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Conference on 'Understanding the role of sex and gender in nutrition research' Symposium one: Influence of sex and gender in nutrition research

Nutrition research and practice with transgender and gender non-conforming populations

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The purpose of the present article is to describe the current state of sex and gender data collection in nutrition science research, discuss the effects of flawed data collection practices, highlight considerations for transgender and gender non-conforming populations and propose a sex- and gender-informed approach to human subjects research. Sex and gender are separate constructs that are often conflated in nutrition research and practice. Current nutrition surveillance programmes in the United States, United Kingdom and Ireland do not accurately capture sex and gender data, which undermines the accuracy of the analyses and excludes gender minorities. Transgender and gender non-conforming populations have distinct clinical and psychosocial nutrition considerations that require further research to inform nutrition policy and practice, such as anthropometric and biochemical changes with hormone therapy, eating disorders, food insecurity and nutrition as a source of empowerment or expression of gender identity. Researchers can apply a sex- and gender-informed approach to human subjects research by treating sex and gender as separate, relevant demographic data, appreciating gender as a fluid construct, and approaching data collection on gender minorities with sensitivity to privacy and confidentiality.

Sex: Gender identity: Transgender persons

Sex and gender are often conflated or omitted in nutrition research and practice settings; however, these are separate and essential constructs in nutrition science[1–3]. *Sex* is assigned as female or male at birth based on assessment of external genitalia at birth, chromosomes and gonads, whereas *gender* is a core element of a person's individual sense of self and how they fit into the world as a man, woman, neither or a different gender identity. The term *cisgender* describes a person whose sex and gender are aligned. The term *transgender* describes a person whose gender differs from the sex they were assigned at birth. *Gender non-conforming* describes a person whose gender differs from the sex they were assigned at birth, but may be more complex, fluid and multifaceted[4,5]. Conflation or omission of sex and gender data has meaningful implications for nutrition science. The purpose of the present article is to describe the current state of sex and gender data collection in nutrition science research, discuss the effects of flawed data collection practices and highlight considerations for transgender and gender non-conforming populations. A sex- and gender-informed approach to nutrition research design, analysis and reporting will be proposed.

Current state of sex and gender data collection in nutrition science research

Data produced by nutrition surveillance programmes are essential for nutrition epidemiology and population-level

Abbreviation: HT, hormone therapy.

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analyses. Sex and gender data collection practices vary programme. In the United States, the National Health and Nutrition Examination Survey asks participants to report their 'gender' with response options of 'male', 'female' or 'does not identify as either'. If the participant 'cannot decide', interviewers are instructed to probe with the question, 'What would you tell a doctor?' If the participant still 'cannot decide' or 'refuses to answer', interviewers are then instructed to ask for sex assigned at birth noted on the participant's original birth certificate[2,6]. This approach offers numerous opportunities for improvement. When querying gender, response options are limited to the female–male binary and do not adequately capture the identities of gender minorities. With the probe 'What would you tell a doctor?', participants may still be uncertain of whether to report their sex or gender; additionally, participants may feel uncomfortable or unsafe sharing sensitive information about their gender identity. Lastly, the switch to querying sex is a clear conflation of sex and gender data in data collection and reporting practices.

Next, the Behavioral Risk Factor Surveillance System collects state-level data about residents' health-related risk behaviours, chronic health conditions and use of preventive health services. The Behavioral Risk Factor Surveillance System began offering states an optional module in 2014 which includes sexual orientation and gender identity data; a single-question module on sex at birth was added in 2019. As of 2019, thirty-two states adopted the sexual orientation and gender identity module and seven states adopted the sex at birth module[7]. Although this approach offers separate questions for sex and gender, analyses are limited by whether individual states have adopted the modules. The Youth Risk Behavior Surveillance System, which tracks health behaviours among students in grades nine through twelve, conflates sex and gender in a different manner. Although the category of the question is labelled as 'gender identity', the question posed to respondents is, 'What is your sex?'[8] Similar to National Health and Nutrition Examination Survey data collection practices, this approach conflates sex and gender and offers the binary female–male response options.

In Ireland, the Irish Universities Nutrition Alliance collects data on the dietary intake and health status of the population from ages 1–90 with surveys administered throughout the lifespan. The National Adult Nutrition Survey reports data by gender with males or females[9]. The recent National Teens' Food Survey II and the National Children's Food Survey II report data by gender with boys or girls[10,11]. The National Pre-School Nutrition Survey conflates the terms sex and gender throughout its reporting[12]. This approach could be strengthened by separately querying sex and gender, as well as offering a wider breadth of gender response options.

Lastly, throughout the United Kingdom, the National Diet and Nutrition Survey collects data on diet, nutrient intake and nutritional status of the population ages 1·5 and older. The National Diet and Nutrition Survey reports data on sex for men/boys and women/girls[13]. Similar to the Irish Universities Nutrition Alliance data collection practices, the National Diet and Nutrition Survey approach could be strengthened by providing a separate question for sex and gender with a breadth of gender response options.

Effects of conflation or omission of sex and gender data in nutrition science

Conflation or omission of sex and gender data obfuscates essential demographic data in nutrition studies conducted with human subjects. When sex and gender are conflated, such as a general question that asks participants to check a box for male or female, transgender and gender non-conforming patients may be unsure of whether to record their biological sex or gender identity, which will undermine the precision and generalisability of the study[2].

In addition, limiting the response options for gender to male or female contributes to the erasure of transgender and gender non-conforming participants from a dataset. Portions of a country's population may be unrepresented or misrepresented as a result. In the United Kingdom, the Government Equalities Office estimated there are 200 000–500 000 transgender individuals, though acknowledged no robust data on the transgender population exist[14]. In Ireland, the Lesbian, Gay, Bisexual, Transgender and Intersex Ireland Report collected data on 2264 lesbian, gay, bisexual, transgender and intersex people, 12·3 % of whom identified as transgender[15]. Based on a medical record review at a gender dysphoria clinic in Dublin, Ireland, scholars estimated that 0·0067 % of the population was impacted by gender dysphoria, a condition that describes unease or mismatch between one's sex and gender, by comparing the number of patients referred for hormone therapy (HT) with census data[16]. In the United States, scholars extrapolated data from the Behavioral Risk Factor Surveillance System and Youth Risk Behavior Surveillance System to estimate 1·4 % of youth ages 13–17, or 150 000 people, and 0·5 % of adults, or 1·3 million people identified as transgender[17]. Precise estimates of the number of transgender individuals remain unknown throughout much of the world[5].

Lack of data on transgender and gender non-conforming populations perpetuates a research gap on the distinct nutrition needs and health disparities impacting the population, and therefore insufficient evidence to inform nutrition policy and practice. The pipeline of data to policy and practice is cut short by omission of basic demographic data.

Food and nutrition considerations for transgender and gender non-conforming populations

Emerging research has identified prominent food and nutrition-related considerations among transgender and gender non-conforming populations (Fig. 1). The nutrition-related considerations are broadly classified as

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clinical or psychosocial in nature[18]. Importantly, these studies have relied on smaller samples relative to the large samples supported by national nutrition surveillance programmes.

Clinical nutrition considerations

Transgender individuals may transition to their affirmed gender socially, legally and/or medically. The timing and ways in which a person transitions are individualised[5]. A medical transition may involve gender-affirming surgeries and/or HT, the latter of which results in nutrition-related anthropometric and biochemical changes. The goals of HT for adults are to lower endogenous sex hormone levels and existing secondary sex characteristics, and to replace hormones that will produce secondary sex characteristics aligned with one's affirmed gender. Masculinising HT involves administration of testosterone, whereas feminising HT includes the use of oestrogen, anti-androgens and gonadotropin-releasing hormone agonists. Gonadotropin-releasing hormone agonists are also used to suppress puberty in transgender adolescents[19].

Anthropometric changes. HT results in changes in body weight, composition and shape. Expected changes with masculinising HT include weight gain, increased lean body mass, decreased fat mass and a redistribution of body fat with an increased waist:hip ratio. Expected changes with feminising HT include weight gain, decreased lean body mass, increased fat mass and a redistribution of body fat with a decreased waist:hip ratio[20–22]. These changes have an anticipated onset within as a few months of starting HT, and a maximum effect within several years[5].

Biochemical changes. HT also results in biochemical changes. Regarding lipid levels, masculinising HT results in decreased HDL cholesterol, increased LDL-cholesterol and variable effects on TAG. Feminising HT results in increased high-HDL-cholesterol and TAG, with variable effects on LDL-cholesterol, in part due to differences in the route of medication administration[5,19]. Regarding blood count values, masculinising HT tends to increase erythrocytes, Hb and haematocrit, whereas feminising HT has the opposite effect[23].

Vital signs and diagnostic tests. Changes in blood pressure and bone mineral density are also anticipated with HT. Masculinising HT results in increased blood pressure, whereas effects are variable with feminising HT. Bone mineral density is expected to remain stable or increase with both forms of HT[24].

Psychosocial nutrition considerations

Distinct psychosocial nutrition considerations persist among transgender and gender non-conforming populations regardless of a medical transition. These considerations arise, in part, due to gender-based stigma and discrimination, as well as gendered expectations surrounding food, nutrition and the body.

Eating disorders and disordered eating. Transgender populations are disproportionately impacted by eating disorders and disordered eating. Prevalence estimates

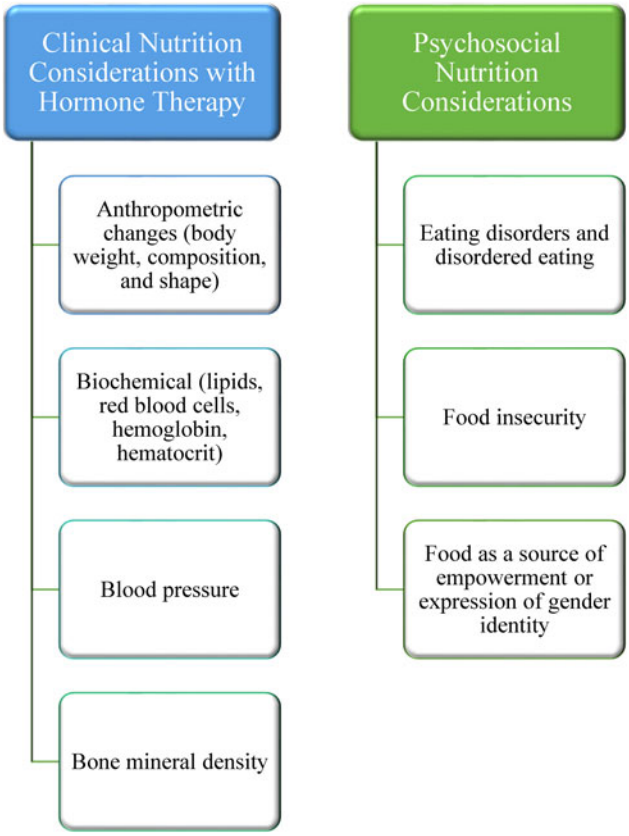

Fig. 1. Clinical and psychosocial nutrition considerations with transgender and gender non-conforming populations.

range from 2 to 35 % of transgender youth and young adults[25,26]. Theorised rationale for this disparity includes a desire to attain or suppress attributes of the body that align with one's gender, menstrual and/or pubertal suppression and disordered eating as coping mechanism for gender-based stigma and discrimination[25–28].

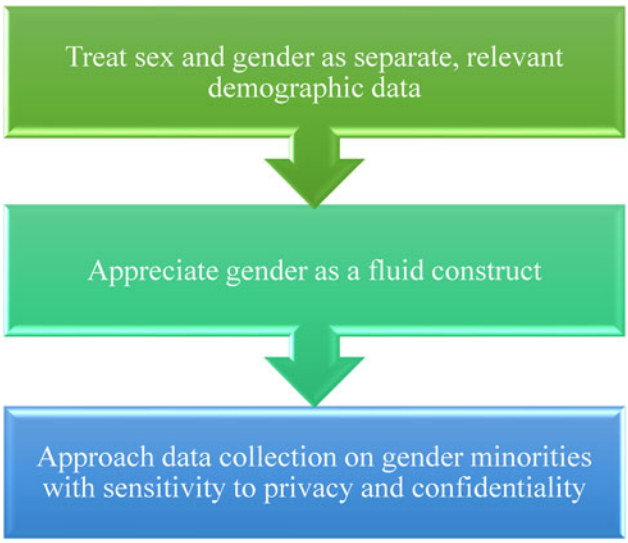

Fig. 2. Sex- and gender-informed approach to nutrition research.

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Food insecurity. Food insecurity also impacts transgender populations, in part due to known intersections with poverty, homelessness and joblessness[29]. Prevalence estimates range up to 79% of adults in the southeastern United States[30]. Across the United States, transgender adults were over twice as likely than cisgender adults to face food insecurity during the coronavirus disease-2019 pandemic[31]. In addition to known social determinants, unique considerations include needing to present an identification card that does not match one's name, photo or sex, fear of discrimination from faith-based food pantries and safety concerns when travelling to access food assistance resources[30,31].

Food and nutrition as a source of empowerment or expression of gender identity. Lastly, food and nutrition have been framed as a source of empowerment for transgender and gender non-conforming populations. Food and nutrition may be an expression of one's gender identity through food choices or body size, mitigate undesirable effects of HT such as dyslipidaemia, or serve as a form of self-care for one's evolving body[32–34].

A sex- and gender-informed approach to nutrition research design, analysis and reporting: practical strategies for nutrition researchers

A sex- and gender-informed approach can improve the accuracy and inclusion of nutrition research design, analysis and reporting. The Sex and Gender Equity in Research guidelines offer researchers a starting point for reporting sex and gender data throughout the research process but is not inclusive of gender minorities[35]. This section, based on the published literature, details practical strategies for researchers to apply when designing studies with human subjects, especially transgender participants (Fig. 2).

(1) ***Treat sex and gender as separate, relevant demographic data.*** When designing the demographic data section of a study with human subjects, researchers can collect sex and gender as separate, relevant data. Sex and gender should be treated as essential data on par with other demographic data such as age, race and ethnicity[35,36]. The 'two-step' approach requires a separate question to query sex and gender. Table 1 shows two approaches to framing questions on these constructs. Given that culturally appropriate language is constantly evolving, the ideal wording may vary by country, culture or time period[5]. For example, although recommendations in the United States use the culturally appropriate language of 'two-spirit' for American Indian and Alaskan Native participants, this may not apply for populations in other countries.

(2) ***Appreciate gender as a fluid construct.*** Researchers can appreciate gender as a fluid construct, rather than a female–male binary. This approach can improve the inclusivity of nutrition research by ensuring that gender minorities are captured in a dataset. Researchers can include response options that capture gender fluidity, such as transgender, genderqueer or gender non-conforming. Providing a free-text response options allows research participants to provide their own gender identity that may not be captured in the response options listed (i.e. non-binary, genderfluid, agender), thus honouring a participant's autonomy in naming their own identity[3].

(3) ***Approach data collection on gender minorities with sensitivity to privacy and confidentiality.*** Although privacy and confidentiality are requisite in all human subjects research, collection of sex and gender data is especially sensitive for gender minorities who face gender-based stigma or

Table 1. Two proposed wordings of a two-step method to query sex and gender data

Construct	University of California San Francisco Transgender Care & Treatment Guidelines[4]	The National Academies of Science, Engineering, and Medicine (NASEM)[3]
Gender	What is your gender identity? ■ Male ■ Female ■ Transgender man/Transman ■ Transgender women/Transwoman ■ Genderqueer/Gender non-conforming ■ Additional identity (fill in) _____ ■ Decline to state	What is your current gender? [Mark only one] ■ Female ■ Male ■ Transgender ■ [If respondent is American Indian/Alaska Native (AIAN):] Two-Spirit ■ I use a different term: _____ ■ Don't know ■ Prefer not to answer
Sex	What sex were you assigned at birth? ■ Male ■ Female ■ Decline to state	What sex were assigned at birth, on your original birth certificate? ■ Female ■ Male ■ Don't know ■ Prefer not to answer

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discrimination[29,36]. Researchers can ensure they are only collecting the minimum amount of data necessary to meet a study's purpose. For example, a study that measures metabolic rate may require collecting data on sex, but not gender identity. Lastly, researchers can appreciate that participants may not feel safe or comfortable their gender identity, especially if the study sample is small and they would be more likely to be identified. Offering a response option such as 'decline to state' or 'prefer not to answer' ensures that participants are not forced to share this data if they do not feel comfortable doing so (Table 1).

Conclusions

Sex and gender are separate constructs that are often conflated in nutrition research with human subjects. Current nutrition surveillance programmes in the United States, United Kingdom and Ireland do not accurately capture sex and gender data, which undermines the accuracy of the analyses and excludes gender minorities. Transgender and gender non-conforming populations have distinct clinical and psychosocial nutrition considerations that require further research to inform nutrition policy and practice. Researchers can apply a sex- and gender-informed approach to human subjects research by treating sex and gender as separate, relevant demographic data, appreciating gender as a fluid construct and approaching data collection on gender minorities with sensitivity to privacy and confidentiality. This approach has the potential to markedly improve the accuracy of nutrition science research and the inclusion of transgender and gender non-conforming populations.

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