 (21.0)	18 (15.3)	
Post-secondary	3753 (72.9)	109 (79.0)	95 (81.2)	
Income, n (%)				0.013[e]
< $50,000	1790 (33.5)	52 (36.4)	53 (45.3)	
≥$50,000	2407 (45.0)	72 (50.3)	43 (36.8)	
I do not wish to answer	1147 (21.5)	19 (13.3)	21 (17.9)	
Marital status, n (%)				< 0.0001[f]
Married/Common law	3726 (71.2)	91 (65.0)	58 (51.3)	
Single/Widowed/Divorced	1509 (28.8)	49 (35.0)	55 (48.7)	
United States (US) Census Region, n (%)				0.0022[g]
West	1399 (26.2)	47 (32.9)	35 (29.9)	
Midwest	1296 (24.2)	22 (15.4)	22 (18.8)	
South	1485 (27.8)	41 (28.7)	24 (20.5)	
East	1091 (20.4)	30 (21.0)	30 (25.6)	
Non-US	73 (1.4)	3 (2.1)	6 (5.1)	
Delay from symptom onset to diagnosis (years), median (IQR)	5 (2–11)	6 (2–13)	6 (2–12)	0.076
PDDS, n (%)				0.0037[h]
Mild (0–1)	1568 (29.6)	40 (28.2)	33 (28.2)	
Moderate (2–4)	1763 (33.3)	64 (45.1)	51 (43.6)	
Severe (5–8)	1963 (37.1)	38 (26.8)	33 (28.2)	
Any relapses in the last 6 months, n (%)	740 (13.9)	21 (14.7)	32 (27.6)	0.0014[i]
Current smoker, n (%)	433 (8.2)	14 (9.9)	16 (13.9)	0.078
BMI (kg/m²)[a], mean (SD)	27.1 (12.1)	27.7 (7.0)	27.2 (7.0)	0.55
BMI category[a], n (%)				0.45
Underweight/normal	2345 (44.6)	58 (41.4)	51 (44.0)	
Overweight	1579 (30.0)	38 (27.1)	31 (26.7)	
Obese	1335 (25.4)	44 (31.4)	34 (29.3)	
Physical activity (yes), n (%)	3182 (60.2)	86 (61.0)	79 (67.5)	0.28
Alcohol intake, n (%)				0.76
Never	1788 (33.7)	44 (31.4)	34 (29.1)	
Two to four times a month or less	2256 (42.6)	60 (42.9)	51 (43.6)	
Two or more times per week	1255 (23.7)	36 (25.7)	32 (27.3)	

PDDS = Patient Determined Disease Steps, BMI = body mass index; a-P-values: heterosexual vs. homosexual = 0.0006, heterosexual vs. other < 0.0001, homosexual vs. other = 0.0025; b- P-values: heterosexual vs. homosexual = 0.31, heterosexual vs. other < 0.0001, homosexual vs. other = 0.0094; c- P-values: heterosexual vs. homosexual = 0.0064, heterosexual vs. other = 0.34, homosexual vs. other =0.015; d- P-values: heterosexual vs. homosexual = 0.11, heterosexual vs. other = 0.0078, homosexual vs. other = 0.30; e- P-values: heterosexual vs. homosexual = 0.061, heterosexual vs. other = 0.028, homosexual vs. other = 0.088; f- P-values: heterosexual vs. homosexual = 0.11, heterosexual vs. other < 0.0001, homosexual vs. other = 0.019; g- P-values: heterosexual vs. homosexual = 0.074, heterosexual vs. other = 0.002, homosexual vs. other = 0.33; h- P-values: heterosexual vs. homosexual = 0.0075, heterosexual vs. other = 0.047, homosexual vs. other = 0.096; i- P-values: heterosexual vs. homosexual = 0.82, heterosexual vs. other = 0.0002, homosexual vs. other = 0.038.

difference between the groups, if present.

A lower proportion of the transgender group reported that their doctor was aware of their gender identity than did the cisgender group. This may reflect discrimination experiences (Bell and Purkey, 2019), or be partly due to our finding of the lack of comfort of transgender individuals in discussing sexual health with the physician responsible for the care of their

MS. Women who are in sexual minorities report lower satisfaction with their health care providers who are unaware of their sexual identity (Mosack et al., 2013). We found no difference between the transgender and cisgender groups regarding overall physician satisfaction, but satisfaction was influenced by whether their physician knew their gender identity.

Similar to the transgender group, the homosexual and other sexual

Table 3

Outcomes according to gender identity and sexual orientation status.

	Any ER visits, n (%)	Any Hospital admissions, n (%)	Use of disease-modifying therapy, n (%)	Satisfied with doctor, n (%)	Comfortable discussing sexual health with doctor, n (%)
Gender identity					
Cisgender	856 (15.4)	464 (8.4)	3372 (60.4)	5240 (95.9)	4283 (79.4)
Transgender	6 (24.0)	3 (12.0)	13 (52.0)	24 (100)	15 (62.5)
P-value	0.24	0.51	0.39	0.31	0.042
Sexual orientation					
Heterosexual	826 (15.6)	441 (8.3)	3221 (60.3)	5024 (96.0)	4116 (79.7)
Homosexual	15 (10.5)	13 (9.9)	94 (65.7)	135 (95.7)	104 (73.2)
Other	21 (17.9)	12 (10.3)	70 (59.8)	105 (91.3)	78 (68.4)
P-value	0.19	0.59	0.42	0.039[a]	0.0026[b]

[a] P-value: heterosexual vs. homosexual = 0.86, heterosexual vs. other = 0.011, homosexual vs. other = 0.14.

[b] P-value: heterosexual vs. homosexual = 0.06, heterosexual vs. other = 0.0032, homosexual vs. other = 0.40.

Table 4

Odds ratios (95% confidence intervals) for the association of emergency room (ER) visits, hospital admissions, disease-modifying therapy (DMT) use, satisfaction with doctors, and comfort discussing sexual health with doctor with sexual orientation.

Characteristic	Any ER visits	Any hospital admissions	Any DMT	Satisfied	Comfortable
Sexual orientation					
Heterosexual	1.0	1.0	1.0	1.0	1.0
Homosexual	0.75 (0.43, 1.31)	1.51 (0.84, 2.71)	1.14 (0.77, 1.68)	1.07 (0.43, 2.67)	0.59 (0.39, 0.88)
Other	1.08 (0.63, 1.83)	1.24 (0.63, 2.45)	0.73 (0.48, 1.10)	0.52 (0.26, 1.07)	0.54 (0.35, 0.84)
Sex at birth					
Female	1.0	1.0	1.0	1.0	1.0
Male	1.03 (0.84, 1.25)	1.27 (1.00, 1.62)	1.01 (0.87, 1.17)	1.56 (1.04, 2.32)	3.50 (2.78, 4.42)
Age					
< 55	1.0	1.0	1.0	1.0	1.0
55–64	1.04 (0.83, 1.29)	1.15 (0.85, 1.56)	0.51 (0.43, 0.61)	0.92 (0.64, 1.32)	0.83 (0.69, 1.00)
≥65	1.24 (0.99, 1.54)	1.66 (1.24, 2.24)	0.27 (0.22, 0.31)	1.06 (0.71, 1.57)	0.95 (0.78, 1.16)
Race					
White	1.0	1.0	1.0	1.0	1.0
Non-white	1.15 (0.92, 1.45)	1.17 (0.87, 1.56)	1.21 (1.01, 1.46)	1.31 (0.83, 2.07)	1.24 (0.99, 1.55)
Education level					
High school/GED	1.0	1.0	1.0	1.0	1.0
Post-secondary	1.01 (0.84, 1.21)	1.12 (0.89, 1.42)	0.89 (0.77, 1.02)	1.15 (0.84, 1.57)	0.85 (0.72, 1.01)
Income					
< $50,000	1.34 (1.10, 1.64)	1.50 (1.16, 1.94)	0.78 (0.67, 0.91)	0.71 (0.50, 1.02)	1.04 (0.86, 1.25)
≥$50,000	1.0	1.0	1.0	1.0	1.0
I do not wish to answer	1.02 (0.82, 1.28)	1.02 (0.76, 1.37)	0.82 (0.70, 0.96)	0.99 (0.66, 1.48)	0.92 (0.76, 1.10)
Marital status					
Married/Common law	0.95 (0.79, 1.14)	0.88 (0.70, 1.11)	1.12 (0.98, 1.29)	1.15 (0.84, 1.58)	0.73 (0.62, 0.87)
Single/Widowed/Divorced	1.0	1.0	1.0	1.0	1.0
Patient Determined Disease Steps					
Mild (0–1)	1.0	1.0	1.0	1.0	1.0
Moderate (2–4)	1.45 (1.15, 1.84)	1.31 (0.94, 1.83)	0.93 (0.80, 1.09)	0.66 (0.45, 0.96)	1.02 (0.85, 1.22)
Severe (5–8)	2.34 (1.85, 2.97)	2.49 (1.81, 3.43)	0.60 (0.51, 0.71)	0.79 (0.50, 1.21)	0.94 (0.77, 1.14)
Any relapses in the last 6 months	2.32 (1.91, 2.82)	2.19 (1.71, 2.80)	1.09 (0.91, 1.30)	0.72 (0.50, 1.02)	1.06 (0.85, 1.30)
Current smoker	0.82 (0.61, 1.10)	0.90 (0.62, 1.32)	0.78 (0.62, 0.95)	0.77 (0.50, 1.21)	1.37 (1.03, 1.84)
Body mass index					
Underweight/normal	1.0	1.0	1.0	1.0	1.0
Overweight	0.96 (0.79, 1.16)	0.86 (0.67, 1.11)	1.14 (0.99, 1.31)	0.90 (0.65, 1.26)	1.01 (0.86, 1.20)
Obese	1.20 (0.99, 1.46)	1.15 (0.90, 1.48)	1.11 (0.95, 1.29)	0.99 (0.69, 1.41)	1.00 (0.84, 1.20)
Any physical activity	1.02 (0.86, 1.21)	1.20 (0.96, 1.48)	0.89 (0.78, 1.02)	0.88 (0.65, 1.19)	1.09 (0.93, 1.28)
Alcohol intake					
Never	1.0	1.0	1.0	1.0	1.0
Two to four times a month or less	0.83 (0.70, 0.99)	0.69 (0.55, 0.87)	1.12 (0.98, 1.29)	1.23 (0.89, 1.69)	1.21 (1.02, 1.43)
Two or more times per week	0.68 (0.54, 0.86)	0.70 (0.52, 0.95)	0.86 (0.73, 1.02)	1.06 (0.71, 1.58)	1.06 (0.87, 1.30)
C-statistic	0.67	0.71	0.68	0.63	0.63
HLGOF	10.2, $p = 0.25$	14.6, $p = 0.068$	2.59, $p = 0.96$	10.7, $p = 0.22$	9.0, $p = 0.34$

HLGOF = Hosmer Lemeshow Goodness of Fit; Addition of covariate of Doctor knowledge of sexual orientation produced poor model fit thus not retained.

orientation participants reported lower doctor awareness of their sexual orientation, and less comfort discussing sexual health with their doctor. In the general population, homosexual and bisexual persons are less likely to disclose their sexual orientation to health care providers than heterosexuals (Durso and Meyer, 2013). A prior study suggested that homosexual and bisexual MS patients are more likely to experience less staff friendliness, and face frequent assumptions that they were heterosexual (Lavorgna et al., 2017). These types of experiences may affect disclosure of sexual identity to healthcare providers. The other sexual orientation group reported less satisfaction with their care providers compared to the homosexual and heterosexual patients. These findings are consistent with recent data showing that although a shift towards positive attitudes towards homosexual individuals has occurred over time, this shift has not occurred towards members of other sexual minority groups (Dodge et al., 2016). Recognition of the need for culturally sensitive care is growing, but a recent survey by the American Academy of Neurology identified awareness gaps by neurologists (Rosendale et al., 2019). Nearly half (44%) of neurologists felt that acknowledging sexual orientation and gender identity had no bearing on managing neurological illness. Potential ways to provide more culturally sensitive care include having a medical record system that records and tracks patients' preferred name, gender identity, sexual orientation, and preferred pronouns, training staff in the appropriate use of language, and using open-ended questions when asking about partner status and living situations (Fredriksen-Goldsen et al., 2014; Landry, 2016).

Higher socioeconomic status, an enabling factor based on the

Andersen Healthcare Utilization Model (Andersen, 2008), was associated with reduced odds of ER visits and hospital admission and increased odds of DMT use. As expected, having relapse(s) or worse disability, which reflect needs for healthcare utilization based on the Andersen model, was associated with increased odds of ER visits and hospital admission. Higher alcohol intake was inversely related to odds of having ER visits, and moderate alcohol intake decreased the odds of having hospital admission. This relationship has consistently been shown in other studies (Rice et al., 2000). Theories proposed to explain this phenomenon including individuals with more severe medical conditions being unable to consume alcohol, or individuals self-medicating with alcohol being less likely to seek healthcare (Rice et al., 2000; Polen et al., 2001). Our questionnaire did not allows us to examine these possibilities.

This study had several limitations. First, NARCOMS participants are volunteers who may not fully represent the general MS population. Second, our response rate was 56% and non-responders differed from responders with respect to SES and disability at enrollment. Third, the number of participants reporting a transgender sexual identity, while consistent with findings in the general population, was very small, limiting the inferences we could draw in this study. Fourth, we did not capture the sex or gender identity of the health care providers of study participants, which may have modified participant satisfaction with care. Finally, we used one question to assess satisfaction with their physician. Future studies should use more comprehensive validated instruments to assess satisfaction with care more broadly. Nonetheless,

this study involved a large, socio-demographically varied population with MS, and addressed a topic which has been understudied in MS.

Gender identity and sexual orientation were not associated with differences in healthcare utilization in the NARCOMS population. However, gender identity influenced comfort discussing sexual health with physicians; and sexual orientation influenced comfort discussing sexual health and satisfaction with physicians. Provision of adequate culturally appropriate care to individuals in minority gender identity and sexual orientation groups requires health care providers to appreciate gender and sexual orientation as non-binary entities, and to appreciate the challenges patients of a gender or sexual minority may have in getting adequate care. Our findings suggest opportunities exist to improve the health care experiences of these groups.

Disclosures

Acknowledgements

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