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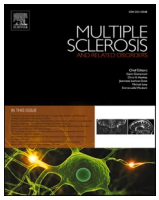

Review article

# Diversity and representation within the literature on sexual dysfunction in multiple sclerosis: A systematic review

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ABSTRACT

*Introduction:* Sexual dysfunction (SD) is a common and distressing symptom for people living with multiple sclerosis (MS). Populations included in existing studies of SD may not fully reflect the diversity of people living with MS, with important implications for wider applicability. We aimed to evaluate reporting of sex, gender identity, sexual orientation, and ethnicity across studies of SD in MS.

*Methods:* A systematic search of four databases was performed. Two independent authors evaluated all papers. Reporting of sex and gender identity, sexual orientation, and ethnicity were recorded.

*Results:* A total of 419 papers were reviewed, and 204 studies with 77,902 participants met the criteria for evaluation. Of 204 studies, 98 (48.0%) included both male and female participants; 78 (38.2%) included females only, and 27 (13.2%) males only. In 19 (9.3%) studies, participants were asked their gender. No studies reported asking a two-step question on sex and gender identity. No studies reported including non-binary patients or gender identities other than male or female. No studies reported including intersex patients. Only 10 (4.9%) studies reported the inclusion of homosexual or bisexual participants, or participants from other sexual minority groups. The overwhelming majority of studies (181; 88.7%) did not report ethnicity or race of participants.

*Conclusion:* Sex, gender identity, sexual orientation, and ethnicity are poorly reported in studies on SD in MS. These variables must be adequately evaluated to ensure research applies across diverse MS patient populations.

## 1. Introduction

Multiple sclerosis (MS) affects an estimated 2.8 million people worldwide and is increasing in prevalence in every region of the globe. (Walton et al., 2020) Sexual dysfunction (SD) is an important and common 'hidden' symptom in MS. It is defined as a person's inability to participate in a sexual relationship as they would wish. International Classification of Diseases (ICD) People with sexual dysfunction have been shown to have a poorer quality of life, poorer outcomes in health, personal relationships, and safety alongside greater alienation from their community. (Lew-Starowicz and Rola, 2013) The prevalence of SD in MS is estimated at 55–61 % in women, and 63 % in men, with individual studies reporting prevalence rates of up to 90 % in both men and women. (Yazdani et al., 2023; Azimi et al., 2019; Dastoorpoor et al., 2021; Polat Dunya et al., 2020)

In males, sexual function includes libido, erection, ejaculation, orgasm, and detumescence. In females, it consists of libido, arousal, orgasm, and satisfaction. (Guo et al., 2012) SD can be categorised into primary, secondary, and tertiary. In the context of MS, primary SD describes SD caused by demyelinating lesions affecting neural pathways necessary for sexual function. Secondary SD results from MS symptoms such as fatigue and physical disability, which may limit sexual expression. Tertiary SD arises from the psychological and emotional effects of MS. (Kessler et al., 2009) SD in MS may fall into one of these three categories or result from any combination of the three.

Specific scales exist for evaluating sexual function; (Gaviria Carrillo et al., 2023) in addition, sexual function often comprises a small number of items on general quality of life questionnaires. Despite the high prevalence, evidence-based interventions for managing SD in people with MS are limited. Body mapping and stimulation tools are amongst

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the specific recommendations for SD in people with MS . (Gromisch et al., 2016) However, there is no evidence for their effectiveness in this group. Therapeutic approaches, both pharmacological and non-pharmacological, focus on the physical limitations experienced by people with SD and MS, which are unlikely to address secondary SD fully and have no impact on tertiary SD.

The importance of representation across sexual and gender minority groups is increasingly understood. The terms "gender" and "sex" are commonly used interchangeably but are distinct. Sex is a biological component, whereas gender is an identity influenced by social, cultural, and environmental factors. (Clayton and Tannenbaum, 2016) Sexual orientation can additionally impact healthcare outcomes. Homosexual women, non-binary people (a person who does not identify with the binary categories of man and woman), (Gender identity, 2023) pansexual, asexual and queer people particularly lack representation in MS research. (Rosendale et al., 2021) MS affects people of all races and ethnicities, and differences in race and ethnicity can manifest in health disparities. (Ontaneda and Amezcua, 2023) It is crucial to understand better which populations the current body of research represents to design studies and report results in a way that enables potential interventions to be relevant to all people we treat.

Representation across the body of literature on SD and MS has not been studied. In this systematic review, we examine the existing literature on SD in MS with a focus on representation within and across studies. We considered three parameters within which people can be minoritised: gender, sexual orientation, and ethnicity, with the aim of understanding current representation and highlighting the need for further work in this area.

## 2. Methods

### 2.1. Search strategy

The initial systematic search was performed across four databases in September 2023: MEDLINE (via PubMed), Embase, CINAHL, and Emcare. The following keywords were used in the search strategy: ("multiple sclerosis" OR MS OR CIS OR "clinically isolated syndrome") AND ("sexual dysfunc*" OR libido* OR orgasm* OR "sex* behav*" OR "sex* disorder" OR "sex* satisfaction" OR "sex* arousal" OR "erectile dysfunc*"). No limits were set on the search dates to ensure all relevant evidence was included.

### 2.2. Study selection

Abstracts were screened independently by two reviewers, with any inconsistencies resolved through discussion. A systematic review software manager (Rayyan) was used to carry out abstract screening. (Ouzzani et al., 2016) Full-text screening and evaluation of included studies was carried out independently by two reviewers with a third reviewer resolving any inconsistencies. English language studies with a full-text available reporting on any aspect of SD in a population of people with MS were included. Non-human research, case reports, letters, reviews, and systematic reviews were excluded. Studies purely focused on validating tools to measure SD were excluded as these often focused on homogenous populations and translation of already validated scales and did not evaluate SD itself. Studies where the population were healthcare professionals rather than people with MS were excluded. PRISMA guidelines for scoping reviews were adhered to where appropriate (Appendix 1). (Tricco et al., 2018)

### 2.3. Study evaluation

Representation within studies in each area was evaluated based on reporting and population breakdown. The three areas assessed were gender and sex diversity, ethnic and racial diversity, and sexual orientation (Table 1). Gender and sex reporting were assessed across five domains to ascertain which sexes and gender identities were included in each study. Evaluation of reporting of sexual orientation was done in two steps and evaluated in line with the question within the UK census to report sexual orientation. (18) Ethnicity or race reporting in studies utilised three questions to assess reporting and categorisation of ethnicities.

**Table 1**
Questions used when evaluating studies across three domains; sex and gender identity, sexual orientation, and ethnicity and race.

| | Question |
|---|---|
| **Sex and gender identity** | 1: Were both sex and gender identity reported?<br>2: Were participants asked to self-identify their sex, gender identity, or both?<br>3: Was a two-step question utilised on sex assigned at birth and current gender identity?<br>4: Was there an option to select non-binary or other gender identity, or to self-specify gender by writing your own answer? If yes, did the study include anyone identifying with a gender identity other than a man or woman?<br>5: Did the study include any intersex individuals? |
| **Sexual orientation** | 1: Was sexual orientation asked about in the study?<br>2: Were there at least four sexual orientation categories to select from (heterosexual, homosexual, bisexual, and other), or an option to self-specify by writing in an answer? |
| **Ethnicity/ race** | 1: Was ethnicity or race reported?<br>2: Does the study avoid grouping ethnicities (e.g. BAME or White vs Non-white)?<br>3: Which categories were included in the reporting of ethnicity? (if applicable) |

## 3. Results

### 3.1. Search results

Our search retrieved a total of 6131 results. Duplicate removal resulted in 4358 records for title and abstract screening. A total of 419 reports were screened at a full-text level, with 215 exclusions, leaving a total of 204 studies for evaluation (Fig. 1).

### 3.2. Characteristics of studies

A total of 204 studies were evaluated, incorporating 77,902 people with MS. Studies were published between 1969 and 2023, with a median publication year of 2016. Of these, 180 (75.0 %) were published from 2000 onwards. The location of the participants in each study was recorded and grouped by sub-region (Fig. 2). The country producing the most studies was Iran (41/204; 20.1 %), followed by Turkey (21/204; 10.3 %) and Italy (20/204; 9.8 %). Scientific area of publication varied; 137 (67.2 %) papers were published in medical journals, 52 (25.5 %) in multidisciplinary journals, 12 (5.9 %) in nursing journals, 2 (1.0 %) in psychology journals and 1 (0.5 %) in an allied health journal. By subject area, most papers were published in neurology journals (75; 36.8 %), sexual behaviour, health, and medicine journals (52; 25.5 %), and general medicine journals (20; 9.8 %).

### 3.3. Gender, sexual orientation, and ethnic diversity within studies

Around half of the studies included, 98/204 (48.0 %), included both male and female participants. Of the remainder, 78 (38.2 %) included female patients only, and 27 (13.2 %) male patients only. None reported both sex and gender identity of the participants. Only 19 (9.3 %) asked participants to report their gender, and 8 (3.9 %) to report their sex. Nine studies (4.4 %) reported utilising existing demographic data from medical records or databases to determine gender or sex, and the remainder, 168 (82.4 %) did not report how gender or sex was determined. No studies reported asking a two-step question on sex and gender identity. No studies reported including non-binary patients or gender

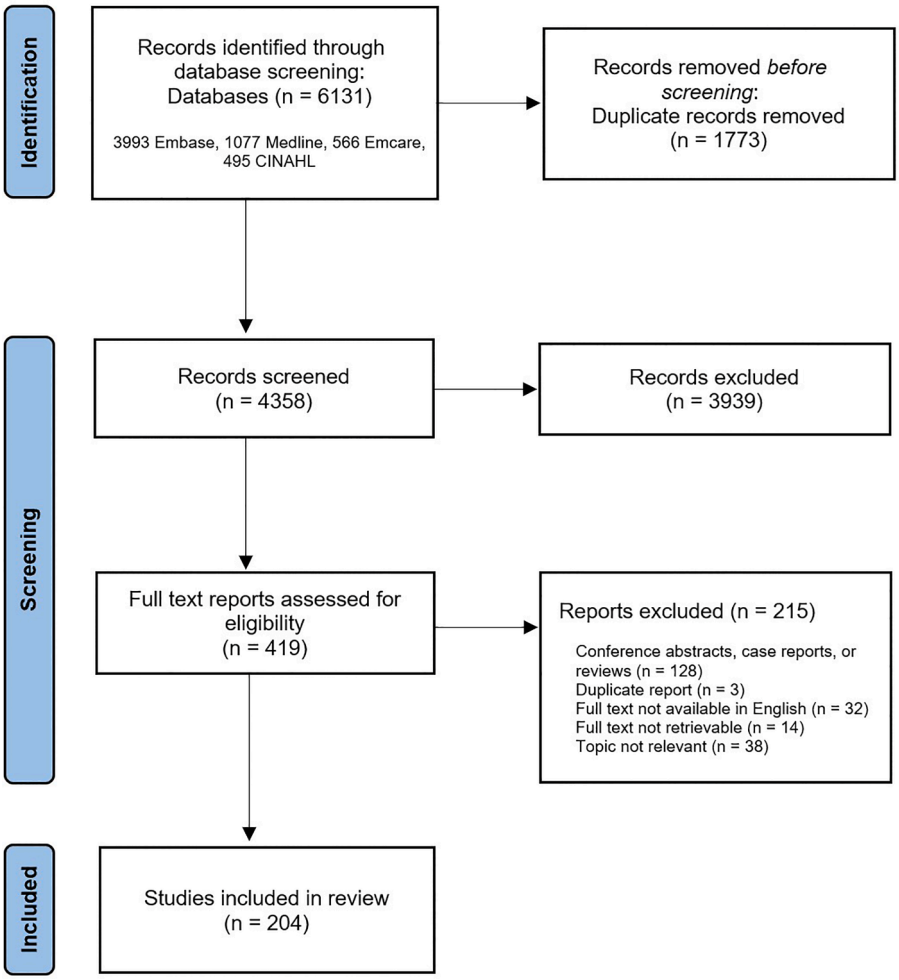


**Fig. 1.** PRISMA flow diagram of study screening and selection.

identities other than male or female. No studies reported including intersex patients.

The overwhelming majority of studies (167/204; 81.9 %) did not report sexual orientation. Only 10 (4.9 %) studies reported the inclusion of participants who were homosexual and/or bisexual in addition to heterosexual participants. A further six studies (2.9 %) specified the proportion of heterosexual participants but did not specify sexual orientation(s) of the remaining participants. Four studies specified being in a heterosexual relationship as an inclusion criterion, and 11 (5.4 %) studies reported that all participants included were heterosexual. A number of studies, 31 (15.2 %), had a martial status of married in the inclusion criteria.

Eight studies (3.9 %) reported the proportion of White vs non-White, grouping all other ethnicities. A further three studies included populations that were all White. Seven (34.3 %) studies reported including specific ethnicities such as Black or Hispanic. Five studies commented on the backgrounds of all or the majority of their study populations being from Anglo-Saxon backgrounds. The remainder of the studies (181/204; 88.7 %) did not report the ethnicity of their participants.

### 3.4. Subject areas of studies

A total of 74/204 (36.3 %) of studies, incorporating 46,725 participants, primarily examined the prevalence of SD in MS, with 35 studies also examining clinical and/or demographic factors associated with SD. The impact of SD on overall quality of life measures was the main subject area of 7 studies.

The association or correlation of different factors with SD was the primary subject in 58/204 (28.4 %) studies. A further 41 studies that looked at the prevalence of SD in MS also evaluated the association or correlation of other factors with SD. In total 99 studies examined associations with SD (Table 2).

Interventions for SD in MS were examined in 40/204 (19.6 %) studies involving a total of 2349 participants (Table 3). Overall, 10/40 studies examined pharmacological interventions and 30/40 non-pharmacological interventions.

The experiences of people with MS with SD were the primary focus in 32 (15.7 %) studies. Of these, 21 focussed on the experience of sexuality and sexual satisfaction in people with MS and SD, 11 examined the impact of MS on relationships and relationship functioning, and four on changes in sexual life, functioning, and satisfaction. Four studies looked at communication with healthcare professionals around SD, three on expectations around the management of SD, three on the impact on quality of life and three on coping strategies.

## 4. Discussion

Our review highlights the almost complete lack of data around population diversity in studies of SD in people living with MS, despite a wide range of topics in such studies. There were no studies that explicitly included sex and gender-diverse participants. However, we acknowledge that some studies may have included sex and gender minorities but did not report this. Whilst on the surface, this finding is unsurprising, in studies specifically examining and questioning participants on sexual

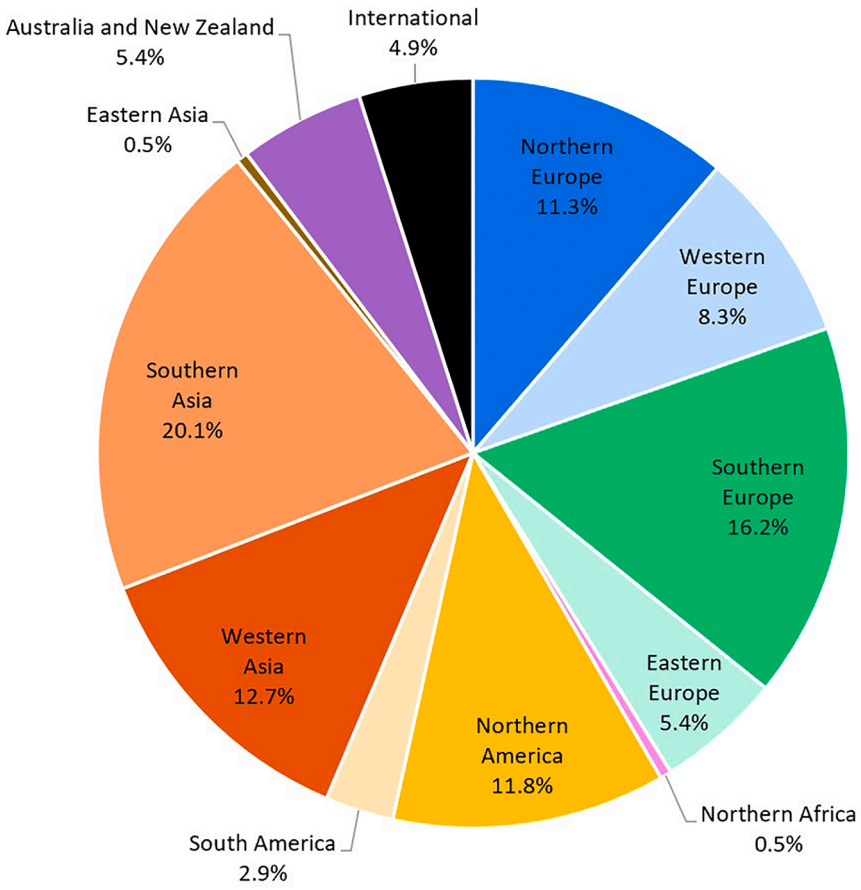


**Fig. 2.** Location of study participants by United Nations subregions.

**Table 2**
Number of studies that investigated the association or correlation of clinical, demographic, lifestyle or personal factors, and investigation findings with SD, sexual satisfaction, or sexual function in MS. Some studies examined more than one associated factor.

| Factor type | Factor | Number of studies |
|---|---|---|
| Clinical characteristics | Bladder function or lower urinary tract symptoms | 9 |
| | Cognitive function or impairment | 5 |
| | Depression, anxiety, mental health | 26 |
| | Disease severity, disability, or characteristic of MS | 48 |
| | Hormone status | 4 |
| Demographic characteristics (such as age, education status, smoking status) | | 26 |
| Lifestyle or personal factors | Quality of life | 14 |
| | Relationship factors | 4 |
| | Self-esteem, social support, and illness perception | 5 |
| Investigation findings | MRI findings | 8 |
| | Sensory evoked potentials | 6 |
| | Urodynamic findings | 5 |

dysfunction (rather than epidemiological or routine MS care studies), we would argue that this is notable. Recent UK Census data indicates that 3.2 % of the population identify as gay, lesbian, bisexual or another sexual orientation (LGBTQ+), with 7.5 % of the population choosing not to answer the question. (19) The apparent non-representation of people from sexual and gender minorities within this area of research needs to be highlighted as a first step towards improving representation.

Understanding the populations taking part in these studies is crucial to understand how best to meet the needs of the diverse population of people living with MS; including, or implying the inclusion of, only a narrow population in studies of this nature limits applicability, relevance, and may result in the needs of already minoritised people with MS not being met. This is of prime importance when studying SD in MS, as biological sex influences the phase of the sexual response cycle that an individual experiences and the psychological and emotional components of tertiary SD may be impacted by gender identity. Whilst it could be argued that data around sex, sexuality and gender are hard to come by, this is often because neurologists do not enquire. However, they are of prime importance to people living with MS and they require the same attention as other aspects of MS.

Where both sex and gender are relevant to the topic, research studies should report both, and analysis should consider this. (Heidari et al., 2017) Asking a two-step question on sex assigned at birth and then on current gender identity is recommended as this avoids confusion and accurately gathers data on both factors. (Clayton and Tannenbaum, 2016) Sex and gender minorities are underrepresented across neurological research as a whole, and the small body of existing research often focuses on one factor such as sexual orientation, thus failing to examine the impact of other factors and characteristics that may converge to cause disparate outcomes. (Rosendale et al., 2021) Despite the importance of this, only eight studies explicitly reported including participants with sexual orientations other than heterosexual, with six studies including homosexual participants, and five including bisexual participants. (Zorzon et al., 2001; Zorzon et al., 1999; Petracca et al., 2023,24; Gagliardi, 2003; Hennessey et al., 1999) One study utilised different terms for sexual orientation, such as “only towards women, not at all towards men” and “occasionally towards men”. It also allowed participants to select the option “does not find gender important”. (Prinssen et al., 2023) We note that in some regions representation may have been

**Table 3**
Interventional studies for SD in MS.

| Study randomisation | Intervention type | Details on intervention |
|---|---|---|
| Non-randomised studies ($n = 13$) | Counselling/ therapy ($n = 1$) | Educational counselling ($n = 1$) |
| | Devices ($n = 2$) | Vacuum penile tumescence ($n = 2$) |
| | Education ($n = 2$) | Group education ($n = 2$) |
| | Exercise ($n = 2$) | Pelvic floor exercises ($n = 2$) |
| | Exercise and devices ($n = 1$) | Pelvic floor exercises vs nerve stimulation ($n = 1$) |
| | Pharmacological interventions ($n = 5$) | Intracavernous papaverine injection ($n = 1$) |
| | | Natalizumab ($n = 1$) |
| | | Onabotulinum A toxin injection ($n = 1$) |
| | | Tadalafil ($n = 2$) |
| Randomised studies ($n = 27$) | Counselling/ therapy ($n = 11$) | Group counselling ($n = 2$) |
| | | Permission, Limited Information, Specific Suggestions, and Intensive Therapy (PLISSIT) and extended PLISSIT therapy ($n = 6$) |
| | | Sexual and sexuality-specific therapy ($n = 2$) |
| | | Skill-based sexual enhancement counselling ($n = 1$) |
| | Counselling and education ($n = 1$) | Counselling and educational materials ($n = 1$) |
| | Devices ($n = 1$) | Transcutaneous electrical nerve stimulation ($n = 1$) |
| | Diet modifications ($n = 1$) | Synbiotics and anti-inflammatory-antioxidant diet ($n = 1$) |
| | Education ($n = 4$) | 'Good enough sex model' ($n = 1$) |
| | | Group social work ($n = 1$) |
| | | Health promotion education ($n = 1$) |
| | Exercise ($n = 2$) | Aquatic exercise ($n = 2$) |
| | | Yoga ($n = 1$) |
| | Exercise and devices ($n = 1$) | Pelvic floor exercises and electrostimulation ($n = 1$) |
| | Exercise and mindfulness ($n = 1$) | Pelvic floor exercises and mindfulness ($n = 1$) |
| | Pharmacological interventions ($n = 5$) | Bupropion ($n = 1$) |
| | | Midodrine ($n = 1$) |
| | | Sildenafil ($n = 3$) |

further limited due to culture, stigma and legal concerns.

Ethnicity was sparsely reported, and where it was, over half of the studies looked at White vs non-White groups. Studies should avoid grouping using collective terms for people of distinct ethnicities, such as "Black, Indigenous, and people of colour" (BIPOC), "Black, Asian, and minority ethnic" (BAME), and "non-White". (Flanagin et al., 2021) The lack of ethnicity reporting exists across the MS literature; (Onuorah et al., 2022) therefore it is unsurprising that ethnicity was not well reported with respect to SD. Frequencies and manifestations of primary, secondary, and tertiary SD in MS could conceivably vary by ethnic background, thus despite ethnicity being a social construct, disaggregating results has the potential to reveal health disparities. (Flanagin et al., 2021; Romano et al., 2023) Reporting of race and ethnicity must include a careful examination of associated factors, such as socioeconomic status, structural biases and discrimination.

Despite its prevalence, people with MS do not routinely seek help or advice from their neurologist for sexual problems. In one study only 2.2 % of women had ever discussed SD with their physician. (Lew-Starowicz and Rola, 2013) It has been reported that other symptoms, embarrassment, or sexual problems being seen as a low priority, are common reasons for not discussing SD with healthcare providers. Additionally, many people with MS felt that there was no point in discussing SD due to a perceived lack of treatment, and amongst those who seek help, over half are dissatisfied with the help given. (Tudor et al., 2018; Redelman, 2009) The most common barriers to healthcare professionals initiating discussions include others in the consultation room, a lack of knowledge about SD, and a lack of time in the consultation. (Tudor et al., 2018; Gaviria-Carrillo et al., 2022) Additional concerns include how healthcare professionals engage in communication around LGBTQIA+ relationships, SD during menopause, and SD in older people. (Tudor et al., 2018)

This scoping review was not without limitations. Despite our best efforts, there were 14 full-text papers that we could not retrieve, although they were listed in the search results of the CINAHL and Embase databases. What these papers may have contributed to our understanding of SD in MS is unknown. In addition, we could not evaluate full-texts that were not available in English. There was a lack of studies from Central Asia, Eastern Asia, South-Eastern Asia and all subregions of Africa. Whether studies from these countries were not captured in our search is unknown. The geographic spread of papers may have further limited reported, as we note that many papers originated from Iran, where same-sex sexual activity is criminalised at the present time, and LGBTQ+ people are subject to discrimination and violence.

The interpretation of sex and gender identity, sexual orientation, and ethnicity reporting is constrained by the lack of reporting on these factors in the majority of studies. Although it seems that sex and gender minorities were excluded from the body of literature on SD in MS, it is not possible to conclude that this is the case due to the lack of reporting. Likewise, ethnicity was not reported in the vast majority of studies. Finally, this review focussed on the reporting of sex, gender identity, sexual orientation, and ethnicity, thus did not look in detail at the evidence on the prevalence of SD in MS, interventions for SD in MS, the factors associated with SD and MS, and the literature examining the experiences of people with SD and MS. Although the topics of the studies were reported, these were not evaluated for bias and accuracy.

Overall, the lack of reporting on sex and gender identity, sexual orientation, and ethnicity in studies on SD and MS makes it difficult to know the true makeup of the populations reported on in the literature. Reporting of gender identity, sex, sexual orientation and ethnicity is important to illuminate health disparities, and understand how these factors affect health outcomes. Clinician attention to sexual function is low compared to other symptom areas, particularly for people from sexual or gender minority groups. (Anderson et al., 2021) The MS community is global and diverse, and a lack of representation in research studies can obscure and compound health disparities and compromise the generalisability of the studies to the wider MS population. An intersectional approach is essential; including sex and gender minorities, a range of diverse ethnicities, and a consideration of socioeconomic, demographic, and geographic factors to fully explore how SD affects all people with MS and determine effective interventions that will need to be equitably distributed to the global MS community.

## CRediT authorship contribution statement

**Safiya A Zaloum:** Writing – original draft, Methodology, Investigation, Formal analysis, Data curation. **Meera Mahesh:** Writing – review & editing, Formal analysis. **Melisa A Cetin:** Writing – review & editing, Formal analysis. **Shivani Ganesh:** Writing – review & editing, Formal analysis. **Rachel Horne:** Writing – review & editing, Conceptualization. **Gavin Giovannoni:** Writing – review & editing, Conceptualization. **Ruth Dobson:** Writing – review & editing, Supervision, Methodology, Conceptualization.

## Declaration of competing interest

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