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Health Care and Social Predictors of Gender Positivity and Gender Distress Among Transgender and Nonbinary People in Canada

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A thesis submitted in partial fulfillment of the requirements for the Master of Science degree in Epidemiology and Biostatistics

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Abstract

Background: Transgender (trans) health care is focused on gender dysphoria and overlooks the diverse gender experiences of trans and nonbinary (TNB) individuals, especially gender positivity (also known as gender euphoria), a crucial aspect and resilience factor of trans well-being. Existing research on gender positivity is primarily qualitative, lacking quantitative assessment tools. This thesis provides quantitative insights by utilizing new assessment scales to evaluate gender positivity (GP) and gender distress (GD).

Methods: Data (n = 2316) were from Trans PULSE Canada, a 2019 cross-sectional community-based survey of TNB people aged 14+ in Canada. Social and bodily dimensions of gender well-being were measured with the Trans Youth CAN! Gender Positivity Scale and Gender Distress Scale, originally developed using a clinical sample of TNB youth in Canada. This thesis applied confirmatory factor analysis to validate psychometric properties of the two scales, and structural equation modelling to examine health care and social predictors associated with GP and GD.

Results: Correlation analysis demonstrated that GP and GD have a complex relationship instead of being simple opposites. Confirmatory factor analysis supported two-factor (social and body) models for GP and GD, confirming that GP and GD are multi-faceted distinct constructs. Structural equation modelling revealed that gender-affirming medical care was associated with higher GP and lower GD across social and bodily dimensions. However, when barriers impeded accessing ongoing care, these benefits were diminished compared to unobstructed ongoing care or completion of needed care. Possessing government identification with the preferred gender marker was linked to overall gender well-being. The frequency of misgendering emerged as a prominent risk factor, detrimentally impacting both GP and GD across social and body dimensions. Strong parental support was significantly associated with greater GP and less social GD, a link not observed with other familial or romantic partner support.

Conclusion: This study enhances our understanding of TNB gender experiences, underscoring the need for a more balanced and holistic healthcare perspective that promotes gender positivity. The findings suggest that TNB healthcare practices could benefit from incorporating strength- and resilience-based approaches, cultivating gender positivity as a protective factor for the health and well-being of the TNB population.

Keywords:

Transgender, nonbinary, Canada, gender positivity, gender euphoria, gender distress, gender dysphoria, resilience, social determinants of health, gender-affirming care, structural equation model

Summary for Lay Audience

This thesis investigates the health care and social factors that influence the gender well-being of transgender and nonbinary (TNB) people in Canada. Traditionally, transgender healthcare has focused on gender dysphoria and overlooked the diverse gender experiences of TNB individuals, particularly gender positivity (also known as gender euphoria) – the positive, empowering feelings related to one's gender. There is a dearth of quantitative research or assessment tools on gender positivity. To address this gap, we used two new psychological scales to measure gender-related positivity and distress in both the social and body dimensions. These scales capture broader manifestations of TNB gender feelings without pathologizing them, viewing TNB people as a community rather than a patient group.

Applying advanced statistical analyses on the data of 2316 TNB individuals aged 14+ from a 2019 Canadian community survey (Trans PULSE Canada), this thesis study reveals a complex relationship between gender positivity and distress, challenging the notion that they are simple opposites. Furthermore, we found a significant association between gender-affirming medical treatments and higher gender positivity, as well as lower gender distress, in both social and body dimensions. However, when individuals faced barriers to accessing such care, these improvements were diminished compared to when they had unobstructed ongoing care or completed needed care. Possessing a government-issued identification document with the preferred gender designation is also linked to improved gender well-being overall. Notably, misgendering stands out as a prominent risk factor, negatively impacting both social and body gender well-being. In addition, strong parental support plays a uniquely crucial role in fostering gender positivity and reducing social distress among TNB individuals.

These findings expand the dysphoria-centered viewpoint to a community-informed, holistic, and more balanced understanding of TNB gender experiences. This multidimensional understanding can inform future research, gender-affirming healthcare practices, policies, and societal representations. Transgender healthcare can benefit from resilience- and strength-based approaches that foster gender positivity as a protective factor for the health and well-being of TNB individuals.

Contribution Statement

All chapters of this thesis were written by Luxi (Lux) Li as part of the fulfilment of requirements for his Master of Science degree from the Department of Epidemiology and Biostatistics. Trans PULSE Canada collected the survey data in 2019. Following research ethics approval by the Research Ethics Board and concept sheet approval by the Steering Committee of Trans PULSE Canada, the data were made assessable to Lux in 2021. The two scales TYC-GPS and TYC-GDS were developed by the Trans Youth CAN! research team with extensive community input and feedback. Lux was responsible for conducting all statistical analyses reported in this thesis, except for the sample weights, which were calculated and provided by Trans PULSE Canada.

Lux's thesis supervisory committee — Drs. Greta Bauer, Ayden Scheim, and Rachel Calogero — provided guidance in the conceptualization of research questions, conduct of analyses, interpretation of results, and revision of the thesis draft. In addition, Drs. Piotr Wilk and Mauricio Coronel-Villalobos provided expert opinions and helpful feedback for the confirmatory factor analysis and the structural equation modelling in this thesis.

Acknowledgements

The proverb “Better to light a candle than to curse the darkness” captures the essence of this thesis. Rather than cursing the darkness, the thesis endeavours to light a candle, offering a counter-narrative to the prevailing deficit-focused discourse surrounding transgender (trans) experiences within psychology, health research, and societal conversations.

It is not my intention to invalidate or minimize the genuine adversities and suffering that many trans and nonbinary individuals have endured and continue to face. However, as a trans person myself and a researcher, I posit that the time has come to broaden our investigative scope beyond the confines of gender dysphoria and stigma. Recognizing and addressing these aspects of trans and nonbinary experience remain crucial, yet they do not encapsulate our entirety. We are not singularly defined by hardship. We are beings of multifaceted identities, experiences, and strengths.

This Master’s thesis stands as a testament to the collective support and wisdom imparted by a distinguished group of individuals and organizations, to whom I own immense gratitude:

Foremost, my supervisor, Dr. Greta Bauer. who has been a source of inspiration since my undergraduate days back in 2010. In 2021, at the crossroad of my career and the height of the global pandemic, there was only one item on my bucket list: to conduct trans research with Dr. Bauer. Long story short, I embarked on the journey with the Western EpiBio graduate program thanks to her support and encouragement. I am grateful for her mentorship, guidance, wisdom, and grit. She is a role model not only in academia and research but also in life.

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To my partner, Trevor Copp (PaoPao), who loves me as who I am, embraces my quirkiness, holds space for me, and temporarily allows my piles to spawn more piles. He and his family make me feel home in Canada.

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Each of these individuals and entities has woven a thread into the tapestry of my thesis work, and for this, I am eternally grateful.

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List of Abbreviations

AFAB	Assigned female at birth
AMAB	Assigned male at birth
CFA	Confirmatory factor analysis
CFI	Comparative fit index
DAG	Directed acyclic graph
dbody	Gender distress – body (factor)
dsoci	Gender distress – social (factor)
DWLS	Diagonally weighted least squares (estimator)
GAC	Gender-affirming care
GD	Gender distress
GD Body	Gender Distress – Body Subscale
GD Social	Gender Distress – Social Subscale
GP	Gender positivity
GP Body	Gender Distress – Body Subscale
GP Social	Gender Distress – Social Subscale
MAR	Missing at random
MCAR	Missing completely at random
MNAR	Missing not at random
MI	Multiple imputation
NB	Nonbinary
NB-AFAB	Nonbinary, assigned female at birth
NB-AMAB	Nonbinary, assigned male at birth
pbody	Gender positivity – body (factor)
psoci	Gender positivity – social (factor)
RMSEA	Root mean square error of approximation
SAAB	Sex assigned at birth
SEM	Structural equation modelling/model
SMSR	Standardized root mean square residual
TLI	Tucker-Lewis index
TNB	Transgender and nonbinary

TPC	Trans PULSE Canada
TYC	Trans Youth CAN!
TYC-GDS	Trans Youth CAN! Gender Distress Scale
TYC-GPS	Trans Youth CAN! Gender Positivity Scale
WLSMV	Mean- and variance-adjusted weighted least squares

Chapter 1

1 Introduction and Objectives

This chapter will describe the thesis study rationale and objectives.

1.1 Study Rationale

Transgender (trans) health care has been centering on gender dysphoria, which is defined as clinically significant distress related to a marked incongruence between one's experienced or expressed gender and the gender assigned at birth (American Psychological Association, 2013). Although a diagnosis of gender dysphoria is historically a prerequisite for accessing gender-affirming medical services, it does not capture the full spectrum of gender experiences among trans and gender nonbinary (TNB) people (Galupo & Pulice-Farrow, 2020; Lindley, Lee, Norton, & Budge, 2024), and existing scales designed to measure gender dysphoria fall short in accommodating nonbinary gender identities (Pulice-Farrow, Bravo, & Galupo, 2019). Furthermore, the dysphoria-centred view carries pathologizing medicalized connotations and overlooks a crucial aspect of trans identity and experiences: gender positivity.

Gender positivity encompasses positive gender-related feelings, such as joy, validation, and pride (Bauer et al., 2021a). Gender positivity is often referred to as gender euphoria and celebrated among the TNB communities, but it has garnered much less attention than dysphoria in research and society at large. According to positive psychology, it is imperative to address the strengths and resilience of marginalized populations, since the resilience factors can serve as protective mechanisms against some harmful impacts of marginalization (Ghabrial & Andersen, 2021; Lopez & Snyder, 2012). However, there is a dearth of peer-reviewed studies – especially quantitative studies – on the positive aspects of TNB experiences. Relatedly, there is a lack of psychological scales to measure TNB gender positivity. Existing studies on gender positivity, which predominately rely on qualitative methodologies, have revealed intricate and nuanced relationships between gender positivity and dysphoria (Beischel, Gauvin, & van Anders, 2022; Jacobsen & Devor, 2022). These findings underscore the need for a dedicated assessment scale for gender positivity (Beischel et al., 2022). Moreover, while qualitative research is valuable for

exploration and conceptualization, more quantitative research is needed as it has the advantage of systematically investigating gender-related experiences and risk/resilience factors.

To fill the gap in the quantitative knowledge base, the Trans Youth CAN! team (Bauer, Pacaud, et al., 2021) developed and conducted a validation analysis for the Gender Positivity Scale (TYC-GPS) and the Gender Distress Scale (TYC-GDS) (Bauer et al., 2021a,b). TYC-GPS measures gender positivity (GP) as a multifaceted construct instead of the mere opposite or reduction of gender dysphoria. TYC-GDS captures broader manifestations of gender distress (GD) instead of a clinical diagnosis. Both scales consist of two subscales related to the sexed body and social gender, which is in alignment with findings from later qualitative research (Beischel et al., 2022). TYC-GPS and TYC-GDS were included in the Trans PULSE Canada (TPC) full survey in 2019. The TPC was a nationwide community-based study of the health and well-being of TNB people in Canada (Scheim, Coleman, Lachowsky, & Bauer, 2021). The present thesis analyzed the TPC data to investigate gender positivity, gender distress, and their health care and social predictors among the TNB community population in Canada.

1.2 Study Objectives

This thesis aimed to broaden the viewpoint of trans health care from one that is centered solely on gender dysphoria to a more comprehensive and nuanced perspective that cultivates gender positivity. It endeavoured to contribute to psychometric instruments capable of capturing the spectrum of TNB experiences, encompassing social and bodily dimensions of gender positivity and distress. It sought to lay the conceptual and methodological groundwork necessary for future research and strength-based therapy. Specifically, this thesis had three primary objectives:

Objective 1: To describe the patterns of gender positivity, gender distress, and their social and bodily dimensions among TNB people in Canada, overall and stratified by gender and sex.

Objective 2: To evaluate the internal consistency and construct validity of the Trans Youth CAN! Gender Positivity Scale (TYC-GPS) and the Trans Youth CAN! Gender Distress Scale (TYC-GDS) in a TNB community sample.

Objective 3: To explore health care and social predictors associated with the social and bodily aspects of gender positivity and gender distress.

Chapter 2

2 Literature Review

This chapter introduces key terms pertaining to TNB identities, provides an overview of the literature on gender dysphoria, gender positivity, and their respective measures, and identifies potential health care and social factors associated with TNB gender well-being.

2.1 Sex, Gender, Trans, and Nonbinary Identities – An Introduction of Terms

The terms "sex" and "gender" are often used interchangeably, yet they carry distinct meanings. Biological *sex* refers to physical attributes differentiating males and females, including chromosomes, gene expression, hormones, gametes, and reproductive/sexual anatomy. While sex is typically classified as either male or female, intersex variations exist among the biological components and their manifestations (Canadian Institutes of Health Research (CIHR), 2023; Kaiser, 2012). In contrast, *gender* refers to the spectrum of social, cultural, and psychological constructs of identities, expressions, roles, and behaviours associated with biological sex (CIHR, 2023; Kaiser, 2012; Nanda, 2014). However, this clear-cut dichotomy between sex as purely biological and gender as purely social can be misleading, as both are products of intricate interactions between biological and social factors, and sex/gender effects are often entangled (Springer, Mager Stellman, & Jordan-Young, 2012). For example, gender identity is rooted in biology (Burke, Manzouri, & Savic, 2017; Fisher & Cocchetti, 2020; Majid et al., 2020), and both sex and gender variables influence the brain, self-perception, behaviour, and health (Health, 2023; Joel & McCarthy, 2017; Kaiser, 2012). Thus, it is important to refrain from viewing sex and gender as a simplistic "biological versus social" binary division, and recognize that their combined effects often defy separation, making it challenging to isolate the effects of sex versus gender individually (Springer et al., 2012).

Western societies predominantly adhere to a binary sex and gender model, where newborns are discerned as male or female at birth based on their external genitalia (i.e., *sex assigned at birth*) and assigned a gender of boy or girl correspondingly (i.e., *gender assigned at birth*). In the case of ambiguous genitalia, pressure to conform the child to one clear sex category often compels surgical interventions without the child's informed consent, sometimes resulting

in harm (Horowicz, 2017). Nonetheless, various cultures recognize more than two genders, such as Two-Spirit in some Indigenous North American groups, *hijra* or *khawaja sira* in South Asia, *xanith* in Oman, and *calabai* (trans women), *calalai* (trans men), and *bissu* (half-male and half-female) in Indonesia (Carol R. Ember, Escobar, Rossen, & McCarter, 2019). However, colonialism, westernization, and systematic inequity have suppressed gender diversity and nonconformity in many of these cultures (Nanda, 1999). Additionally, even within the binary gender construct, what it means to be a "man" or "woman" varies considerably across societies and time.

Gender identity is a person's internal sense of being a woman/girl, a man/boy, a blend of both, or an alternative gender (American Psychological Association, 2015). Gender identity is different from *sexual orientation* (e.g., heterosexual, gay, lesbian, bisexual), which refers to one's sexual and romantic attraction to other people. Most people are *cisgender*, whose gender identities are in alignment with their sex assigned at birth (SAAB). In contrast, *transgender,* commonly abbreviated as *trans,* is an umbrella term that encompasses people whose gender identity differs from their SAAB, regardless of whether they have medically or socially transitioned (American Psychological Association, 2015). *Nonbinary* is an umbrella term for gender identities that are not exclusively woman/girl or man/boy, such as genderqueer, genderfluid, bigender, or agender (American Psychological Association, 2015). Although *nonbinary* (NB) falls under the *trans* definition, not all NB individuals identify as trans. Therefore, we use the inclusive term *trans and nonbinary* (TNB) to refer to our study participants, whose gender identities diverge in various ways from their SAAB. Specifically, an individual who was assigned female at birth (AFAB) but identifies as a man/boy is a *trans man/boy*. An individual who was assigned male at birth (AMAB) but identifies as a woman/girl is a trans *woman/girl*. Furthermore, those who were AFAB and whose gender identities fall on the masculine side of the gender spectrum are *transmasculine* (*transmasc* for short), including trans men/boys and nonbinary individuals. Similarly, those who were AMAB and whose gender identities fall on the feminine side of the gender spectrum are *transfeminine* (*transfem* for short), including trans women/girls and nonbinary individuals.

According to the 2021 Canada Census, 0.33% of the Canadian population over the age of 15 identify as transgender or nonbinary, and 62.0% of these TNB respondents were younger than

35 (Statistics Canada, 2022). The 0.33% may be an underestimation since TNB respondents in some households may have been uncomfortable disclosing their gender identities to the individual who served as reporter for the household, or they may have been uncomfortable disclosing it to the government during this first inclusive census.

Gender expression refers to how individuals express and enact their gender within their cultural context. This includes physical appearance such as clothing, accessories, hairstyle, and beauty products, as well as the adoption of mannerisms, speech, behavioural patterns, names, and pronouns (American Psychological Association, 2015; Coleman et al., 2022; Hembree et al., 2017). The freedom to express gender congruently with one's gender identity has been shown to substantially benefit TNB well-being, reducing mental health risks such as depression, anxiety, self-harm, and suicidal ideation/behaviour (Coleman et al., 2022; Glynn et al., 2016; Russell, Pollitt, Li, & Grossman, 2018).

2.2 Gender Dysphoria and Gender Euphoria/Positivity

2.2.1 Gender dysphoria

Many but not all TNB people experience *gender dysphoria*, which the 5th edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) by the American Psychiatric Association (APA) defines as clinically significant distress or impairment related to persistent marked incongruence between one's experienced/expressed gender and the gender assigned at birth (APA, 2013). Importantly, this definition places the locus of the psychiatric diagnosis in the debilitating distress that may arise from gender incongruence, rather than the TNB gender identity *per se*. The equivalent diagnosis is termed "gender incongruence" in the latest edition of the World Health Organization (WHO)'s International Classification of Diseases (ICD-11) (Reed et al., 2016). Notably, gender incongruence is not classified under "mental health disorders" but under "conditions related to sexual health" in ICD-11. Although still problematic, this classification, together with APA's definition of gender dysphoria, reflects ongoing efforts toward de-pathologizing and de-stigmatizing TNB identities and gender-nonconforming expressions, behaviours, and preferences (Crocq, 2021; Reed et al., 2016). It is mainly due to

concerns of preserving healthcare access that gender dysphoria or incongruence remains a "disorder" or "condition" in the diagnostic manuals, as many countries currently require a diagnosis of gender dysphoria or incongruence for TNB people to access gender-affirming health services or insurance. Without a formal diagnosis, these services and insurance would likely become even less available (Crocq, 2021).

While it is a step in the right direction, the construct of gender dysphoria has a few crucial limitations. First, it still carries pathologizing and stigmatizing connotations (Lev, 2013). Gender-diverse identities and expressions have long been pathologized in medicine, historically labelled with psychiatric diagnoses of "transvestitism", "transgenderism", and "gender identity disorder" (Crocq, 2021). While "gender dysphoria" emphasizes that it is not the identity or expression itself but the related distress that may be grounds for a diagnosis, it nevertheless implies that being TNB is defined and legitimized by severe distress and misery, limiting gender-affirming medical care to those who fit this narrow notion to the satisfaction of clinical gatekeepers. Second, while gender dysphoria is a useful construct, it is far from encompassing the full range of TNB gender experiences (Galupo & Pulice-Farrow, 2020). As a clinical diagnosis, gender dysphoria does not capture the broad sub-clinical range of gender-related distress (Lindley et al., 2024) and overlooks the positive aspects of TNB identities and experiences (Beischel et al., 2022).

Sociologists have contextualized gender dysphoria within the framework of *transnormativity* (Johnson, 2016). Transnormativity is the prevailing narrative ingrained in medical and mainstream cultural understanding of trans identity, often characterized by the notion of being "born in the wrong body", evident gender non-conformity since early childhood, and a strong inclination toward seeking medical transition (Jacobsen & Devor, 2022). Transnormativity is the counterpart of cisnormativity, which is the assumption that only cisgender identities and expressions are normal and acceptable, implying that being cisgender-like is the ideal and ultimate goal for all trans people. Qualitative research indicates that transnormative expectations stem from medical gatekeeping and media stereotypes, perpetuating a trans narrative that emphasizes deficit, extreme distress, and self-hatred to justify medical transition, and that many trans people internalize these harmful norms into their self-expectations and reinforce them within the trans community (Jacobsen & Devor, 2022; Lindley et al., 2024).

While transnormativity has facilitated the attainment of rights and legitimacy for some trans people within medical and legal systems, it often compels TNB individuals to selectively recount their experiences to healthcare providers to prove themselves as suitable candidates for gender-affirming medical services (Jacobsen & Devor, 2022; Johnson, 2016) Consequently, transnormativity privileges a binary and medicalized path to trans identity and further marginalizes other TNB gender journeys (Beischel et al., 2022; Johnson, 2016). Defining transness by dysphoria contributes to self-doubt among many TNB individuals, leading them to question whether they are "trans enough" and hinge their self-esteem on medical transition and passing as cisgender (Jacobsen & Devor, 2022).

Furthermore, the emphasis on dysphoria amplifies anxiety and anticipatory negativity, limiting TNB people's capacity to experience positive emotions (Budge, Orovecz, & Thai, 2015; Jacobsen & Devor, 2022). A similar repercussion occurs in trans rights movements that focus on anti-trans violence, which inadvertently exacerbates fear and hopelessness among the trans community and overshadows the varieties of trans lives (Jacobsen & Devor, 2022; Westbrook, 2020). Trans scholars and community members are advocating for diverse narratives that not only acknowledge the challenges faced by TNB people but also highlight the joy and euphoria in their lives (Ashley, 2019; Beischel et al., 2022; Jacobsen & Devor, 2022; Westbrook, 2020).

2.2.2 Gender euphoria/positivity

Gender euphoria is the "positive homologue of gender dysphoria" (Ashley & Ells, 2018). Unlike gender dysphoria, which is a term defined by psychiatrists, gender euphoria is a concept created by and for TNB people to describe the "joyful feeling of rightness in one's gender/sex" (Beischel et al., 2022). Despite its frequent discussion within gender-minority communities, peer-reviewed studies on gender euphoria are limited, particularly quantitative studies, thus leaving its relation to gender dysphoria unclear.

Addressing this dearth of research literature, the prospective cohort study Trans Youth CAN! emerged as a pivotal quantitative investigation into the health of TNB adolescents referred to gender clinics across Canada (Bauer et al., n.d.; Bauer et al., 2021a; Mokashi, Lawson, Gotovac, & Bauer, 2020). It conceptualized gender euphoria as *gender positivity*, encompassing a spectrum of positive gender-related emotions, not only intense euphoria but also joy, pride, and

validation (Bauer et al., 2021b). Complementing this, the study also explored *gender distress*, which includes a broader range of negative gender-related feelings than the traditional definition of gender dysphoria, capturing non-clinical levels of distress (Bauer et al., 2021c). This study unveiled gender positivity and gender distress as multi-dimensional phenomena that manifest in relation to both the sexed body and social gender (Bauer et al., n.d.; Gotovac & Bauer, 2021; Trans Youth CAN!, 2021).

In addition to quantitative research, qualitative studies reflect various conceptualizations of gender euphoria. For instance, Ashley & Ells (2018) frame it in terms of gender alignment, denoting a "distinct enjoyment or satisfaction" resulting from the alignment between an individual's bodily gender characteristics and gender identity. Devor (2004) situates gender euphoria within a model of trans identity development, where it can supplant dysphoria upon transitioning. Bradford, Rider, and Spencer (2021) define gender euphoria as a form of relief from gender distress, while Lambrou et al. (2020) consider it a form of trans resilience.

The definition of gender euphoria as the relief, absence, or opposite of dysphoria implies an intrinsic link between the two, positing that resolving a dysphoric aspect would lead to euphoria (Bradford et al., 2021; Jacobsen & Devor, 2022). However, this proposed polarity between gender euphoria and dysphoria has been subject to scrutiny. Some scholars and community members argue that euphoria and dysphoria are distinct experiences, and TNB individuals may experience one without the other (Ashley, 2019) or both strongly simultaneously (Jacobsen & Devor, 2022). Furthermore, while euphoria generally increases with social support and gender-affirming care, "it is important not to assume this means a linear progression away from dysphoria and towards euphoria" (Jacobsen & Devor, 2022). Importantly, a recent community-based qualitative survey by Beischel et al. (2022) highlights the multi-faceted, biopsychosocial nature of gender euphoria and dysphoria in bodily and social aspects, as well as their complex interplay. These findings support the quantitative data initially put forth by the Trans Youth CAN! study.

2.2.3 Gender minority stress model

Positive psychology underscores the importance of addressing the resilience of marginalized groups, as resilience factors can alleviate some harmful impacts of marginalization

(Ghabrial & Andersen, 2021; Lopez & Snyder, 2012). The roles of resilience factors in TNB health and well-being can be explored through the lens of the *gender minority stress model* (Hendricks & Testa, 2012; Testa, Habarth, Peta, Balsam, & Bockting, 2015), which originates from the minority stress model initially developed for sexual minorities (e.g., lesbian, gay, and bisexual people) (Brooks, 1981; Meyer, 1995). Minority stress refers to "excess stress to which individuals from stigmatized social categories are exposed as a result of their social, often a minority, position" (Meyer, 2003, p3). Hendricks and Testa (2012) adapted the minority stress model to address gender minorities, including trans, nonbinary, and other gender-diverse populations whose gender identity or expression differs from the norm based on their sex assigned at birth. Gender minorities encounter high levels of minority stress, including stigma, discrimination, violence, and health inequities (Bauer, Scheim, Pyne, Travers, & Hammond, 2015; James et al., 2016; Marcellin, Scheim, Bauer, & Redman, 2013; Scheim, 2017; White Hughto, Reisner, & Pachankis, 2015).

The gender minority stress model distinguishes distal stressors (e.g., anti-trans discrimination, rejection, victimization, misgendering) and proximal stressors (e.g., internalized transphobia, negative expectations, identity concealment, gender dysphoria) that contribute to negative health outcomes for trans and gender-diverse individuals (Galupo, Pulice-Farrow, & Lindley, 2020; Jacobsen & Devor, 2022; Testa et al., 2015). Resilience factors, such as pride and community connectedness, act as protective factors mitigating the adverse impact of these stressors on health (Beischel et al., 2022; Matsuno & Israel, 2018; Testa et al., 2015). Notably, gender euphoria is a crucial form of trans resilience (Lambrou et al., 2020). However, current frameworks and assessments of gender minority stress and resilience fall short of fully incorporating gender euphoria as a protective factor (Beischel et al., 2022). Understanding gender euphoria, its relationship to gender distress, and its health care and social determinants is imperative for developing effective interventions to support gender minority populations.

2.3 Existing Measures of Gender Dysphoria and Gender Positivity

2.3.1 Existing measures of gender dysphoria

Two widely used validated scales for assessing gender dysphoria in adults and adolescents are the Utrecht Gender Dysphoria Scale (UGDS) and the Gender Identity/Gender Dysphoria Questionnaire for Adolescents and Adults (GIDYQ-AA). Both are self-reported, one-factor scales aiming to capture dysphoria as a single construct, with 5-point Likert-type items addressing a mixture of bodily and social aspects.

The UGDS, a 12-item scale developed for use in clinical care and research, measures gender dysphoria as a unidimensional construct related to the body, gender identity, and gender roles (Cohen-Kettenis & Van Goozen, 1997; Schneider et al., 2016; Steensma et al., 2013). It has two versions based on sex assigned at birth (SAAB), featuring unparalleled questions and language that reflect traditional gender norms. For example, the assigned male version uses "more emotional, stereotypically feminine-coded language", whereas the assigned female version uses "more pragmatic, stereotypically masculine-coded language" (McGuire et al., 2020). This asymmetry between the SAAB versions makes it difficult to compare gender/sex groups meaningfully (McGuire et al., 2020), as transmasculine participants consistently score higher in gender dysphoria than transfeminine participants (Olson, Key, & Eaton, 2015), raising questions about whether this disparity is genuine or stems from measurement artifact. Furthermore, the asymmetry poses applicability challenges for longitudinal studies tracking gender-affirming medical treatments and gender role transitions (McGuire et al., 2020). Additionally, the UGDS lacks inclusivity for nonbinary gender identities (McGuire et al., 2020) and sensitivity for capturing dysphoria changes during early non-surgical gender-affirming treatments (Bauer et al., n.d.; De Vries et al., 2014; De Vries, Steensma, Doreleijers, & Cohen-Kettenis, 2011), and its sexual items (e.g., "I like to behave sexually as a girl/woman") may be unsuitable for younger adolescents.

The GIDYQ-AA is a 27-item scale designed to assess "subjective, social, somatic, and sociolegal indicators of gender identity/gender dysphoria" in the past 12 months (Deogracias et al., 2007). Since it was developed based on older diagnostic criteria for Gender Identity Disorder (DSM-IV-TR; APA, 2000), its items tend to conflate gender identity incongruence or uncertainty

with gender dysphoria. In the GIDYQ-AA, “gender identity/dysphoria” is measured along a continuum between male and female poles (Deogracias et al., 2007), reflecting the degree of gender incongruence or uncertainty rather than dysphoria per se, in contrast to the UGDS in which the continuum ranges from not dysphoric to dysphoric. A comparative evaluation of these two scales suggested that they measure different definitions of dysphoria (Schneider et al., 2016). Another difference is that the GIDYQ-AA confines its measurements to the past 12 months, whereas the UGDS does not specify a time frame. An advantage of the GIDYQ-AA over the original UGDS is its use of parallel items in the two SAAB versions (Deogracias et al., 2007; Schneider et al., 2016) facilitating direct comparisons between different gender/sex groups.

Notably, the UGDS and the GIDYQ-AA both predate DSM-5, and some of their measures are based on outdated conceptualizations of trans identity (Shulman et al., 2017). Similarly, there exist several outdated assessment tools that focus primarily on diagnosing “gender identity disorder”, “gender identity disorder of children”, or “transsexualism”, such as the Minnesota Multiphasic Personality Inventory (MMPI) Gender Dysphoria subscale (Althof, Lothstein, Jones, & Shen, 1983) and the Recalled Childhood Gender Identity/Gender Role Questionnaire (Zucker et al., 2006). These scales contain items that pathologize gender nonconformity or conflate gender identity with sexual orientation, rendering them obsolete due to conceptual and cultural shifts regarding gender diversity and changes in diagnostic criteria for gender dysphoria (Shulman et al., 2017). Valuable revisions would involve aligning these measures with a contemporary understanding of gender diversity, integrating recognition of nonbinary gender identities and expressions, and eliminating reliance on gender stereotypes.

A recent adaptation of the UGDS, the Utrecht Gender Dysphoria Scale - Gender Spectrum (UGDS-GS), addresses the limitations of older scales (McGuire et al., 2020). With 18 items, the UGDS-GS combines the two sexed versions into a single version to be applied across the gender spectrum. Unlike the original UGDS, the UGDS-GS is inclusive of nonbinary gender identities and employs more nuanced language accounting for diverse gender experiences, aiming for a more accurate assessment of gender dysphoria beyond the binary framework. The UGDS-GS has shown improved applicability in comparing gender/sex groups and enhanced sensitivity in capturing the evolving experiences of individuals undergoing non-surgical gender-affirming treatments over time (McGuire et al., 2020). However, while the UGDS-GS has been

validated using adult samples, its validation in adolescent populations is still pending, necessitating further research to establish its validity and applicability among different age groups, populations, and settings. Additionally, neither of its subscales –dysphoria and gender affirmation – distinguishes between bodily and social gender dimensions as separate factors.

2.3.2 Existing measures of gender positivity

Several scales for trans and gender-minority research incorporate subscales or items related to gender positivity. For example, the Gender Identity Reflection and Rumination Scale (Bauerband & Galupo, 2014) includes a subscale assessing the positive reflection of one's gender identity. Similarly, the Gender Minority Stress and Resilience Scale (Testa et al., 2015) has two resilience subscales pertaining to community connectedness and pride. Furthermore, the Gender Congruence and Life Satisfaction Scale (Jones, Bouman, Haycraft, & Arcelus, 2019) contains items measuring gender satisfaction with physical attributes and social roles. However, these scales capture mixed constructs of gender positivity and distress. While they feature subscales or items related to specific aspects of positivity, they do not explicitly measure gender positivity or euphoria.

A few existing scales explicitly assess the positive aspects of trans identity or experience, and they have been validated in trans adults. One such scale is the Transgender Congruence Scale (Kozee, Tylka, & Bauerband, 2012), which includes 12 items divided into two subscales: appearance congruence and gender identity acceptance. Appearance congruence (nine items) measures the alignment between one's physical appearance and gender identity. Gender identity acceptance (three items) evaluates the acceptance and pride of one's gender identity and expression. A limitation of this scale is its assumption that all TNB individuals aspire to align their outward appearance with their internal gender (Shulman et al., 2017). Additionally, the gender identity acceptance subscale's brevity, comprising only three items, restricts its ability to capture the breadth of positivity. Similarly, the Strength of Transgender Identity Scale (Barr et al., 2016), comprising only six items, measures limited aspects regarding gender identity strength. More recently, the Transgender Positive Identity Measure (T-PIM; Taube & Mussap, 2020), specifically designed to assess positivity within the TNB community, features 24 items evaluating five dimensions of positive gender identity: authenticity, intimacy and relationships,

community, social justice, and insight. Notably, the latter two scales both focus on gender identity rather than bodily and social gender. Recent community-based qualitative research has proposed that gender positivity, akin to gender dysphoria, can manifest distinctively in terms of sexed bodily aspects versus social gender roles or treatments (Beischel et al., 2022). However, to the best of our knowledge, no available measures for gender positivity differentiate between these two dimensions.

2.4 Health care and Social Factors Associated with Trans and Nonbinary Gender Well-being

2.4.1 Gender-affirming medical care

The World Professional Association for Transgender Health (WPATH) Standards of Care recommends gender-affirming care for trans and gender-diverse (TGD) people when it is medically necessary (Coleman et al., 2022). Gender affirmation refers to "the process of recognizing and affirming TGD people in their identity – whether socially, medically, legally, behaviorally, or some combination of these" (Coleman et al., 2022, S13). It is important to acknowledge that gender-affirming care encompasses more than just medical transition (Coleman et al., 2022), and not all TNB individuals desire or pursue medical transition (Scheim, 2017). However, for many TNB individuals, medical gender affirmation is a crucial form of health care. Gender-affirming medical care refers to procedures that help align one's physical characteristics with their gender identity (Puckett, Cleary, Rossman, Mustanski, & Newcomb, 2018; Stroumsa, 2014), which includes but is not limited to puberty blockers for youth, transition-related surgeries, hormones, hair removal, and voice training (Coleman et al., 2022).

Mounting evidence has shown that gender-affirming medical care is associated with improved mental and physical health outcomes in TNB adults and youth, including a reduction in gender dysphoria, psychological distress, depression, anxiety, substance abuse, and suicide ideation and attempts, as well as an increase in gender euphoria, psychological well-being, positive affect, self-esteem, and quality of life (Almazan & Keuroghlian, 2021; Austin, Papciak, & Lovins, 2022; Baker et al., 2021; G. R. Bauer et al., 2015; N. J. Bradford & Syed, 2019; Colizzi, Costa, & Todarello, 2014; Glynn et al., 2016; Hughto, Gunn, Rood, & Pantalone, 2020; Lelutiu-Weinberger, English, & Sandanapitchai, 2020; Nguyen et al., 2018; Tordoff et al., 2022).

Specifically, several studies highlighted that the experience of gender euphoria is unequivocally linked to "gender-affirming antecedents" (Austin et al., 2022), including medical and non-medical aspects of transition, gender expression, and affirmation (Austin et al., 2022; Beischel et al., 2022; N. J. Bradford et al., 2021; Jacobsen & Devor, 2022).

When evaluating the effects of medical gender affirmation, researchers should account for the diverse needs, completion statuses, and care access barriers among TNB individuals. In the 2019 Trans PULSE Canada survey, 73.4% of 2217 TNB participants reported that they needed gender-affirming medical care, and only 35.4% of those who needed such care had completed it (Scheim et al., 2021). Many TNB people encounter interconnected systematic and interpersonal barriers when seeking gender-affirming medical care. Common barriers include financial and insurance obstacles, restrictive laws and policies, long waitlists, long-distance travel requirements, institutional gatekeeping and biases, provider incompetence, and the fear of rejection, misgendering, discrimination, or mistreatment by providers (Gridley et al., 2016; Puckett et al., 2018).

2.4.2 Unmet mental health care needs

TNB individuals experience disproportionally high mental health risks compared to the general population, including depression, anxiety, substance abuse, and suicide ideation and attempts (Dhejne, Van Vlerken, Heylens, & Arcelus, 2016; Gilbert, Pass, Keuroghlian, Greenfield, & Reisner, 2018; Grant et al., 2011; Wheldon & Wiseman, 2019). These challenges have been linked to various stigma- and discrimination-driven inequities at structural (e.g., bigoted social norms, restrictive laws, lack of protective policies, inadequate healthcare resources, economic marginalization), interpersonal (e.g., family rejection, isolation, victimization), and individual levels (e.g., internalized transphobia, identity concealment) (Lelutiu-Weinberger et al., 2020; Reisner et al., 2016; Scheim, 2017; White Hughto et al., 2015).

Furthermore, TNB individuals bear a substantial burden of unmet mental health care needs (Ferlatte et al., 2019; McCann & Sharek, 2016; Puckett et al., 2018). In the United States, a large study (n = 803,905) found that trans participants reported 3.63 times the adjusted odds of experiencing unmet mental health needs compared to the non-LGBTQ population during the

COVID-19 pandemic, surpassing the odds of other LGBTQ participants (S. Chen, Wang, She, Qin, & Ming, 2022).

The overall mental health of TNB individuals is inextricably connected to their experiences of gender euphoria and dysphoria. Taking care of mental health enhances the intensity, frequency, and duration of euphoria, while mitigating dysphoria improves other aspects of mental well-being. Conversely, poor mental health and dysphoria exacerbate each other (Jacobsen & Devor, 2022). For example, untreated depression or anxiety may prompt TNB individuals to isolate themselves, reducing opportunities for social affirmation and limiting their ability to experience euphoria (Jacobsen & Devor, 2022). Therefore, addressing unmet mental health care needs is crucial for understanding and fostering TNB gender well-being.

2.4.3 Social factors

Gender affirmation encompasses not only medical interventions but also social aspects. Social transition refers to the non-medical process of presenting oneself to the world in alignment with one's gender identity (Austin et al., 2022). It can occur on the interpersonal level (e.g., adopting a preferred name and pronoun, changing clothing and hairstyle, and garnering support for one's gender identity and expression from family and other social contexts) and the structural level (e.g., obtaining legal documents with one's preferred name and gender/sex designation) (Hughto et al., 2020; Lelutiu-Weinberger et al., 2020). For many TNB individuals, social transition is the first and sometimes the only method of gender affirmation. An expanding body of research supports the positive association between social gender affirmation and psychological well-being within diverse TNB populations (Bauer et al., 2015; Coleman et al., 2022; Glynn et al., 2016; Hughto et al., 2020; Olson, Durwood, Demeules, & McLaughlin, 2016; Scheim, Perez-Brumer, & Bauer, 2020). Conversely, the absence of social affirmation (e.g., misgendering, family rejection) is linked to poor mental health outcomes (Lelutiu-Weinberger et al., 2020; Levitt & Ippolito, 2014; Sevelius, 2013; White Hughto et al., 2015). In this section, we will provide a brief literature overview on various types of social gender affirmation and discrimination. The goal is to identify potential intervenable protective and risk factors for TNB gender well-being. These factors are part of the broader context of social determinants of health, which are non-medical factors that influence health outcomes.

Living in true gender. A central aspect of gender euphoria is living authentically in one's identified gender, experiencing a sense of rightness and feeling "at home" in one's body (Beischel et al., 2022). Being seen as one's genuine self is emotionally liberating, and the ensuing visibility opens opportunities for acceptance, validation, and support from others (Hughto et al., 2020; Jacobsen & Devor, 2022). For TNB individuals, living in true gender, or simply disclosing their gender identity in a safe space, is associated with improved psychological well-being, such as lower self-harm and depressive symptomatology (Coleman et al., 2022; Katz-Wise, Reisner, White Hughto, & Budge, 2017; Strain & Shuff, 2010). However, revealing one's TNB identity (commonly known as "coming out") comes with challenges. It is often met with social rejection, discrimination, violence, and other forms of trans stigma, which negatively impact health outcomes (Levitt & Ippolito, 2014; White Hughto et al., 2015). Nevertheless, these challenges may diminish over time as a TNB individual continues to live in their true gender and accumulates more social support.

Name and pronoun change. Adopting a chosen name and/or pronoun that aligns with one's gender identity and authentic self is a celebrated key milestone in the gender journey of many TNB people. The affirming and often euphoric impact of using a TNB person's chosen name, pronoun, and correct gendered title is evident through TNB participants' narratives in qualitative studies (Austin et al., 2022; Brown et al., 2020; Galupo et al., 2020; Jacobsen & Devor, 2022). Additionally, a community cohort study on TNB youth aged 15-24 found that those whose chosen names were affirmed in more social contexts (home, school, work, and with friends) experienced fewer depressive symptoms and lower suicide risk compared to their counterparts with name affirmation in fewer contexts (Russell et al., 2018). After adjusting for demographic characteristics and total social support, an additional context of name affirmation predicted 29% lower suicide ideation and 56% lower suicide attempts in these youth (Russell et al., 2018). Considering that a legal name change may be infeasible for many TNB youth, the support from parents, teachers, peers, and healthcare providers by using their chosen names is pivotal in fostering their mental health (Russell et al., 2018).

Identity document concordance. Having at least one government-issued identification document (ID; e.g., driver's license, passport) concordant with a TNB individual's preferred

name and gender/sex designation is found to be significantly associated with reductions in psychological distress and past-year suicide risk (Bauer et al., 2015; Scheim et al., 2020). These findings highlight the crucial role of legal gender affirmation as a structural social determinant of health for TNB people, endorsing the growing global momentum towards more supportive gender recognition policies at governmental and legislative levels (Lelutiu-Weinberger et al., 2020; Scheim et al., 2020).

Misgendering. The gender minority stress model elucidates how external stressors can be internalized by trans and gender-diverse individuals and lead to adverse mental health outcomes (Hendricks & Testa, 2012; Testa et al., 2015). Misgendering, defined as the "misclassification of one's gender" (Jacobsen et al., 2023), is a prominent stressor and form of invalidation experienced by gender-minority people (Jacobsen et al., 2023; Matsuno, Bricker, Savarese, Mohr, & Balsam, 2022; McLemore, 2018). Misgendering can involve the intentional or unintentional use of incorrect pronouns, names, or gendered language when referring to someone. A higher frequency of misgendering is linked to increased dysphoria, body dissatisfaction, disordered eating behaviour, psychological distress, rumination, depression, anxiety, hypervigilance, and impaired social functioning in TNB individuals (Jacobsen et al., 2023; McLemore, 2018; Mitchell, MacArthur, & Blomquist, 2021; Puckett, Aboussouan, Ralston, Mustanski, & Newcomb, 2023). Conversely, being addressed by the correct name and pronouns is vital for gender affirmation and is associated with better mental health outcomes (Hughto et al., 2020; Russell et al., 2018).

Community belonging. Building resilience in TNB individuals is closely tied to a sense of belonging within TNB communities (Barr, Budge, & Adelson, 2016; Singh, 2013; Singh, Hays, & Watson, 2011). Due to frequent rejection and victimization by their families of origin (Bockting, Miner, Swinburne Romine, Hamilton, & Coleman, 2013), TNB people often have a strong need to seek belonging in TNB and other LGBTQ+ communities (Lefevor, Sprague, Boyd-Rogers, & Smack, 2018; Matsuno & Israel, 2018). According to the gender minority stress model, community belonging acts as a buffer against the negative impacts of stressors (Hendricks & Testa, 2012). Indeed, a strong sense of belonging to TNB communities is associated with decreased depressive symptomatology and anxiety, as well as increased

psychological well-being, self-esteem, and satisfaction with life (Barr et al., 2016; Hendricks & Testa, 2012; Pflum, Testa, Balsam, Goldblum, & Bongar, 2015). It also reduces social isolation, a prominent risk factor for suicide ideation (Van Orden et al., 2010). A longitudinal study in the US found that trans community involvement moderates the effect of gender abuse (enacted stigma) on major depression among trans women (Nuttbrock et al., 2015). Qualitative interviews underscore that time spent with other TNB people and in LGBTQ+ community spaces as a vital source of resilience and euphoria. In these settings, TNB individuals feel a sense of connection and recognition, and less need for self-explanation (Jacobsen & Devor, 2022). TNB support groups can serve as restful and safe havens to navigate cisnormativity and manage gender-based harm (Weber, 2023). Supporting and advocating for fellow TNB people also validates one's own identity (Jacobsen & Devor, 2022) and brings empowerment through collective efforts towards positive social changes (Singh & McKleroy, 2011). Additionally, involvement in community activities facilitates access to community resources like mental health and legal aid (Singh & McKleroy, 2011).

Gender support from family or romantic partner. Among various types of social support, family support for gender stands out as a prominent protective factor in TNB health and well-being (Lefevor et al., 2018; Puckett, Matsuno, Dyar, Mustanski, & Newcomb, 2019; Snapp, Watson, Russell, Diaz, & Ryan, 2015). Family gender support (including from parents/guardians and other family members, such as a spouse/romantic partner) is linked to decreased depressive symptoms, perceived burden of being trans, psychological distress, substance abuse, and suicide risk, as well as higher life satisfaction and self-esteem among TNB individuals (Bockting et al., 2013; Glynn et al., 2016; Lefevor et al., 2018; Simons, Schrager, Clark, Belzer, & Olson, 2013), and these protective influences last from adolescence into adulthood (Ryan, Russell, Huebner, Diaz, & Sanchez, 2010). Notably, strong parental support for gender plays a remarkably critical role in bolstering resilience and well-being, particularly among TNB youth (Olson et al., 2016; Simons et al., 2013; Travers, Bauer, Pyne, Bradley, & Gale, 2012). In a study involving 123 trans youth in Ontario who were out to their parents, those perceiving strong parental support for their gender identity and expression reported higher life satisfaction, self-esteem, and lower levels of depression and suicide attempts compared to those whose parents were somewhat to not

at all supportive (Travers et al., 2012). Without strong parental support, an alarming 57% of transgender youth attempted suicide in the past year, while 4% of those with strongly supportive parents did so (Travers et al., 2012). A related community study of TNB people aged 16+ in Ontario found that strong parental support for gender is uniquely associated with reduced past-year suicide ideation, in contrast to other sources of strong social support for gender (Bauer et al., 2015).

Trans-specific abuse from family or romantic partner. While family support can buffer the harmful impacts of stigma, many TNB individuals face rejection from their own families due to their gender identity or expression. For example, punishments for feminine behaviour and eviction from home were common among trans women when they were minors (Gagne & Tewksbury, 1998; Koken, Bimbi, & Parsons, 2009). The consequences of family rejection extend beyond adolescence, with high levels of family rejection correlating with increased risks of depression, substance misuse, sexual risk behaviours, and suicide among trans youth and adults (Klein & Golub, 2016; Yadegarfard, Meinhold-Bergmann, & Ho, 2014). Moreover, being evicted or running away from home during adolescence elevated the risks of homelessness, poverty, and associated health problems (Koken et al., 2009). Family rejection or abuse is not simply the opposite of family acceptance of gender. Studies examining family reactions to children's LGBT identity show that parental acceptance and rejection are distinct constructs that can co-occur during families' adjustment process (Perrin et al., 2004; Ryan et al., 2010). In an interview study involving trans women, most participants reported that their families exhibited mixed responses following the disclosure of their gender identity (Koken et al., 2009). These mixed responses ranged from acceptance to aggressive rejection, with many noting a positive shift towards more support over time. Additionally, it was common that support came from one parent while rejection came from the other parent (Koken et al., 2009). The nuanced nature of family responses to TNB identities justifies considering family rejection or abuse as a separate variable distinct from family support for gender.

Romantic relationship plays a vital role in the mental health of TNB individuals (St. Amand, Sharp, Michonski, Babcock, & Fitzgerald, 2013), especially in the absence of parental support or therapeutic services (Hines, 2009). Sadly, TNB people often face abuse from their

intimate partners. The Canadian Trans and Non-Binary Youth Health Survey revealed that among TNB youth who had been in dating relationships, 27% in 2014 and 30% in 2019 reported experiencing physical harm from their dates (Taylor et al., 2020; Veale et al., 2015). The 2015 US Transgender Survey reported a disturbing 54% lifetime prevalence of intimate partner abuse (James et al., 2016), including psychological abuse, coercive control, physical violence, stalking, and forced sex (King, Restar, & Operario, 2019). Partner abuse against TNB individuals has unique characteristics, as the abuser can leverage societal transphobia to assert power and control over the TNB person (Barrett & Sheridan, 2017; Cook-Daniels, 2015). Examples of trans-specific partner abuse include interference with gender-affirming medical care or gender expression, threats to "out" the TNB partner without consent, and belittlement of the partner's TNB identity (Cook-Daniels, 2015; Messinger & Guadalupe-Diaz, 2020). However, whether and how the impact of trans-specific partner abuse shapes TNB experiences of social and bodily gender distress or positivity remains unclear.

2.4.4 Demographic covariates

We identified the following demographic variables that are potentially associated with both gender well-being (social and bodily gender positivity and distress) and its health care and social determinants.

Age. TNB youth under the age of 25 face notable health disparities compared to their older TNB counterparts in Canada (Navarro, Johnstone, et al., 2021). This includes poorer mental health, higher suicide risk in the past year, less access to gender-affirming healthcare, fewer trans-inclusive primary care experiences, higher rates of verbal harassment and sexual assault, and a heightened tendency to avoid public spaces, such as washrooms and schools, due to fear of harassment or outing (Navarro, Johnstone, et al., 2021). Moreover, the gender journeys of TNB youth exhibit considerable diversity. For example, while some adolescents have a consistent gender identity from an early age, others undergo more fluid gender identity development over time (Coleman et al., 2022). These developmental intricacies may manifest as varying experiences of gender distress or positivity, posing unique challenges in gender-affirming care for TNB youth.

Gender/sex. Gender stressors can vary within TNB communities. Trans women are negatively affected by transmisogyny, the intersection of transphobia and misogyny (Serano, 2007). In contrast, trans men often benefit from a greater "passing" privilege due to testosterone treatment (Sevelius, 2013). These factors may contribute to observed disparities in employment and health status between trans men and trans women (Clements-Nolle, Marx, Guzman, & Katz, 2001; Sevelius, 2013; Xavier, Bobbin, Singer, & Budd, 2005). Furthermore, nonbinary people experience gender and gender-minority stressors both similarly and uniquely compared to binary trans people (Coleman et al., 2022). For some nonbinary individuals, the contradictions and fluidity of their gender elicits euphoria (Jacobsen & Devor, 2022). However, challenging gender binary norms presents additional difficulties for nonbinary people in navigating gender identity and expression. They face heightened instances of invalidation and misgendering, frequently encountering dismissals of their genders as "not real" or a passing "fad" (Jacobsen et al., 2023; Johnson, LeBlanc, Deardorff, & Bockting, 2020; Navarro et al., 2021). These stressors potentially have differential effects on gender well-being within TNB communities.

Racialization. In health inequity research, "race" should not be viewed as a biologically essentialist variable; instead, it serves as a proxy measure for exposure to structural and individual racism through racialization (Lett, Asabor, Beltrán, Cannon, & Arah, 2022; Robinson, Renson, & Naimi, 2020). Racialization is the process of assigning racial meaning and associated power hierarchies to individuals or groups based on perceived differences like skin colour, hair texture, and cultural heritage (Lett, Asabor, et al., 2022; Omi & Winant, 2014). In Western societies, racialized populations often experience more adverse health outcomes and inadequate health care compared to their white counterparts, likely due to systemic racism (Hamed, Bradby, Ahlberg, & Thapar-Björkert, 2022; Lett, Abrams, Gold, Fullerton, & Everhart, 2022; Lett, Asabor, et al., 2022). In sexual and gender minority populations, discrimination mediates psychological distress heterogeneously for different racial groups (Bauer & Scheim, 2019). The Trans PULSE Canada study showed that racialized TNB participants reported poorer overall health, greater uncertainty in seeking gender-affirming medical care, and higher levels of identity siloing (i.e., constraint on expressing authentic selves in identities and social positions), compared to non-racialized TNB participants (Chih et al., 2020). Despite these challenges, there

is evidence that racialized TNB individuals draw strength from both their gender and ethno-racial identities as sources of personal growth and community connectedness, which leads to greater identity positivity and resilience in the face of adversity (Singh, 2013; Taube & Mussap, 2020, 2022). However, it is unclear whether racialization plays a role in shaping experiences of gender positivity or distress, and whether health care and social factors impact gender well-being differentially for racialized versus non-racialized TNB individuals.

Indigenous identity. Gender identity and expression are culturally defined and interpreted (Coleman et al., 2022). In Canada, many Indigenous communities have culturally specific genders that cannot be easily translated into Western gender or transgender categories (Billard & Nesfield, 2020). Traditionally, Indigenous gender-diverse people are esteemed and often take on revered roles in sacred ceremonies (House, 2016; Merasty, Gareau, Jackson, Masching, & Dopler, 2021). Furthermore, the Indigenous conceptualization of gender defies the Euro-American separation of gender identities and sexual orientations (Billard & Nesfield, 2020). Consequently, the experiences of gender positivity or distress may differ for Indigenous gender-diverse people compared to non-Indigenous TNB individuals. However, during colonization, the imperial imposition of Christian cisheteronormativity led to the suppression and often criminalization of Indigenous gender identities outside the gender binary (Billard & Nesfield, 2020). This historical oppression and cultural erasure may continue to adversely impact the gender well-being and health determinants of Indigenous gender-diverse people (Coleman et al., 2022).

Autism. Mounting evidence suggests a link between autism and gender variance, although the underlying mechanism remains unclear (for reviews, see Glidden, Bouman, Jones, & Arcelus, 2016; Van Der Miesen, Hurley, & De Vries, 2016; van Schalkwyk, Klingensmith, & Volkmar, 2015). Gender identity development in autistic children may diverge from the patterns or timeline in non-autistic children (Tateno, Tateno, & Saito, 2008; Gerrit I. van Schalkwyk et al., 2015), potentially contributing to the observed elevated prevalence of gender dysphoria in autistic youth (Tateno et al., 2008; Van Der Miesen et al., 2016). Conversely, individuals with gender dysphoria, both youth and adults, exhibit increased symptomatology of autism spectrum disorder (ASD) (De Vries, Noens, Cohen-Kettenis, Van Berckelaer-Onnes, & Doreleijers, 2010;

Heylens et al., 2018; van der Miesen, de Vries, Steensma, & Hartman, 2018). Some researchers argue that the observed heightened ASD-like symptoms are not exclusive to ASD but rather stem from reversable psycho-social impairment in gender dysphoric individuals (e.g., challenges in peer relations related to minority stress and anxiety) and specificity limitations of ASD assessment instruments, cautioning against framing inquiries like "Do trans youth just have autism?" as unhelpful (Turban & van Schalkwyk, 2018). Nevertheless, despite questioning the direct link between autism and gender *dysphoria*, these researchers still acknowledge the support for the heightened co-occurrence of autism and gender *variance* (Strang et al., 2014; van der Miesen et al., 2018; Gerrit Ian van Schalkwyk, 2018). Importantly, a diagnosis of ASD should not preclude gender-affirming clinical care (Strang et al., 2018; Turban & van Schalkwyk, 2018). A growing number of researchers and autistic advocates are challenging the common pathologizing framing of autism and gender dysphoria as "comorbid." They propose that the overlap between neurodiversity and gender diversity highlights the fluid and intersectional nature of gender, and that gender diversity is an expected outcome in autistic individuals due to less reliance on social norms in identity development and expression (Ehrensaft, 2018; Gerrit Ian van Schalkwyk, 2018). Furthermore, qualitative research has suggested that autistic TNB individuals may experience gender positivity and distress differently than their non-autistic counterparts (Jacobsen et al., 2023).

Chapter 3

3 Methodology

3.1 Study Design

3.1.1 Data source

This thesis utilized cross-sectional data from Trans PULSE Canada (TPC), a 2019 nationwide community-based survey study on the health of 2873 trans and nonbinary (TNB) adults and adolescents across Canada (Scheim et al., 2021). Eligible participants were 14 years of age or older, lived in Canada, and identified with a gender identity different from their sex assigned at birth (Scheim et al., 2021). Core questionnaire items in the TPC survey were adapted from the provincial survey Trans PULSE Ontario conducted between 2009 and 2010 (Bauer et al., 2009), originally created by a 10-person community-based research team and refined based on input from a 16-person community engagement team. The TPC survey updated the Trans PULSE Ontario survey's core items to reflect evolving community language (e.g., for nonbinary identities), and added new measures. In addition to addressing the broad TNB communities, the TPC introduced tailored measures specifically designed for nine priority populations within the TNB communities: Indigenous, racialized, immigrants, sex workers, nonbinary, older adults, youth, people with disabilities, and people living in rural or remote areas. These measures were formulated by Priority Population Teams comprising core TPC research team members and community representatives with pertinent lived experience, community insights, and research or policy experience. The development of these priority-population-specific measures entailed a 6-month community engagement process, improving item functionality and clarity through pre-testing by members of each priority population (Scheim et al., 2021).

3.1.2 Sampling methods and data collection

The TPC data were collected through convenience sampling from July 26 to October 1, 2019. Respondents were recruited online via mailing lists or social media, in person at sexual and gender minority social events (e.g., Pride festivals), or through outreach by peer research

associates in major Canadian metropolitan areas: Montreal, Ottawa, downtown Toronto, the Greater Toronto Area, Southwestern Ontario, Winnipeg, Saskatoon, Edmonton, Calgary, and Vancouver. The peer research associates were well-connected TNB community members who were trained to promote the survey and administer questionnaires (Scheim et al., 2021).

The TPC survey was available in English or French in either full-length (full survey, 60-70 minutes) or a short form (short survey, 10 minutes). The short survey contained demographic questions and key health indicators from each main section of the full survey. Respondents could complete the survey online (on REDCap), in person on a tablet (with one of 11 peer research associates), on paper (mailed with a stamped return envelope), or over the telephone (toll-free, with or without a language interpreter). The online or tablet surveys were programmed and recorded in REDCap (Harris et al., 2009). Responses in the other survey modes were entered into REDCap by research assistants. Respondents were presented with a letter of information and indicated consent through participation. They had the option to either remain anonymous or provide their contact information at the end of the survey and consent to being re-contacted for future research opportunities. Responses and contact information were confidentially stored in separate secure databases (Scheim et al., 2021). Respondents did not receive an honorarium.

3.1.3 Ethics approval

The TPC study was approved by Research Ethics Boards at Western University, Wilfried Laurier University, Unity Health Toronto, and the University of Victoria. In addition, as part of our community-based research approach, a concept sheet proposing the current thesis study and its analyses was approved by the TPC Steering Committee, which was the core decision-making body of the TPC project and comprised a majority of TNB academics and/or community members.

3.1.4 Analytic sample

The present thesis study included TPC respondents who completed at least 80% of items in both the Trans Youth CAN! Gender Positivity Scale (TYC-GPS) and Gender Distress Scale (TYC-GDS) (Bauer et al., 2021b,c). Specifically, this entailed completing a minimum of 9 of 11

TYC-GPS items and 12 of 14 TYC-GDS items. Of the total 2873 TPC respondents, 2316 (80.6%) were included in the current analytic sample. Since TYC-GPS and TYC-GDS were presented only in the full survey, the analytic sample was comprised solely of respondents who participated in the full survey. Of the 2481 TPC full-survey respondents, 2316 (93.3%) were included, and 165 (6.7%) were excluded because they did not complete at least 80% of each scale. Details about the sample characteristics are described in the Results section 4.1.1.

3.2 Study Measures

The following section describes the outcome measures, the predictors for structural equation modelling (SEM), the covariates adjusted for in the SEM, and the descriptive variables. All measures were self-reported.

3.2.1 Outcome measures

Gender positivity (GP) and gender distress (GD) were measured by TYC-GPS (Bauer et al., 2021b) and TYC-GDS (Bauer et al., 2021c), respectively. Each scale consisted of two subscales – Social and Body – assessing gender feelings related to the gendered social life and the body. This yielded four subscales, namely GP-social, GP-body, GD-social, and GD-body. In the confirmatory factor analysis (CFA) and the SEM, these four subscales were treated as four latent variables (labelled *psoci*, *pbody*, *dsoci*, and *dbody*) with their corresponding items as indicators.

TYC-GPS and TYC-GDS were originally developed in 2017 for Trans Youth CAN! (TYC), a prospective cohort study of 174 youth from puberty to 15 years of age at enrolment who attended an initial hormone appointment for consideration of puberty blockers or hormones for gender dysphoria at one of 10 gender clinics across Canada. The items were developed based on researcher and clinician expertise and feedback from two youth groups in English and French (Bauer et al., 2021b,c). This thesis study used the 2021 updated versions of the original 2017 scales. The update was that each scale had one item removed and one item reclassified into a subscale based on validation analysis (Bauer et al., 2021b,c). TYC-GPS and TYC-GDS (in

English and French) were judged by the TPC team as being applicable to both youth and adults in the TNB communities, in both clinical and non-clinical settings.

TYC-GPS captured positive gender feelings (e.g., pride, validation, and confidence) related to social life and body (Bauer et al., 2021b). The TYC-GPS 2021 version comprised 11 items, including six items for the Social subscale and five items for the Body subscale (Table 1; Appendix A). The structure of TYC-GPS was consistent with later qualitative research findings, which showed that GP is not the mere absence or reduction of gender dysphoria but rather a distinct, multi-dimensional construct related to social gender and body (Beischel et al., 2022; Jacobsen & Devor, 2022). The TYC-GPS items were identical for those assigned male or female at birth.

TYC-GDS captured the broad range of distress related to gender dysphoria without pathologizing it as a clinical diagnosis (Bauer et al., 2021c). It consisted of nine modified items from the Utrecht Gender Dysphoria Scale (UGDS) (Cohen-Kettenis & Van Goozen, 1997; Steensma et al., 2013) and five new items. The nine modified items were created by pooling from the assigned-male and assigned-female versions of the UGDS, removing redundant items and sexual behaviour items to make the scale appropriate for younger youth, and revising the wording to make it applicable to nonbinary individuals. The five new items addressed aspects that were not measured in other gender dysphoria scales, such as the voice and developmental changes of the body (Bauer et al., 2021c). Of the 14 items in the TYC-GDS 2021 version (Table 1; Appendix A), five were for the Social subscale and nine were for the Body subscale. Unlike TYC-GPS which did not distinguish by sex assigned at birth (SAAB), TYC-GDS had two versions for those assigned male and female, respectively. The two versions shared eight identical items (e.g., “I dislike my voice because I feel that it doesn’t match my gender”), and the other six items used different wordings for gender or sex characteristics (e.g., “I worry that I might always have a masculine body” for assigned-male, versus “I worry that I might always have a feminine body” for assigned-female). These different wordings between the two versions are marked with italic text and square brackets [ ] in Table 1.

In both TYC-GPS and TYC-GDS, respondents indicated to what extent they agreed with each item statement on a 5-point Likert scale, from *disagree completely* (scored 1) to *agree completely* (scored 5). These scales were originally designed for adolescents potentially initiating

gender-affirming medical care, and thus they did not include any "not applicable" options related to bodily changes that may have been made. The TPC team altered some of the bodily items (i.e., those related to genitalia, period, breasts, or facial hair) to include a "not applicable" option to make them work for a broader population.

Table 1. Trans Youth CAN! Gender Positivity Scale (TYC-GPS), Trans Youth CAN! Gender Distress Scale, (TYC-GDS), and corresponding variable names in the analysis

Trans Youth CAN! Gender Positivity Scale (TYC-GPS) [a]	
Gender Positivity – Social (psoci)	
b11b	I feel a sense of accomplishment and pride being able to express myself as my gender
b11c	I enjoy going out in public and doing social activities because I can express myself as my gender
b11d	I feel validated when strangers in public treat me like my gender
b11e	I feel confident trying new and different clothes that express my gender
b11f	I feel happy that society sees me on the outside for who I am on the inside
b11g	I am relieved I don't have to work as hard as I used to for people to see me as my gender
Gender Positivity – Body (pbody)	
b11h	I feel confident in my body
b11i	I feel attractive
b11j	I feel comfortable in my body
b11k	I feel like my body fits with the real me
b11l	Things about my body that used to bother me don't bother me as much anymore
Trans Youth CAN! Gender Distress Scale (TYC-GDS) [a,b]	
Gender Distress – Social (dsoci)	
b12b	I avoid social situations or activities because I can't express myself in my gender
b12c	I feel hurt if someone calls me the wrong gender (using the wrong pronouns / name / language)
b12e	I feel that society doesn't accept or embrace me in my gender
b12f	I worry that people will always treat me as the wrong gender
b12j	When people treat me like the wrong gender or expect me to behave like a *boy/man [girl/woman]* I feel hurt
Gender Distress – Body (dbody)	
b12a	I wish I had been born in a different body
b12g	I dislike seeing my naked body
b12h	I feel like I can't trust what my body might do as I get older
b12i	I dislike my voice because I feel that it doesn't match my gender

b12k	I feel unhappy because I have a *masculine [feminine]* body
b12l	I worry that I might always have a *masculine [feminine]* body
b12m	I dislike peeing *standing up [sitting down]*
b12n	I dislike having a *penis or erections [front hole or monthly bleeding (period)]* because it makes me feel like I'm not my true gender
b12o	I dislike having *facial hair [breasts]* because it makes me feel like I'm not my true gender

[a] On a Likert-type scale of 1 – 5, respondents indicated to what extent they agreed with each statement. 1 = disagree completely, 2 = disagree somewhat, 3 = neutral, 4 = agree somewhat, 5 = agree completely.
[b] Gender Distress Scale had 2 versions: assigned male at birth and assigned female at birth. Text in italics and [ ] indicate the version differences.

3.2.2 Predictors for structural equation modelling

The following variables were included as key predictors in the SEM. All of them were treated as manifest (i.e., measured) variables. See Table 2 for a summary.

Gender-affirming care (GAC). GAC was defined as gender-affirming medical treatments, such as puberty blockers, hormone therapy, and gender-affirming surgery. GAC status and barriers was a nominal variable with six categories: (1) plan to but haven't begun GAC, have barriers; (2) plan to but haven't begun GAC, no barriers; (3) ongoing GAC, have barriers; (4) ongoing GAC, no barriers; (5) had needed GAC; (6) not plan to have GAC or unsure. These six categories were derived from two questions:

a. Which of the following applies to your current situation regarding puberty blockers, hormones and/or surgery? (Please check only one).
b. Are any of the following barriers delaying your gender-affirming medical care? (Please check all that apply)

The response options for question (a) were: (1) I have had the gender-affirming medical treatment (GAMT) that I need/want, (2) I am in the process of completing GAMT, (3) I am planning to receive GAMT but have not begun, (4) I am not planning to receive GAMT, and (5) I am not sure whether I am going to seek GAMT. Options (4) and (5) were pooled. Respondents who indicated that they were in the process of completing GAMT or planning but not begun

GMAT were asked question (b) about barriers delaying GAMT. The response options for question (b) included a list of specific barriers, an "other, specify: _____" fill-in option, and "none of the above." We dichotomized the responses about barriers (yes vs. no). Because responses to question (b) about GAC barriers were completely nested within and dependent on responses to question (a) about GAC status, including both variables as separate predictors in the SEM would create multicollinearity problems. Therefore, we combined these two items into one variable with six non-overlapping categories about GAC status and barriers.

Unmet mental health care needs in the past year (ment). This was a nominal variable with three categories: (1) did not need mental health care, (2) needed mental health care and able to access all, and (3) had unmet mental health care needs (i.e., needed mental health care but unable to access any or some). This variable was created by comparing responses to two questions, which asked respectively whether the respondent *needed* or *used* any of the mental health care services from the same list (check all that apply) in the past 12 months. If respondents indicated any service needs in the first question but did not access these services in the second question, they were classified into category (3).

Number of years living in true gender (yrtrue). This was an ordinal variable with four levels: (1) 0 year (not living in true gender), (2) 2 years or less, (3) 3 - 5 years, and (4) 6+ years. This variable was coded by subtracting the age at which the respondent began living in their true gender from their current age if the respondent indicated that the gender they currently lived as in their day-to-day life was different from their sex assigned at birth (SAAB). The subtraction result was then binned into one of the four categories. If the day-to-day lived gender did not differ from SAAB, then *yrtrue* was coded as 0. The number of years was binned and treated as a nominal variable instead of continuous, because the value 0 year was qualitatively different than the other values.

Legal name change (namech). Respondents indicated whether they had legally changed their name to reflect their gender. Legal name change was a binary variable (yes vs. no).

Having any government ID with gender marker concordance (idmatch). This binary variable was created by comparing responses to two questions, which asked respectively the respondent's *current* and *preferred* gender marker listed on multiple forms of legal identity document (e.g., driver's license, health card). If the preferred matched the current gender marker on any form of government ID, then *idmatch* was coded as 1; otherwise, it was coded as 0.

Asking people to use a different pronoun (askpron). Respondents indicated if they had asked people in their lives to use a different pronoun that better reflects their gender. *askpron* was a nominal variable with four categories: (1) no, haven't asked; (2) no, don't need to change pronoun; (3) yes, some people; (4) yes, everyone.

Asking people to use a different name (askname). Respondents indicated if they had asked people in their lives to use a different name that better reflects their gender. *askname* was a nominal variable with four categories: (1) no, haven't asked; (2) no, don't need to change name; (3) yes, some people; (4) yes, everyone.

Frequency misgendered (misgen). Respondents indicated in general how often people misgendered them by using incorrect names, pronouns, or gendered language. *misgen* was an ordinal variable with five levels: never (reference), every year, every month, every week, and every day.

Sense of belonging in TNB spaces (belong). Sense of belonging in TNB spaces in person or online was a binary variable (strong sense of belonging vs. no). This variable was created by dichotomizing responses to four questions, which asked how the respondent would describe their sense of belonging in *trans* or *nonbinary* spaces *online* or *in person*, respectively. If the respondent selected "very strong" or "somewhat strong" in any of these four questions, then *belong* was coded as 1; otherwise, it was coded as 0.

Strong support of gender identity or expression from parents/guardians (supp_parent). This variable was dichotomized as strongly supportive versus not (including "not applicable"),

given evidence that having strong parental support for gender is uniquely important for mental health, general well-being, and suicide reduction in TNB people, and that this positive impact is qualitatively different from none, low, or moderate parental support or other sources of strong social support (Bauer et al., 2015; Travers et al., 2012). Respondents indicated the level of support for their gender identity or expression provided by their parent(s) or guardian(s). "Very" supportive was coded as 1; all other options ("not at all", "not very", "somewhat", "they don't know", and "not applicable") were coded as 0. This dichotomization was similar to how the same variable was coded in previous studies using the Trans PULSE Ontario data (Scheim, 2017; Travers et al., 2012).

Strong support of gender identity or expression from other family members (supp_otherfam). This variable was dichotomized as having strong support from any other (i.e., non-parental) family member(s) versus not, to be consistent with the dichotomized coding of parental support for gender. Respondents indicated the level of support for their gender identity or expression provided by various non-parental family members, including spouse or partner(s), child(ren), or grandchild(ren). If respondents selected "Very" supportive from any of these family members, *supp_otherfam* was coded as 1; otherwise, it was coded as 0.

Negative trans-specific behaviour from family members (neg_fam). Respondents younger than 25 years of age were asked whether any family members had any negative behaviour towards them because they were trans or nonbinary (e.g., threatened them with violence, kicked them out of the house). This lifetime measure was classified into three categories: If the respondent selected one or more of the abusive behaviours from the six check-all-that-apply options, *neg_fam* was coded as "yes." For respondents who were 25 or older, *neg_fam* was coded as "n/a" (not applicable). For respondents who selected "none of the above," *neg_fam* was coded as "no."

Negative trans-specific behaviour from romantic partner (neg_partner). Respondents who indicated that they had a romantic relationship in the past 12 months were asked whether a romantic partner had any negative behaviour towards them in the past year because they were

trans or nonbinary (e.g., interfered with their gender-affirming medical care, threatened to out them). This past-year measure was classified into three categories: If the respondent answered "yes" to one or more of the six listed negative behaviours, *neg_partner* was coded as "yes." If the respondent did not have a romantic relationship in the past year or selected "not applicable" to all six listed behaviours, *neg_partner* was coded as "n/a." If the respondent answered "no" to all six listed behaviours, *neg_partner* was coded as "no."

3.2.3 Sociodemographic covariates for structural equation modelling

As determined by a directed acyclic graph (section 3.3) guided by literature (section 2.4), the following covariates were adjusted for in the SEM. A summary list can be found in Table 2. In addition, they were reported in the descriptive results as sociodemographic variables.

Age. Respondents filled in their age in years. In the SEM, age was a continuous covariate. In the sample characteristics table, age was discretized into four categories: 14 – 24, 25 – 34, 35 – 49, and 50 +.

Gender/sex. Gender/sex was a nominal variable with four categories: 1 = trans man/boy (hereafter referred to as *trans men* for short), 2 = trans woman/girl (hereafter referred to as *trans women* for short), 3 = nonbinary and assigned female at birth (NB-AFAB), 4 = nonbinary and assigned male at birth (NB-AMAB). This variable was derived from respondents' sex assigned at birth (male, female) and current gender identity (a. man or boy, b. woman or girl, c. Indigenous or other cultural gender identity (e.g., two-spirit), and d. nonbinary, genderqueer, agender, or a similar identity). Due to its small sample size, "Indigenous or other cultural gender identity (e.g., two-spirit)" was combined with "nonbinary, genderqueer, agender, or a similar identity" to form the nonbinary gender identity category.

Racialization. Racialization was a binary variable with 1 = racialized and 0 = non-racialized. Respondents who either (a) identified as or (b) were perceived or treated as a person of colour in

Canada were categorized as racialized. This categorization was determined by the Racialized Priority Population Team.

Indigenous identity. Indigenous identity was a binary variable with 1 = Indigenous and 0 = non-Indigenous. Respondents who indicated that they were Indigenous were further asked to specify their Indigenous group. Those who selected "First Nations (status)," "First Nations (non-status)," "Métis," "Inuk," and "Indigenous from Canada, don't know which group" were categorized as Indigenous. This categorization was determined by the Indigenous Leadership Group.

Autism. Autism was a binary variable with 1 = autistic and 0 = allistic (i.e., non-autistic). Respondents were categorized as autistic if they (a) were diagnosed with autism or Asperger's or (b) identified as autistic.

Table 2. Outcomes, predictors, and covariates

Survey item(s)	Variable name	Description	Scale
Outcome variables			
b11b - b11g	psoci	Gender Positivity – Social Subscale	Ordinal (5pt Likert)
b11h - b11l	pbody	Gender Positivity – Body Subscale	Ordinal (5pt Likert)
b12b, b12c, b12e, b12f, b12j	dsoci	Gender Distress– Social Subscale	Ordinal (5pt Likert)
b12a, b12g, b12h, b12i, b12k - b12o	dbody	Gender Distress– Body Subscale	Ordinal (5pt Likert)
Predictors for SEM			
(recoded) i2 x i8	GAC	Gender-affirming care status and barriers. 1=plan to but haven't begun GAC, have barriers (ref) [a]; 2=plan to but haven't begun GAC, no barriers; 3=ongoing GAC, have barriers; 4=ongoing GAC, no barriers;	Nominal

		5=had needed GAC; 6= not plan to/unsure.	
(recoded) j1 x j2	ment	Unmet mental health care needs (past year). 1=did not need mental health care services (ref); 2=needed and able to access all; 3=needed but unable to access.	Nominal
(recoded) a1 – b7	yrtrue	Number of years living in true gender. 0= not living in true gender (ref); 1= 2 years or less; 2= 3 - 5 years; 3= 6+ years.	Ordinal
b26	namech	Legal name change. 0=no (ref); 1=yes	Binary
(recoded) b27 vs b28	idmatch	Have any legal ID with preferred gender marker. 0=no (ref); 1=yes.	Binary
(reversed) b23	askpron	Have asked people to use a different pronoun. 1=no, haven't asked (ref); 2=no, don't need to change pronoun; 3=yes, some people; 4=yes, everyone.	Nominal
(reversed) b24	askname	Have asked people to use a different name. 1=no, haven't asked (ref); 2=no, don't need to change name; 3=yes, some people; 4=yes, everyone.	Nominal
(reversed) b25	misgen	Frequency of being misgendered. 1=never (ref); 2=every year; 3=every month; 4=every week; 5=every day.	Ordinal
(recode) b15, b16, b17, b18	belong	Strong sense of belonging in TNB spaces in person or online. 0=no strong sense of belonging (ref); 1=very or somewhat strong sense of belonging.	Binary

(recoded) n5a	supp_parent	Strong support of gender identity or expression from parents/guardians. 0=no or n/a (ref); 1=yes.	Binary
(recoded) n5b, n5c, n5d	supp_otherfam	Strong support of gender identity or expression from any other family member (spouse/partner, children, or grandchildren), if R has that type of family member. 0=no or n/a (ref); 1=yes.	Binary
(recoded) sum of n10	neg_fam	Negative trans-specific behaviours from family members. 1=none (ref); 2=n/a; 3=yes.	Nominal
(recoded) sum of n7a – n7f	neg_partner	Negative trans-specific behaviours from romantic partner (past year). 1=none (ref); 2=n/a; 3=yes.	Nominal
Covariates for SEM			
a1	age	Age in years.	Continuous
(recoded) b5 x b2	gender/sex	Gender x Sex assigned at birth. 1=trans man (TM) (ref); 2=trans woman (TW); 3=nonbinary or similar identity, assigned female at birth (NB-AFAB); 4=nonbinary or similar identity, assigned male at birth (NB-AMAB).	Nominal
(recoded) a4, a5	racialization	Racialization (identified or perceived as a person of colour in Canada). 0=non-racialized (ref); 1=racialized.	Binary
(recoded) a3a, a3_5	Indigenous	Indigenous identity (in Canada). 0=non-Indigenous (ref); 1=Indigenous.	Binary
(recoded) a26, a27	autism	Autism. 0=allistic (i.e., non-autistic) (ref); 1=autistic (diagnosed or self-identified).	Binary

[a] ref: reference category.

3.2.4 Other descriptive variables

In addition to the sociodemographic variables listed in section 3.2.3, we included the following descriptive variables.

Disability or chronic illness. Disability or chronic illness was a binary variable (living with a disability, chronic illness/pain, or mental health condition vs. no disability or chronic illness). Disability or chronic illness was broadly defined based on self-identification or diagnosis of various debilitating conditions. Respondents were classified as living with a disability or chronic illness if they self-identified as any of the following: autistic, blind, crip, deaf, disabled or living with a disability (including episodic disability), living with chronic pain, neurodivergent, a psychiatric survivor, mad, or person with mental illness, or another identity related to body/mind differences, or if they had been diagnosed with any of the following: acquired brain injury, autism or Asperger's, chronic illness, chronic pain condition, intellectual or developmental disability, intermittent or episodic illness or condition, learning disability, mobility or physical disability, vision impairment, mental health condition, or another form of disability or impairment.

Immigrant status. Immigrant status was a binary variable (immigrant vs. non-immigrant). Respondents were classified as immigrants if they were born outside of Canada, and non-immigrants if they were born in Canada.

Rural. Rural was a binary variable (living in a rural area or small town vs. not living in a rural area or small town). This variable was created using postal-code community size designations. A community size of less than 10,000 is considered a rural or small town in Canada, as these areas are outside of Census Agglomerations and Census Metropolitan Areas (Statistics Canada, 2016).

Low-income household. This was a binary variable (low-income household vs. non-low-income household). The classification was determined by comparing the reported household income with Statistics Canada's 2019 low-income measure, adjusted by the number of people supported by the income (Statistics Canada, 2019).

Education. Respondents reported the highest level of formal education they had completed. Responses were categorized into five levels: (1) less than high school; (2) high school diploma; (3) some college or university or CEGEP; (4) CEGEP, college, or university degree; (5) graduate or professional school degree.

Employment status. Respondent aged 16 or older reported their current employment status, which was regrouped into four categories: (1) permanent full-time; (2) employed, not permanent full-time; (3) not employed or on leave; (4) not employed or student or retired.

3.3 Directed Acyclic Graph

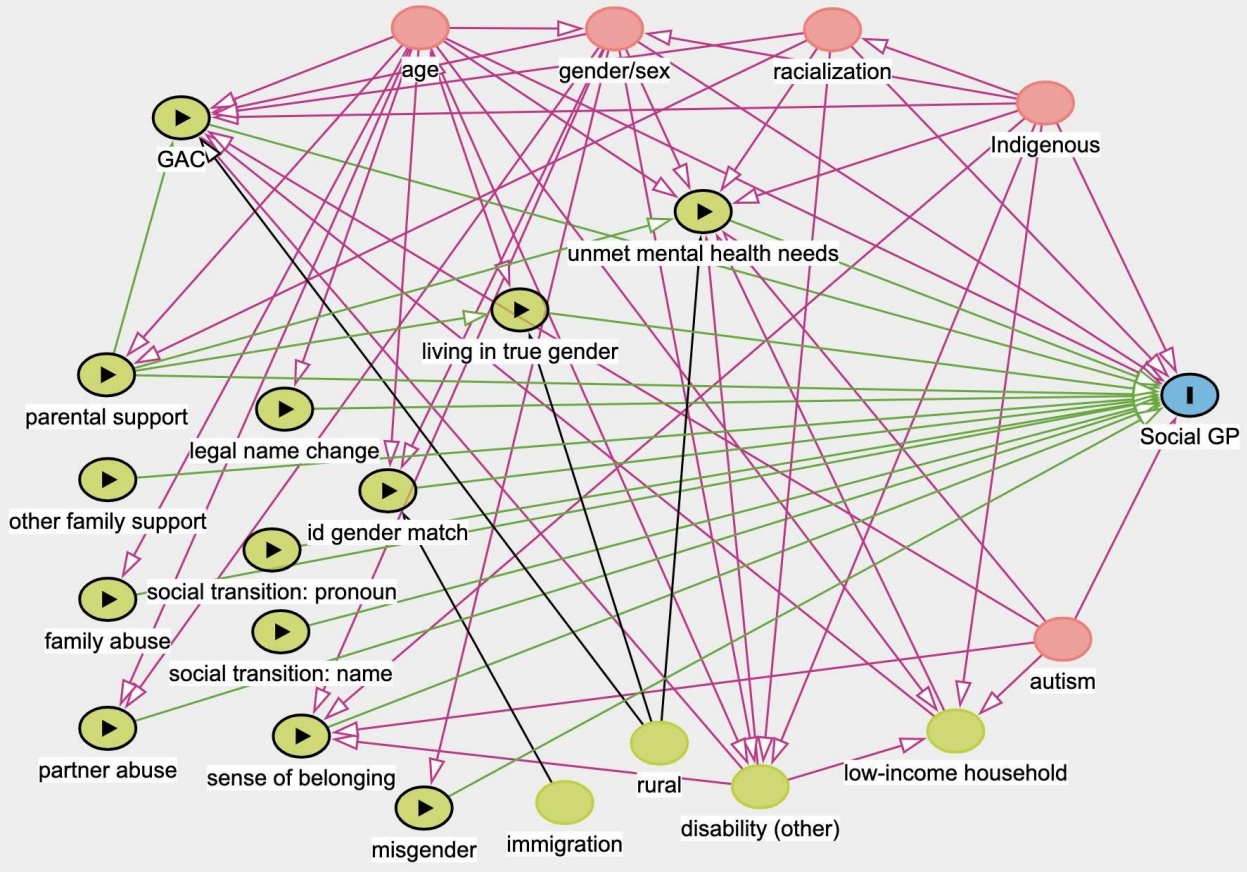
Directed acyclic graphs (DAGs) are diagrams that provide visual representations of causal assumptions and facilitate confounding assessment. The counterfactual definition of "no confounding" is when the same outcomes observed in the unexposed group would be expected in the exposed group if the exposed group had been unexposed, or vice versa. Conversely, confounding is present when the exposed and unexposed groups are non-exchangeable in this way (Greenland & Robins, 1986; T. J. VanderWeele & Shpitser, 2013; Tyler J. VanderWeele, 2012). The lack of exchangeability in the background risks (i.e., covariates other than the exposure of interest) induces confounding of observed associations (Bours, 2020). Specifically, if a covariate is associated with the exposure and independently affects the outcome, it introduces a spurious association between the exposure and the outcome when its distribution is incomparable under different exposure scenarios. Confounding threatens the validity of causal inferences about an exposure-outcome relation of interest; thus, confounders should be controlled for via study design and/or statistical adjustment (Bours, 2020). The use of DAGs can help minimize confounding bias and improve causal inference in observational studies

(Greenland, Pearl, & Robins, 1999; Merchant & Pitiphat, 2002; Rohrer, 2018). Specifically, a DAG follows a set of rules to identify the minimal sufficient adjustment set, which is the smallest group of covariates that need to be controlled for to accurately estimate the magnitudes of the relationships between the exposures and the outcomes for a given DAG (Foraita, Spallek, & Zeeb, 2014). Controlling for the minimal sufficient adjustment set enables a balance between minimizing confounding bias and parsimony.

In the Literature Review (Chapter 2 section 2.4), we identified various medical and social determinants of health that are potential protective and risk factors for TNB gender well-being, including intervenable factors (e.g., gender-affirming care status and barrier, unmet mental health care needs, name and gender ID concordance, other social support variables) and demographic factors (age, gender/sex, racialization, Indigenous identity, autism). Guided by the literature review and expert recommendations, we included these factors as exposure variables and covariates in the DAG, as well as several additional demographic variables (e.g., low-income household, immigration) that might be associated with some of the protective and risk factors.

We used the web application DAGitty v3.1 (dagitty.net) (Textor, van der Zander, Gilthorpe, Liśkiewicz, & Ellison, 2016) to construct a DAG to represent the theoretical conceptual model and determine the minimal sufficient adjustment set. A comprehensive DAG encompassing all four outcomes (*psoci*, *pbody*, *dsoci*, and *dbody*) would be overly complex; thus, for simplicity, we illustrated only *psoci* (i.e., Gender Positivity – social subscale) to exemplify the other outcomes (Figure 1), assuming that these outcomes shared similar causal structures. Based on the DAG, the minimal sufficient adjustment set included the following covariates: age, gender/sex, racialization, Indigenous identity, and autism.

Figure 1. Directed acyclic graph (DAG) for health care and social determinants of Gender Positivity (Social aspect)



Note. The other outcomes - Gender Positivity (Body aspect) and Gender Distress (Social or Body aspect) - presumably share similar causal structures.

The purpose of this DAG was to guide the development of a plausible structural equation model (SEM). A DAG could be thought of as a "qualitative schematic" or nonparametric SEM (Kunicki, Smith, & Murray, 2023; Rohrer, 2018). This DAG was not comprehensive and did not

encompass all possible parent variables, pathways, mediators, unmeasured covariates, or other causal elements. The minimal sufficient adjustment set used to adjust for confounding was sufficient with respect to this DAG only. There is likely residual confounding not captured by the DAG for which we could not control.

It is also worth noting that the DAG may look different among TNB people than the general population. Being TNB can moderate the relationships between some variables. For example, the 2019 Canadian census showed higher low-income household rates among racialized families and immigrants (Employment and Social Development Canada, 2021), but the 2019 TPC survey did not find statistically significant associations between low-income household rates and racialization or immigration within the TNB community, which has an overrepresentation of low-income households (Chih et al., 2020; Navarro et al., 2021). Therefore, Figure 1 includes no arrows linking racialization or immigration to low-income household.

3.4 Data Considerations

3.4.1 Sample weights

The TPC research team developed sample weights to weight data from the full survey participant group to the sociodemographic composition of all participants (short- and full-survey respondents). In this thesis, because the analytic sample comprised only full-survey respondents, descriptive statistics and univariate analysis were weighted for the results to be more representative of the entire TPC sample.

Briefly, the weights were created using *ipfweight* in Stata (StataCorp, 2017) based on raking, an iterative proportional fitting algorithm (Deming & Stephan, 1940). An iterative stepwise adjustment was performed until the difference between the weighted margins of the selected variables and the known population margins became smaller than a tolerance value. The selected variables were the sociodemographic variables with statistically significantly different distributions between the full- and short-survey respondents, including current sex work status, ethno-racial background (Black/white/other), two measures of disability (autism or

neurodivergence, and mental illness), low-income household, and language of survey completion (English/French).

Sample weights were not incorporated in the CFA and the SEM, because the software used for these analyses (R and the package *lavaan*) could not accommodate sample weights unless a maximum-likelihood (ML) estimator was applied (Rosseel, 2012), and we used a robust diagonally weighted least squares (DWLS) estimator instead. Nevertheless, the sample weights likely had negligible impacts on the estimated parameters, because the weights included in the analytic sample were very close to 1, ranging from 0.90 to 1.69 with a mean of 1.00. This suggested that our analytic sample was representative of the entire TPC sample, and that whether the analysis incorporated the sample weights likely made little difference.

3.4.2 Missing data

The counts and percentages of missing observations for the outcome measures, predictors, and covariates are shown in Table 3. Overall, 18.6% of the analytic sample had at least one variable with missing data. The main source of the missingness was from the predictors, with 16.3% of respondents missing at least one predictor observation. Individual predictor missing percentages ranged from 0.1% to 11.2%. There was much less missingness for the outcome measures (2.4% overall) and covariates (0.6% overall). All individual outcome items had $\leq$ 0.6% of data missing, and all individual covariates had $\leq$ 0.3% of data missing.

When the amount of missing data is < 10%, it is unlikely to bias subsequent statistical analysis (Bennett, 2001). In this study, the univariate analysis and the CFA both had much less than 10% of data missing. Only the SEM, which included the predictors, had > 10% missing data. Therefore, the missing data issue was non-ignorable only for the SEM and needed to be managed before conducting the SEM.

Three possible mechanisms could have led to the occurrence of missing data: missing completely at random (MCAR), missing at random (MAR), and missing not at random (MNAR) (Rubin, 1976). MCAR means that the missingness is unrelated to both observed and unobserved variables. MAR means that the missingness depends on observed variables but not on unobserved ones. MNAR means that the missingness is influenced by both observed and unobserved variables. Importantly, the missing mechanism is not a fixed property of the data set;

rather, it can vary depending on the particular model and variables included in the analysis (Bennett, 2001; Mallinckrod, Lane, Schnell, Peng, & Mancuso, 2008). The problem of missing data is ignorable under MCAR, since the available data are representative of the full sample, but MCAR is a stringent assumption and is rarely met in practice. MAR is a more tenable and less restrictive assumption under which missing data can be ignored in certain situations (Enders & Bandalos, 2001). MAR is the default assumption for most multiple imputation or maximum-likelihood-based techniques for handling missing data (Enders, 2022).

While MAR and MNAR cannot be distinguished based on observed data, it is possible to rule out MCAR by visually inspecting the missingness pattern (Perkins et al., 2018). Thus, we illustrated the missing pattern of the predictors (Figure 2) since most of the missing data in our analytic sample occurred in the predictors. Each row (horizontal line across the figure) represents an individual respondent, sorted by the values of the first predictor *GAC*. Each column represents a predictor variable. Red lines depict missing data. Black, gray, and white lines depict observed data, with lighter shades denoting smaller values. Figure 2 reveals a tendency for the missingness to co-occur across many predictors (except for *yrtrue* and *belong*), which suggests that the occurrence of missing data was related to some observed variables. Although visual inspection is not a formal test, it showed that the MCAR assumption might not be valid. Therefore, the underlying missing mechanism was likely to be either MAR or MNAR. Since MAR and MNAR are indistinguishable based on observed data or missingness patterns, it is inherently impossible to formally assess the MAR assumption (Mackinnon, 2010; Perkins et al., 2018). Consequently, we cannot fully exclude MNAR as a potential explanation for the missingness. Nevertheless, modern methods for handling missing data (e.g., multiple imputation conditioned on auxiliary variables) can transform potential MNAR to approximate MAR or MCAR (Bennett, 2001; Enders, 2022b). Thus, we assumed MAR and applied multiple imputation (Statistical Analysis section 3.5.5) before proceeding to the SEM.

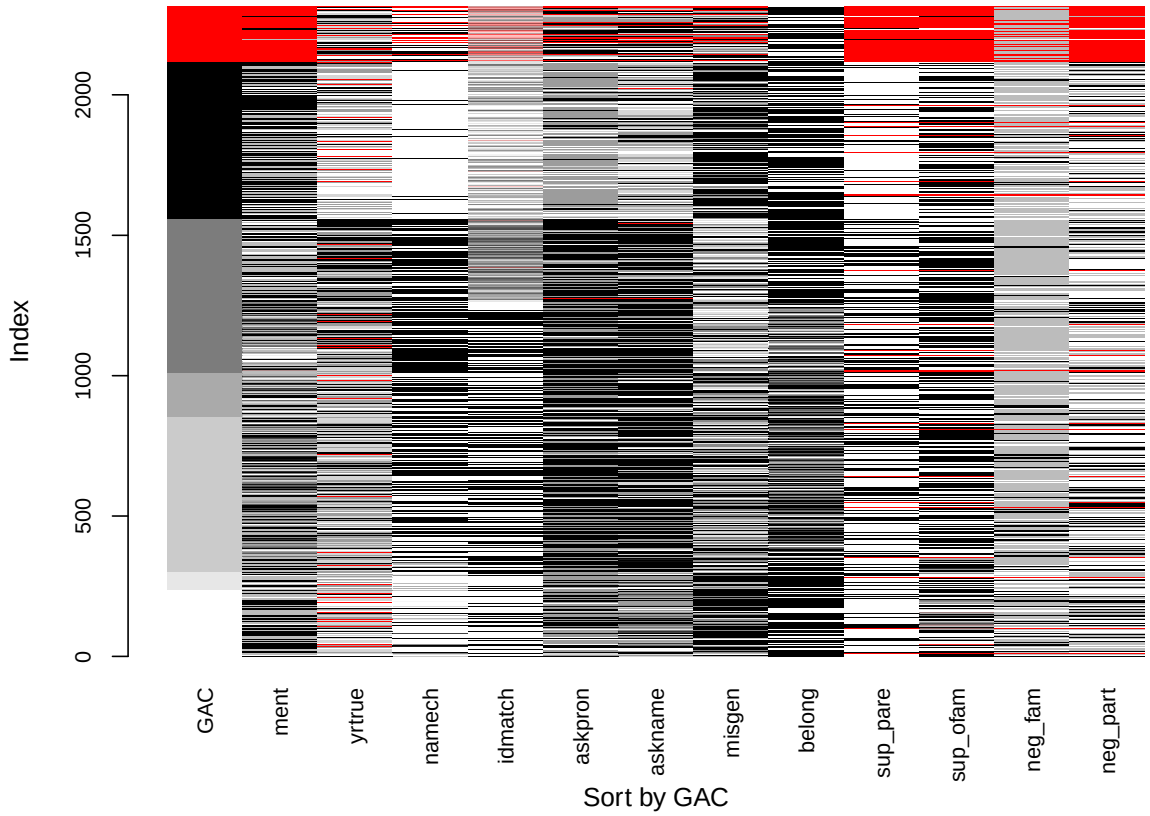
Table 3. Count and percentage of missing observations for the outcomes, predictors, and covariates

Variable	Frequency Missing (n)	Percent Missing (%)[a]
Overall	**430**	**18.6**
Outcome Measures		
Any outcome item	**55**	**2.4**
I feel a sense of accomplishment and pride being able to express myself as my gender (b11b)	2	0.1
I enjoy going out in public and doing social activities because I can express myself as my gender (b11c)	1	0.04
I feel validated when strangers in public treat me like my gender (b11d)	3	0.1
I feel confident trying new and different clothes that express my gender (b11e)	5	0.2
I feel happy that society sees me on the outside for who I am on the inside (b11f)	11	0.5
I am relieved I don't have to work as hard as I used to for people to see me as my gender (b11g)	14	0.6
I feel confident in my body (b11h)	0	0
I feel attractive (b11i)	1	0.04
I feel comfortable in my body (b11j)	1	0.04
I feel like my body fits with the real me (b11k)	3	0.1
Things about my body that used to bother me don't bother me as much anymore (b11l)	0	0
I wish I had been born in a different body (b12a)	1	0.04
I avoid social situations or activities because I can't express myself in my gender (b12b)	5	0.2
I feel hurt if someone calls me the wrong gender (using the wrong pronouns / name / language) (b12c)	2	0.1
I feel that society doesn't accept or embrace me in my gender (b12e)	2	0.1
I worry that people will always treat me as the wrong gender (b12f)	2	0.1
I dislike seeing my naked body (b12g)	0	0
I feel like I can't trust what my body might do as I get older (b12h)	0	0
I dislike my voice because I feel that it doesn't match my gender (b12i)	0	0
When people treat me like the wrong gender or expect me to behave like a *boy/man [girl/woman]* I feel hurt (b12j)	4	0.2
I feel unhappy because I have a *masculine [feminine]* body (b12k)	5	0.2

I worry that I might always have a *masculine [feminine]* body (b12l)	4	0.2
I dislike peeing *standing up [sitting down]* (b12m)	1	0.04
I dislike having a *penis or erections [front hole or monthly bleeding (period)]* because it makes me feel like I'm not my true gender (b12n)	5	0.2
I dislike having *facial hair [breasts]* because it makes me feel like I'm not my true gender (b12o)	5	0.2
Predictors		
Any predictor	**378**	**16.3**
Gender-affirming care status and barriers	197	8.5
Unmet mental health needs	190	8.2
Years living in true gender	111	4.8
Legal name change	41	1.8
Has any government ID that matches preferred gender	80	3.5
Has asked people to use a different pronoun	42	1.8
Has asked people to use a different name	45	1.9
How often is respondent misgendered	48	2.1
Sense of belonging in trans/NB space in person or online	2	0.1
Strong support on gender identity from parents/guardians	258	11.1
Strong support on gender identity from other family member	258	11.1
Negative trans-specific family behaviour	106	4.6
Negative trans-specific negative partner behaviour	259	11.2
Covariates		
Any covariate	**15**	**0.6**
Age	7	0.3
Gender/sex	2	0.1
Racialization	2	0.1
Indigenous identity	4	0.2
Autism	0	0

*Percent missingness was calculated using a denominator value of N=2316, which was the analytic sample size of the analytic sample.

Figure 2. Missing data pattern of the predictors



Note. Each row represents an individual respondent, and each column represents a predictor variable. Red line: missing value. Black to gray to white lines: larger to smaller observed values of a variable. sup_pare: supp_parent. sup_ofam: supp_otherfamily. neg_part: neg_partner.

3.5 Statistical Analyses

Data cleaning and preprocessing, calculation of missing data counts and percentages, univariate analysis, weighted ANOVAs, weighted t-tests, estimation of inter-item and item-total correlations, and multicollinearity analysis were conducted in SAS version 9.4 (SAS Institute Inc., 2023). All other statistical analyses were conducted in RStudio version 2023.03.0+386 (RStudio Team, 2023) with R version 4.2.2 (R Core Team, 2022).

3.5.1 Univariate analysis

To describe sample sociodemographic characteristics, we reported counts and weighted percentages for categorical variables, and weighted means and standard deviations (SDs) for continuous variables. To describe the patterns of GP, GD, and their social- and body-subscale scores, we calculated weighted means, SDs, medians, and interquartile ranges, overall and stratified by gender identity and sex assigned at birth (SAAB). Furthermore, we performed weighted t-tests and ANOVAs to examine whether GP, GD and the subscale scores differed by gender identity or SAAB. Additionally, since the scales were developed based on literature suggesting that GP and GD are not polar opposites, we constructed scatterplots to investigate the correlations between the two overall scales, subscales across the two scales, and subscales within each scale.

3.5.2 Psychometric analysis of TYC-GPS and TYC-GDS

TYC-GPS and TYC-GDS were originally developed and validated using a clinical sample of TNB youth aged 10 to 15 in need of gender-affirming medical treatments (Bauer et al., 2021a,b,c). However, these scales had not been validated in a community sample consisting predominately of TNB adults with diverse gender-affirming care needs and statuses. Therefore, we conducted psychometric analyses to evaluate the scales' internal consistency and construct validity in a TNB community sample, using the TPC data.

3.5.2.1 Inter-item correlations, item-total correlations, and internal consistency

We computed polychoric inter-item correlations and polyserial item-total correlations for TYC-GPS and TYC-GDS, since the individual item responses were ordinal and the summed scale scores were continuous (Drasgow, 2014; Leung, 2011). In addition, to estimate internal consistency (a measure of reliability), we calculated Cronbach's alpha (α) (Cronbach, 1951) and McDonald's omega, including omega-total (ω_t) and omega-hierarchical (ω_h) (McDonald, 1999; Revelle & Condon, 2019). Cronbach's alpha has been repeatedly criticized for having unrealistic

assumptions (Malkewitz, Schwall, Meesters, & Hardt, 2023; McNeish, 2018; Revelle, 2014). Researchers are advised to report alternative coefficients, such as ω_t and ω_h (Revelle & Condon, 2019). ω_t estimates the total reliability of a test, capturing the proportion of variance explained by all factors, whereas ω_h estimates the general reliability, quantifying the proportion of variance explained by a single general factor (Revelle & Condon, 2019). While McDonald's omega is the recommended reliability estimate, we also reported Cronbach's alpha to facilitate comparison and sensitivity analysis regarding the scales' application across diverse TNB populations (Bauer et al, in prep).

3.5.2.2 Confirmatory factor analysis

We conducted a two-factor first-order confirmatory factor analysis (CFA) on TYC-GPS and TYC-GDS separately to evaluate how well they described the TNB community sample data. Widely used in social sciences and psychology, CFA is a theory-driven statistical method to verify theoretical relationships between observed and latent variables, thereby testing *a priori* hypothesized measurement models and construct validity (Kline, 2016). A latent variable is a construct that cannot be directly observed or measured but is approximated through measures presumed to assess part of the construct (American Psychological Association, 2016). CFA allows researchers to evaluate whether a set of items (i.e., indicators) adequately represents the underlying latent construct (i.e., factor) while accounting for measurement errors. In our theoretical model, TYC-GPS and TYC-GDS each comprised two correlated factors – social and body – corresponding to the two subscales, and the subscale items were the indicators measuring the factors (Table 1). This two-factor structure was determined based on research literature (e.g., Beischel et al., 2022), expert recommendations, and participant feedback.

CFA produces parameter estimates by comparing the data-based and model-implied covariance matrices. Our parameter of primary interest is factor loading, which captures the strength and direction of the relationship between latent constructs and indicators in the measurement model. Specifically, standardized factor loadings enable comparing the relative importance of each indicator in measuring the latent construct. Squared standardized factor loadings depict the percentage of indicator variance explained by the latent construct.

Unstandardized factor loadings are useful for significance testing and for understanding the indicator contribution in its original unit (Tavakol & Wetzel, 2020).

We performed the CFA using the R package *lavaan* and its function *cfa* (Rosseel, 2012). The *lavaan* package is designed specifically for latent variable analyses, including CFA and SEM. For the CFA model to be identified, we standardized the factors by constraining each factor variance to be 1.0, a method known as the unit variance identification constraint (Kline, 2016). We chose this method over the *lavaan* default, which constrains the unstandardized factor loading of the first indicator of each factor to 1.0 (Rosseel, 2012), because we were interested in estimating factor loadings of all the indicators. For model fitting, we applied the robust mean- and variance-adjusted weighted least square (WLSMV) method, which is the default method for categorical variables in *lavaan* and *Mplus* (Muthen & Muthen, 2017). WLSMV employed the diagonally weighted least square (DWLS) estimator with robust corrections to standard errors and chi-square statistics (Muthén, Du Toit, & Spisic, 1997). We used a DWLS instead of maximum-likelihood (ML) estimator because the 5-point Likert items were on an ordinal scale and the item responses were skewed towards 5 and 4 (agree strongly or somewhat). ML methods assume that the observed variables are continuous and follow a multivariate normal distribution, whereas DWLS assumes normality only for the underlying latent variable but not for the observed variables (Li, 2016). Although a robust ML estimator (e.g., MLR) can correct for nonnormality to some extent, it cannot account for the inherent nonlinearity among ordinal observed variables. By contrast, a DWLS estimator can deal with both nonnormality and nonlinearity (Lei & Shiverdecker, 2020). Thus, DWLS is recommended over ML for ordinal variables since DWLS generally leads to more robust, more precise, and less biased estimation than ML (Flora & Curran, 2004; Li, 2016; Mîndrilă, 2010).

To evaluate the goodness-of-fit of our CFA model, we calculated several commonly reported fit indices, including the comparative fit index (CFI), the Tucker-Lewis index (TLI), the root mean square error of approximation (RMSEA) with 90% confidence interval, the standardized root mean square residual (SRMR), and chi-square (Schreiber, Stage, King, Nora, & Barlow, 2006). Among them, CFI and TLI are incremental fit indices: They represent how well the proposed model fits the data relative to a baseline (null) model, and higher values indicate better fits. RMSEA, SRMR, and chi-square are absolute fit indices: They represent how

badly the proposed model deviates from the data without reference to any null model, and smaller values indicate better fits. We reported scaled values of these fit indices because they were calculated from scaled (i.e., variance-adjusted) chi-square statistics using the WLSMV method. Among the scaled fit indices, we denoted CFI, TLI and RMSEA as robust since they were adjusted further with robust nonnormality correction (Brosseau-Liard & Savalei, 2014; Brosseau-Liard, Savalei, & Li, 2012).

Conventional "rules of thumb" values for a good fit are CFI and TLI $\geq .95$, RMSEA $\leq .06$, and SRMR $\leq .08$ (Hu & Bentler, 1998; Hu & Bentler, 1999). Furthermore, Hu and Bentler (1999) recommended a two-index strategy for evaluating acceptable fits, which includes SRMR and one of CFI, TLI, and RMSEA. A two-index combination that suggests an acceptable fit requires SRMR $\leq .09$ and one of the following: TLI $\geq .95$ or .96, CFI $\geq .95$ or .96, or RMSEA $\leq .06$ (Hooper, Coughlan, & Mullen, 2008; Hu & Bentler, 1999). However, these cut-off values were determined using ML estimation and multivariate normal continuous data, and they cannot be generalized to DWLS and ordinal data fit results (Nye & Drasgow, 2011). So far, no clear guideline exists for evaluating goodness-of-fit for DWLS estimates, ordinal data, or scaled fit indices (Beauducel & Herzberg, 2006; Garrido, Abad, & Ponsoda, 2016; Xia & Yang, 2019). Nevertheless, simulation studies have shown that DWLS estimation generally produces higher CFI and TLI, lower RMSEA, and similar SRMR values compared with its ML or MLR counterpart (Nye & Drasgow, 2011; Shi & Maydeu-Olivares, 2020; Xia & Yang, 2019). Therefore, SRMR is more consistent across these different estimators and data scale conditions than the other fit indices (Shi & Maydeu-Olivares, 2020). Although universal cut-off values for assessing DWLS fit indices remain elusive, a good or acceptable fit plausibly requires similar SRMR ($\leq .08$ for a good fit, $\leq .09$ for an acceptable fit), higher CFI and TLI ($> .95$ for a good fit), and lower RMSEA ($< .06$ for a good fit), compared to the ML criteria. Additionally, while a non-significant chi-square test result also indicates a good fit, the chi-square test is overly sensitive to data non-normality and trivial deviations from a "perfect" model, prone to showing significant results and rejecting the proposed model in large samples. Thus, it is recommended to not rely solely on the chi-square test to evaluate the model goodness of fit (Mueller & Hancock, 2008). Nevertheless, we reported chi-square results in recognition of their value in identifying model misspecification, as previous scholarship has cautioned against outright dismissal of them

despite their limitations (e.g., Hayduk, Cummings, Boadu, Pazderka-Robinson, & Boulianne, 2007; Kline, 2018).

3.5.3 Structural equation modelling

We conducted confirmatory structural equation modelling (SEM) to explore health care and social predictors associated with GP and GD. SEM is an umbrella framework that encompasses various multivariate statistical techniques, including factor analysis, regression analysis, path analysis, latent variable models, and latent growth models (Kline, 2016). CFA, multiple regression, and analysis of variance (ANOVA) are special forms of SEM. Aiming to parsimoniously explain the relationships between variables and/or constructs (Kunicki et al., 2023), SEM is a versatile approach that combines the strengths of factor analysis and regression analysis. Compared to multiple regression, SEM has several key advantages: (1) SEM can represent constructs as latent variables, which is useful for scale development and evaluation; (2) SEM provides goodness-of-fit indices for formal assessment of how well a theoretical model reproduces observed data, aiding decisions on model acceptance, rejection, refinement, and comparison; (3) SEM's flexibility enables simultaneous estimation of intricate structural relationships (e.g., multiple dependent and independent variables, multiple direct and indirect effects), while accounting for measurement error (Hox & Bechger, 1998; Kline, 2016).

We considered four correlated outcomes (GP-social, GP-body, GD-social, and GD-body) as factors measured by the corresponding subscale indicators. Guided by literature and a DAG (sections 2.4 and 3.3), the SEM included 13 predictors and adjusted for five demographic covariates, all of which were manifest variables (see Table 2 for a summary list). The model assumed that there were direct paths from each predictor and covariate to all four factors without considering mediation or interaction. We estimated path coefficients between the outcome factors and the explanatory variables (predictors and covariates). Path coefficients are the SEM equivalent of regression coefficients; they quantify the change in the outcome to a unit change in the explanatory variable when holding other variables in the model constant (Bollen, 1989). Path coefficients are akin to factor loadings, except that path coefficients represent connectivity in the structural component, whereas factor loadings convey factor-indicator relationships in the measurement component of SEM.

Before conducting the SEM, we checked for potential multicollinearity issues among the SEM variables by calculating the variance inflation factor (VIF) and tolerance values (Kline, 2016). A VIF greater than 5 to 10 and a tolerance smaller than 0.1 to 0.2 would indicate the presence of multicollinearity (Kim, 2019). The multicollinearity test included the predictors, covariates, and four subscale means representing the four outcomes. All VIFs were less than 5, ranging from 1.05 to 2.05, and all tolerance values were above 0.2, ranging from 0.49 to 0.96. Therefore, multicollinearity was likely not a considerable issue for the SEM.

Model fitting was performed using the R-package *semTools* (an extension of *lavaan*) and its function *sem.mi* (Jorgensen, Pornprasertmanit, Schoemann, & Rosseel, 2022). As in the CFA, we applied DWLS estimation with robust corrections for standard errors and chi-square test statistics (i.e., the WLSMV method) to adjust for categorical variables and nonnormality. For model identification, we constrained the factor variance to 1.0. Model fit was assessed with chi-square statistics, CFI, TLI, RMSEA with 90% confidence interval, and SRMR.

3.5.4 Measurement invariance

Measurement invariance is a pivotal concept in CFA and SEM, particularly for scale validation, group comparison, and cross-cultural research. It refers to the assumption that the psychometric properties of a construct are equivalent across different groups or occasions. Researchers typically follow a stepwise process to test for measurement invariance from the least to the most stringent level: (1) configural invariance, ensuring the same factor structure (number of factors, pattern of free and fixed factor loadings) across groups; (2) metric (weak) invariance, where factor loadings are equivalent across groups; (3) scalar (strong) invariance, i.e., equivalent item intercepts; (4) residual (strict) invariance, i.e., equivalent item residuals. Achieving a weaker level of invariance is a prerequisite for a stronger level. To meaningfully compare predictor effects across groups, it is essential to establish at least metric invariance and ideally scalar invariance in the measurement tool; otherwise, group differences observed in the structural model could be simply due to the measurement tool's non-invariance across groups (Putnick & Bornstein, 2016).

While a comprehensive examination of measurement invariance (e.g., across survey languages, age groups) for the purpose of scale validation is beyond the scope of this thesis, we tested for configural, metric, and scalar invariance of TYC-GPS and TYC-GDS separately across four gender/sex groups (trans men, trans women, NB-AFAB, and NB-AMAB), two sex-assigned-at-birth groups (AFAB and AMAB), and binary (trans men or trans women) versus nonbinary (NB-AFAB or NB-AMAB) gender groups. Furthermore, we conducted the same measurement invariance tests for the combination of GPS and GDS, since it was the measurement component of the SEM. Configural, metric, and scalar invariance was assessed by progressively constraining the factor structure, factor loadings, and item intercepts to be equal across the groups, using the *cfa* function in *lavaan* (Rosseel, 2012). The resulting nested models with increasing constraints were compared using the *compareFit* function in *semTools* (Jorgensen et al., 2022). If the model fit deteriorated substantially when an equality constraint was added, it indicated that the constrained parameter was non-invariant across the groups.

Consensus remains elusive regarding the optimal fit indices or their cut-off values for determining measurement invariance under all conditions (Putnick & Bornstein, 2016). Thus, we employed commonly reported criteria. To establish configural invariance, the measurement model with a configural equality constraint (i.e., equal factor structure across groups) must exhibit acceptable fit: SRMR $\leq .09$ and at least one of the following: TLI $\geq .95$, CFI $\geq .95$, or RMSEA $\leq .06$ (Hooper et al., 2008). Metric and scalar invariance was assessed by the extent of deterioration in the model fit when loading and intercept equality constraints were added. For metric invariance, the criteria included a $\leq .01$ decrease in CFA, $\leq .015$ increase in RMSEA, and $\leq .030$ increase in SRMR. For scalar invariance, the criteria included a $\leq .01$ decrease in CFA and $\leq .015$ increase in SRMR (Chen, 2007; Putnick & Bornstein, 2016). Additionally, we reported chi-square test results for each level of equality constraint (χ^2) and for the difference between two successive levels of constraint ($\Delta\chi^2$ for nested models) since their non-significance used to be the classical criterion for measurement invariance. While the chi-square test is overly sensitive to trivial deviations in large samples (Putnick & Bornstein, 2016), it is recommended to include chi-square results in line with the established practice within the field for a comprehensive assessment of model fit and measurement invariance (Hayduk et al., 2007; Kline, 2018).

3.5.5 Multiple imputation

For the internal consistency estimation, inter-item correlations, item-total correlations, CFA, and measurement invariance tests, complete case analysis (CCA) was employed because the overall missing data rate was low (2.37%) among TYC-GPS and TYC-GDS item responses (i.e., the outcome measures). However, CCA was not appropriate for the SEM, because the SEM predictors had 16.32% of data missing and the missing mechanism was unlikely to be MCAR (Data Consideration section 3.4.2). CCA operates under the stringent assumption of MCAR, and when the extent of missingness is non-ignorable (e.g., > 10%), CCA usually produces biased results and substantially reduces statistical power due to deleting too much data. A simple method for dealing with missing data is mean imputation, but it is generally not recommended because it underestimates parameter variances (Bennett, 2001; Little & Rubin, 2002).

The default method in *lavaan* for handling missing data in SEM is full information maximum likelihood (FIML) (Rosseel, 2012). However, FIML was not suitable for our analysis due to two main reasons: (1) FIML requires the use of a full-information estimator, e.g., ML or MLR. Our analysis implemented DWLS, which is not a full-information estimator, and hence the software could not combine DWLS with FIML; (2) While FIML manages missing data in the outcomes, it deletes cases with missing data in the predictors. In our study, most of the missing data were from the predictors, making FIML less useful.

An alternative common method is multiple imputation (MI) (Enders & Mansolf, 2018). Under the MAR assumption, MI imputes from the observed data distribution to estimate possible values for the missing data. MI involves three steps. Step 1 is to generate multiple imputed complete datasets where the missing data are substituted with simulated values. Step 2 is to analyze each imputed dataset separately, leading to multiple sets of results. Step 3 is to combine these results using Rubin's rules (Enders, 2022b; Rubin, 1987) to yield a single comprehensive set of estimates (White, Royston, & Wood, 2011). MI has a few advantages compared to FIML: (1) MI allows the use of DWLS estimation; (2) MI is more flexible with a mixture of incomplete categorical and continuous variables, regardless of whether they are the outcomes or the

predictors; (3) MI is less prone to convergence problems; (4) MI can incorporate auxiliary variables better (Enders, 2022b; Enders & Mansolf, 2018).

Auxiliary variables are extraneous variables that are correlated with the occurrence of missing data and/or incomplete analysis variables but are not part of the focal analysis themselves (Enders, 2022a). Methodologists have recommended incorporating auxiliary variables into the imputation process to fine-tune the prediction of missing values, an approach known as "inclusive analysis strategy." Doing so can reduce nonresponse bias and/or improve estimation precision (Enders, 2022a). Moreover, conditioning the imputation on auxiliary variables can bolster the plausibility of the MAR assumption and mitigate potential MNAR detrimental impact, since MAR entails that the missingness is random after conditioning on observed variables (Collins, Schafer, & Kam, 2001; Enders, 2022a). Nevertheless, it can be counterproductive to add as many auxiliary variables as possible (Enders & Mansolf, 2018). A more practical strategy is to include a small number of potent auxiliary variables that are correlated with both the occurrence of missingness and the incomplete variables of the focal analysis (Enders, 2022a).

We conducted preliminary analyses of chi-square tests to identify candidate auxiliary variables to include in the MI. Eligible auxiliary variables must meet the following criteria: (1) They were statistically significantly correlated with one or more incomplete predictors and the occurrence of missingness (coded with a binary missing data indicator) in these predictors. We examined only the predictors because non-ignorable missingness occurred among the predictors. (2) As indicated by Cramer's V, the significant correlation must have an effect size that was at least medium (e.g., $V > 0.17$ when $df = 3$, and $V > 0.13$ when $df = 5$) with the incomplete predictor and at least non-negligible (e.g., $V > 0.06$ when $df = 3$, and $V > 0.05$ when $df = 5$) with the occurrence of missingness (Cohen, 1988; Enders, 2022a). (3) The auxiliary variable itself had very little missing data. We identified the following candidate auxiliary variables: gender/sex, age (youth vs. non-youth), education level, and survey language (English vs. French). Gender/sex and age (in years) were already included as covariates in the MI. Adding another variable for age (youth vs. non-youth) might introduce multicollinearity problems to the imputation process. Hence, we added education level and survey language as auxiliary variables

to the MI. Note that these auxiliary variables were added only for the purpose of improving the imputation (step 1) and were excluded from the subsequent SEM (steps 2 and 3).

For step 1 of MI, we used the R-package *Amelia* (Honaker, King, & Blackwell, 2011) to generate 20 complete datasets in which the missing data were imputed. Included in the imputation were the outcome indicators (11 GP items and 14 GD items), 13 predictors, five covariates for the SEM, and two auxiliary variables. We generated 20 imputations because it is recommended to create at least 5-10 imputations for point estimates of coefficients (Rubin, 1987) and 20 imputations for consistent estimates of standard errors (von Hippel, 2020). The R-package *Amelia* employed an expectation-maximization (EM) with bootstrapping algorithm to impute missing data. (Honaker & King, 2010; Honaker et al., 2011). The imputed values were on the same scale (binary, multinominal, ordinal, or continuous) as the original variable. Compared to other MI algorithms, such as multiple imputation by chain equations (MICE, also known as fully conditional specification) (Van Buuren, Brand, Groothuis-Oudshoorn, & Rubin, 2006), EM with bootstrapping is faster and more robust to convergence problems when imputing many variables (Honaker et al., 2011). Next (step 2 of MI), we fit the structural equation model to each imputed dataset. Finally (step 3 of MI), we combined the fit results using Rubin's rule and robust D_2 statistics (Li, Meng, Raghunathan, & Rubin, 1991). D_2 statistics is ideal for pooling weighted least squares test statistics (Liu & Sriutaisuk, 2020). The last two steps were conducted using the R-package *semTools* (Jorgensen et al., 2022), an extension of *lavaan*.

3.6 Summary of Preliminary Analysis

The thesis plan has undergone substantial changes from its initial proposal. Originally, we intended to group the SEM predictors into five latent variables (lived gender integrity, navigation of interpersonal gender space, sense of belonging in TNB communities, trans-specific family support, and trans-specific family abuse) and three manifest variables (GAC status, GAC barriers, and unmet mental health care needs). However, this model failed to converge, likely due to the poorly constructed latent predictors and multicollinearity issues. Therefore, we removed the latent constructs and treated all the predictors as manifest variables. Additionally, we applied theory-based refinement to recode or remove some of the predictors. For example, we combined

GAC status and barriers into one compound variable to eliminate potential multicollinearity, since only respondents seeking GAC reported experiencing barriers.

Moreover, our original plan involved conducting an intersectional analysis using multi-group SEM to compare eight intersections: four gender/sex groups by two race groups (racialized and non-racialized). Unfortunately, this proved infeasible due to small sample sizes in the racialized groups, with useable observations numbering only 72, 50, 151, and 27 for racialized trans men, trans women, NB-AFAB, and NB-AMAB, respectively. A minimum of 200 observations per group is required for valid SEM with robust DWLS estimation (Bandalos, 2014; Forero, Maydeu-Olivares, & Gallardo-Pujol, 2009). Consequently, we merged the data across the racialization categories and attempted multi-group SEM for the gender/sex groups. However, the SEM measurement model did not establish even configural invariance across the gender/sex groups (see Results section 4.3.2 and Appendix F and G for details). Given that metric invariance of the measurement model is the minimum prerequisite for a multi-group SEM to meaningfully assess structural differences across groups (Putnick & Bornstein, 2016), the pursuit of a multi-group SEM was deemed inappropriate and thus not undertaken.

Chapter 4

4 Results

4.1 Objective 1: Patterns of Gender Positivity and Gender Distress

4.1.1 Sample characteristics

Summary sample characteristics with weighted percentages are reported in Table 4. Of respondents, 71.3% were younger than 35. The average age was 30.7 years (standard deviation = 11.3 years), ranging from 14 to 74 years. The largest gender/sex group was nonbinary people who were assigned female at birth (NB-AFAB, 40.8%), followed by roughly equal percentages (~ 25%) of trans men and trans women. Racialized participants composed 13.7% of the sample. Among the racialized respondents, 40.5% identified as Asian (East, South, or Southeast), 13.8% Black, 24.3% Indigenous, 3.5% Indo-Caribbean, 12.1% Latin American, and 8.7% Middle Eastern (respondents could select more than one option). In addition, of the 8.8% of respondents who indicated that they were Indigenous from Canada, 53.5% identified as First Nations, 46.8% Métis, 1.0% Inuk, and 12.7% were unsure which Indigenous group (respondents could select more than one option). The majority (78.9%) of respondents were living with some type of disability or chronic illness (broadly defined, inclusive of mental health conditions, chronic illness, and chronic pain). Specifically, 14.7% of respondents were diagnosed with autism or Asperger's or self-identified as autistic. Most respondents were born in Canada (87.0%) and residing in urban areas (93.7%). Almost half (46.9%) of the sample were living in low-income households. Despite that the majority (78.3%) of all respondents had at least some postsecondary education, only 34.8% of respondents older than 16 were employed in a permanent full-time position.

Table 4. Sample characteristics (N=2316)

Variable	Frequency n [a] (weighted %)
Age	
14 - 24	794 (34.4)
25 - 34	851 (36.9)
35 - 49	459 (19.8)

50+	205 (8.9)
Gender/sex	
Trans man/boy	593 (25.5)
Trans woman/girl	572 (25.2)
Nonbinary, assigned female at birth (NB-AFAB)	952 (40.8)
Nonbinary, assigned male at birth (NB-AMAB)	197 (8.6)
Racialization	
Racialized	305 (13.7)
Non-racialized	2009 (86.3)
Indigenous identity	
Indigenous in Canada	201 (8.8)
Not Indigenous in Canada	2111 (91.2)
Autism	
Autistic (diagnosed or self-identified)	351 (14.7)
Allistic (non-autistic)	1965 (85.3)
Disability or chronic illness	
Living with a disability or chronic illness	1838 (78.9)
No disability or chronic illness	478 (21.1)
Immigration	
Not born in Canada	294 (13.0)
Born in Canada	2013 (87.0)
Rural vs Urban	
Living in a rural area or small town	142 (6.3)
Not living in a rural area or small town	2111 (93.7)
Low-income household	
Low-income household	969 (46.9)
Not low-income household	1130 (53.1)
Education	
Less than high school	234 (10.1)
High school diploma	264 (11.6)
Some college/university/CEGEP	607 (26.4)
College/university/CEGEP degree	912 (39.4)
Graduate/professional school degree	291 (12.5)
Employment status (age 16+)	
Permanent full-time	698 (34.8)
Employed, not permanent full-time	739 (37.7)
Not employed or on leave	356 (17.9)
Not employed and student or retired	190 (9.6)

[a] Unweighted n.

4.1.2 Descriptive statistics of TYC-GPS and TYC-GDS

Weighted descriptive statistics of item-wise and mean scores of TYC-GPS, TYC-GDS, and their social and body subscales are shown in Table 5. All items took the full range of possible values (1 - 5). Mean scores were computed over the corresponding items for respondents who completed at least 80% of the items. The overall GP and GD mean scores were 3.45 and 3.53, respectively. The subscale means ranged from 2.92 (GP-Body) to 3.89 (GP-Social), with higher scores (i.e., stronger agreement) for the social subscales compared to the body subscales.

Table 5. Descriptive statistics of mean and item-wise scores of TYC-GPS, TYC-GDS, and the social and body subscales (N=2316)

	Mean (SD) [a]	**Median (IQR)** [a]	**Missing n**
Gender Positivity - Overall [b]			
Mean score [c] (Min: 1.1. Max: 5.0)	3.4 (0.8)	3.5 (1.2)	0
Gender Positivity – Social			
Mean score [c] (Min: 1.0. Max: 5.0)	3.9 (0.8)	4.0 (1.2)	8
(b11b) I feel a sense of accomplishment and pride being able to express myself as my gender	4.1 (1.0)	4.0 (1.0)	2
(b11c) I enjoy going out in public and doing social activities because I can express myself as my gender	3.5 (1.2)	4.0 (2.0)	1
(b11d) I feel validated when strangers in public treat me like my gender	4.6 (0.7)	5.0 (1.0)	3
(b11e) I feel confident trying new and different clothes that express my gender	3.9 (1.1)	4.0 (2.0)	5
(b11f) I feel happy that society sees me on the outside for who I am on the inside	3.7 (1.35)	4.0 (2.0)	11
(b11g) I am relieved I don't have to work as hard as I used to for people to see me as my gender	3.5 (1.4)	4.0 (3.0)	14
Gender Positivity – Body			
Mean score [c] (Min: 1.0. Max: 5.0)	2.9 (1.1)	3.0 (1.8)	0
(b11h) I feel confident in my body	2.8 (1.3)	3.0 (2.0)	0
(b11i) I feel attractive	3.0 (1.2)	3.0 (2.0)	1
(b11j) I feel comfortable in my body	2.8 (1.3)	3.0 (2.0)	1
(b11k) I feel like my body fits with the real me	2.7 (1.3)	2.0 (2.0)	3
(b11l) Things about my body that used to bother me don't bother me as much anymore	3.2 (1.3)	4.0 (2.0)	0

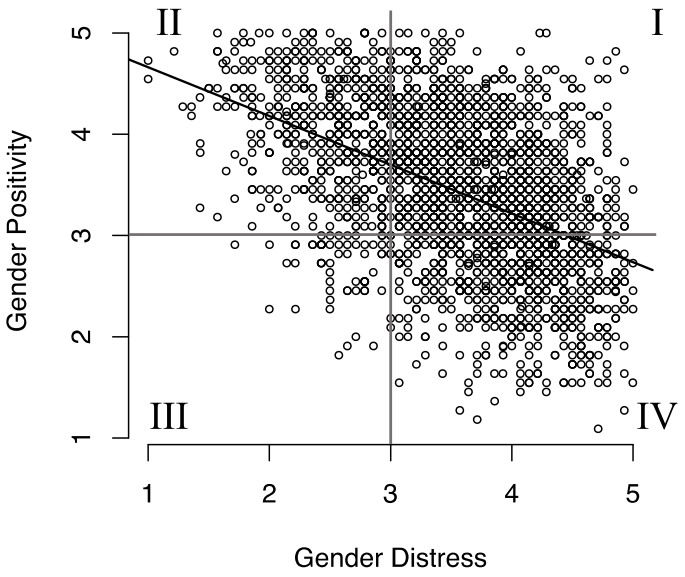
Gender Distress - Overall [b, d]			
Mean score [c] (Min: 1.0. Max: 5.0)	3.5 (0.8)	3.6 (1.1)	0
Gender Distress – Social			
Mean score [c] (Min: 1.0. Max: 5.0)	3.8 (0.8)	4.0 (1.0)	2
(b12b) I avoid social situations or activities because I can't express myself in my gender	3.0 (1.3)	3.0 (2.0)	5
(b12c) I feel hurt if someone calls me the wrong gender (using the wrong pronouns / name / language)	4.1 (1.1)	4.0 (1.0)	2
(b12e) I feel that society doesn't accept or embrace me in my gender	3.7 (1.2)	4.0 (2.0)	2
(b12f) I worry that people will always treat me as the wrong gender	3.7 (1.4)	4.0 (2.0)	2
(b12j) When people treat me like the wrong gender or expect me to behave like a *boy/man [girl/woman]* I feel hurt	4.5 (0.9)	5.0 (1.0)	4
Gender Distress – Body			
Mean score [c] (Min: 1.0. Max: 5.0)	3.4 (0.9)	3.4 (1.4)	4
(b12a) I wish I had been born in a different body	3.8 (1.3)	4.0 (2.0)	1
(b12g) I dislike seeing my naked body	3.4 (1.3)	4.0 (2.0)	0
(b12h) I feel like I can't trust what my body might do as I get older	3.5 (1.2)	4.0 (1.0)	0
(b12i) I dislike my voice because I feel that it doesn't match my gender	3.3 (1.4)	4.0 (3.0)	0
(b12k) I feel unhappy because I have a *masculine [feminine]* body	3.6 (1.3)	4.0 (2.0)	5
(b12l) I worry that I might always have a *masculine [feminine]* body	3.4 (1.4)	4.0 (3.0)	4
(b12m) I dislike peeing *standing up [sitting down]*	2.8 (1.6)	3.0 (3.0)	1
(b12n) I dislike having a *penis or erections [front hole or monthly bleeding (period)]* because it makes me feel like I'm not my true gender	3.0 (1.6)	3.0 (3.0)	5
(b12o) I dislike having *facial hair [breasts]* because it makes me feel like I'm not my true gender	3.6 (1.7)	5.0 (3.0)	5

[a] Weighted means, standard deviations, medians, and interquartile ranges are reported. Weights were the sample weights provided by the TPC project team.
[b] Score range: 1-5. 1 = disagree completely, 2 = disagree somewhat, 3 = neutral, 4 = agree somewhat, 5 = agree completely. Higher scores indicate stronger agreement.
[c] Mean scores were computed for respondents who completed at least 80% of items.
[d] Gender Distress Scale had 2 versions: assigned male at birth and assigned female at birth. Text in *italics* and [ ] indicate the version differences.

Previous research has suggested that GP and GD are not opposite ends on a spectrum but distinct constructs with a complex relationship (Beischel et al., 2022; Gotovac & Bauer, 2021; Jacobsen & Devor, 2022; Trans Youth CAN!, 2021). Our analysis of scatterplots, both for overall GP and GD (Figure 3) and subscale scores (Figure 4), provides further support for the intricacy of this relationship. We found a significant moderate (Akoglu, 2018) negative correlation between the mean scores of overall GP and GD ($r = -0.47$, $p < .0001$). Notably, however, the largest proportion (45.4%) of respondents scored high (i.e., > 3) in both GP and GD (Quadrant I, Figure 3), whereas few respondents (2.2%) scored low (i.e., < 3) in both GP and GD. High GP with low GD were observed in 20.8% of respondents (Quadrant II), and low GP with high GD in 25.5% of respondents (Quadrant IV).

Comparing these results with data from a clinical population of TNB youth who needed but had not begun gender-affirming medications (Trans Youth CAN!), which TYC-GPS and TYC-GDS were originally designed for (Bauer et al., n.d.; Gotovac & Bauer, 2021), we noted distinct patterns. The clinical population predominantly exhibited high GD (Quadrants I and II), aligning with their need for accessing gender clinics, with no individuals falling into the quadrant of low GD and GP (Quadrant III). In contrast, our community-population TPC data displayed a more spread distribution of scores, reflecting diverse gender-affirming care needs and statuses. Notably, individuals reporting the highest levels of GP (5 or near 5) spanned the entire spectrum of GD and vice versa, suggesting heterogeneity and complexity of these experiences.

Figure 3. Scatterplot of TYC-GPS versus TYC-GDS overall scores (N=2316)

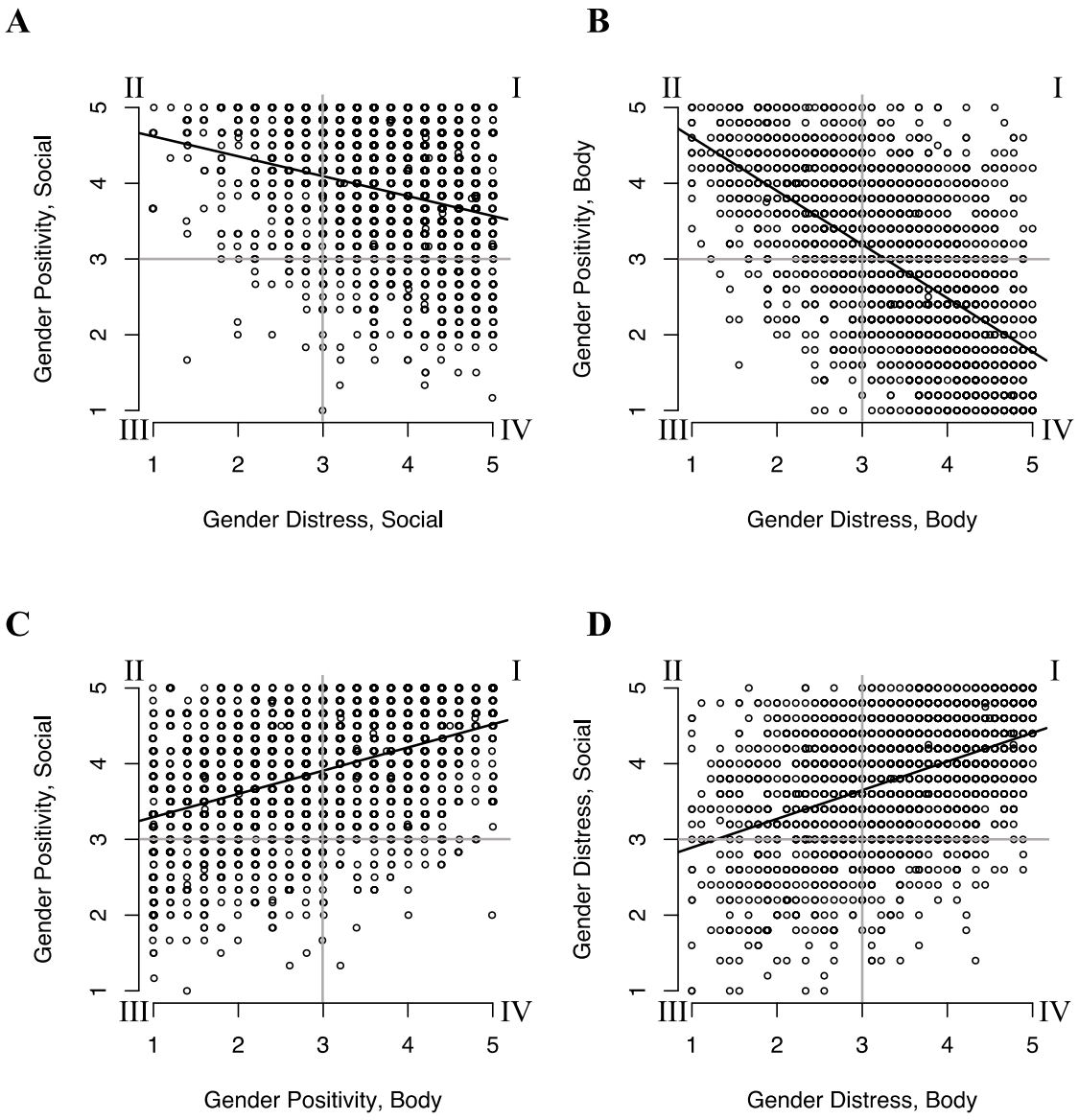


r = -.47; $p < .0001$. *Note*. Dots are slightly jittered to reduce visual overlap.

Similarly, the subscale scores (Figure 4) were more spread and diverse than patterns observed in the pediatric clinical population (Bauer et al., n.d.; Gotovac & Bauer, 2021). Comparing the same subscales across GP and GD, the social and the body subscales displayed distinct relationships. The social subscales had a significant but weak (Akoglu, 2018) negative correlation (r = -.27, p<.0001; Figure 4A). However, the majority (66.2%) of social scores clustered in Quadrant I, indicating both high social positivity and high social distress, and very few respondents (0.7%) scored low in both social positivity and distress. In contrast, the body subscales had a significant moderate to strong (Akoglu, 2018) negative correlation (r = -.60, p<.0001; Figure 4B). The majority of body scores clustered in Quadrants IV (43.6%) and II (23.8%), indicating that high body distress tended to be accompanied by low body positivity and vice versa. Next, we compared the subscales within each scale of GP (Figure 4C) and GD (Figure 4D). Within both GP and GD, the social and body subscales had a significant moderate (Akoglu, 2018) positive correlation (r = .43 for GP and r = .44 for GD; p < .0001). Few

respondents (1.7%) scored high on body positivity without also scoring high on social positivity (Quadrant IV, Figure 4C), and a similar pattern was observed for distress (4.4%, Quadrant IV, Figure 4D). Furthermore, given that more scores fell into the upper two quadrants (I and II) than the lower two, respondents tended to agree more strongly with the social assessments, whereas the body scores varied more over the full range of the scale. Together, these results support the previous findings that GP and GD are related but distinct constructs, and that higher distress does not necessarily imply lower positivity and vice versa. Moreover, GP and GD each consists of two distinct aspects related to social and bodily gender, which have complex relationships with one another.

Figure 4. Scatterplots of social and body subscales of TYC-GPS and TYC-GDS



A. r = -.27; $p < .0001$
B. r = -.60; $p < .0001$
C. r = .43; $p < .0001$
D. r = .44; $p < .0001$

Note. Dots are slightly jittered to reduce visual overlap.

4.1.3 Gender positivity and gender distress by gender and sex groups

To investigate whether GP, GD, and their social and body subscale scores differ by gender or sex, we estimated weighted mean scores stratified by gender identity or sex assigned at birth (SAAB) (Table 6). In addition, we compared the mean scores over the four gender/sex groups (trans men, trans women, NB-AFAB, NB-AMAB) using weighted analysis of variance (ANOVA) and over the two SAAB groups using weighted t-tests (Table 6). The differences in GP, GD and the subscale scores were highly statistically significant (most p-values < .0001) across gender/sex or SAAB. Overall, in all measures except GD-Social, NB respondents scored lower than trans men or trans women, and transmasculine (i.e., AFAB) respondents scored lower than transfeminine (i.e., AMAB) respondents. Again, these patterns confirmed that GP and GD reflect distinct dimensions of gender well-being, not opposites on a continuum.

The observed differences might have been partially due to discrepancies in gender/sex subgroup sample sizes, in particular the large NB-AFAB group (n=952) compared to the much smaller NB-AMAB group (n=197). To examine the observed gender/sex differences more closely, we performed post-hoc multiple pairwise comparisons with Tukey-Kramer adjustments (Appendix C). For overall gender positivity and social gender positivity, either binary group (trans men or trans women) scored significantly higher than either nonbinary group, although we did not observe statistically significant differences between trans men and trans women or between the two nonbinary groups. In contrast, trans women scored the highest in bodily gender positivity compared to the other three groups, which did not differ significantly from one another.

Intriguingly, trans women also scored the highest in overall gender distress. For bodily gender distress, trans women > trans men > NB-AMAB > NB-AFAB, and the difference between every two groups was statistically significant. However, nonbinary respondents showed higher social gender distress than trans women or trans men, although we did not observe statistically significant differences between the two nonbinary groups or between trans men and trans women. This pattern suggests that the significantly higher social gender distress among AFAB compared to AMAB respondents (Table 6) was likely driven by the fact that the sample included many more AFAB nonbinary than AMAB nonbinary respondents (Appendix C).

Table 6. Weighted statistics [a] of mean scores [b] of TYC-GPS, TYC-GDS, and the social and body subscales by gender and sex groups (N=2314)

	Gender Positivity						Gender Distress					
	GP (overall)		GP-Social		GP-Body		GD (overall)		GD-Social		GD-Body	
	Mean (SD)	Median (IQR)	Mean (SD)	Median (IQR)	Mean (SD)	Median (IQR)	Mean (SD)	Median (IQR)	Mean (SD)	Median (IQR)	Mean (SD)	Median (IQR)
Gender/ Sex [c]	**** [d]		**** [d]		**** [d]		**** [d]		**** [d]		**** [d]	
TM (n=593)	3.6 (0.8)	3.7 (1.2)	4.2 (0.6)	4.3 (0.8)	3.0 (1.1)	3.0 (2.0)	3.5 (0.8)	3.6 (1.3)	3.6 (0.7)	3.6 (1.2)	3.5 (0.9)	3.7 (1.3)
TW (n=572)	3.7 (0.8)	3.8 (1.2)	4.2 (0.8)	4.3 (1.0)	3.1 (1.1)	3.2 (1.8)	3.7 (0.8)	3.8 (1.1)	3.7 (0.8)	3.8 (1.2)	3.7 (0.9)	3.8 (1.3)
NB-AFAB (n=952)	3.2 (0.7)	3.3 (0.9)	3.6 (0.7)	3.7 (1.0)	2.8 (1.0)	2.8 (1.6)	3.4 (0.7)	3.5 (1.0)	4.0 (0.7)	4.0 (1.0)	3.1 (0.9)	3.2 (1.3)
NB-AMAB (n=197)	3.2 (0.8)	3.2 (1.2)	3.5 (0.8)	3.5 (1.0)	2.8 (1.1)	2.8 (1.8)	3.5 (0.8)	3.6 (1.1)	3.9 (0.8)	4.0 (1.0)	3.3 (1.0)	3.4 (1.6)
Sex assigned at birth [e]	**** [d]		**** [d]		*** [d]		**** [d]		** [d]		**** [d]	
AFAB (n=1550)	3.4 (0.7)	3.4 (1.0)	3.8 (0.7)	3.8 (1.2)	2.9 (1.1)	2.8 (1.8)	3.5 (0.8)	3.5 (1.1)	3.8 (0.8)	4.0 (1.0)	3.3 (0.9)	3.3 (1.4)
AMAB (n=766)	3.6 (0.9)	3.7 (1.3)	4.0 (0.8)	4.2 (1.2)	3.0 (1.1)	3.0 (1.8)	3.7 (0.8)	3.8 (1.1)	3.7 (0.8)	3.8 (1.2)	3.6 (0.9)	3.8 (1.3)

[a] Weighted means, standard deviations, medians, and interquartile ranges are reported. Score range: 1-5. Weighted one-way ANOVAs were conducted to compare the four gender/sex group means, and weighted two-samples two-tailed t-tests were conducted to compare the two sex-assigned-at-birth group means. Weights were the sample weights provided by the TPC project team.
[b] Mean scores were computed for respondents who completed at least 80% items.
[c] TM: trans man/boy. TW: trans woman/girl. NB-AFAB: Nonbinary, assigned female at birth. NB-AMAB: Nonbinary, assigned male at birth.
[d] Statistical significance of weighted ANOVA or t-test comparing group means. **: p<.01. ***: p<.001. ****: p<.0001.
[e] AFAB: assigned female at birth (i.e., transmasculine), including TM and NB-AFAB. AMAB: assigned male at birth (i.e., transfeminine), including TW and NB-AMAB.

4.2 Objective 2: Psychometric Properties of TYC-GPS and TYC-GDS

4.2.1 Inter-item correlations, item-total correlations, and internal consistency

Polychoric inter-item correlations, polyserial item-total correlations, and internal consistency estimates are shown in Table 7 (TYC-GPS) and Table 8 (TYC-GDS). The average inter-item correlation was .38 for TYC-GPS and .33 for TYC-GDS, which fell within the ideal range of .20 to .40, suggesting that the items were reasonably homogenous without being redundant (Piedmont, 2014). With a few exceptions, most items had significant positive inter-item correlations, ranging from .01 to .84 for TYC-GPS and -.02 to .85 for TYC-GDS. The only significantly negatively correlated items were b12e (society doesn't accept/embrace me in my gender) with b12a (birth wish), and b12e with b12m (dislike peeing position) in TYC-GDS, but the correlation magnitudes were small (-.09 and -.14, respectively).

Item-total correlations were all significantly positive, ranging from .37 (b11d, stranger validation) to .82 (b11h, body confidence) for TYC-GPS, and from .39 (b12e, society doesn't accept) to .82 (b12k, unhappy because masculine/feminine body) for TYC-GDS, indicating that all items correlated well with the scales (Everitt & Skrondal, 2010; Field, 2005).

Both scales demonstrated good internal consistency. For the overall GP, Cronbach's α = .84, McDonald's omega-total ω_t = .88, and McDonald's omega-hierarchical ω_h = .55. For the overall GD, α = .84, ω_t = .87, and ω_h = .37. α and ω_t were higher than .80, indicating good overall reliability (Lance, Butts, & Michels, 2006; McNeish, 2018). The low ω_h values suggested that the scales might not have a strong hierarchical structure, and that a substantial proportion of variance among scale items could not be attributed to a single dominant common factor (Revelle & Condon, 2019). These findings aligned with the hypothesized two-factor structure. For the subscales, α = .75 and ω_t = .76 for GP-Social, α = .89 and ω_t = .90 for GP-Body, α = .70 and ω_t = .71 for GD-Social, and α = .84 and ω_t = .84 for GD-Body (ω_h was not computed because each subscale had a one-factor constraint). Both body subscales demonstrated good internal consistency, especially GP-Body. In contrast, the social subscales showed modest (> .70) internal consistency, which is acceptable in the initial stage of new confirmatory research (Gefen, Straub, & Boudreau, 2000; Nunnally, 1978) but suggests room for improvement.

Table 7. TYC-GPS: Inter-item correlations, item-total correlations, and internal consistency

	Polychoric Inter-Item Correlations											Polyserial Item-Total Correlations		
Item	b11b	b11c	b11d	b11e	b11f	b11g	b11h	b11i	b11j	b11k	b11l	GP Overall	GP-Social	GP-Body
b11b	1	.52****	.41****	.39****	.27****	.21****	.29****	.26****	.31****	.27****	.23****	.52****	.59****	.30****
b11c		1	.40****	.49****	.53****	.49****	.45****	.36****	.43****	.43****	.36****	.72****	.79****	.45****
b11d			1	.36****	.42****	.22****	.09***	.07*	.07*	.01	.06*	.37****	.57****	.06*
b11e				1	.46****	.32****	.37****	.35****	.29****	.25****	.18****	.58****	.68****	.32****
b11f					1	.71****	.30****	.17****	.26****	.27****	.23****	.63****	.81****	.28****
b11g						1	.36****	.21****	.30****	.37****	.41****	.65****	.75****	.38****
b11h							1	.77****	.84****	.75****	.59****	.82****	.44****	.90****
b11i								1	.71****	.60****	.49****	.69****	.32****	.81****
b11j									1	.84****	.64****	.81****	.39****	.92****
b11k										1	.70****	.78****	.39****	.89****
b11l											1	.70****	.36****	.78****

Note. GP overall: $\alpha = .84$, $\omega_t = .88$, $\omega_h = .55$. GP-Social: $\alpha = .75$, $\omega_t = .76$. GP-Body: $\alpha = .89$, $\omega_t = .90$.
*$p < .05$. **$p < .01$. ***$p < .001$. ****$p < .0001$.

Table 8. TYC-GDS: Inter-item correlations, item-total correlations, and internal consistency

	Polychoric Inter-Item Correlations														Polyserial Item-Total Correlations		
Item	b12a	b12b	b12c	b12e	b12f	b12g	b12h	b12i	b12j	b12k	b12l	b12m	b12n	b12o	GD Overall	GD-Social	GD-Body
b12a	1	.20 ****	.24 ****	-.09 ***	.13 ****	.45 ****	.31 ****	.46 ****	.23 ****	.57 ****	.53 ****	.41 ****	.39 ****	.44 ****	.60 ****	.16 ****	.69 ****
b12b		1	.18 ****	.47 ****	.51 ****	.33 ****	.28 ****	.32 ****	.27 ****	.43 ****	.43 ****	.12 ****	.24 ****	.33 ****	.59 ****	.75 ****	.41 ****
b12c			1	.06 **	.28 ****	.18 ****	.16 ****	.26 ****	.66 ****	.25 ****	.25 ****	.18 ****	.25 ****	.22 ****	.44 ****	.55 ****	.30 *
b12e				1	.68 ****	.12 ****	.22 ****	.19 ****	.19 ****	.22 ****	.25 ****	-.14 ****	.07 **	.14 ****	.39 ****	.73 ****	.15 ****
b12f					1	.29 ****	.33 ****	.36 ****	.37 ****	.41 ****	.47 ****	-.02	.23 ****	.32 ****	.61 ****	.84 ****	.38 ****
b12g						1	.45 ****	.35 ****	.26 ****	.64 ****	.58 ****	.35 ****	.47 ****	.42 ****	.68 ****	.32 ****	.72 ****
b12h							1	.30 ****	.21 ****	.41 ****	.46 ****	.16 ****	.24 ****	.24 ****	.54 ****	.33 ****	.54 ****
b12i								1	.32 ****	.54 ****	.50 ****	.26 ****	.29 ****	.50 ****	.65 ****	.39 ****	.65 ****
b12j									1	.36 ****	.34 ****	.25 ****	.31 ****	.30 ****	.53 ****	.63 ****	.39 ****
b12k										1	.85 ****	.34 ****	.48 ****	.62 ****	.82 ****	.45 ****	.84 ****
b12l											1	.31 ****	.45 ****	.55 ****	.80 ****	.47 ****	.81 ****
b12m												1	.50 ****	.30 ****	.49 ****	.08 ***	.59 ****
b12n													1	.45 ****	.64 ****	.28 ****	.69 ****
b12o														1	.70 ****	.35 ****	.72 ****

Note. GD overall: $\alpha = .84$, $\omega_t = .87$, $\omega_h = .37$. GD-Social: $\alpha = .70$, $\omega_t = .71$. GD-Body: $\alpha = .84$, $\omega_t = .84$.
*$p < .05$. **$p < .01$. ***$p < .001$. ****$p < .0001$.

4.2.2 Confirmatory factor analysis

4.2.2.1 Confirmatory factor analysis for TYC-GPS

A two-factor CFA model was fit to TYC-GPS (Table 9). Model fit was good (robust CFI = .972; robust TLI = .964; robust RMSEA = .075 with 90% CI from .071 to .079; scaled SRMR = .060). All unstandardized factor loadings were statistically significant (all $p < .001$). Standardized factor loadings ranged from .29 (b11d, stranger validation) to .80 (b11c, interpersonal gender expression enjoyment) for GP-Social and from .67 (b11l, reduced body concerns over time) to .89 (b11j, body comfort) for GP-Body. As a rule of thumb to assess item construct validity, Comrey and Lee (1992) suggested that loadings exceeding .71 ($.71^2$ = 50% variance captured by the latent construct) are excellent, .63 (40% overlapping variance) very good, .55 (30% overlapping variance) good, .45 (20% overlapping variance) fair, and .32 (10% overlapping variance) poor. According to these criteria, four of six GP-Social items exhibited good to excellent validity, and all five GP-Body items demonstrated very good to excellent validity. The only item that showed poor validity was b11d (stranger validation) of GP-Social, which also had the lowest item-total correlation (see Section 4.2.1).

Furthermore, we assessed the discriminant validity of the two TYC-GPS subscales, as social and body GP should be empirically distinguishable constructs (Hu & Liden, 2015; Rönkkö & Cho, 2022). The correlation between social and body GP was strong ($\rho = .526$, $p < .001$) but did not exceed .70, indicating that these factors were measuring distinct constructs with negligible collinearity (Shao, Elahi Shirvan, & Alamer, 2022). Additionally, the average variance extracted, which reflects the average percentage of variance captured within a factor, was .395 for social GP and .641 for body GP. Both AVEs surpassed the square of the factor correlation ($\rho^2 = .276$), indicating good discriminant validity (Rönkkö & Cho, 2022). Overall, these model fit results supported a two-factor solution for TYC-GPS.

Table 9. Two-factor confirmatory factor analysis of TYC-GPS (N=2284)

Item	Standardized Factor Loading		Unstandardized Factor Loading (SE)	
Gender Positivity – Social	**Factor 1**	**Factor 2**	**Factor 1**	**Factor 2**
(b11b) I feel a sense of accomplishment and pride being able to express myself as my gender	.48		.46 (.03)***	
(b11c) I enjoy going out in public and doing social activities because I can express myself as my gender	.80		.98 (.03)***	
(b11d) I feel validated when strangers in public treat me like my gender	.29		.21 (.02)***	
(b11e) I feel confident trying new and different clothes that express my gender	.57		.65 (.03)***	
(b11f) I feel happy that society sees me on the outside for who I am on the inside	.63		.86 (.03)***	
(b11g) I am relieved I don't have to work as hard as I used to for people to see me as my gender	.64		.92 (.03)***	
Gender Positivity – Body				
(b11h) I feel confident in my body		.88		1.15 (.02)***
(b11i) I feel attractive		.71		.88 (.02)***
(b11j) I feel comfortable in my body		.89		1.16 (.02)***
(b11k) I feel like my body fits with the real me		.83		1.12 (.02)***
(b11l) Things about my body that used to bother me don't bother me as much anymore		.67		.89 (.02)***

Note. Diagonally weighted least squares (DWLS) estimator with robust standard errors was applied. All factor loadings were statistically significant (*** $p < .001$). Robust CFI = .972; robust TLI = .964; robust RMSEA = .075 (90% CI: .071, .079); scaled SRMR = .060. Mean- and variance-adjusted chi-square test results: scaled $\chi^2 = 956.39$, df = 43, $p < .001$.

4.2.2.2 Confirmatory factor analysis for TYC-GDS

A two-factor CFA model was fit to TYC-GDS of all respondents (Table 10). Most fit indices suggested marginal fit (robust CFI = .937; robust TLI = .925; robust RMSEA = .082 with 90% CI from .079 to .086) (Fabrigar, MacCallum, Wegener, & Strahan, 1999; Hu & Bentler, 1999; Nye & Drasgow, 2011), except SRMR which indicated good fit (scaled SRMR = .073) (Hooper et al., 2008; Hu & Bentler, 1999). It is worth noting that SRMR is less sensitive to

variations in the estimator and data scale compared to the other fit indices (Shi & Maydeu-Olivares, 2020). All unstandardized factor loadings were statistically significant (all $p < .001$). Standardized factor loadings ranged from .41 (b12c, feel hurt when misgendered) to .71 (b12f, worry about persistent wrong gender treatment) for GD-Social and from .38 (b12m, dislike peeing position) to .86 (b12k, unhappy because masculine/feminine body) for GD-Body; only two of five GD-Social items and six of nine GD-Body items had good (> .55) to excellent (> .71) validity (Comrey & Lee, 1992). Furthermore, the factor correlation was strong but smaller than .70 ($\rho = 0.602$, $p < .001$), affirming that social and body GD were correlated but distinct constructs (Shao et al., 2022). However, the average variance extracted was low at 0.342 for social GD and 0.373 for body GD, and only one of them slightly exceeded the square of the factor correlation ($\rho^2 = .362$), suggesting limited discriminant validity (Gefen et al., 2000; Rönkkö & Cho, 2022), especially for the social subscale. In other words, social and body GD were not sufficiently distinguishable in the current measurement even though they were conceptually distinct constructs. Additionally, we fit the same two-factor CFA model to TYC-GDS separately for AFAB and AMAB respondents (Appendix D and E). Results were similar to those based on merged data. Overall, these mixed results suggested potential revisions in future research to improve the validity of TYC-GDS.

Table 10. Two-factor confirmatory factor analysis of TYC-GDS (N=2284)

Item	**Standardized Factor Loading**		**Unstandardized Factor Loading (SE)**	
Gender Distress – Social	**Factor 1**	**Factor 2**	**Factor 1**	**Factor 2**
(b12b) I avoid social situations or activities because I can't express myself in my gender	.66		.88 (.03)***	
(b12c) I feel hurt if someone calls me the wrong gender (using the wrong pronouns / name / language)	.41		.43 (.03)***	
(b12e) I feel that society doesn't accept or embrace me in my gender	.45		.55 (.03)***	
(b12f) I worry that people will always treat me as the wrong gender	.71		.96 (.03)***	

(b12j) When people treat me like the wrong gender or expect me to behave like a *boy/man [girl/woman]* I feel hurt	.51	.44 (.03)***	
Gender Distress – Body			
(b12a) I wish I had been born in a different body	.56		.71 (.03)***
(b12g) I dislike seeing my naked body	.64		.86 (.03)***
(b12h) I feel like I can't trust what my body might do as I get older	.48		.57 (.03)***
(b12i) I dislike my voice because I feel that it doesn't match my gender	.57		.82 (.03)***
(b12k) I feel unhappy because I have a *masculine [feminine]* body	.86		1.10 (.02)***
(b12l) I worry that I might always have a *masculine [feminine]* body	.83		1.16 (.02)***
(b12m) I dislike peeing *standing up [sitting down]*	.38		.56 (.03)***
(b12n) I dislike having a *penis or erections [front hole or monthly bleeding (period)]* because it makes me feel like I'm not my true gender	.54		.85 (.03)***
(b12o) I dislike having *facial hair [breasts]* because it makes me feel like I'm not my true gender	.58		.96 (.03)***

Note 1. Diagonally weighted least squares (DWLS) estimator with robust standard errors was applied. All factor loadings were statistically significant (*** $p < .001$). Robust CFI = .937; robust TLI = .925; robust RMSEA = .082 (90% CI: .079, .086); scaled SRMR = .073. Mean- and variance-adjusted chi-square test results: scaled $\chi^2 = 1845.27$, df = 76, $p < .001$.
Note 2. Gender Distress Scale had 2 versions: assigned male at birth (AMAB) and assigned female at birth (AFAB). Text in *italics* and [ ] indicates the version differences. Model fit was based on merged data from AMAB and AFAB respondents.

4.2.2.3 Measurement invariance for TYC-GPS and TYC-GDS over gender and sex

We assessed configural, metric (weak), and scalar (strong) measurement invariance of TYC-GPS and TYC-GDS respectively across various sex and gender groups (Appendix F), with the following criteria: For configural invariance, SRMR ≤ .09 and at least one of the following: TLI ≥ .95, CFI ≥ .95, or RMSEA ≤ .06 (Hooper et al., 2008); for metric invariance, ≤ .01 decrease in CFA, ≤ .015 increase in RMSEA, and ≤ .030 increase in SRMR; for scalar invariance, ≤ .01 decrease in CFA and ≤ .015 increase in SRMR (Chen, 2007; Putnick &

Bornstein, 2016). Notably, the establishment of each level of invariance implies the prior establishment of weaker level(s) of invariance; for example, the confirmation of scalar invariance presupposes the establishment of configural and metric invariance.

TYC-GPS demonstrated scalar invariance across sex assigned at birth (SAAB). Scalar invariance means that the items had statistically equal intercepts and similar meanings in AFAB and AMAB groups; thus, mean differences in the items accurately reflected mean differences in the underlying construct across SAAB (McGuire et al., 2020; Putnick & Bornstein, 2016). Consequently, scalar invariance enables meaningful comparisons and interpretations of absolute SAAB-specific scale scores, or item means between AFAB and AMAB respondents.

Furthermore, TYC-GPS showed metric invariance across the four gender/sex groups (trans men, trans women, NB-AFAB, and NB-AMAB) and for binary (trans men or trans women) versus nonbinary gender groups. Metric invariance means equivalence of factor loadings, indicating that each item contributes to the latent construct (social or body GP) to a comparable extent across these groups (Putnick & Bornstein, 2016). However, the absence of scalar invariance across gender/sex and binary vs. nonbinary groups suggested possible systematic differences in how these groups perceive the baseline of social or body GP and the meanings of certain items. While it is appropriate to compare which group scores higher or lower on social or body GP, careful consideration is advised when interpreting the group-specific scale scores, as some items may not hold the same connotations across the groups.

On the contrary, TYC-GDS exhibited inadequate measurement invariance compared to TYC-GPS. For the two SAAB groups, the TYC-GDS failed to establish configural invariance, the weakest level of measurement invariance. This indicates potential differences in the fundamental structure of the constructs (e.g., the number of factors, or the number of items on each factor) between AFAB and AMAB respondents (Putnick & Bornstein, 2016). Since TYC-GDS employs separate AFAB and AMAB versions, merging data across these versions necessitates caution.

Nevertheless, TYC-GDS showed configural invariance for the four gender/sex groups (trans men, trans women, NB-AFAB, and NB-AMAB) and for binary versus nonbinary groups, suggesting the invariance of fundamental construct structure across these groups. However, it is plausible that when the sample was split into four groups, there was insufficient power to detect

the lack of configural invariance, hence explaining the observation of configural invariance for four gender/sex groups but not for SAAB. Furthermore, the lack of metric or scalar invariance suggests that the relative contributions of the GD items to the underlying constructs and the meanings of some items might vary across these groups (e.g., nonbinary vs binary), leading to divergent interpretations of the scale. Thus, when interpreting GD differences among gender and/or sex groups, it is imperative to acknowledge that any observed disparities might stem from non-invariance in the measurement tool rather than genuine effect disparities in the structural model.

4.3 Objective 3: Health care and Social Predictors of Gender Positivity and Gender Distress

4.3.1 Structural equation modelling

SEM fit results are summarized in Table 11 (see Appendix F for a path diagram depicting additional results). As we hypothesized, completion of needed gender-affirming care (GAC) and ongoing GAC without barriers were associated with increased GP and reduced GD in both the social and body aspects, whereas ongoing GAC with barriers was associated with smaller improvements in GP and GD compared to ongoing GAC without barriers. Interestingly, having any government ID with the preferred gender marker served as a protective factor for both social and body gender well-being, fostering higher positivity and lower distress. Among the other protective factors, statistically significant associations were observed with some but not all four outcomes (GP-Social, GP-Body, GD-Social, and GD-Body). For example, living in true gender was significantly linked to improved positivity (i.e., higher body and social GP) but not social distress, and only living in true gender for a long time (6+ years) was significantly associated with reduced bodily distress. Additionally, having asked everyone to use a different pronoun was a strong predictor for heightened social GP but not for the other outcomes. Furthermore, we found that strong gender support from parents or guardians was uniquely important for gender well-being: it was associated with higher GP and mitigated social GD, while analogous associations were not observed for strong gender support from other family members. This finding is consistent with previous research showing the crucial importance of strong parental

gender support, which was qualitatively different from other forms of strong social support (Bauer et al., 2015; Olson et al., 2016; Simons et al., 2013; Travers et al., 2012).

Based on the magnitudes of the standardized path coefficients, the overall strongest risk factor was the frequency of misgendering: getting misgendered more frequently was associated with reduced GP and aggravated GD in both social and body contexts. Other risk factors were significantly associated with some but not all four outcomes. For example, having unmet mental health care needs in the past year was linked to lower GP and worsened social GD but not body GD, and experiencing negative trans-specific behaviour from a romantic partner in the past year was associated with exacerbated GD and lower body GP but did not appear to impact social GP. The finding that many of these predictors were associated with some but not all four outcomes supported our hypotheses that GP and GD are not opposite ends of a single continuum but rather reflect independent gender well-being dimensions, and that social and body gender aspects are distinct constructs.

A closer examination of the standardized path coefficients identified the three strongest health care and social predictors for each of the four outcomes (sociodemographic covariates are addressed below). For social GP, the top three predictors (in descending order) were living in true gender (↑), misgendering frequency (↓), and having asked everyone to use a different pronoun (↑). For social GD, these were misgendering frequency (↑), having unmet mental health care needs in the past year (↑), and not needing to change name (↓). For both body GP and GD, these were the completion of needed GAC (better), not planning to receive GAC or unsure (better), and misgendering frequency (worse).

Additionally, we examined the associations between sociodemographic covariates and the outcomes. Our analysis unveiled intriguing patterns across gender/sex. Compared to trans men, trans women experienced higher distress but also elevated body positivity; both NB groups showed poorer social gender well-being (lower social positivity and higher social distress), but they also reported better body gender well-being (higher body positivity and lower body distress). Older respondents demonstrated better gender well-being than younger respondents, scoring higher in positivity and lower in social distress. Racialized respondents reported higher positivity but did not differ significantly in distress compared to their non-racialized counterparts. We did not observe any statistically significant discrepancies in GP or GD between

Indigenous and non-Indigenous, or autistic and non-autistic respondents. These divergent trends of GP, GD, and their social- and body-related manifestations further supported our hypothesis that they are distinct constructs with intricate and nuanced inter-relationships.

The incremental model fit was poor (scaled CFI = .672, scaled TLI = .616), suggesting that the proposed model did not fit the data substantially better relative to a null model. Nevertheless, the absolute fit indices demonstrated good fit (scaled RMSEA = .068 with 90% CI from .067 to .069, scaled SRMR = .057), indicating that the proposed model's deviations from the data were satisfactorily small in terms of covariances and residuals. These mixed results suggested that the proposed model did not adequately account for the complex relationships among the variables, potentially due to misspecifications, omitted paths, or incorrect variable relationships.

4.3.2 Measurement invariance for SEM measurement model over gender and sex

We assessed measurement invariance for the SEM measurement model across various gender and sex groups (Appendix G). The SEM measurement model was the combination of TYC-GPS and TYC-GDS with four correlated factors (social and body GP and GD) and their corresponding items. Regrettably, the measurement did not exhibit configural invariance across sex assigned at birth (AFAB vs AMAB), binary versus nonbinary gender, and the four gender/sex groups (trans men, trans women, NB-AFAB, and ANB-AMAB). The lack of configural invariance indicated inconsistencies in the fundamental structure of the constructs across these groups. The main source of the non-invariance likely stemmed from TYC-GDS, as it displayed insufficient measurement invariance over gender and sex (section 4.2.2.3). Consequently, the measurement model fell short of establishing metric or scalar invariance, which is the prerequisite for conducting a multi-group SEM. Therefore, it was infeasible to compare predictor-outcome associations across the gender or sex groups, since any observed disparities might be artifacts of non-invariance within the measurement component rather than from differential predictor impacts in the structural component of the SEM.

Table 11. Structural equation modelling: Path coefficients of health care and social predictors on social and body aspects of gender positivity and gender distress (N=2316)

Predictor (Manifest Variable) [a]	Outcome (Latent Variable) [a]											
	GP-Social			GP-Body			GD-Social			GD-Body		
	β [b]	λ (SE) [c]	*p* [d]	β [b]	λ (SE) [c]	*p* [d]	β [b]	λ (SE) [c]	*p* [d]	β [b]	λ (SE) [c]	*p* [d]
(GAC_2) Plan to but haven't begun GAC, no barriers [e]	.05	.34 (.18)	.060	.02	.17 (.15)	.263	.01	.07 (.18)	.698	-.04	-.31 (.14)	.021*
(GAC_3) Ongoing GAC, have barriers [e]	.09	.28 (.12)	.017 *	.15	.44 (.09)	<.001 ***	.02	.09 (.12)	.460	-.13	-.39 (.08)	<.001 ***
(GAC_4) Ongoing GAC, no barriers [e]	.10	.49 (.14)	<.001 ***	.16	.74 (.12)	<.001 ***	-.05	-.32 (.15)	.035*	-.14	-.70 (.11)	<.001 ***
(GAC_5) Had needed GAC [e]	.15	.46 (.12)	<.001 ***	.36	1.02 (.10)	<.001 ***	-.09	-.32 (.13)	.014*	-.38	-1.12 (.10)	<.001 ***
(GAC_6) Don't plan to have GAC/unsure [e]	.07	.23 (.12)	.052	.28	.78 (.09)	<.001 ***	-.06	-.23 (.11)	.033*	-.33	-.98 (.09)	<.001 ***
(ment_2) Needed mental health care and able to access all in past year [f]	-.03	-.09 (.09)	.288	-.01	-.02 (.08)	.819	.05	.16 (.10)	.133	-.03	-.08 (.09)	.364
(ment_3) Had unmet mental health care needs in past year [f]	-.09	-.24 (.09)	.006 **	-.08	-.19 (.08)	.017*	.12	.40 (.10)	<.001 ***	-.002	-.004 (.08)	.961
(yrtrue_1) Have been living in true gender for 2 years or less [g]	.33	.95 (.12)	<.001 ***	.10	.27 (.09)	.001 **	.002	.01 (.11)	.942	.01	.03 (.09)	.779
(yrtrue_2) Have been living in true gender for 3-5 years [g]	.25	.75 (.12)	<.001 ***	.13	.37 (.09)	<.001 ***	.005	.02 (.12)	.873	-.06	-.17 (.10)	.086
(yrtrue_3) Have been living in true gender for 6+ years [g]	.15	.49 (.12)	<.001 ***	.12	.34 (.10)	.001 **	-.03	-.11 (.12)	.380	-.09	-.28 (.11)	.008 **
(namech) Have had a legal name change [h]	.05	.12 (.08)	.126	.10	.25 (.07)	.001 **	-.02	-.07 (.09)	.460	-.04	-.11 (.07)	.132
(idmatch) Have any government ID with preferred gender marker [i]	.08	.22 (.07)	.001 **	.08	.20 (.06)	.001 **	-.10	-.34 (.07)	<.001 ***	-.07	-.17 (.06)	.005 **

(askpron_2) Don't need to change pronoun [k]	.02	.13 (.19)	.482	.001	.01 (.17)	.962	.07	.54 (.23)	.018*	-.03	-.20 (.20)	.319
(askpron_3) Have asked some people to use a different pronoun [j]	.07	.19 (.14)	.182	.02	.04 (.11)	.737	.06	.18 (.15)	.231	.06	.16 (.13)	.214
(askpron_4) Have asked everyone to use a different pronoun [j]	.18	.48 (.16)	.002 **	.03	.07 (.12)	.568	.10	.31 (.17)	.064	.08	.20 (.14)	.151
(askname_2) Don't need to change name [k]	.04	.14 (.14)	.310	.08	.27 (.11)	.012*	-.10	-.49 (.14)	<.001 ***	-.15	-.54 (.12)	<.001 ***
(askname_3) Have asked some people to use a different name [k]	.12	.39 (.13)	.004 **	.02	.05 (.10)	.648	-.04	-.15 (.13)	.262	-.04	-.14 (.11)	.203
(askname_4) Have asked everyone to use a different name [k]	.04	.11 (.14)	.452	.05	.12 (.10)	.254	-.09	-.28 (.14)	.036*	-.09	-.24 (.11)	.029*
(misgen) Frequency of being misgendered [l]	-.21	-.20 (.03)	<.001 ***	-.25	-.22 (.02)	<.001 ***	.51	.59 (.04)	<.001 ***	.28	.26 (.03)	<.001 ***
(belong) Strong sense of belonging in TNB spaces in person or online [m]	.17	.50 (.07)	<.001 ***	.12	.34 (.06)	<.001 ***	-.02	-.08 (.07)	.284	-.07	-.21 (.06)	<.001 ***
(supp_parent) Strong support of gender from parents/guardians [n]	.07	.20 (.06)	<.002 ***	.05	.13 (.06)	.023*	-.09	-.31 (.08)	<.001 ***	-.02	-.04 (.06)	.467
(supp_otherfam) Strong support of gender from any other family member [o]	.03	.08 (.07)	.259	.03	.08 (.06)	.166	-.02	-.07 (.08)	.388	-.04	-.11 (.06)	.090
(neg_fam_2) Negative trans-specific behaviours from family members – Not applicable [p]	-.05	-.15 (.09)	.095	-.01	-.04 (.08)	.645	.03	.12 (.10)	.215	.002	.004 (.08)	.957
(neg_fam_3) Have experienced negative trans-specific behaviours from family members (lifetime) [p]	.03	.11 (.10)	.276	-.01	-.05 (.09)	.574	.04	.18 (.10)	.077	.04	.14 (.09)	.109
(neg_partner_2) Negative trans-specific behaviours from romantic partner in past year – Not applicable [q]	.01	.02 (.08)	.787	-.10	-.26 (.07)	<.001 ***	.05	.18 (.09)	.039*	.10	.28 (.07)	<.001 ***
(neg_partner_3) Experienced negative trans-specific behaviours from romantic partner in past year [q]	-.01	-.04 (.08)	.566	-.04	-.13 (.07)	.049*	.06	.24 (.08)	.003 **	.06	.18 (.07)	.008 **
Covariate (Manifest Variable) [a]												

Age [r]	.11	.01 (.004)	.001 **	.10	.01 (.003)	.001 **	-.17	-.02 (.004)	<.001 ***	-.04	-.004 (.004)	.204
Gender/Sex (TW) [s]	-.04	-.13 (.08)	.116	.07	.19 (.08)	.011*	.11	.39 (.10)	<.001 ***	.09	.26 (.07)	<.001 ***
Gender/Sex (NB-AFAB) [s]	-.23	-.62 (.09)	<.001 ***	.10	.26 (.07)	<.001 ***	.21	.69 (.10)	<.001 ***	-.28	-.75 (.08)	<.001 ***
Gender/Sex (NB-AMAB) [s]	-.15	-.74 (.13)	<.001 ***	.05	.24 (.11)	.036*	.16	.92 (.14)	<.001 ***	-.08	-.39 (.12)	.001 **
Racialization [t]	.05	.18 (.09)	.032*	.07	.25 (.07)	.001 **	.01	.04 (.09)	.648	-.03	-.11 (.08)	.156
Indigenous identity [u]	.02	.09 (.11)	.416	-.03	-.11 (.09)	.192	.01	.07 (.11)	.537	.03	.16 (.09)	.079
Autism [v]	-.03	-.12 (.08)	.121	.04	.13 (.07)	.071	.03	.15 (.08)	.071	-.02	-.07 (.07)	.312

Note. Diagonally weighted least squares (DWLS) estimator with robust standard errors was applied. Scaled CFI = .672; scaled TLI = .616; scaled RMSEA = .068 (90% CI: .067, .069); scaled SRMR = .057. Mean- and variance-adjusted chi-square test results: Scaled χ^2 = 11239.53, df = 962, p < .001.

[a] See Table 2 for detailed descriptions.

[b] β: Standardized path coefficient.

[c] λ (SE): Unstandardized path coefficient (standard error).

[d] *p < .05. **p < .01. ***p < .001.

[e] GAC: Gender-affirming care status and barriers (nominal variable). Reference category: Plan to but haven't begun GAC, have barriers (GAC_1).

[f] ment: Unmet mental health care needs in past year (nominal variable). Reference category: Did not need mental health care services in past year (ment_1).

[g] yrtrue: Number of years living in true gender (nominal variable). Reference level: Have not lived in true gender (yrtrue_0). Other levels: Have been living in true gender for 2 years or less, 3 - 5 years, and 6+ years. This variable captures whole years and does not account for the variance of months or days. For example, "2 years or less" can range from 1 day to 2 years and 364 days.

[h] namech: Legal name change (binary variable). Reference category: Have not had a legal name change.

[i] idmatch: Government ID matching preferred gender marker (binary variable). Reference category: Don't have any government ID with preferred gender marker.

[j] askpron: Have asked people to use a different pronoun (nominal variable). Reference category: Have not asked people to use a different pronoun (askpron_1).

[k] askname: Have asked people to use a different name (nominal variable). Reference category: Have not asked people to use a different name (askname_1).

[l] misgen: Frequency misgendered (ordinal variable). Reference level: Never misgendered. Other levels: Misgendered every year, month, week, or day.

[m] belong: Strong sense of belonging in TNB spaces (binary variable). Reference category: Did not have a strong sense of belonging in TNB spaces in person or online.
[n] supp_parent: Strong support of gender identity or expression from parents/guardians (binary variable). Reference category: No or not applicable.
[o] supp_otherfam: Strong support of gender identity or expression from any other family member (binary variable). Reference category: No or not applicable.
[p] neg_fam: Negative trans-specific behaviours from family members – lifetime (nominal variable). Reference category: None.
[q] neg_partner: Negative trans-specific behaviours from romantic partner(s) – past year (nominal variable). Reference category: None.
[r] Age in years. Continuous variable.
[s] Gender/sex: Nominal variable. TW: trans women/girls. NB-AFAB: Nonbinary, assigned female at birth. NB-AMAB: Nonbinary, assigned male at birth. Reference category: trans men/boys.
[t] Racialization: Identifying or being perceived as a person of colour in Canada. Binary variable. Reference category: non-racialized.
[u] Indigenous identity: Identifying as Indigenous in Canada. Binary variable. Reference category: non-Indigenous.
[v] Autism: Diagnosed with autism or Asperger's or self-identified as autistic. Binary variable. Reference category: non-autistic.

Chapter 5

5 Discussion

In this chapter, we will summarize and discuss the study's findings in the context of existing literature. Additionally, we will critically reflect on the methodology, address strengths and limitations, discuss practical implications, and provide recommendations for future research.

5.1 Summary and Discussion of Findings

5.1.1 Patterns of gender positivity and gender distress scores

5.1.1.1 Scale and subscale correlations

Scatterplot analyses supported that gender positivity and gender distress are intricately related but distinct constructs (Figures 3 and 4). The overall GP and GD scores exhibited a moderate negative correlation (r = -.47), similar to the correlation (r = -.53) observed in a clinical sample of TNB youth from Trans Youth CAN! (TYC; Bauer et al., n.d.; Gotovac & Bauer, 2021)). Interestingly, the largest portion of respondents (TPC: 45.4%, TYC: 65.0%) scored high in both GP and GD, indicating that high gender distress is not necessarily accompanied by low gender positivity, and vice versa. Furthermore, while the scores and subscale scores were more spread in the TPC community sample than patterns observed in the TYC clinical youth sample, both samples exhibited comparable subscale correlations in expected directions as follows: A moderate to strong negative correlation was observed between the two body subscales (TPC: r = -.60, TYC: r = -.65), indicating that low body distress tends to co-occur with high body positivity, and vice versa. In contrast, the social subscales only showed a weak negative correlation (TPC: r = -.27, TYC: r = -.19). Within the GP or GD scale, the body and social subscales exhibited moderate positive correlations: In the TPC community sample, this body-social correlation was .43 or .44, whereas in the TYC clinical youth sample it was .31 for GP and .50 for GD. Overall, these findings support that GP and GD each consists of social and bodily aspects with complex interrelationships. Future research could explore whether these interrelationships vary as a function of gender-affirming care status.

5.1.1.2 Gender positivity and gender distress by gender and sex groups

We found that nonbinary respondents scored lower in overall and social gender positivity and higher in social gender distress compared to trans men and trans women. This diminished social gender well-being may stem from the more frequent invalidation of nonbinary gender identities (Johnson et al., 2020), which leads to feelings of invisibility (Conlin et al., 2019), especially among nonbinary youth, who exhibit lower self-esteem than binary trans youth (Witcomb et al., 2019). This invalidation is prevalent not only in social life but also in health care, particularly gender-affirming medical care and mental health care (Clark, Veale, Townsend, Frohard-Dourlent, & Saewyc, 2018; James et al., 2016). Compared to binary trans individuals, nonbinary individuals report heightened apprehension towards healthcare providers, fearing prejudice, discrimination, and insensitive or incompetent treatment (Burgwal & Motmans, 2021; Grant et al., 2011). This fear results in elevated rates of health care avoidance, gender identity concealment from health care professionals, pressure to fit in to the gender binary for gender-affirming care access, difficulty finding appropriate care sources, and unmet health care needs (Burgwal & Motmans, 2021; Grant et al., 2011; Kcomt, Gorey, Barrett, & McCabe, 2020; Navarro et al., 2021; Taylor et al., 2020).

Notably, among the four gender and sex groups (trans men, trans women, NB-AFAB, and NB-AMAB), trans women scored the highest not only in overall and bodily gender distress but also in bodily gender positivity. Previous research links transmisogynistic stigma, social rejection, body shame, and violence against trans women to increased vulnerability for poor self-image, risky behaviour, poverty, and adverse health outcomes (Bockting, Robinson, & Rosser, 1998; Herbst et al., 2008; Sevelius, 2013). Gender affirmation may play a particularly crucial role in mediating the impact of stigma-related stressors on bodily gender distress and positivity among trans women. Stigma-related stressors heighten the need for gender affirmation while simultaneously limiting gender affirmation access due to social oppression among trans women (Sevelius (2013). This compounded challenge and unmet needs for gender affirmation likely aggravate bodily gender distress among trans women, while gender affirmation and effective coping strategies enhance bodily gender positivity. Health intervention should therefore focus on promoting gender affirmation and alleviating the social oppression that contributes to the distress that disproportionally impacts trans women.

5.1.2 Psychometric properties of TYC-GPS and TYC-GDS

5.1.2.1 Reliability, validity, and factor structure

TYC-GPS, TYC-GDS, and their respective body subscales exhibited good reliability, with α and ω_t higher than .80 (Lance et al., 2006; McNeish, 2018). The two social subscales displayed modest reliability (α and ω_t > .70), which is deemed acceptable in the preliminary stage of scale development (Gefen et al., 2000; Nunnally, 1978) but indicates potential for improvement. A caveat is that ω_t may overestimate reliability, particularly in large samples and complex data structures (Cho, 2021; Malkewitz et al., 2023).

The weakest item of TYC-GPS appeared to be b11d ("I feel validated when strangers in public treat me like my gender"), which had the lowest factor loading (.29) and item-total correlation (.37) among all TYC-GPS items. As for TYC-GDS, the item with the lowest factor loading (.41) was b12c ("I feel hurt if someone calls me the wrong gender (using the wrong pronouns/name/language)"). These results are somewhat puzzling, since our SEM indicated that misgendering was a strong predictor for low gender positivity and high gender distress, overall and across social and bodily dimensions. It is plausible that these validation- or misgendering-related items act as causal indicators that caused the latent construct (social GP or GD), instead of effect indicators that were caused by the latent construct (Kline, 2016). Classical CFA and SEM assume that the measurement model has effect indicators. This assumption may not apply to TYC-GPS and TYC-GDS, which may comprise a mixture of effect and causal indicators. We will discuss this issue further in section 5.2.2 *Effect vs causal indicators* under *Methodological Considerations*.

A two-factor (social and body) CFA model yielded good fit for TYC-GPS. Additionally, the social and body GP subscales exhibited good discriminant validity, as indicated by the factor correlation and the average variance extracted. These results support that TYC-GPS comprises two factors and sufficiently captures social and body GP as distinct constructs. In contrast, for TYC-GDS, a two-factor CFA model yielded only marginal fit, and the average variance extracted implied limited discriminant validity between the two factors. These results suggest that the current factor structure of TYC-GDS may be inadequate, and that it does not sufficiently distinguish between social and body GD. Alternatively, it is possible that this issue reflects more

on the nature of gender distress rather than a limitation of the measurement tool. Social interactions may fuel body-related distress and vice versa; thus, the social and bodily dimensions of gender distress may be too intertwined to be teased apart as distinct aspects. The main source of these limitations is unlikely to be the two versions of TYC-GDS based on sex assigned at birth, since separate analyses for AFAB and AMAB data yielded similar fit results to those using merged data. Future research may consider revising TYC-GDS items to improve scale validity or applying exploratory factor analysis to investigate the factor structure.

5.1.2.2 TYC-GPS and TYC-GDS measurement invariance over gender and sex

TYC-GPS attained scalar invariance across sex assigned at birth (SAAB), indicating that the factor structure, item-factor relationships, and item intercepts were all equivalent between AFAB and AMAB groups. Equivalence of item intercepts means that an AFAB respondent and an AMAB respondent who have the same level on a factor (social or body GP) would score the same on its items (Kline, 2016). Scalar invariance ensures meaningful direct comparisons of scale scores, subscale scores, and item means between SAAB groups, because (1) group differences in estimated factor means are unbiased, and (2) group differences in item means are undistorted by differential item functioning (Kline, 2016).

However, TYC-GPS demonstrated only metric invariance between binary and nonbinary (NB) respondents, as well as across the four gender and sex groups (trans men, trans women, NB-AFAB, and NB-AMAB). Metric invariance without scalar invariance implies that while item-factor relationships are consistent across these groups, item intercepts may vary, resulting in different item-wise and subscale baseline scores among the groups. This is possibly attributed to differential interpretations of certain items. The absence of scalar invariance necessitates caution when directly comparing binary and NB groups or across the four gender and sex groups on GP scores, subscale scores, or item means, since observed discrepancies could reflect non-invariance of the measurement tool instead of true group differences on the latent construct. Nevertheless, it is appropriate to compare factor variances or covariances across these groups.

In contrast to TYC-GPS, TYC-GDS failed to establish configural invariance (the most basic form of measurement invariance) over SAAB. This suggests that the factor structure of TYC-GDS varies between AFAB and AMAB groups, potentially involving different factors or

numbers of factors. Thus, combining data across the two SAAB versions of TYC-GDS is likely problematic, which we will address in the forthcoming Limitations section. Furthermore, TYC-GDS exhibited only configural invariance over binary vs. NB groups and the four gender and sex groups. However, configural invariance over the latter four groups is questionable, since the absence of configural invariance over SAAB predicts a similar outcome for the gender and sex groups. The invariance tests might lack power to detect non-invariance across the four gender and sex groups given the unequal group sample sizes (Chen, 2007) and the small NB-AMAB sample size.

To recap, for NB versus binary trans groups, the Positivity scale exhibited metric invariance, indicating potential differences in the interpretation of some items between the two groups. For example, NB respondents may find the item "I feel validated when strangers in public treat me like my gender" as a less meaningful indicator for social GP, given the difficulty and ambiguity of achieving stranger validation for a nonbinary gender in a typical public space. On the other hand, the Distress scale only showed configural invariance, indicating a consistent factor structure, but the factors (social and body GD) may carry different meanings for NB vs. binary groups, or the items may be related to the factors differently (Kline, 2016). For example, the item "I wish I had been born in a different body" may be challenging to interpret in a nonbinary way or may insufficiently reflect nonbinary body GD.

Furthermore, the limited measurement invariance of the scales suggests that gender positivity and distress may manifest distinctly for NB individuals compared to binary trans individuals, particularly gender distress. Qualitative research has underscored the unique challenges in navigating and negotiating NB identities within social spaces and interpersonal relationships (Pulice-Farrow et al., 2019). In contrast to binary trans individuals, whose gender validation often hinges on how well they conform to a binary gender script and "pass," expressing and affirming nonbinary genders require nuanced considerations beyond the binary framework. NB identities are often doubly invalidated as "not real" by general society and "not really trans" by some binary LGBT individuals and gender-affirming care professionals.

For AFAB versus AMAB respondents, the Positivity scale achieved scalar invariance, whereas the Distress scale lacked the most basic configural invariance. These results indicate that the single version of the Positivity scale consistently captures gender positivity across SAAB, but

the two SAAB versions of the Distress scale are likely unbalanced. While some SAAB-specific GD items differ only by simple antonyms (e.g., “masculine” vs. “feminine”), other items refer to more disparate concepts (e.g., “facial hair” vs. “breasts”) that may not function equivalently across SAAB. For example, the AMAB body GD item “dislike having facial hair” may cross-load on social GD, whereas its AFAB counterpart “dislike having breasts” may be more restricted to body GD or not applicable for transmasculine respondents who had completed top surgery. Additionally, some GD items may contribute to their corresponding factor to varying degrees across SAAB. For example, even though the item “dislike my voice” is identical in the two SAAB versions, it may serve as a more important indicator of GD for transfeminine than transmasculine individuals, given the greater difficulty of achieving voice feminization compared to voice masculinization following hormonal therapy.

5.1.3 Health care and social predictors of gender positivity and gender distress

We applied structural equation modeling (SEM) to investigate potential predictors and covariates of GP and GD. The predictors included 13 intervenable medical or social determinants of health, and the covariates included five sociodemographic characteristics. The effects of these variables can be understood using the framework of minority stress (Hendricks & Testa, 2012; Testa et al., 2015). The 13 predictors offer potential targets for intervention via medical, social, and/or policy approaches, with various levels of strategies. For example, social support for name and pronoun changes in interpersonal settings can be fostered through educational programs and social media campaigns, whereas name and pronoun changes on government-issued IDs require policy and legal support at both federal and provincial/state levels (Bauer et al., 2015). Given the different levels of strategies involved, we analyzed these predictors individually rather than grouping them into overarching constructs (Bauer et al., 2015).

5.1.3.1 Medical gender affirmation

One of our key findings was that gender-affirming medical care (GAMC) status, barriers, and need were all significantly associated with TNB gender well-being. Completion of needed GAMC and unhindered ongoing GAMC were linked to improvement in all four outcomes,

including higher GP and lower GD in both social and body aspects. This trend was evident when comparing to TNB individuals who planned to but had not begun GAMC and faced barriers during the process (the reference group). Additionally, comparing to this reference group, TNB individuals receiving ongoing GAMC despite barriers, those who planned to start GAMC and had no barriers, and those not needing GAMC all exhibited better gender well-being in one or some of the outcome measures. For example, individuals receiving ongoing GAMC despite barriers showed higher positivity and lower body distress, whereas those not needing GAMC showed lower distress and higher body positivity. Although causal relationships cannot be established given the cross-sectional data, it is likely that ongoing GAMC contributed to improved gender well-being in the former group, and lower gender distress reduced the necessity of GAMC in the latter group. Overall, TNB individuals who planned to but had not begun GAMC and faced GAMC-delaying barriers experienced the lowest gender well-being, whereas those who completed needed GAMC or received unhindered ongoing GAMC exhibited the highest gender well-being.

Our findings underscore the importance to consider the diverse needs, barriers, and completion statuses when assessing the effectiveness of medical gender affirmation. Researchers should strive to account for these complexities and exercise caution in selecting an appropriate reference group. Failing to do so can lead to misinterpretation and misrepresentation of findings, which can have detrimental effects not only on health care but also on policymaking. For example, opponents of gender-affirming care in recent US court hearings often cited a 2019 Swedish study to justify restricting or banning medical transition (Southern Poverty Law Center, 2023). This Swedish study found that TNB individuals who received gender-affirming surgeries did not exhibit a lower use of mental health treatment for mood disorders or suicide attempts compared to TNB individuals without such surgeries (Bränström & Pachankis, 2020a,b). Notably, limitations arise from the composition of the reference group, which included TNB individuals who did not desire surgical interventions. Such individuals might have lower baseline levels of gender dysphoria and psychological distress compared to those requiring surgeries. Indeed, our finding indicated a strong correlation between bodily gender well-being (lower body GD and higher body GP) and the absence of intention to undergo medical gender transition. Thus, a more appropriate reference group for the Swedish study would have been TNB

individuals who sought but had not started gender-affirming surgeries. Furthermore, the exposed group (i.e., those who received gender-affirming surgeries) did not account for variations in surgery status, type, or barriers. Recognizing these complexities is important for interpreting and contextualizing findings in the broader landscape of TNB health research. Indeed, a 2015 study in Ontario, Canada among TNB people in need of hormonal and/or surgical transition found a complex relationship between the process of medical transition and suicide risk when accounting for transition status and sub-groups: While suicide ideation reduced monotonically from the planning stage to ongoing to completion of medical transition, among the sub-group with suicide ideation, those in the process of transition had a higher risk of a suicide attempt compared to those who planned to but not yet started transition (Bauer et al., 2015). It was the completion of needed/desired medical transition that was associated with large relative and absolute reductions in both suicide ideation and attempts (Bauer et al., 2015).

5.1.3.2 Unmet mental health care needs

We examined the impact of unmet mental health care needs in the past year. Compared to TNB individuals who did not need mental health care, those with unmet mental health care needs experienced significantly lower GP and higher social GD, but those who were able to access all needed mental health care did not show significant differences. These findings suggest that barriers to mental health care may substantially reduce gender well-being among TNB individuals.

Barriers to mental health services parallel those in gender-affirming medical care, which include high costs, lack of insurance coverage, absence or inadequacy of TNB-tailored services, limited provider knowledge and sensitivity on TNB issues, and the stigma surrounding mental health concerns (Ferlatte et al., 2019; Gridley et al., 2016; McCann & Sharek, 2016; Snow, Cerel, Loeffler, & Flaherty, 2019). Additionally, many TNB individuals mistrust mental health professionals and institutions (Gridley et al., 2016), due to the history of pathologization, gatekeeping, and "conversion therapy" of gender-diverse identities and expressions (Argyriou, 2022; Holt, Hope, Mocarski, & Woodruff, 2023). These barriers span structural, interpersonal, and individual levels, necessitating multilevel interventions for resolution.

5.1.3.3 Social gender affirmation and social inclusion

Among the social predictors, the frequency of misgendering emerged as the most prominent risk factor for diminished gender well-being across all four outcome measures. This finding aligns with previous research highlighting the multi-faceted detrimental impact of misgendering on TNB mental health, including heightened psychological distress, depression, rumination, body dissatisfaction, eating disorders, anxiety, hypervigilance, and impaired social functioning (Barr, Snyder, Adelson, & Budge, 2022; Jacobsen et al., 2023; McLemore, 2018; Mitchell et al., 2021; Puckett et al., 2023). In contrast, actively requesting others to use the correct pronoun or name, a key step of social transitioning, was associated with partial improvements in gender well-being. This finding is in line with literature demonstrating the vital effects of correct pronoun and name usage on TNB mental health and HIV-related health outcomes (Hughto et al., 2020; Russell et al., 2018; Sevelius, 2013).

Another important aspect of social transitioning is updating government-issued IDs to accurately reflect one's gender and/or name. Our study revealed that having at least one government ID with the preferred gender designation serves as a protective factor for gender well-being across all four outcomes, which is consistent with prior research linking this protective factor to reduced past-year suicide ideation and attempts (Bauer et al., 2015). This underscores the impact of structural-level gender affirmation (e.g., through government policies) on individual-level health outcomes. However, we found that legal name change was significantly associated with higher body positivity but not the other outcomes. Since updates of gender designation and name on government IDs are highly correlated, accounting for the stronger predictor probably diminished the observed association for the weaker predictor. Legal gender designation concordance appears to be a stronger and more general predictor for gender well-being compared to legal name concordance. This may be because gender designation updates on government IDs, a process historically more stringent than name changes, likely reflect more advanced stages in the legal gender recognition process.

Our findings indicate that while living authentically in one's true gender was associated with improved gender positivity in both social and body contexts, a reduced bodily distress was specifically linked to a duration of 6 or more years living in true gender. This could be attributed to the protracted nature of gender transition, accompanied by common initial rejection and

barriers. Previous research has showed that although the initiation of gender transition can be cathartic and alleviate mental health issues, such as gender dysphoria, self-harm behaviour, and suicidal ideation (Erich, Tittsworth, Dykes, & Cabuses, 2008), these issues may persist at high levels when the transition encounters rejection and barriers (Hughto et al., 2020; Rood et al., 2017). Thus, it is important to perceive gender transition as a process and a non-linear journey (Hughto et al., 2020; Jacobsen & Devor, 2022). Changes in gender positivity and distress frequently deviate from a straightforward progression away from distress and towards positivity (Jacobsen & Devor, 2022). To assess this prolonged and often non-linear progression more accurately, we need longitudinal studies with extended follow-up periods (e.g., > 5 years) since the initiation of gender transition.

We found that a strong sense of belonging to TNB communities, either in person or online, was associated with higher gender positivity and lower bodily distress. The impact of TNB community connectedness on mental health remains inconclusive in previous studies (Puckett et al., 2019). It has been found that TNB community connectedness can foster self-actualization and self-acceptance, alleviate feelings of isolation and depressive symptoms, and serve as a buffer against gender-based abuse (Graham et al., 2014; Nuttbrock et al., 2015; Pflum et al., 2015). However, these benefits come with increased visibility of one's TNB identity and awareness of negative events among other TNB individuals, which can expose one to minority stressors and potentially contribute to depression, anxiety, and anticipated rejection (Bradford, Reisner, Honnold, & Xavier, 2013; Puckett et al., 2019; Rotondi et al., 2011). These mixed effects may explain the absence of a significant association between a strong sense of TNB community belonging and lower social gender distress.

Among the social support variables, strong gender support from parents or guardians stands out as a crucial protective factor, associated with higher gender positivity and lower social gender distress. Similar benefits were not observed for strong support from other family members (e.g., spouse, children). These findings align with previous research highlighting the unique importance of strong parental gender support on TNB mental health (Bauer et al., 2015; Olson et al., 2016; Travers et al., 2012). Conversely, we did not observe any significant associations between negative trans-specific behaviours from family members and the outcomes for respondents younger than 25. The absence of contrary associations may be due to variations

in the target age groups and measurement methods used by the variables about trans-specific support versus abuse: Although both variables are life-time measures, the parental support variable asked all respondents how supportive of gender identity or expression their parent(s) or guardian(s) were, whereas the familial abuse variable asked youth under 25 whether any of their family member had done any specific negative behaviour to them due to them being TNB. Qualitative research has shown that family members' reactions to TNB identity disclosure are usually mixed, ranging from strong support to aggressive rejection, and shifting towards more support over time (Koken et al., 2009). Family dynamics often involve initial shock or rejection, followed by a grieving process and eventual acceptance (Lev, 2006). Therefore, isolated negative behaviours from some family members may not reflect overall or consistent familial unsupportiveness.

Experiencing trans-specific negative behaviour from romantic partner in the past year, or having no romantic partner in the past year, was associated with higher gender distress and lower bodily positivity. Although the cross-sectional nature of the study limits the establishment of causal relationships, it is likely that partner behaviours that leverage transphobia, such as body objectification and interference with gender-affirming medical care, contribute to heighted distress and reduced bodily positivity. The plausible causal direction in the latter association is less clear: The absence of a romantic partner may result in less support and consequently reduced gender well-being; conversely, lower gender well-being, especially lower bodily positivity, may hinder the likelihood of seeking or finding a romantic partner.

5.1.3.4 Sociodemographic background factors

Gender and sex, age, and racialization were significantly associated with variations in TNB gender well-being. Similar patterns of variation across gender and sex have been discussed above in section 5.1.1.2. In terms of age, youth under 25 displayed lower gender positivity and higher social gender distress than their older counterparts. This aligns with prior research indicating health disparities for TNB youth compared to older adults, including limited access to gender-affirming care, poorer mental health, heightened suicide risk, and a higher tendency to avoid public spaces due to fear of harassment or outing (Navarro et al., 2021b). Future research is warranted to investigate the interplay between younger age, gender positivity and distress, and

these health disparities. Furthermore, racialized respondents reported higher gender positivity than their non-racialized counterparts. This may be attributed to the ability of racialized TNB individuals to derive strength from their ethno-racial identities, which fosters community connectedness and resilience (Singh, 2013; Taube & Mussap, 2020, 2022). Indeed, we found that a strong sense of TNB community belonging was linked to higher gender positivity. Future research can explore whether community belonging or connectedness serves as a mediator in the relationship between racialization on gender well-being.

5.2 Methodological Considerations

5.2.1 Possible effect-measure modification and indirect pathways in the structural equation model

The SEM employed in our study was intentionally simplified, featuring solely direct, parallel pathways from the predictors and covariates to the outcomes. This simplified model served as an initial step to explore the relationships among the myriad variables under considerations. However, it may overlook potential effect-measure modification and indirect pathways.

The gender minority stress model (Hendricks & Testa, 2012) posits that resilience factors, such as community connectedness and positive emotions, can buffer the adverse impact of stressors on health (Beischel et al., 2022; Budge et al., 2015, 2017; Matsuno & Israel, 2018; Testa et al., 2015). This theoretical perspective suggests the need to consider moderating and mediating variables. For example, an alternative model could investigate whether resilience factors, e.g., a strong sense of belonging to TNB communities or gender positivity, moderate the impact of the predictors on gender distress. Moreover, certain predictors can influence others. For example, strong parental support may increase the likelihood of TNB youth undergoing necessary medical and social transitions, which ultimately improve gender well-being.

Future research can explore the intricate web of relationships among the variables with a refined model. This entails model modifications through scrutiny for potential misspecifications, omitted paths, or inaccurate variable relationships. While examining the modification indices can offer insights into areas for model refinement, it is crucial to temper this data-driven approach by theoretical guidance to mitigate the risk of overfitting. Moreover, future studies should compare

alternative models to determine which one better encapsulates the underlying relationships among the variables.

Since our SEM is grounded in the minority stress theory, it is pertinent to note that the categorization of "proximal" and "distal" stressors does not necessarily align with individual- and structural-level factors in epidemiology. During model development, researchers must exercise caution against assuming that structural- or group-level factors are invariably upstream from individual-level causes (Bauer, 2014; Krieger, 2008).

5.2.2 Effect vs. causal indicators

Classical test theory and factor analysis assume that a measurement model consists of effect indicators, also known as reflective indicators. These indicators are the effects or manifestations of the underlying latent construct. An example of effect indicators is the measurement of verbal intelligence (Bollen & Lennox, 1991), where higher scores on scale items indicate higher intelligence. In our study, we assumed that the TYC-GPS and TYC-GDS indicators reflected the effects of social or body GP or GD. However, this assumption may not hold true. Some of the indicators may be causal indicators (sometimes referred to as formative indicators, but see Bollen & Bauldry, 2011), which determine or form the latent construct (Bollen & Lennox, 1991). For example, "I feel validated when strangers in public treat me like my gender" may have contributed to social gender positivity, rather than being an outcome of it. Exemplars of causal indicators include income, occupation, education, and neighborhood that constitute the latent construct of socioeconomic status (SES). Unlike effect indicators, changes in causal indicators directly impact the level of the latent construct without simultaneously affecting other causal indicators. For instance, a change in income would alter SES without necessitating a concurrent change in education (Bollen & Lennox, 1991).

It is worth noting that a scale can comprise a mix of effect and causal indicators. The 20-item Center for Epidemiological Studies Depression Scale (CES-D; Radloff, 1977) is an example, containing both effect indicators of depressed mood (e.g., "I felt sad") and plausible causal indicators like "I felt lonely", where loneliness may cause depression rather than the reverse. Alternatively, loneliness may be a distinct dimension requiring multiple indicators for measurement (Bollen & Lennox, 1991).

Understanding the distinction between effect and causal indicators is crucial for scale development, as conventional guidelines for construct measurement validity and reliability are based on effect indicators, making them potentially inappropriate for causal indicators. For instance, a common practice to safeguard internal consistency is screening correlation matrices to ensure that items of the same factor are positively correlated and discard items with negative or near-zero correlations. However, this approach is unsuitable for evaluating causal indicators, since causal indictors of the same factor could exhibit positive, negative, or no correlations (Bollen & Lennox, 1991). Blind adherence to the conventional selecting criteria may result in discarding valid measures if they are causal indicators.

Discerning between causal and effect indicators requires careful considerations of the underlying theoretical framework and empirical evidence (Bollen & Lennox, 1991; Bollen & Bauldry, 2011; Diamantopoulos & Winklhofer, 2001; Edwards & Bagozzi, 2000; Fayers & Hand, 2002; Jarvis, MacKenzie, & Podsakoff, 2003), along with formal tests involving vanishing tetrads (Bollen & Ting, 2000; Gamst-Klaussen, Gudex, & Olsen, 2018). Tetrads are the differences in the products of pairs of covariances among four random variables (Bollen & Ting, 1998). For correlated observed variables in the model, if one or more of their tetrads are zero (i.e., "vanish"), then that suggests a causal latent variable generating these correlations (Spearman, 1904; Spirtes, Glymour, & Scheines, 1993). Additionally, there are alternative methods to assess the validity of causal indicators (Diamantopoulos & Winklhofer, 2001; Fayers & Hand, 2002), perform structural equation modelling with causal indicators (e.g., using partial least squares SEM; Benitez, Henseler, Castillo, & Schuberth, 2020; Bradshaw et al., 2023), and examine measurement invariance for a hybrid scale comprising both effect and causal indicators (e.g., with a multiple-indicators multiple-causes model, i.e., MIMIC). These analyses are beyond the scope of this thesis, but future research can explore them to refine the scales, factor analysis, and SEM.

5.2.3 Confirmatory vs. exploratory factor analysis

Confirmatory factor analysis (CFA) evaluates pre-determined measurement models, with the factor number and structure specified beforehand. Each indicator is constrained to load only on the factor(s) designated by the researcher (Kline, 2016). Following model fit assessment,

researchers can modify the model, such as removing poorly fitting items. Additionally, CFA allows comparison of alternative models to determine which one aligns better with the observed data. The model modification and comparison provide formal processes to refine the theoretical measurement model. In our study, CFA is appropriate since there is a clear hypothesis about the theoretical framework. However, considering that this is an early stage of scale development where the correct model specification is uncertain, conducting exploratory factor analysis (EFA) could be beneficial. EFA explores data patterns to uncover the underlying factor structure without *a-priori* constraints. For future investigations, applying EFA to a different dataset of TYC-GPS and TYC-GDS can help refine the measurement models.

5.3 Strengths, Limitations, and Future Research

5.3.1 Strengths

A 2016 review found a notable gap in transgender research, with less than 5% of studies focusing on positive aspects of being trans (Moradi et al., 2016). Even studies on trans resilience tend to underscore vulnerability from marginalization, rather than the unique strengths arising from trans identities and experiences (Bockting et al., 2013). There is a paucity of validated assessment tools for measuring TNB gender positivity, strengths, or resilience. Existing scales center on gender dysphoria and have substantial limitations, such as outdated content, pathologizing undertones, and inadequate inclusivity of nonbinary identities. In comparison to older scales, TYC-GPS and TYC-GDS capture a broader range of gender experiences among TNB people as a community instead of a patient group. These scales are also suitable for nonbinary identities and younger age groups through the incorporation of inclusive languages. Notably, to the best of our knowledge, TYC-GPS is the first scale to measures TNB gender positivity across distinct bodily and social dimensions.

The present study contributes to the validation of TYC-GPS and TYC-GDS by leveraging data from the largest TNB community-based survey in Canada, which reflects diverse age groups, gender affirmation needs and statuses, and lived experiences. This validation using a community sample complements the findings from a clinical youth sample (Bauer et al., n.d.;

Bauer et al., 2021; Gotovac & Bauer, 2021), supporting the generalizability for these new assessment tools. Furthermore, the present study applied structural equation modelling grounded in gender minority stress theory to identify medical and social determinants impacting TNB gender well-being, offering insights for intervention strategies aimed at improving health equity.

By highlighting the positivity and strengths embedded in TNB gender experiences, this study diversifies representative narratives and challenges the misconception that cisgender-like gender experiences should be the standard and goal for trans wellness. The findings provide a conceptual and methodological foundation for future research and strength-based therapy, fostering gender positivity and enhancing psychological resilience. Shifting from the deficit-focused perspective to a balanced, multi-faceted, and holistic approach to TNB well-being holds promise for practical applications in gender-affirmative health care and social movements.

5.3.2 Limitations and future research

Alongside its encouraging findings, our study has several limitations. Firstly, the cross-sectional nature of the observational data precludes causal conclusions. While the study found significant associations between various medical and social predictors and TNB gender well-being, establishing causation is challenging. The study suggests that these predictors likely contributed to differences in gender positivity and distress, but alternative causal relationships cannot be ruled out. For example, a strong sense of belonging to TNB spaces was linked to higher gender positivity. It remains plausible that heightened positivity in one's TNB identity prompts increased community engagement rather than the reverse, or that a third variable (e.g., gender-affirming medical care) fosters both gender positivity and a strong sense of community belonging. Longitudinal studies are needed to delve deeper into these relationships and explore whether they evolve over time following gender-affirming care. Qualitative research has illuminated that TNB participants commonly describe their gender euphoria in connection with gender-affirming interventions, ranging from intense joy upon achieving transition milestones to a quieter sustained sense of calmness and peace in later stages of transition (Jacobsen & Devor, 2022). Longitudinal data will be better suited for investigating these nuanced changes in gender well-being.

Secondly, we did not conduct convergent and divergent validation of TYC-GPS and TYC-GDS with other scales, such as life satisfaction, psychological well-being, depression, anxiety, and self-harm. Additionally, given the cross-sectional data, we could not examine whether improved gender well-being predicts changes in these related measures. Future research evaluating the convergent, divergent, and predictive validity of the two new scales would provide valuable insight.

Thirdly, while the Trans PULSE Canada sample is diverse in various aspects, including age, ethno-racial background, gender identity, sexual orientation, geographic regions, socioeconomic status, and gender-affirming care needs and status, it is a convenience sample and may not be representative of the general TNB population in Canada. Moreover, the sample lacked a sufficient number of racialized participants, especially racialized transfeminine individuals, for conducting meaningful multi-group analyses over racialization status. Additionally, although the SEM incorporated racialization and Indigenous identity as covariates, the dichotomized coding of "racialized vs non-racialized" and "Indigenous vs non-Indigenous" was rather crude and might overlook nuanced cultural differences. These limitations constrain the generalizability of our findings. Future research needs a larger, more racially diverse sample of TNB individuals to explore how ethno-racial background may influence gender-related feelings and processes.

Fourthly, the limited measurement invariance of the two scales across gender and sex groups, especially TYC-GDS, warrants caution when interpreting group-comparison results, because observed disparities may be due to non-invariance of the measurement tool rather than genuine group differences. Since the TYC-GDS did not establish configural invariance across sex assigned at birth, future research should separately analyze gender distress scores for AFAB and AMAB groups. Furthermore, it is worth noting that the actual measurement invariance levels of the two scales may be even more limited than the invariance test results suggested, because ΔRMSEA and ΔCFI between nested models using DWLS estimation may lack sufficient power to detect non-invariance (Koziol, 2010), and the performance of the ΔCFI and ΔTLI criteria is impacted by model complexity and sample size (Sass, Schmitt, & Marsh, 2014). Future research could assess differential item functioning (DIF) to locate the scale items that contribute to the violation of measurement invariance. DIF is when an item elicits a differential response that

depends on the group membership after conditioning on the true score on the corresponding factor (Kline, 2016). Detected DIF items are candidates for deletion or revision.

Fifthly, due to the limited measurement invariance across gender/sex and the insufficient sample size for racialized participants, we could not perform multi-group SEM to explore potential variations across the intersections of gender/sex and racialization. Although our SEM incorporated gender/sex, racialization, and other sociodemographic characteristics as covariates, this approach cannot capture the dynamics between intersecting identities, social positions, and processes of oppression and privilege (Bauer, 2014). Future research should employ quantitative intersectional analysis guided by theory to elucidate these dynamics, potentially construing them as an interaction (synergistic or antagonistic), effect-measure modification, mediation, or moderated mediation (Bauer, 2014).

Lastly, although our SEM incorporated structural-level variables like government ID concordance, it is not a group-level or multi-level statistical analysis. The complexity of the intersectional dynamics among the variables is further compounded by the structural roles of policies and institutional practices in shaping them (Bauer, 2014). Indeed, individual-level health disparities among TNB populations have been linked to a plethora of stigma- and discrimination-driven inequalities at structural, institutional, and interpersonal levels (Lelutiu-Weinberger et al., 2020; Scheim, 2017; Stroumsa, 2014; White Hughto et al., 2015). There are various social-structural processes that "function as intervening pathways between systemic discrimination and adverse health" (Suslovic & Lett, 2023, p2). These multilevel causes, effects, and processes elude capture by individual-level models. Researchers and policymakers should be cautious about misguided interventions that focus solely on individual-level factors while neglecting social-structural factors influencing or constraining individual behaviours (Lofters & O'Campo, 2012), as multi-level stigma requires comprehensive multi-level interventions (Suslovic & Lett, 2023; White Hughto et al., 2015).

Health equity researchers caution against intersectional analysis that operates solely through a deficit-based lens and advocate for recognizing the unique strengths arising from intersections of oppression and power for marginalized populations (Bryant et al., 2021; Lett, 2022). To facilitate future research in positive intersectionality, it is imperative to develop

validated measurement tools for strength, resilience, and empowerment on intersecting identities, positions, and processes (Ghabrial & Andersen, 2021).

5.4 Practical Implications

"Talking about sources of pain is important. It's the first step toward relief. But if all we do is talk about pain, I worry that affirms it as the collective trans destiny. It is not. Medical transition is a site for joy, for life-affirmation, for taking control", said Lily Alexandre, a young Canadian trans woman, in her video essay on trans youth in Canada for a Trans PULSE Canada-affiliated knowledge transfer project (Alexandre, 2022). While recognizing the importance of relieving gender dysphoria, Lily envisioned future trans health care as joyful and empowering. She acknowledged the difficulties in finding joy, given the history of pervasive harm, pathologization, and gatekeeping by healthcare institutions, as well as financial challenges and other barriers, "but we can't afford to lose hope," she stressed.

Lily's perspective aligns with a growing movement among TNB community members and scholars advocating for a holistic model in TNB health care. This model emphasizes gender positivity as a guiding principle for transition, rejecting the deficit-based notion that trans experiences are inherently negative and require fixing. As a nonbinary participant succinctly summed up in a community-based interview study, "Dysphoria really doesn't help; it just causes confusion and anguish. Euphoria guides and points to where you want to go on your journey" (Jacobsen & Devor, 2022). Healthcare providers are encouraged to adopt strength- and resilience-based approaches to assist TNB people in fulfilling their gender journeys "through an act of joy and love" (Jacobsen & Devor, 2022).

TYC-GPS and TYC-GDS offer useful tools for healthcare practitioners and researchers to assess changes in gender-related positive feelings or distress among TNB individuals during gender affirmation. For those who opt not to undergo medical or social transition, these scales can still offer a nuanced evaluation on their state of gender well-being in both bodily and social aspects. Beyond focusing solely on reducing dysphoria, trans health assessment should be balanced by questions that explore positive experiences and sources of joy. Physicians and mental health counsellors are encouraged to maintain an open and receptive stance, recognizing

the diverse and often non-linear developmental paths of TNB clients' gender experiences (Diamond, Pardo, & Butterworth, 2011; Lindley et al., 2024).

When offering strength- or resilience-based therapy, counsellors should be mindful that sustaining a high level of positivity is likely unrealistic and unattainable. Instead, counsellors should foster TNB clients' positive experiences and reflections while providing a realistic perspective on gender positivity, cognizant of the fact that positivity can be fostered even in the presence of moderate to high levels of gender distress. Collaborating with clients to develop personalized coping strategies for moments of distress or reduced positivity is essential.

It is crucial to acknowledge the limitations of resilience-based therapy, which has long suffered from neglecting social-structural context. Resilience is originally conceptualized as a personality trait to "respond to stressful or traumatic situations in healthy or positive ways" (Kte'pi, 2020; Suslovic & Lett, 2023). For example, the Brief Resilience Scale assesses resilience as an individual's ability to recover easily from stressful experiences (Smith et al., 2008). However, as resilience researcher Michael Ungar succinctly articulated, "resilience is not a DIY endeavour" (Ungar, 2019). Suslovic and Lett (2023) critiqued the individualist neoliberal paradigm of "resilience as treatment" in public health, medicine, and health services research. From a Black queer and trans feminist standpoint, the authors argued that focusing on individual adaptation to structural trauma is misguided and futile, since it places the responsibility of intervention on marginalized individuals rather than the system that generates and transmits trauma, thereby maintaining the status quo. They cautioned that, as more quantitative measures of resilience are being developed, researchers and healthcare professionals must not lose sight of the "systemic, intergenerational, and collective means" underlying harm that entails resilience as a posttraumatic response. They pointed out that studies seeking to identify resilience factors disproportionally occur in racialized populations and other oppressed and marginalized groups, placing a higher expectation on individuals experiencing structural harm to adapt to the system by becoming resilient. While we encourage counsellors and therapeutic programs to foster gender positivity as a protective factor for TNB individuals, it is imperative to understand resilience within a social-structural framework, as well as the limits and potential harms of an individual-based resilience approach in the face of continuing structural threat and a lack of safety.

Suslovic and Lett (2023) advocated for a holistic trauma framework (Alvarez & Farinde-Wu, 2022) and a liberation health framework (Martinez & Fleck-Henderson, 2014) as alternative or complementary approaches to the prevailing individual-centric resilience paradigm. The holistic trauma framework emphasizes collective healing and deindividualizes the burden to adapt to violent conditions, prioritizing community-level interventions to interrupt and prevent violence (Alvarez & Farinde-Wu, 2022). The liberation health framework encourages practitioners to conceptualize factors contributing to a client's presenting problem on multiple scales — individual, cultural, and institutional — and pursue social justice alongside the client (Martinez & Fleck-Henderson, 2014). Both frameworks caution against normalizing social-structurally induced suffering and emphasize proactively addressing harm rather than solely coping with its aftereffects.

In alignment with these perspectives, we urge healthcare practitioners and researchers to honour TNB people's strengths, bodies, and expertise, commit to their healing, joy, and liberation, and leverage community support and resilience. This approach aligns with a broader call for community-led health care as a form of mutual aid (Sharman, 2021), advocating for social changes to reduce and prevent health disparities. We hope that the present community-informed study will contribute to the creation of holistic TNB health care.

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Appendices

Appendix A. TYC-GPS and TYC-GDS items from the Trans PULSE Canada survey

Next we are going to ask you about different ways that you may experience your gender. One's gender can lead to both positive and negative experiences, so we have them both.

B11/12. To what extent do you agree with the following statements?

B11b. I feel a sense of accomplishment and pride being able to express myself as my gender

Disagree completely	Disagree somewhat	Neutral	Agree somewhat	Agree completely
❍	❍	❍	❍	❍

B11c. I enjoy going out in public and doing social activities because I can express myself as my gender

Disagree completely	Disagree somewhat	Neutral	Agree somewhat	Agree completely
❍	❍	❍	❍	❍

B11d. I feel validated when strangers in public treat me like my gender

Disagree completely	Disagree somewhat	Neutral	Agree somewhat	Agree completely
❍	❍	❍	❍	❍

B11.e I feel confident trying new and different clothes that express my gender

Disagree completely	Disagree somewhat	Neutral	Agree somewhat	Agree completely
❍	❍	❍	❍	❍

B11f. I feel happy that society sees me on the outside for who I am on the inside

Disagree completely	Disagree somewhat	Neutral	Agree somewhat	Agree completely
❍	❍	❍	❍	❍

B11g. I am relieved I don't have to work as hard as I used to for people to see me as my gender

Disagree completely	Disagree somewhat	Neutral	Agree somewhat	Agree completely
❍	❍	❍	❍	❍

B11h. I feel confident in my body

Disagree completely	Disagree somewhat	Neutral	Agree somewhat	Agree completely
○	○	○	○	○

B11i. I feel attractive

Disagree completely	Disagree somewhat	Neutral	Agree somewhat	Agree completely
○	○	○	○	○

B11j. I feel comfortable in my body

Disagree completely	Disagree somewhat	Neutral	Agree somewhat	Agree completely
○	○	○	○	○

B11k. I feel like my body fits with the real me

Disagree completely	Disagree somewhat	Neutral	Agree somewhat	Agree completely
○	○	○	○	○

B11l. Things about my body that used to bother me don't bother me as much anymore

Disagree completely	Disagree somewhat	Neutral	Agree somewhat	Agree completely
○	○	○	○	○

B12a. I wish I had been born in a different body

Disagree completely	Disagree somewhat	Neutral	Agree somewhat	Agree completely
○	○	○	○	○

B12b. I avoid social situations or activities because I can't express myself in my gender

Disagree completely	Disagree somewhat	Neutral	Agree somewhat	Agree completely
○	○	○	○	○

B12c. I feel hurt if someone calls me the wrong gender (using the wrong pronouns / name / language)

Disagree completely	Disagree somewhat	Neutral	Agree somewhat	Agree completely
○	○	○	○	○

B12e. I feel that society doesn't accept or embrace me in my gender

Disagree completely	Disagree somewhat	Neutral	Agree somewhat	Agree completely
○	○	○	○	○

B12f. I worry that people will always treat me as the wrong gender

Disagree completely	Disagree somewhat	Neutral	Agree somewhat	Agree completely
○	○	○	○	○

B12g. I dislike seeing my naked body

Disagree completely	Disagree somewhat	Neutral	Agree somewhat	Agree completely
○	○	○	○	○

B12h. I feel like I can't trust what my body might do as I get older

Disagree completely	Disagree somewhat	Neutral	Agree somewhat	Agree completely
○	○	○	○	○

B12i. I dislike my voice because I feel that it doesn't match my gender

Disagree completely	Disagree somewhat	Neutral	Agree somewhat	Agree completely
○	○	○	○	○

Please answer the B13 questions below if your sex assigned at birth was male. Otherwise, please skip to B14.

B13. To what extent do you agree with the following statements?

B13a. When people treat me like the wrong gender or expect me to behave like a boy/man I feel hurt

Disagree completely	Disagree somewhat	Neutral	Agree somewhat	Agree completely
❍	❍	❍	❍	❍

B13b. I feel unhappy because I have a masculine body

Disagree completely	Disagree somewhat	Neutral	Agree somewhat	Agree completely
❍	❍	❍	❍	❍

B13c. I worry that I might always have a masculine body

Disagree completely	Disagree somewhat	Neutral	Agree somewhat	Agree completely
❍	❍	❍	❍	❍

B13d. I dislike peeing standing up

Disagree completely	Disagree somewhat	Neutral	Agree somewhat	Agree completely	Not applicable
❍	❍	❍	❍	❍	❍

B13e. I dislike having a penis or erections because it makes me feel like I'm not my true gender

Disagree completely	Disagree somewhat	Neutral	Agree somewhat	Agree completely	Not applicable
❍	❍	❍	❍	❍	❍

B13f. I dislike having facial hair because it makes me feel like I'm not my true gender

Disagree completely	Disagree somewhat	Neutral	Agree somewhat	Agree completely	Not applicable
❍	❍	❍	❍	❍	❍

***Note.** Survey items B13a – B13f were recoded into variables b12j – b12o in the thesis analysis.

Please answer the B14 questions below if your sex assigned at birth was female. Otherwise, please skip to B15.

B14. To what extent do you agree with the following statements?

B14a. When people treat me like the wrong gender or expect me to behave like a girl/woman I feel hurt

Disagree completely	Disagree somewhat	Neutral	Agree somewhat	Agree completely
○	○	○	○	○

B14b. I feel unhappy because I have a feminine body

Disagree completely	Disagree somewhat	Neutral	Agree somewhat	Agree completely
○	○	○	○	○

B14c. I worry that I might always have a feminine body

Disagree completely	Disagree somewhat	Neutral	Agree somewhat	Agree completely
○	○	○	○	○

B14d. I dislike peeing sitting down

Disagree completely	Disagree somewhat	Neutral	Agree somewhat	Agree completely
○	○	○	○	○

B14e. I dislike having a front hole or monthly bleeding (period) because it makes me feel like I'm not my true gender

Disagree completely	Disagree somewhat	Neutral	Agree somewhat	Agree completely	Not applicable
○	○	○	○	○	○

B14f. I dislike having breasts because they make me feel like I'm not my true gender

Disagree completely	Disagree somewhat	Neutral	Agree somewhat	Agree completely	Not applicable
○	○	○	○	○	○

***Note.** Survey items B14a – B14f were recoded into variables b12j – b12o in the thesis analysis.

Appendix B. Other relevant items from the Trans PULSE Canada survey

2019 Survey – English – Paper Version

Section A.

Welcome to the survey! These first questions are meant to give you a chance to tell us some basic information about yourself.

A1. How old are you?

_____ years old

A3. Which of the following reflect your ethno-racial background? **(Please check all that apply)**

- ❑ Black African (e.g. Ghana, Kenya, Somalia)
- ❑ Black Canadian or African-American
- ❑ Black Caribbean (e.g., Jamaica, Haiti)
- ❑ East Asian (e.g. China, Japan, Korea, Taiwan)
- ❑ Indigenous (e.g. First Nations, Metis, Inuit, Native American)
- ❑ Indo-Caribbean (e.g. Guyanese with origins in India)
- ❑ Jewish
- ❑ Latin American (e.g. Argentina, Mexico, Nicaragua)
- ❑ Middle Eastern (e.g. Egypt, Iran, Israel, Saudi Arabia)
- ❑ South Asian (e.g. India, Sri Lanka, Pakistan)
- ❑ South East Asian (e.g. Vietnam, Malaysia, Philippines)
- ❑ White Canadian or White American
- ❑ White European (e.g. England, Greece, Sweden, Russia)
- ❑ Other, please specify: _____

Please answer the next question only if you selected "Indigenous" above. Otherwise, please skip to question A4.

A3a. Are you…? **(Please check all that apply)**

- ❑ First Nations (status)
- ❑ First Nations (non-status)
- ❑ Métis
- ❑ Inuk
- ❑ Indigenous from Canada, don't know which group
- ❑ Indigenous from another country

- ❑ Unsure

A4. Do you identify as a person of colour?

- ○ Yes
- ○ No

A5. Are you perceived or treated as a person of colour in Canada?

- ○ Yes
- ○ No

A8. What country were you born in?

- ○ Canada
- ○ Outside of Canada, please specify country: _____ → Skip to A9
- ○ Unsure → Skip to A9

A14. What is the highest level of formal education you have completed?

- ○ Some high school, no diploma or GED
- ○ GED
- ○ High school graduate
- ○ Some CÉGEP, no diploma
- ○ CÉGEP graduate
- ○ Some college or trade school, no degree
- ○ College or trade school graduate
- ○ Some university, no degree
- ○ Bachelor's degree
- ○ Some graduate work, no degree
- ○ Master's degree (e.g. MA, MS, MBA)
- ○ Some doctoral or professional work, no degree
- ○ Doctoral or professional degree (e.g. PhD, MD, JD)

Please answer the next five questions if you are age 16 or older. Otherwise, please skip to A26.

Next we are going to ask a few questions about your income. Although a lot of health costs are covered by health insurance, there is still a relationship between our health and our incomes. Please know that, like all other information you have provided, these answers will be kept confidential.

We recognize that, as a community, we work in all types of fields. When we talk about work and income, we are talking about *all* types of income-generating activity, both formal and informal employment. This includes work from public speaking to sex work to child care.

A21. What is your best estimate of the total income from all members living in your household including yourself, before taxes and deductions, from all sources in in 2018? (include any money your household received from any person or organization). By household members, we mean people with whom you share income and resources, or who share income and resources with you.

- ○ Less than $10,000
- ○ $10,000 to less than $15,000
- ○ $15,000 to less than $20,000
- ○ $20,000 to less than $30,000
- ○ $30,000 to less than $40,000
- ○ $40,000 to less than $50,000
- ○ $50,000 to less than $60,000
- ○ $60,000 to less than $80,000
- ○ $80,000 to less than $100,000
- ○ $100,000 to less than $150,000
- ○ $150,000 or more
- ○ Unsure

A22. Including yourself, how many people in Canada were being supported on this income?

_____ people

A23. How many people outside of Canada were being supported on this income?

_____ people

The next few questions are about disabilities. We acknowledge that disability is a very broad category that can include many realities and experiences. Some people who might be labelled under disability categories might not identify as living with a disability.

A26. Do you self-identify as someone who currently lives with the following realities or conditions? **(Please check all that apply)**

- ❑ Autistic
- ❑ Blind
- ❑ Crip
- ❑ Deaf
- ❑ Disabled or living with a disability (including episodic disability)
- ❑ Chronic pain
- ❑ Neurodivergent
- ❑ Psychiatric survivor, mad, or person with mental illness
- ❑ Another identity related to body/mind differences: _____
- ❑ None of the above

A27. Have you been diagnosed with any of the following? **(Please check all that apply)**

- ❑ Acquired brain injury
- ❑ Autism or Asperger's
- ❑ Chronic Illness
- ❑ Chronic pain condition
- ❑ Intellectual or developmental disability
- ❑ Intermittent or episodic illness or condition
- ❑ Learning disability
- ❑ Mobility or physical disability
- ❑ Vision impairment
- ❑ Mental health condition
- ❑ Any other form of disability or impairment that we have missed: _____
- ❑ None of the above

B2. What sex were you assigned at birth, meaning on your original birth certificate?

Note: If you choose not to answer this question, you will not receive later questions about surgeries, health screening, or gender dysphoria related to body parts.

- ❍ Male
- ❍ Female

B5. If you had to select ONE response that best describes your current gender identity for the purposes of a survey, what would it be?

- ❍ Man or boy
- ❍ Woman or girl
- ❍ Indigenous or other cultural gender identity (e.g., two-spirit)
- ❍ Non-binary, genderqueer, agender, or a similar identity

B6. What gender do you currently live as in your day-to-day life? **(Please check only one)**

- ❍ Man or boy
- ❍ Woman or girl
- ❍ Sometimes man/boy, sometimes woman/girl
- ❍ Non-binary, genderqueer, agender, or similar

B7. If your answer to question B6 is different than your sex assigned at birth, then at what age did you begin living in your true gender?

_____ years old

- ❍ Not applicable

B15. How would you describe your sense of belonging in trans spaces in person?

- ❍ Very strong
- ❍ Somewhat strong
- ❍ Somewhat weak
- ❍ Very weak
- ❍ I don't have access to trans spaces in person
- ❍ I am not interested in accessing trans spaces in person

B16. How would you describe your sense of belonging in trans spaces online?

- ❍ Very strong
- ❍ Somewhat strong
- ❍ Somewhat weak
- ❍ Very weak
- ❍ I don't have access to trans spaces online
- ❍ I am not interested in accessing trans spaces online

B17. How would you describe your sense of belonging in non-binary spaces in person?

- ❍ Very strong
- ❍ Somewhat strong
- ❍ Somewhat weak
- ❍ Very weak
- ❍ I don't have access to non-binary spaces in person
- ❍ I am not interested in accessing non-binary spaces in person

B18. How would you describe your sense of belonging in non-binary spaces online?

- ❍ Very strong
- ❍ Somewhat strong
- ❍ Somewhat weak
- ❍ Very weak
- ❍ I don't have access to non-binary spaces online
- ❍ I am not interested in accessing non-binary spaces online

In the next few questions, we'll ask about how your name and pronouns may reflect your gender. By "reflect your gender," we just mean something that fits with your gender or agender in a way that feels good to you.

B23. Have you asked people in your life to use a different pronoun that better reflects your gender?

- ❍ Yes, everyone
- ❍ Yes, some people
- ❍ No, don't need to change my pronoun → Skip to B24
- ❍ No, I haven't asked → Skip to B24

B24. Have you asked people in your life to call you by a different name that better reflects your gender?

- ❍ Yes, everyone
- ❍ Yes, some people
- ❍ No, don't need to change my name
- ❍ No, I have not asked

B25. In general, how often do people misgender you by using incorrect names, pronouns, or gendered language?

- ❍ Every day
- ❍ Every week
- ❍ Every month
- ❍ Every year
- ❍ Never → Skip to B26

B26. Have you legally changed your name to reflect your gender?

- ❍ Yes → Skip to B27
- ❍ No

B27. For the following forms of legal identification, are you listed as “male”, “female”, “X”, or with no gender marker?

	Male	Female	X	No gender marker	I don’t have this
Driver’s license	❍	❍	❍	❍	❍
Canadian birth certificate	❍	❍	❍	❍	❍
Other (non-Canadian) birth certificate	❍	❍	❍	❍	❍
Health card	❍	❍	❍	❍	❍
Canadian passport	❍	❍	❍		❍
Other (non-Canadian) passport	❍	❍	❍	❍	❍
Certificate of Indian status card	❍	❍	❍	❍	❍
Canadian citizenship card	❍	❍	❍		❍
Canadian permanent resident card	❍	❍	❍		❍
Canadian armed forces card	❍	❍	❍	❍	❍
Provincial photo ID card (non-driver’s licence)	❍	❍	❍	❍	❍

B28. For the following forms of legal identification, how would you prefer to be listed?

	Male	Female	X	No gender marker	Something else	I don’t have this
Driver’s license	❍	❍	❍	❍	❍	❍
Canadian birth certificate	❍	❍	❍	❍	❍	❍
Other (non-Canadian) birth certificate	❍	❍	❍	❍	❍	❍
Health card	❍	❍	❍	❍	❍	❍
Canadian passport	❍	❍	❍	❍	❍	❍
Other (non-Canadian) passport	❍	❍	❍	❍	❍	❍
Certificate of Indian status card	❍	❍	❍	❍	❍	❍
Canadian citizenship card	❍	❍	❍	❍	❍	❍
Canadian permanent resident card	❍	❍	❍	❍	❍	❍
Canadian armed forces card	❍	❍	❍	❍	❍	❍
Provincial photo ID card (non-driver’s licence)	❍	❍	❍	❍	❍	❍

Section I.

In the next section, we would like to learn about your experiences with finding competent and respectful gender-affirming medical care. For our purposes, "gender-affirming medical care" refers to puberty blockers, gender-affirming hormones, surgeries, and/or body modifications.

I2. Which of the following applies to your current situation regarding puberty blockers, hormones and/or surgery? **(Please check only one)**

- ○ I have had the gender-affirming medical treatment that I need/want → Skip to I10
- ○ I am in the process of completing gender-affirming medical treatment
- ○ I am planning to receive gender-affirming medical treatment, but have not begun
- ○ I am not planning to receive gender-affirming medical treatment → Skip to I10
- ○ I am not sure whether I am going to seek gender-affirming medical treatment → Skip to I10

I8. Are any of the following barriers delaying your gender-affirming medical care? **(Please check all that apply)**

- ☐ Can't afford treatment
- ☐ Can't afford travel to treatment
- ☐ Denied because of my gender identity or expression
- ☐ Denied because of my weight
- ☐ Denied because of my mental health
- ☐ Denied because of my autism
- ☐ Denied because of my disability
- ☐ On a waitlist
- ☐ Other, specify: _____
- ☐ None of the above

Section J.

Next, we have some questions about your experiences accessing mental health care

J1. In the past 12 months, have you needed any of the following services (whether or not you actually used them)? **(Please check all that apply)**

- ❑ General counselling
- ❑ Couples therapy
- ❑ Sex therapy
- ❑ Trauma or grief counselling
- ❑ Eating disorder services
- ❑ Addictions services
- ❑ None of the above

J2. In the past 12 months, have you used any of the following services? **(Please check all that apply)**

- ❑ General counselling
- ❑ Couples therapy
- ❑ Sex therapy
- ❑ Trauma or grief counselling
- ❑ Eating disorder services
- ❑ Addictions services
- ❑ None of the above

Please answer the next question if you needed a mental health service (listed in J1), but didn't actually use it (in J2). Otherwise, please skip to the next question.

J2a. Were you unable to access the mental health services you needed because you're trans or non-binary?

- ❍ Yes
- ❍ No

Section N.

Next we're going to ask some questions about your family.

N5. In general, how supportive of your gender identity or expression are the following people?

	Not at all	Not very	Somewhat	Very	They don't know	Not applicable
N5a. Your parent(s) or guardian(s)	❍	❍	❍	❍	❍	❍
N5b. Your spouse or partner(s)	❍	❍	❍	❍	❍	❍
N5c. Your child(ren)	❍	❍	❍	❍	❍	❍
N5d. Your grandchild(ren)	❍	❍	❍	❍	❍	❍

N6. In the past 12 months, have you had a romantic relationship?

❍ Yes
❍ No → Skip to N8

N7. In the past 12 months, has a romantic partner done any of the following because you're trans or non-binary?

	Yes	No	Not applicable
N7a. Interfered with your gender-affirming medical care	❍	❍	❍
N7b. Interfered with your clothing or gender expression	❍	❍	❍
N7c. Avoided introducing you to friends and family	❍	❍	❍
N7d. Threatened to out you	❍	❍	❍
N7e. Threatened to leave you	❍	❍	❍
N7f. Objectified your body	❍	❍	❍
N7g. Helped you with your gender-affirming medical care	❍	❍	❍
N7h. Affirmed your clothing or gender expression	❍	❍	❍
N7i. Introduced you to their friends and family	❍	❍	❍
N7j. Advocated for others to use your correct name and/or pronouns	❍	❍	❍
N7k. Reduced contact with people who weren't supportive of your gender	❍	❍	❍
N7l. Celebrated your body	❍	❍	❍

Please complete the rest of Section N if you are under the age of 25. Otherwise, please skip to Section O on page 77.

N10. Have any of your family members done any of these things to you because you're trans or non-binary? **(Please check all that apply)**

❑ Stopped speaking to you for a long time or ended your relationship
❑ Threatened you with violence
❑ Were violent towards you
❑ Kicked you out of the house
❑ Did not allow you to wear the clothes that reflected your gender
❑ Sent you to a therapist, counsellor, or religious adviser to stop you from being trans or non-binary
❑ None of the above

Appendix C. Post-hoc [a] pairwise comparisons of Trans Youth CAN! Gender Positivity Scale (TYC-GPS), Trans Youth CAN! Gender Distress Scale (TYC-GDS), and the social and body subscale mean scores by gender/sex [b]

		Gender Positivity						Gender Distress					
		GP (Overall)		GP-Social		GP-Body		GD (Overall)		GD-Social		GD-Body	
Group 1	Group 2	Mean Difference Estimate $(\bar{X}_1 - \bar{X}_2)$	Adj P-value [c]	Mean Difference Estimate $(\bar{X}_1 - \bar{X}_2)$	Adj P-value [c]	Mean Difference Estimate $(\bar{X}_1 - \bar{X}_2)$	Adj P-value [c]	Mean Difference Estimate $(\bar{X}_1 - \bar{X}_2)$	Adj P-value [c]	Mean Difference Estimate $(\bar{X}_1 - \bar{X}_2)$	Adj P-value [c]	Mean Difference Estimate $(\bar{X}_1 - \bar{X}_2)$	Adj P-value [c]
TM	TW	-0.0	.820	0.1	.365	-0.2	.044	-0.2	.003	-0.1	.177	-0.2	.002
TM	NB-AFAB	0.4	<.0001	0.6	<.0001	0.1	.060	0.1	.020	-0.4	<.0001	0.4	<.0001
TM	NB-AMAB	0.4	<.0001	0.7	<.0001	0.1	.633	0.03	.968	-0.3	<.0001	0.2	.019
TW	NB-AFAB	0.4	<.0001	0.5	<.0001	0.3	<.0001	0.3	<.0001	-0.3	<.0001	0.6	<.0001
TW	NB-AMAB	0.5	<.0001	0.1	<.0001	0.3	.012	0.2	.017	-0.2	.006	0.4	<.0001
NB-AFAB	NB-AMAB	0.05	.835	0.1	.139	-0.04	.972	-0.1	.452	0.1	.232	-0.2	.022

[a] Following statistically significant weighted one-way ANOVA tests that compared the four gender/sex group means (Table 6).
[b] Gender/sex groups: TM: trans man/boy. TW: trans woman/girl. NB-AFAB: Nonbinary, assigned female at birth. NB-AMAB: Nonbinary, assigned male at birth.
[c] *P*-value was adjusted using the Tukey-Kramer adjustment.

Appendix D. Two-factor confirmatory factor analysis of TYC-GDS, assigned female at birth (AFAB) version (N=1533)

Item	Standardized Factor Loading		Unstandardized Factor Loading (SE)	
Gender Distress – Social	**Factor 1**	**Factor 2**	**Factor 1**	**Factor 2**
(b12b) I avoid social situations or activities because I can't express myself in my gender	.70		.91 (.04)***	
(b12c) I feel hurt if someone calls me the wrong gender (using the wrong pronouns / name / language)	.43		.45 (.04)***	
(b12e) I feel that society doesn't accept or embrace me in my gender	.38		.46 (.04)***	
(b12f) I worry that people will always treat me as the wrong gender	.67		.90 (.04)***	
(b12j) When people treat me like the wrong gender or expect me to behave like a *girl/woman* I feel hurt	.52		.44 (.03)***	
Gender Distress – Body				
(b12a) I wish I had been born in a different body		.58		.75 (.03)***
(b12g) I dislike seeing my naked body		.66		.87 (.03)***
(b12h) I feel like I can't trust what my body might do as I get older		.46		.54 (.03)***
(b12i) I dislike my voice because I feel that it doesn't match my gender		.56		.81 (.03)***
(b12k) I feel unhappy because I have a *feminine* body		.87		1.13 (.02)***

(b12l) I worry that I might always have a *feminine* body	.84	1.17 (.02)***
(b12m) I dislike peeing *sitting down*	.31	.46 (.04)***
(b12n) I dislike having *front hole or monthly bleeding (period)* because it makes me feel like I'm not my true gender	.54	.83 (.04)***
(b12o) I dislike having *breasts* because it makes me feel like I'm not my true gender	.60	1.02 (.04)***

Note. Text in italics is different between the AFAB and AMAB GDS versions. Model fit was based on data from the AFAB respondents. Diagonally weighted least squares (DWLS) estimator with robust standard errors was applied. All factor loadings were statistically significant (*** $p < .001$). Robust CFI = .931; robust TLI = .918; robust RMSEA = .089 (90% CI: .085, .093); scaled SRMR = .078. Mean- and variance-adjusted chi-square test results: scaled $\chi^2 = 1388.11$, df = 76, $p < .001$.

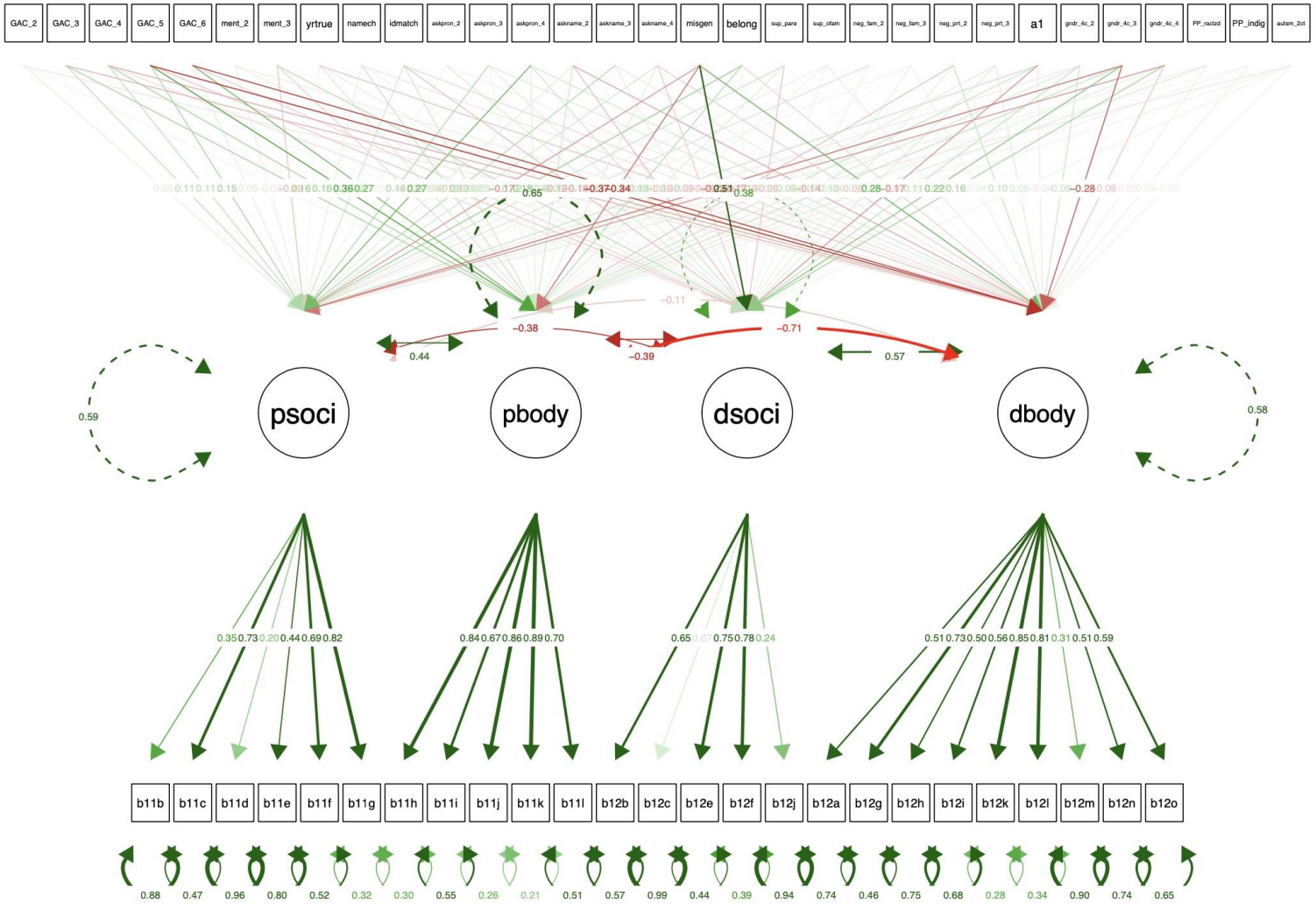
Appendix E. Two-factor confirmatory factor analysis of TYC-GDS, assigned male at birth (AMAB) version (N=753)

Item	Standardized Factor Loading		Unstandardized Factor Loading (SE)	
Gender Distress – Social	**Factor 1**	**Factor 2**	**Factor 1**	**Factor 2**
(b12b) I avoid social situations or activities because I can't express myself in my gender	.59		.82 (.05)***	
(b12c) I feel hurt if someone calls me the wrong gender (using the wrong pronouns / name / language)	.35		.37 (.05)***	
(b12e) I feel that society doesn't accept or embrace me in my gender	.60		.76 (.05)***	
(b12f) I worry that people will always treat me as the wrong gender	.79		1.08 (.05)***	
(b12j) When people treat me like the wrong gender or expect me to behave like a *boy/man* I feel hurt	.48		.44 (.05)***	
Gender Distress – Body				
(b12a) I wish I had been born in a different body		.48		.51 (.05)***
(b12g) I dislike seeing my naked body		.68		.93 (.05)***
(b12h) I feel like I can't trust what my body might do as I get older		.52		.63 (.05)***
(b12i) I dislike my voice because I feel that it doesn't match my gender		.57		.70 (.05)***
(b12k) I feel unhappy because I have a *masculine* body		.81		1.03 (.05)***

(b12l) I worry that I might always have a *masculine* body	.79	1.10 (.04)***
(b12m) I dislike peeing *standing up*	.48	.79 (.06)***
(b12n) I dislike having *penis or erections* because it makes me feel like I'm not my true gender	.59	.97 (.05)***
(b12o) I dislike having *facial hair* because it makes me feel like I'm not my true gender	.52	.71 (.06)***

Note. Text in italics is different between the AMAB and AFAB GDS versions. Model fit was based on data from the AMAB respondents. Diagonally weighted least squares (DWLS) estimator with robust standard errors was applied. All factor loadings were statistically significant (*** $p < .001$). Robust CFI = .923; robust TLI = .908; robust RMSEA = .095 (90% CI: .089, .010); scaled SRMR = .087. Mean- and variance-adjusted chi-square test results: scaled $\chi^2 = 856.52$, df = 76, $p < .001$.

Appendix F. Structural equation model (SEM) path diagram with standardized parameter estimates



Green: positive value. Red: negative value. Straight single-headed arrow: standardized path coefficient or factor loading. Solid double-headed arrow between two factors: factor correlation. Dashed curved double-headed arrow: factor variance. Solid double-headed curved arrow in the bottom: residual. See Table 2 for variable descriptions and Table 11 for path coefficient results.

Appendix G. Measurement invariance tests across gender/sex: two-factor confirmatory factory analysis (CFA) for TYC-GPS and TYC-GDS

CFA	TLI_R	CFI_R	ΔCFI_R	$RMSEA_R$ (90% CI)	$\Delta RMSEA_R$	$SRMR_S$	$\Delta SRMR_S$	χ_U^2 (df)	$\Delta\chi_U^2$ (Δdf)	Decision
GPS										
Sex Assigned at Birth: AFAB (n=1530) vs AMAB (n=754)										
Configural	.959	.968		.078 (.074, .082)		.062		637.06 **** (86)		Accept
Metric	.961	.966	-.002	.076 (.071, .081)	-.002	.064	.002	679.79 **** (95)	20.95* (9)	Accept
Scalar	.963	.965	-.001	.074 (.069, .079)	-.002	.066	.002	709.46 **** (104)	50.95 **** (9)	Accept
Gender/Sex: TM (n=591) vs TW (n=566) vs NB-AFAB (n=934) vs NB-AMAB (n=192)										
Configural	.968	.975		.074 (.070, .078)		.063		608.97 **** (172)		Accept
Metric	.966	.970	-.005	.074 (.068, .079)	0	.069	.006	735.82 **** (199)	59.67 *** (27)	Accept
Scalar	.954	.953	-.017	.084 (.079, .089)	.01	.080	.011	1056.59 **** (226)	463.07 **** (27)	Reject

Binary vs Nonbinary: TM or TW (n=1157) vs NB-AFAB or NB-AMAB (n=1126)										
Configural	.962	.970		.073 (.068, .077)		.061		552.22 (86)		Accept
Metric	.965	.970	0	.070 (.065, .075)	-.003	.062	.001	582.21 (95)	15.31 (9)	Accept
Scalar	.952	.955	-.015	.081 (.076, .086)	.011	.073	.011	840.93 (104)	300.86 **** (9)	Reject
GDS										
Sex Assigned at Birth: AFAB (n=1533) vs AMAB (n=753)										
Configural	.909	.924		.091 (.087, .094)		.081		1501.91 **** (152)		Reject
Metric	.899	.909	-.015	.096 (.092, .100)	.005	.087	.006	1814.55 **** (164)	110.25 **** (12)	Reject
Scalar	.880	.884	-.015	.104 (.101, .108)	.008	.096	.009	2307.43 **** (176)	650.11 **** (12)	Reject
Gender/Sex: TM (n=586) vs TW (n=564) vs NB-AFAB (n=942) vs NB-AMAB (n=193)										

Configural	.964	.970		.066 (.063, .070)		.062		906.94 **** (304)		Accept
Metric	.910	.916	-.054	.096 (.091, .100)	.030	.089	.027	2018.28 **** (340)	370.71 **** (36)	Reject
Scalar	.843	.837	-.079	.125 (.121, .129)	.029	.119	.030	3615.40 **** (376)	2152.80 **** (36)	Reject
Binary vs Nonbinary: TM or TW (n=1150) vs NB-AFAB or NB-AMAB (n=1135)										
Configural	.955	.963		.064 (.061, .067)		.058		785.21 **** (152)		Accept
Metric	.923	.931	-.032	.084 (.080, .088)	.020	.079	.021	1421.84 **** (164)	230.40 **** (12)	Reject
Scalar	.874	.878	-.053	.108 (.104, .111)	.024	.101	.022	2445.61 **** (176)	1317.3 **** (12)	Reject

Note. TLI_R: robust Tucker-Lewis index. CFI_R: robust comparative fit index. $RMSEA_R$: robust root mean square error of approximation. $SRMR_S$: scaled standardized root mean-square residual. χ_U^2: unscaled chi-squared. $\Delta\chi_U^2$: unscaled chi-squared for nested model comparison test. Criteria: Configural invariance: SRMR ≤ .09 and at least one of the following: TLI ≥ .95, CFI ≥ .95, or RMSEA ≤ .06. Metric invariance: ≤ .01 decrease in CFA, ≤ .015 increase in RMSEA, and ≤ .030 increase in SRMR; optional: non-significant $\Delta\chi_U^2$. Scalar invariance: ≤ .01 decrease in CFA and ≤ .015 increase in SRMR; optional: non-significant $\Delta\chi_U^2$.
*p < .05. **p < .01. ***p < .001. ****p < .0001.

Appendix H. Measurement invariance tests across gender/sex: the measurement model (TYC-GPS and TYC-GDS) of structural equation modelling (SEM)

SEM	TLI_R	CFI_R	ΔCFI_R	$RMSEA_R$ (90% CI)	$\Delta RMSEA_R$	$SRMR_S$	$\Delta SRMR_S$	χ_U^2 (df)	$\Delta\chi_U^2$ (Δdf)	Decision
GPS and GDS										
Gender/Sex: (TM vs TW vs NB-AFAB vs NB-AMAB)										
Configural	.939	.946		.074 (.072, .076)		.075		3867.96 **** (1076)		Reject
Metric	.910	.914	-.032	.090 (.087, .093)	.016	.092	.017	6027.10 **** (1139)	465.58 **** (63)	Reject
Scalar	.886	.886	-.028	.101 (.099, .104)	.011	.104	.012	7816.06 **** (1202)	2311.12 **** (63)	Reject
Sex Assigned at Birth: (AFAB vs AMAB)										
Configural	.905	.915		.094 (.092, .097)		.089		5700.30 **** (538)		Reject
Metric	.895	.902	-.013	.099 (.096, .101)	.005	.095	.006	6518.24 **** (559)	190.35 **** (21)	Reject
Scalar	.890	.893	-.009	.101 (.098, .103)	.002	.098	.003	7046.56 **** (580)	735.93 **** (21)	Reject

Binary/Nonbinary (TM or TW vs NB-AFAB or NB-AMAB)										
Configural	.939	.945		.073 (.071, .075)		.072		3506.62 **** (538)		Reject
Metric	.925	.931	-.014	.081 (.078, .083)	.008	.081	.009	4460.84 **** (559)	227.02 **** (21)	Reject
Scalar	.908	.911	-.020	.089 (.087, .092)	.008	.090	.009	5610.32 **** (580)	1284.92 **** (21)	Reject

Note. TLI_R: robust Tucker-Lewis index. CFI_R: robust comparative fit index. $RMSEA_R$: robust root mean square error of approximation. $SRMR_S$: scaled standardized root mean-square residual. χ_U^2: unscaled chi-squared. $\Delta\chi_U^2$: unscaled chi-squared for nested model comparison test. Criteria: Configural invariance: SRMR ≤ .09 and at least one of the following: TLI ≥ .95, CFI ≥ .95, or RMSEA ≤ .06. Metric invariance: ≤ .01 decrease in CFA, ≤ .015 increase in RMSEA, and ≤ .030 increase in SRMR; optional: non-significant $\Delta\chi_U^2$. Scalar invariance: ≤ .01 decrease in CFA and ≤ .015 increase in SRMR; optional: non-significant $\Delta\chi_U^2$.
*p < .05. **p < .01. ***p < .001. ****p < .0001.

Appendix I. Letter of ethics re-approval for the Trans PULSE Canada project

Western Research

Date: 19 June 2024

To: Greta Bauer

Project ID: 113787

Study Title: Trans PULSE Canada: A National Study of Transgender Health

Application Type: Continuing Ethics Review (CER) Form

Review Type: Delegated

Date Approval Issued: 19/Jun/2024 16:58

REB Approval Expiry Date: 11/Jul/2025

Dear Greta Bauer,

The Western University Non-Medical Research Ethics Board has reviewed this application. This study, including all currently approved documents, has been re-approved until the expiry date noted above.

REB members involved in the research project do not participate in the review, discussion or decision.

The Western University NMREB operates in compliance with the Tri-Council Policy Statement Ethical Conduct for Research Involving Humans (TCPS2), the Ontario Personal Health Information Protection Act (PHIPA, 2004), and the applicable laws and regulations of Ontario. Members of the NMREB who are named as Investigators in research studies do not participate in discussions related to, nor vote on such studies when they are presented to the REB. The NMREB is registered with the U.S. Department of Health & Human Services under the IRB registration number IRB 00000941.

Please do not hesitate to contact us if you have any questions.

Electronically signed by:

Erika Basile, Director, Research Ethics and Compliance on behalf of Dr. Isha DeCoito, NMREB Chair 19/Jun/2024 16:58

Reason: I am approving this document

Note: This correspondence includes an electronic signature (validation and approval via an online system that is compliant with all regulations).

Curriculum Vitae

Name	Luxi (Lux) Li
Post-Secondary Education	University of Alberta Edmonton, Alberta, Canada 2006 – 2008 McMaster University Hamilton, Ontario, Canada 2008 – 2010 Honours BSc McMaster University Hamilton, Ontario, Canada 2011 – 2017 PhD Western University London, Ontario, Canada 2021 – 2024 MSc
Related Graduate Honours and Awards	Dr. Carol Buck Graduate Scholarship in Epidemiology and Biostatistics, 2022 Canadian Institutes of Health Research (CIHR) Canada Graduate Scholarship – Masters (CGS-M), 2022 Ontario Graduate Scholarship – Masters (OGS-M), 2022 (declined) Western University Western Research Forum Best Oral Presentation Award, 2022 Western University Schulich School of Medicine & Dentistry Graduate Scholarship, 2021 – 2023
Related Work Experience	External Advisory Committee Member Native Women's Association of Canada 2023 – 2024 Research Assistant, Member of Steering Committee and Data Stewardship Committee Trans PULSE Canada

2021 – 2024

Related Publications

Adams, N., Jacobsen, K., **Li, L**., Francino, M., Rutherford, L., Tei, C., Scheim, A., & Bauer, G. (2024). Health and health care access of autistic transgender and non-binary people in Canada: A cross-sectional study. *Autism in Adulthood*. DOI: 10.1089/aut.2023.0024

Li, L., Valorozo-Jones, C., Tran, G., Scheim, A., & Bauer, G. for the Trans PULSE Canada Team. (2023). Housing barriers among trans and non-binary adults in Canada – A report prepared by Trans PULSE Canada for the Office of the Federal Housing Advocate at the Canadian Human Rights Commission. https://transpulsecanada.ca/results/responsive-report-housing-barriers-among-trans-and-non-binary-adults-in-canada/