More than just hormones

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A Psychological Approach of Sexuality in Transgender Individuals

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A Psychological Approach of Sexuality in Transgender Individuals

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Chapter 1

Introduction

This dissertation is written by a woman. For those who know me, this self-disclosure is very unlikely to come as a shock, as my mannerisms, body shape, and clothes had already lead them to deduce that I am, indeed, a woman. Those who do not know me probably associated the first name printed on the cover of this booklet with 'woman', and it is likely that this comes with a whole range of consequential associations. Perhaps these readers assume that the author of this thesis has long hair and is wearing make-up. Some of them might even have made assumptions regarding the quality of this dissertation, and my abilities to approach complex and sensitive topics from a rational point of view. Most of them have probably made assumptions about my physiology – that I have a uterus, for instance, and wide hips.

Making such assumptions is human, and mostly automatic. But what is 'a woman', exactly? The answer to this question depends on whom you ask. A biology teacher might tell you that it is 'a person with two X-chromosomes'. A child who has just had their first sex education class might blush and chuckle that it is 'someone with a vagina'. A social scholar could tell you it is 'merely a social construction', and is likely to follow this up with that infamous quote by Simone de Beauvoir: "*One is not born, but rather becomes, a woman*" (De Beauvoir, 1949).

We all think we know what we mean when we say "woman" or "man", and we like to think we agree on these words' meanings, but often such terms are not clearly demarked and defined. Therefore, I would like to start this introduction by indicating how I will define and use certain terms throughout this dissertation. The term **sex assigned at birth** refers to a categorical distinction of people, based on some anatomical characteristics observed at (or even before) birth. I assume three categories: female, male, and intersex, with the latter referring to people whose anatomical characteristics cannot straightforwardly be placed into the male-female binary. The term **gender identity** refers to a person's internal, subjective sense of belonging to a certain gender. The categories I will most commonly mention in this dissertation are woman, man, and non-binary, but there is a plethora of other gender identities, such as genderqueer, agender, and gender fluid. The term **gender expression** refers to how a person presents themselves towards other people. One can for instance wear clothes typically associated with a certain gender, or adopt mannerisms that we typically tend to classify as 'masculine' or 'feminine'. Finally, the term **sexual orientation** refers to which gender(s) a person feels attracted to. Sexual orientation labels most widely known include heterosexual, homosexual, lesbian, and bisexual, but as with gender identity, there is a wide variety of self-identifications, such as demi-sexual, asexual, or pansexual.

As indicated in the first paragraph, we tend to assume that when we know how someone identifies on one of the above defined aspects, we can also know something about the other aspects. For instance, the disclosure of my gender identity, 'woman',

leads people to assume this is linked to a certain sex assigned at birth (female, together with the physiology typically associated herewith), gender expression (make-up, long hair), and perhaps even sexual orientation (one might assume I am attracted to men). However, in order to understand this thesis, it is crucial to understand that sex assigned at birth, gender identity, gender expression, and sexual orientation are not necessarily linked to each other the way we have culturally been raised to think they are. For instance, it is indeed the case for a majority of people that their sex assigned at birth is congruent with their gender identity (male + man, or female + woman); we call these people **cisgender**. However, this thesis focuses on **transgender** people, who experience an incongruence between their sex assigned at birth and their gender identity.

1. Transgender identities

'Transgender' is considered an umbrella term, referring not only to transgender men (people who identify as a man and have a female sex assigned at birth) and transgender women (people who identify as a woman and have a male sex assigned at birth), but also non-binary, genderqueer, and other identities (Richards et al., 2016). While the phenomenon of gender identities incongruent with one's sex assigned at birth has been present for hundreds of years and over various cultures (Janssen, 2020; Lang, 2016; Sheppard & Mayo Jr., 2013), its conceptualization has shifted throughout history and the term 'transgender' has only been used since several decennia (Janssen, 2020). In Western-European and North-American cultures, transgender identities have historically been framed mostly from a medical and psychiatric perspective (Kronk & Dexheimer, 2021). While healthcare services directed to transgender people were already pioneered by Magnus Hirschfeld in the early 20th century (Hirschfeld, 1910), the American Psychiatric Association (APA) did not acknowledge a diagnosis related to transgender identities until 1980. In the third edition of the Diagnostic and Statistical Manual of Mental Disorders (known as 'the DSM' and considered a standard handbook for psychiatrists) (APA, 1980), the APA included the diagnoses *Transsexualism* for adults and *Gender Identity Disorder* for children and adolescents. In 1994, the term 'transsexualism' was replaced, and the adult diagnosis too was labelled *Gender Identity Disorder* (APA, 1994). It was not until the publication of the fifth edition of the DSM (APA, 2013) that the APA omitted sub classifications based on sexual orientation, and opted for a diagnosis considered less stigmatizing and pathologizing, *Gender Dysphoria*. In order to receive this diagnosis, people should experience feelings such as 'a strong desire to be of a gender other than one's assigned gender', 'a strong desire to be treated as a gender other than one's assigned gender', or 'a strong conviction that one has the typical reactions and feelings of a gender other than one's assigned gender', and this for at least six months, and with clinically significant distress and impairment (APA, 2013). The prevalence rate of transgender identities has often been estimated using figures on how many individuals access gender affirming medical treatment (GAMT; see below)

(Kuyper & Wijsen, 2014), but this likely results in underestimates, as not every transgender individual experiences gender dysphoria and/or accesses GAMT (Fiani & Han, 2018; Nikkelen & Kreukels, 2018). For instance, Kuyper and Wijsen (2014) found that 5.7% of individuals with a male sex assigned at birth and 4.0% of individuals with a female sex assigned at birth experience an ambivalent or incongruent gender identity, which is a much higher estimate than typically reported based on clinical data, such as the 0.00007% and 0.00003% reported by De Cuypere et al. (2007). Such reports are not necessarily about the prevalence of transgender identities, but rather reflect how many people happen to be diagnosed with gender dysphoria and access GAMT at a given clinic at a given time.

2. Gender dysphoria and gender affirming medical treatment

Several of the DSM criteria explicitly refer to the desire to change one's body, for instance presenting 'a strong desire for the sexual characteristics of a gender other than one's assigned gender' or 'a strong desire to be rid of one's sexual characteristics due to incongruence with one's experienced or expressed gender' (APA, 2013). Indeed, the distress caused by the incongruence between one's gender identity and physical characteristics associated with one's sex assigned at birth is a theme central to many transgender experiences (Cooper et al., 2020). This distress is best understood by listening to transgender individuals' own description of it. For instance, in a qualitative study by Pulice-Farrow et al. (2020a), a transgender woman described her feeling of disconnectedness with her body as follows:

"*Best metaphor I have to describe this is it's like looking at one of those ugly bone breaks that leaves a limb at an unnatural angle. There's a sense of visceral wrongness that can't be deconstructed.*" (Pulice-Farrow et al., 2020a)

In several individuals, this distress leads to physical symptoms such as sore stomachs or the skin hurting (Pulice-Farrow et al., 2020a). As a transgender man in their sample describes:

"*Often I get sensory issues surrounding body parts (e.g., hyperfixate on the feeling of having breasts, not necessarily the gendered connotation, and end up having trouble breathing/focusing/etc.).*" (Pulice-Farrow et al., 2020a).

Perhaps not surprisingly, this distress is mostly associated with body parts or characteristics that are typically considered 'gendered', such as breasts, voice, and genitals (Pulice-Farrow et al., 2020a; Huisman et al., 2022). In order to alleviate the distress caused by the incongruence between gender and sex assigned at birth, some transgender individuals might choose to access GAMT (World Professional Association for Transgender Health, 2022). GAMT can include steps such as gender affirming

hormone treatment (GAHT) and gender affirming surgery (GAS) and is typically provided by multi-disciplinary teams including endocrinologists, surgeons, psychologists, sexologists, speech therapists, and social workers. Traditionally, the aim of GAMT is to bring a person's body 'in line' with what is culturally considered typical for their gender identity. For instance, transgender men often receive testosterone as GAHT, which results in an increase in muscle mass, breast atrophy, facial hair growth, and lowering of the voice – features typically associated with masculine bodies. Transgender women, then, will often receive testosterone blocking medication supplemented by estrogens, which results in an increase in body fat, increase in breast tissue, and decrease in testicular size (T'Sjoen et al., 2019). Note that, while GAHT affects the voice of transgender men who take testosterone, it has no effect in the case of transgender women who take androgen blockers and estrogens, which is why this group will often opt for speech therapy to acquire a more feminine voice and speech pattern (Leyns et al., 2021). Next to GAHT, GAS is considered a central part of transgender health care, and includes genital surgery (e.g., vaginoplasty for transgender women, and phalloplasty for transgender men) and surgery related to secondary sex characteristics (e.g., breast augmentation for transgender women, and mastectomy for transgender men) (World Professional Association for Transgender Health, 2012). It is important to know that many of these procedures are likely to impact fertility (and sometimes definitely and irreversibly do so; for instance, in the case of hysterectomy) (De Roo et al., 2015). This means that transgender individuals who are considering or starting GAMT, regardless of their age, have to consider and decide on their reproductive wishes, and this during a period in their live that is likely already turbulent enough. It is therefore essential that health care practitioners providing GAMT take time to counsel their patients regarding the effects of GAMT on fertility, and a person's option to preserve this if they wish so (De Roo et al., 2015).

As indicated, these GAHT and GAS procedures typically aim to help a person 'fit' their body to what is typically considered masculine or feminine, which is not necessarily most desirable on the individual level, for instance in the case of non-binary identifying individuals (Huisman et al., 2022). Therefore, recently transgender health care and GAMT have started to become more and more individualized, allowing transgender or gender non-conforming individuals to personalize their treatment, regardless of societal expectations surrounding gender (World Professional Association for Transgender Health, 2022). For instance, a non-binary individual with a female sex assigned at birth might opt for mastectomy, without taking testosterone or desiring genital surgery. Similarly, a genderqueer person with a male sex assigned at birth might desire testosterone-suppressing medication, without experiencing a need for any surgical interventions. Unfortunately, almost all cultures around the world still have a long way to go regarding their acceptance of non-binary identities (Eyssel et al., 2017), which makes

this individualized GAMT path for transgender individuals more of an ideal than a reality on the global level.

As mentioned above, the strong relation between gender dysphoria and medical treatment has led to a mostly medical and even pathological focus on transgender identities (Kronk & Dexheimer, 2021). Given the inclusion of *Gender Dysphoria* in the DSM (APA, 2013) and societal discourses, transgender identities are sometimes considered a mental illness (Castro-Peraza et al., 2019). Furthermore, GAMT is provided in a clinical context, which has clear benefits for transgender individuals as they can access high-quality and tailored health care, which can sometimes even be reimbursed by health insurances. While many transgender individuals choose for GAMT, and its beneficial effects on well-being have been demonstrated on many aspects regarding physical and mental well-being (Dhejne et al., 2016; Murad et al., 2010; T'Sjoen et al., 2019), there is a thin line between medically treating transgender individuals and pathologizing their identities. Such pathologization is not trivial, as it impacts human rights on the economic, social, and cultural level (Castro-Peraza et al., 2019). Furthermore, scholars have argued that this medicalization might not necessarily be harmful for gender-conforming transgender individuals, but that non-normative individuals (e.g., genderqueer or non-binary people) might be denied medical services (Vipond, 2015). This way, dominant medical narratives might legitimize transgender identities for those who conform to cultural norms around gender, but simultaneously delegitimize gender variance and non-conformity (Vipond, 2015). Therefore, throughout this thesis, I conceptualize 'transgender' as a self-identification. A person is transgender when they themselves say they are, and they are not when they say they are not; regardless of diagnosis or transition status.

3. Transgender well-being and stigma

The studies further reported in this dissertation (Chapters 2 to 7) have been performed in the Netherlands, and – while scientists are becoming increasingly aware of a need for cultural sensitivity – most of the recommendations by organizations such as the World Professional Association of Transgender Health are still very North American and Western European centered. I often notice that (cisgender) people living in these cultures, and especially the socio-economic advantaged layers of it, are relatively optimistic regarding society's acceptance of transgender and genderqueer identities – "We have come a long way", haven't we? Unfortunately, the scientific literature regarding stigma surrounding transgender identities indicates that this phenomenon is still discouragingly prevalent across countries and cultures. Such stigma are enacted in various ways and on different levels (White Hughto et al., 2015). For instance, transgender individuals experience barriers to health care, such as discrimination or a lack of accessible providers with sufficient knowledge about transgender health care (Safer et al., 2016). Additionally,

compared to cisgender people, transgender people experience much higher rates of physical violence, verbal harassment, and sexual violence (Bockting et al., 2013; Stotzer, 2009; Wirtz et al., 2020). Another important way in which culture negatively affects transgender well-being, is via language. For instance, people using the wrong pronouns and/or misgendering transgender individuals cause the latter distress – an experience that is especially common for non-binary individuals (Eyssel et al., 2017; Guss et al., 2017). Such experiences obviously affect the individual: enacted stigma are associated with greater depression, anxiety, somatization, and general psychological distress in transgender people (Bockting et al., 2013), and structural and interpersonal stigma can pervade into the individual level as internalized transphobia (White Hughto et al., 2015).

Given this hostile social climate, it is not surprising that most studies assessing mental well-being in transgender individuals show alarming figures regarding poor mental health (Dhejne et al., 2016) and suicidal ideation (Clements-Nolle et al., 2006). These findings are quite consistent across cultures (e.g., Zhu et al., 2019, reporting on Chinese culture; Stanton et al., 2015, reporting on the United States; Pitts et al., 2009, reporting on Australia and New Zealand; Nematollahi et al., 2022; reporting on Iran) and age groups (e.g., Warren et al., 2016, reporting on adults; Allen et al., 2019, reporting on adolescents; Aparicio-Garcia et al., 2018, reporting on young people). Furthermore, when individuals are not only part of a gender minority but also another minority (e.g., people of color or with a disability), their mental health is likely to be affected even more negatively (Farvid et al., 2021). While these alarming figures on mental health in the transgender population have often been linked to gender dysphoria, several studies indicate that social and cultural factors play a more important role than psychological factors such as gender incongruence (Arvind et al., 2022), indicating that we still have a long way to go to challenge cisnormative societal discourses if we want to improve well-being for transgender people.

While issues such as stigma against transgender individuals, gender dysphoria, and the detrimental consequences of these two variables on mental health have been extensively described, much less is known about sexual well-being in this group. However, sexuality is a central aspect of being human, and closely related to general well-being. The World Association for Sexual Health declares that everyone is entitled to enjoy sexual rights, regardless of gender identity or expression (World Association for Sexual Health, 2014). Several of the factors that can play a central role in transgender experiences (such as gender dysphoria, hormone treatment, genital surgery, and gender affirmation) are linked to sexuality in complex ways (Holmberg et al., 2019), making it crucial to also monitor sexuality and sexual well-being in transgender individuals. Sexual health and well-being are considered fundamental rights for everyone (World Association for Sexual Health, 2014), so researchers studying sexuality should adhere to an inclusive approach and not only focus on sexuality in cisgender individuals. Therefore, the central

focus of this dissertation will be sexuality and sexual well-being in transgender individuals, in order to complement the current literature on general well-being in this population.

4. Sexual well-being in transgender individuals

When studying sexuality in transgender individuals, researchers should adhere to a biopsychosocial framework (Holmberg et al., 2019). The biopsychosocial model advocates a holistic approach in which biological, psychological, and social factors and their interactions are studied, instead of merely focusing on one single variable (Althof et al., 2005; Rosen & Barsky, 2006). Biological factors include variables such as neuroendocrine function, genetics and medication; psychological factors include variables such as subjective sexual experiences, performance anxiety, self-image, depression; and social factors include variables such as the quality of past and present relationships as well as life stressors, cultural norms and expectations. Below, I will shortly summarize the extant literature on biological, psychological, and social factors involved in sexual well-being in transgender individuals, as well as discuss methodological trends in this research field.

4.1 Biological factors implied in transgender sexuality: a preventive and functional focus

When reviewing the literature on biological factors related to sexuality in transgender individuals, one can discern several trends. Especially in the literature stemming from the United States, there is a strong focus on sexually transmitted diseases (STDs). For instance, a relatively large proportion of the literature is dedicated to STDs and Human Immunodeficiency Virus (HIV), reporting alarming findings about increased prevalence rates in transgender compared to cisgender individuals (e.g., Baral et al., 2013; Becasen et al., 2019; Pitasi et al., 2019). Next to this preventive focus on STDs, many studies have addressed sexual dysfunctions and problems in transgender individuals, especially in the context of GAMT. These studies indicate that transgender individuals encounter more struggles than cisgender individuals (e.g., Kerckhof et al., 2019). While those sexual dysfunctions are common among various groups in terms of GAMT profile (Kerckhof et al., 2019; Weyers et al., 2009), several studies have shown a positive effect of GAHT and GAS on sexual functioning. For instance, transgender men experience a positive effect of GAHT and GAS on several sexual function parameters (Constantino et al., 2013; Wierckx et al., 2011), while Zavlin et al. (2018) reported that transgender women show a high satisfaction with sexual outcomes after vaginoplasty.

By definition, sexual dysfunctions have a negative impact on a person's well-being, and it has been shown that STDs such as HIV can have a great negative impact on a person's quality of life (Aranda-Naranjo, 2004). Therefore, studies investigating sexual

dysfunctions and STDs in transgender individuals are of great value, and make important conclusions. However, sexual health should be defined broader than as the mere absence of disease or dysfunctions (World Health Organization, 2006), and investigating transgender sexuality from a medical perspective only has its limitations, in the sense that it does not do justice to the complexity of transgender experiences in this aspect of life (Holmberg et al., 2019). Therefore, it is crucial to complement the insights from biology-oriented studies with results from studies focusing on psychological and social variables.

4.2 Psychological factors implied in transgender sexuality: a negative picture of sexual events and experiences

Many studies on sexual events and subjective sexual experiences in transgender individuals report these experiences to be rather negative. Fernández-Rouco et al. (2017) found that about one in four transgender people reported having experienced sexual violence at some point, mostly in childhood. Similarly, a recent study indicated that about one in three transgender individuals have experienced sexual abuse (Gil-Llario et al., 2021), and that these rates were higher in transgender women compared to transgender men. Participants in this study also reported avoiding sexual behavior, such as not masturbating, not allowing a partner to touch their genitals, or avoiding intercourse. Whether or not transgender individuals involve their genitals can furthermore be related to the sexual orientation of their partner. Cerwenka et al. (2014) found that so-called 'complementary' relationships (in which the partner is attracted to the transgender person's gender identity and not their sex assigned at birth) are associated with more avoidance of sexual experiences, and more negative sexual experiences in both transgender men and women. When a transgender person experiences an incongruence between their genitals and their gender identity, they might nevertheless still be likely to involve their genitals in sexual activities in case these genitals are typically associated with the gender their partner is attracted to.

With regard to sexual satisfaction, it has been shown that sexual dissatisfaction is more common in transgender individuals than sexual satisfaction (Lindroth et al., 2017). This study approached sexual satisfaction quantitatively, making it difficult to know what 'sexual satisfaction' exactly/actually means for transgender individuals. There have been some qualitative studies trying to capture how transgender individuals define sexual (dis)satisfaction, revealing that descriptions of sexual dissatisfaction include difficulties with orgasm, a desire for different body parts, and gender dysphoria (Lindley et al., 2020), while sexual satisfaction is described as being related to gender affirmation and bodily comfort (Lindley et al., 2021).

Several studies have investigated how sexual experiences are influenced by GAMT. Similarly to sexual functioning, subjective sexual wellbeing seems to be

positively affected by GAMT. Ristori et al. (2020) showed that before GAHT, transgender men and women show sexual distress related to body uneasiness and dissatisfaction toward gender-related body parts or shapes. After two years of GAHT, sexual distress significantly decreased in both groups. Such a direct relationship between GAMT and sexual distress was not found in a cross-sectional study (Staples et al., 2020), although there was an indirect effect in the sense that a longer time since transition began was associated with higher body satisfaction, which then was associated with lower sexual distress. The relevance of body satisfaction in the context of sexual wellbeing is further supported by findings of Nikkelen & Kreukels (2018), who found that body satisfaction is positively associated with sexual feelings such as sexual agency, sexual pleasure, and sexual esteem. Additionally, they investigated how GAMT desire influences sexual feelings, and found that having an unfulfilled compared to a fulfilled treatment desire is related to lower sexual esteem in transgender men and women, and to lower sexual agency and pleasure in transgender women only. Interestingly, the study included a sample of transgender individuals without desire for gender affirming treatment, and found that they sometimes reported even more negative sexual feelings than those with an unfulfilled treatment desire.

It is encouraging that more and more studies are complementing the medical perspective on sexual well-being in transgender individuals with findings regarding psychological outcome variables. Nevertheless, the current findings are still limited, and sexual well-being is often still defined relatively narrowly (e.g., as 'sexual satisfaction' only). Furthermore, studies have mostly included binary identifying individuals only, excluding transgender individuals with non-binary or other identities. Additionally, and related to the dominance of a functional/medical approach, many studies investigate the effect of GAHT or GAS on psychological factors related to sexuality. However, not every transgender individual wants such treatment, and it has been suggested that the experience of treatment desire (instead of treatment *an sich*) plays a crucial role in understanding sexual well-being in transgender individuals (Nikkelen & Kreukels, 2018).

4.3 Social factors implied in transgender sexuality: not always smooth sailing

There have been no studies so far investigating how prevalent romantic relationships are in transgender people, although this variable is sometimes reported among other results. For instance, Gil-Llario et al. (2021) reported that 35.4% of the transgender women and 62.2% of the transgender men were in a stable relationship. Cerwenka et al. (2014) found that, before GAMT, transgender women were less likely to be in a relationship than transgender men (37% versus 53%). After 12 months of GAHT, Defreyne et al. (2021) showed that the percentage of transgender women reporting being in a relationship increased from 35% to 59%, and the percentage of transgender men reporting being in a relationship from 47% to 56%. These findings suggest that a (medical) transition can

make it easier for transgender individuals to find a partner or to be open to a relationship. On the other hand, it is also likely that a transition can pose challenges to the relationship. This was illustrated by St. Amand et al. (2013), who found that 49 % of the participants with a relationship prior to transitioning reported no longer being with the same partner after treatment. Of those whose relationship had ended after transition, more than half reported that the transition was the reason the relationship did not continue.

The majority of studies on relationships in transgender people describe the challenges they regularly face. In a study, most (cisgender) individuals indicated that they would prefer not to date transgender individuals, especially transgender women (Blair et al., 2019). This seems to be even more difficult for transgender women of color, who describe challenges such as feeling dehumanized and objectified in their dating life (Gamarel et al., 2022). When transgender individuals do find a partner, difficulties sometimes continue in the romantic relationship, for instance by the partner minimizing the transgender person's identity or making binary gender assumptions (Pulice-Farrow et al., 2017, 2020b), or by the transgender individual struggling with heteronormative societal discourses (Iantaffi & Bockting, 2011). On top of these micro-aggressions, various studies have indicated that transgender individuals experience a dramatically higher prevalence of intimate partner violence victimization compared to cisgender individuals, regardless of their sex assigned at birth (Peitzmeier et al., 2020).

4.4 Research methods in studies assessing sexual well-being in transgender individuals

Current research findings are mostly reported on a descriptive level, offering little insight into mechanisms underlying sexuality in transgender individuals, and mostly reporting on cross-sectional studies using a questionnaire, often in the setting of GAMT clinics (e.g., Wierckx et al., 2011). For instance, it seems fairly established that transgender individuals differ in terms of sexual well-being compared to cisgender individuals, but *why* is this the case? While this question is inherently interesting for those who seek to understand human sexuality in general, it also has its obvious implications for clinical practice. Unfortunately, the now so often applied cross-sectional questionnaire designs offer little opportunity for investigating underlying mechanisms and factors explaining sexuality. Such designs have limitations in terms of memory bias, their inability to unravel intertemporal relations, and (in case the questionnaire is completed in a clinical setting) poor ecological validity (Bolger et al., 2013; Laurenceau & Bolger, 2005). Such shortcomings can be overcome by applying so called diary study methods, such as the design applied by Dewitte et al. (2015) to study sexuality in cisgender individuals. Such studies, in which participants complete identical questionnaires repeatedly over a longer period of time in their 'natural' setting, allow researchers to not only investigate between-subject but also within-subject effects. In other words, they can investigate how certain

variables on day one are related to other variables on day two. Another way of complementing the findings of cross-sectional questionnaire studies, is by using experimental studies. In such studies, participants are not merely responding to questions, but are put under standardized conditions in which they are instructed to complete a certain task. How they then perform on this task possibly grants researchers insight into the mechanisms influencing certain behaviors. To achieve this, one can for instance combine psychological measures with neurobiological methods to investigate whether and how differences in brain dynamics are related to differences in behavior. But before investigating sexuality in transgender individuals using neuroscientific methods, maybe we should ask ourselves: is this really such a good idea?

5. The neuroscience of transgender identities

It certainly seems to be that more and more researchers are thinking so, given the steady rise in number of neuroscientific studies with transgender participants over the last twenty years. Many of these studies center around a hypothesis related to the neural correlates of transgender identities first phrased by Bao & Swaab (2011). They propose a theory which states that a transgender identity originates prenatally. This is based upon the premise that a fetus' body differentiates sexually into a male or female body early on in pregnancy, while the fetus' brain does something similar later on in pregnancy. It is suggested that if the body and brain differentiate into opposing directions, for instance because of a drastic change in hormone levels in the uterus, the child will later identify with a gender incongruent with its genital anatomy (Bao & Swaab, 2011). Simply speaking: a child is born with a female brain and a male body, or vice versa. Various studies have investigated whether indeed, transgender women show female brain characteristics while transgender men show male brain characteristics, but results so far have been inconclusive and even contradictory (Smith et al., 2015). For instance, Rametti et al. (2011) reported that the brains of transgender men are more like those of cisgender men than those of cisgender women in terms of structural connectivity, and Zubiaurre-Elorza et al. (2013) reported a similar story in terms of cortical thickness. However, Savic & Arver's (2011) study on brain structural volume did not support these findings, and neither did the study by Luders et al. (2009), analyzing grey matter volumes in transgender women.

These inconsistencies with regards to the conclusions about Bao & Swaab's (2011) theory have lead neuroscientists to explore other possible neural underpinnings of transgender identities. A more recent framework gaining momentum and showing promise in terms of preliminary data (Savic & Arver, 2011) does not frame transgender identities as originating from a sex dimorphism in the brain, but instead relates the phenomenon to brain regions involved in own-body perception (Manzouri et al., 2017). For instance, it has been found that transgender men show weaker functional connections

from the pregenual anterior cingulate to the insular cortex and the temporoparietal junction (Manzouri et al., 2017), which the authors interpret as a weak connection between the neuronal networks mediating body perception and body ownership in the context of self. Simplistically speaking, this would mean that (some) transgender individuals experience gender dysphoria, not because they have a 'male' or 'female' brain, but because their brain does not make the connection between their body and their sense of self. This theory is worth pursuing in the sense that it connects well to the psychological experiences of many transgender individuals, and that so far it seems well supported by data (Burke et al., 2017; Feusner et al., 2017; Majid et al., 2020; Manzouri et al., 2017; Manzouri & Savic, 2019; Savic & Arver, 2011). However, the theory also still leaves scientists with many questions. For instance, are these differences between cisgender and transgender individuals in brain networks involved in self-perception cause or consequence of gender dysphoria? Given that the brain is a plastic organ, it might very well be that these differences are caused by transgender individuals ruminating about and focusing on their gender incongruence. And in case that these neurobiological differences do play a causal role in the experience of gender dysphoria, then how come that these 'disruptions' in self-perception relate mostly to gendered body parts such as the genitals?

In addition to studies investigating the neural correlates of transgender identities, a small number of neuroimaging studies have addressed factors related to sexuality in transgender individuals. For instance, Oh et al. (2012) and Kim et al. (2016) reported findings related to a passive viewing of erotic stimuli paradigm in transgender women and transgender men, respectively. However, they did not include cisgender participants and report on very small sample sizes (n = 9 and n = 11, respectively), and did not include a control condition, making it difficult to make any meaningful conclusions about their data. These methodological shortcomings were not present in the studies by Gizewski et al. (2009) and Mueller et al. (2016), both including experimental control conditions and cisgender participants. Gizewski et al. (2009) reported that transgender women show a brain activation pattern similar to cisgender women during sexual arousal. On the other hand, Mueller et al. (2016) found that there were slight differences in brain activation during sexual arousal between cisgender men and transgender individuals, and that testosterone correlated with brain activation differently in transgender compared to cisgender individuals. While these studies make valuable contributions to our knowledge regarding the neurobiological underpinnings of sexuality in transgender individuals, they all rely on passive viewing paradigms, which complicates making any conclusions about the link between neurobiology and psychology.

While the number of neuroimaging studies related to sexuality in transgender people is limited, attempts to elucidate the neural correlates of transgender identities are becoming more collaborative and more large-scaled (see for instance Mueller et al., 2021). However, neuroscientific studies including transgender participants are not

without critique. Social scholars have argued that the fact that neuroscientific studies about transgender people have mainly been conducted by cisgender researchers with a rather reductionist approach, has lead to epistemic injustice (Caselles, 2019), discarding transgender people as epistemic agents and disregarding their lived reality. Similarly, several professionals working in transgender health research have called for a close involvement of the transgender community at all research stages (Adams et al., 2017; Bouman, 2018; T'Sjoen et al., 2017), an involvement that is currently lacking in the field of neuroscience. So instead of researchers asking themselves whether it is a good idea to conduct neuroimaging studies with transgender participants, we should instead, or also, ask the transgender community.

6. Outline of the thesis

In this thesis, I attempt to complement current findings on sexual well-being in transgender individuals by mainly focusing on psychological variables, instead of conceptualizing sexuality as a merely medical and functional aspect of humanity. In order to construct a couple of pieces to complete the complex puzzle of transgender sexuality, I mostly apply a psychological approach, complemented with neuroscience and endocrinology. I report results from four empirical studies, all applying different methods, and all but one including both binary and non-binary identifying transgender individuals.

In **Chapter 2**, I will introduce the Sexual Self-Concept (SSC), a holistic concept that encompasses all thoughts, beliefs, and feelings a person has about themselves as a sexual being (Deutsch et al., 2014). In our conceptualization of the SSC, it entails sexual esteem, sexual attitudes, and sexual self-efficacy. I will also introduce sexual self-concept discrepancies (sexual SCDs), a psychological variable that represents how far away someone's *actual* SSC is from their *ideal* SSC. We conducted an online questionnaire study to investigate differences in SSC and sexual SCDs between binary transgender and cisgender individuals, and to investigate a possible mediating role of sexual SCDs in explaining the relation between gender dysphoria and SSC in transgender individuals.

Chapter 3 presents a first quantitative study of sexual well-being in non-binary and genderqueer transgender individuals. Using online questionnaire data, we investigate differences and similarities between non-binary transgender, binary transgender, and cisgender individuals on variables such as sexual esteem, body image worries, sexual satisfaction, and sexual SCDs. While many previous studies have investigated differences between binary transgender and cisgender individuals, this study is the first to quantitatively map sexual well-being in a community sample of non-binary identifying individuals.

While many studies investigating sexual well-being in transgender individuals investigate the effect of GAHT and/or GAS on sexuality, **Chapter 4** takes a more psychological approach by investigating the associations between treatment desire and sexual well-being. We surveyed both binary and non-binary transgender individuals about their GAMT desire and sexuality to investigate how individuals with a fulfilled treatment desire differ from those with an unfulfilled treatment desire on variables such as sexual satisfaction, gender dysphoria, and sexual SCDs. Additionally, we asked participants about their motives for wanting to undergo/having undergone GAMT, to investigate whether sexual motives play an important role, and whether binary and non-binary individuals report similar motives.

In order to complement these findings with more ecologically valid data, I describe the results of a diary study in **Chapter 5**. For three weeks, 47 transgender and 52 cisgender individuals reported daily on their sexual behavior (in the morning) and sexual esteem and body image (in the evening). Using multilevel modeling, we analyzed whether the morning variables predict the evening variables and vice versa, and whether these predictions differ between transgender and cisgender participants. This analytical framework enables u to not only investigate whether the two groups differ on certain variables on the between-subject level, but also to unravel possible differences in the intertemporal relations as within-subject effects. This study is unique in its design and offers a first extensive, ecologically valid insight into sexuality in a daily context in transgender individuals.

Before further complementing our findings with data from a neuroimaging study assessing sexuality, I acquired feedback regarding neuroscientific studies with transgender individuals from the transgender community. To this end, we organized a qualitative focus group study, which is reported in **Chapter 6**. We invited transgender individuals to the university to engage in an active group discussion on the pros, cons, and sensitivities of doing neuroscientific research with this community. This study answers to the calls of researchers and health professionals to involve transgender individuals more closely in the research that will ultimately affect their lives (Adams et al., 2017; Bouman, 2018; T'Sjoen et al., 2017), and while it certainly gave us more insight into how to conduct our own studies, it will also inspire other researchers who want to conduct neuroscientific studies with transgender individuals.

In **Chapter 7**, I report on an experimental fMRI study investigating the interplay between the behavioral component of sexual inhibition, brain network activity, and testosterone. Thirty-three transgender and 34 cisgender participants were included in this study in which they completed questionnaires regarding sexual well-being, provided a testosterone sample via saliva, and performed an Approach Avoidance task in an MRI

scanner. This study combines psychology with neuroscience and endocrinology, thereby aiming to do justice to the complexity of sexual well-being in transgender individuals.

Chapter 8, finally, summarizes the findings reported in Chapter 2 to 7, places them in the broader context of research related to sexual well-being in transgender individuals, describes their implications, and suggests future research directions.

7. Author positionality

To conclude this introduction, I should probably nuance its first sentence: this dissertation is written by a cisgender woman. I received training and supervision on how to conduct psychological and neuroscientific research in a standardized way, attempting to eliminate bias and reach objectivity. Nevertheless, it seems unlikely to me that I would have looked at my research the exact same way if I were someone else; a transgender woman, or a cisgender man; someone with less privileges, or someone whose life is even easier than mine. Furthermore, I am aware I have conducted my research in a context mostly consisting of cisgender colleagues, and I am building on the work of such cisgender colleagues as well. Nevertheless, I am a vocal ally for the transgender community, and I live with a deep conviction that people should not be treated differently based on their gender or any gender-nonconformity. Throughout the conduct of the studies described in this thesis and its writing process, I have tried to stay mindful of any potential biases I might have carried along, and have discussed them with my supervisors and colleagues. I hope and believe I have managed to adhere to the high research standards expected of a PhD candidate, while being mindful that I am writing about people, and that my work and words could potentially affect their lives. If you are a scientist who disagrees with this disclosure of my positionality, or who fears it might have clouded my work; or if you are a transgender or gender-nonconforming person hurt or insulted by my studies; then know that I am open to discuss and learn further.

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Chapter 2

Sexual self-concept and its relation to gender dysphoria in binary transgender individuals

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CHAPTER 2

Abstract

Sexual responding in transgender people has typically been investigated from a medical and functional perspective. Aligning with the biopsychosocial model, it is however equally important to consider psychological aspects of sexuality in this population. We propose that the Sexual Self-Concept (SSC) theory offers a valuable framework to understand (sexual) wellbeing in transgender people, while Self-Concept Discrepancy (SCD) theory could offer an explanation of the mechanisms underlying negative SSCs related to gender dysphoria. We investigated differences in SSC (consisting of sexual esteem, sexual attitudes, and sexual self-efficacy) in 197 binary transgender and 205 cisgender individuals using an online survey and explored the mediating role of actual/ideal self-discrepancies in explaining the relation between gender dysphoria and SSC. Transgender and cisgender individuals differed significantly in seven out of eight components related to sexual esteem and sexual attitudes. Actual/ideal self-discrepancies mediated the relationship between gender dysphoria and the SSC in transgender individuals for the sexual esteem components related to body perception, conduct, and attractiveness, as well as for sexual anxiety. We found no relation between gender dysphoria and the other SSC components in this group. We conclude that SSC discrepancies could be a valuable treatment target to improve transgender individuals' sexual esteem and sexual attitudes.

1. Introduction

Transgender individuals experience an incongruence between their gender identity and their sex assigned at birth. When this incongruence causes persisting and invasive distress, individuals can be diagnosed with gender dysphoria (American Psychiatric Association, 2013). Alternatively, individuals can be diagnosed with gender incongruence, which has been moved from the chapter on 'Mental health and behavioral disorders' to the chapter on 'Conditions related to sexual health' in the most recent version of the International Statistical Classification of Diseases and Related Health Problems (ICD-11; World Health Organization, 2018). In order to alleviate their distress, some will apply for gender affirming treatment, such as gender affirming hormone therapy and/or gender affirming surgery (World Professional Association of Transgender Health, 2013). Prevalence rates of gender dysphoria are typically based on the number of people receiving such clinical treatment with estimates as low as .0046%, but rising over the years (Arcelus et al., 2015). Yet, up to 5% of the general population reports an incongruence between their gender identity and sex assigned at birth, with only a minority of this group desiring gender affirming treatment, indicating that clinical data strongly underestimate the prevalence of transgender identities (Kuyper & Wijsen, 2014). Importantly, 'transgender' serves as an umbrella term, referring not only to individuals with a binary gender identity (i.e., men and women), but also to people whose gender identity falls outside of this dichotomous norm, identifying as either non-binary or something else. The term cisgender applies to people whose gender identity aligns with their sex assigned at birth.

Body dysphoria and conflicting feelings between body and identity are central themes in transgender experiences (Cooper et al., 2020), although not in all (Fiani & Heather, 2019). Because being comfortable with one's own body is an important aspect of sexual wellbeing (e.g., Sanchez & Kiefer, 2007), and sexual wellbeing is related to general happiness (Rosen & Bachmann, 2008), it is important to investigate bodily self-perceptions in transgender persons (or self-related body perceptions) in relation to their sexual experiences. The World Health Organization considers sexual satisfaction/health an important determinant of quality of life (WHOQOL Group, 1994), indicating the importance of research on sexuality in transgender individuals. Although some studies indicate that sexual dysfunctions occur in a relatively large proportion of the transgender population (Kerckhof et al., 2019; Weyers et al., 2009), it was found that gender affirming treatment has a positive influence (Constantino et al., 2013). However, most of the research on sexuality in this population has typically applied a rather medical/functional approach, by focusing on neo-vaginal depth (Hess et al., 2018), frequency of masturbation and orgasm (Wierckx et al., 2011), and sexual functioning (Weyers et al., 2009). Such functional approach tends to ignore the biopsychosocial nature of sexual responses, which are determined by a myriad of biological,

psychological, relational and sociocultural factors. The handful of studies that have investigated subjective sexual experiences such as sexual agency (Nikkelen & Kreukels, 2018), sexual desire (Wierckx et al., 2014) and sexual anxiety (Dharma et al., 2019) in transgender people did not include cisgender participants, which keeps us from directly comparing the sexual experiences in both groups and examining the specific role of a transgender identity in relation to sexuality.

A concept that captures a wide array of psychological factors related to sexuality is the Sexual Self-Concept (SSC). It is broadly defined as all ideas, thoughts and feelings persons have about themselves as sexual persons (Deutsch et al., 2014). Research on the sexual self-concept lacks consistency and standardization as indicated by the wide variety of terms that have been used to describe this concept (e.g., sexual selfhood or sexual schemas) and the different questionnaires that have been applied. In an attempt to compile current knowledge on the sexual self-concept, Deutsch et al. (2014) constructed a unified, multidimensional model of SSC based on the work of Buzwell and Rosenthal (1996), who drew on three strands of research to conceptualize the SSC. First, they included sexual self-esteem, capturing a person's self-evaluation of worth as a sexual being. Sexual self-esteem can refer to behavior (e.g., feeling good about one's sexual behavior), conduct (e.g., believing one can be comfortable in a sexual situation with a partner), body perception (e.g., perceiving one's own body as well developed), and sexual attractiveness (e.g., believing one is attractive to potential sexual partners). Second, sexual self-efficacy entails a person's perception of mastery of their sexual world. This can be related to being able to be resistive (e.g., perceiving oneself as being able to say no to unwanted sex), to taking precautions (e.g., perceiving oneself as being able to negotiate the use of condoms with a new partner), and to assertiveness (e.g., perceiving oneself as being able to insist a partner to respect one's sexual needs). Finally, Buzwell and Rosenthal's (1996) conceptualization of the SSC included a person's beliefs about their sexual self-image, also denoted as sexual attitudes. This concept covers multiple areas, such as arousal (e.g., perceiving oneself as easily aroused), exploration (e.g., wanting to experiment when it comes to sex), and commitment (e.g., preferring one committed partner to multiple). The sexual attitudes component also includes a factor of sexual anxiety (e.g., worrying about showing discomfort during sex), indicating that the SSC covers both positive and negative affective components of a person's sexual identity.

Previous research on the SSC has included only participants with a cisgender identity. While the SSC as defined above includes mainly affective (e.g., sexual esteem, sexual anxiety) and cognitive (e.g., sexual self-efficacy) aspects, various studies have found that the SSC is related to and predictive of behavioral variables such as sexual risk taking (Breakwell & Millward, 1997; Lou et al., 2010), intentions to engage in sexual activities (Hensel et al., 2011; O'Sullivan et al., 2006), sexual communication (Lou et al., 2010), contraceptive use (Winter, 1988), and STI status and disclosure (Newton &

McCabe, 2008). Importantly, it has also been shown that SSC is related to sexual satisfaction (Anticevic et al., 2017; Mueller et al., 2016). Additionally, Snell et al. (1993) found that response patterns on a multidimensional SSC questionnaire predicted communal versus exchange approaches towards sex, indicating the heuristic value of this multidimensional construct over a single SSC factor. Interestingly, cisgender individuals have been found to show gender differences on several SSC components. For instance, men score higher on arousal and exploration (Deutsch et al., 2014) and sexual self-esteem (Rosenthal et al., 1991) than women. To our knowledge, the SSC has not been applied to transgender people so far, with most studies on sexuality in this population focusing on single factors rather than multidimensional constructs despite the fact that sexuality in transgender people (as in cisgender people) is complex and multifaceted (Holmberg et al., 2019).

Another concept with potentially high explanatory value regarding the relation between self-perceptions and sexual wellbeing that is strongly related to the SSC is the idea of self-concept discrepancies (Higgins, 1987). In the literature on self-concept discrepancies, the self-concept is typically described as consisting of various guides, such as the actual self-concept ("Who am I?"), the ideal self-concept ("Who do I want to be?"), and the ought self-concept ("Who should I be?"). Large discrepancies between different self-concept guides are thought to negatively affect a person's wellbeing by creating emotional discomfort (Higgins, 1987). More specifically, a discrepancy between one's actual and ideal self-concept is related to feelings of disappointment and has been associated with depression (Higgins, 1987; Higgins et al., 1994). Self-concept discrepancies and the accompanying distress can further motivate behavioral tendencies, which may promote dysfunctional strategies to decrease the discrepancy. The concept has successfully been applied in various populations such as individuals with eating disorders (Lantz et al., 2018), chronic pain patients (Morley et al., 2005), and patients with depression (Tangney et al, 1998). Recently, the theory about self-concept discrepancies has been applied in the sexuality field, showing that higher SSC discrepancies are related to more negative outcomes in women with and without genital pain (Dewitte et al., 2017).

Actual/ideal discrepancies have clear heuristic value to understand the sexual experiences of transgender people. That is, a discrepancy between the actual SSC ("Who am I as a sexual person?") and ideal SSC ("Who do I want to be as a sexual person?") is likely to arise from gender dysphoria given the gender-body incongruence that gets 'in the way' during sex (Doorduin & van Berlo, 2014), and might affect components of the SSC such as anxiety and esteem. Indeed, it has been shown that transgender individuals reported disappointment and depressive feelings related to the mismatch between their body and gender identity (Cooper et al., 2020), as would be predicted by the theory about self-concept discrepancies (Higgins et al., 1994). This mismatch and the related distress become less prominent after transition (Cooper et al., 2020), indicating that the

discrepancy between the actual and ideal self-concept might decrease as transgender individuals transition towards their experienced gender. While it is clear that improving gender dysphoria (by gender affirming treatment) has a positive effect on body image and sexual functioning, it is less certain whether 'becoming yourself' also results in a more enjoyable sex life (Holmberg et al., 2019), prompting the question whether actual/ideal SSC discrepancies indeed might explain the relation between gender dysphoria and SSC in transgender individuals.

For the present study, we conducted an online questionnaire study with cisgender and transgender participants on SSC and SSC discrepancies to investigate subjective sexual experiences in transgender people. Transgender people across various transition stages were invited to participate. Based on the studies described above, we expect differences in SSC between transgender and cisgender individuals. More specifically, we hypothesized that transgender individuals score lower on sexual self-esteem and sexual self-efficacy, and higher on sexual anxiety. Secondly, we predicted that transgender individuals present larger actual/ideal SSC discrepancies than cisgender individuals. In addition, we hypothesized that for those SSC components in which transgender and cisgender individuals differ, actual/ideal SSC discrepancy mediates the relation between gender dysphoria and these SSC components in transgender individuals.

2. Methods

2.1 Participants

Participants had to be at least 18 years old and proficient in either Dutch or English, as these were the languages the questionnaires were presented in (all questionnaires were back-to-back translated). In total, 514 participants completed at least part of the survey. From these, three were removed from the dataset because they were younger than 18 years old; three were removed because they did not enter their age; five were removed because they did not enter any information on gender identity; 21 were removed because of a clearly invalid response profile. Based on the information about sex assigned at birth and gender identity provided, participants were assigned to one of five groups: transgender men (n = 125), transgender women (n = 72), cisgender men (n = 98), cisgender women (n = 107), non-binary/other (n = 80). This classification was confirmed by asking participants whether they identified as transgender. Given that our current research questions focus on binary identifying individuals, the latter were not included in the current analysis, resulting in a final sample of 402 participants (age; M = 30.14, SD = 10.92). Of those, 213 participants lived in the Netherlands (52.99%), 77 were from United States of America (19.15%), 54 from Belgium (13.43%), and the remaining 58 from various other countries in Europe (10.95%), North America (1.493%), Oceania (1.00%), Asia (0.50%), Africa (0.25%) and South America (0.25%). The English version

of the survey was completed by 224 participants, while 178 participants completed it in Dutch.

2.2 Procedure

After approval by the Ethics Review Committee Psychology and Neuroscience (ERCPN) of Maastricht University (approval code: 225_95_07_2020), the survey was programmed in Qualtrics. The study was administered online between July 16th and October 2nd 2020. Transgender participants were mainly recruited online via social media in the LGBTQI+ community, including the use of Facebook groups, Twitter, and support organizations advertising the study. In order to reach cisgender people, we advertised the study within the broader university and sex research community. Finally, we asked participants who had completed the survey to spread the link among potentially interested people in their network.

Participants declared informed consent at the beginning of the survey, which in total took 15-25 minutes per participant. As a reward, participants could enter a raffle for a €10 gift voucher at the end of the survey (one voucher per 20 participants; participants were made aware of the odds). The email addresses provided for the raffle were stored separately from the questionnaire responses.

2.3 Measures

Demographics We developed a questionnaire including open questions on age, country of residence, mother tongue, and the number of children participants had, as well as multiple choice questions on educational level, occupation, housing (e.g., living with family, living alone), and relationship status and length. Sexual orientation was assessed by presenting two sliding scales (one for men, one for women) on which participants could indicate how much they were attracted to these genders in general (scored from 0 to 100, with lower scores indicating lower attraction). Sex assigned at birth was assessed via a multiple-choice question including *Male*, *Female*, *Intersex*, and an open option. Gender identity was assessed via a multiple-choice question including *Man*, *Woman*, *Non-Binary*, and an open option. Finally, participants were asked whether they identified as transgender, in which case they were also asked when they had first become aware of their transgender identity and whether they had received a diagnosis of Gender Dysphoria.

Transgender medical care This part of the survey was presented only to those who identified as transgender. Participants were asked whether they were on a waiting list for gender affirming treatment at the time of filling in the survey and what type of treatment they had already received (gender affirming hormone therapy and/or gender affirming surgery).

Gender dysphoria Feelings of gender dysphoria were assessed using the Utrecht Gender Dysphoria Scale (UGDS; Cohen-Kettenis & Van Goozen, 1997; Steensma et al. 2013), which has two different versions depending on the sex assigned at birth of the respondent (male/female). Each version consists of 12 items which participants had to rate on a five-point scale ranging from 1 = *Entirely disagree* to 5 = *Entirely agree*. Because some of the questions would not apply to transgender people who have already undergone certain types of gender affirming treatment (e.g. "I hate having breasts" for a transgender men who has undergone mastectomy), we included the response option not applicable, which was scored to one (low gender dysphoria). Participants' final score on the UGDS was calculated by averaging the scores for all items, with the final scores ranging from one (no gender dysphoria) to five (high gender dysphoria). Both versions had high reliability in our sample (McDonald's ω = .97 for male sex assigned at birth version; McDonald's ω = .94 for female sex assigned at birth version).

Sexual Self-Concept Sexual Self-Concept was assessed using the Sexual Self-Concept Questionnaire (SSCQ; Buzwell & Rosenthal, 1996; adapted by Deutsch et al., 2014). The SSCQ consists of three measures (sexual self-esteem, sexual attitudes, and sexual self-efficacy) and has 84 items in total. For the self-esteem and attitudes measures, all statements had to be rated on a five-point scale ranging from 1 = *Strongly disagree* to 5 = *Strongly agree*. A sum score ranging from one to five was calculated for each subscale by averaging all the item scores. The self-efficacy measure consisted of two steps. First participants had to indicate whether they thought they would be able to perform a certain action. If this was the case, they had to indicate their confidence to do so on a five-point scale ranging from 1 = *Very uncertain* to 5 = *Very certain*. A sum score ranging from zero to five was calculated for each subscale by averaging all the item scores.

The Sexual Esteem measure consists of four subscales. The Behavior subscale assesses perceptions about one's sexual behavior (e.g., "Intimate partners have found (or would find) me sexually satisfying") (five items, McDonald's ω = .81). The Body Perception subscale assesses body satisfaction and feelings of bodily maturity (e.g., "When other people look at me they must think I have a poorly developed body", reverse item) (nine items, McDonald's ω = .66). The Conduct subscale assesses feelings of adequacy in sexual situations and with a partner (e.g., "Most of my friends are (or would) feel more comfortable sexually with their partners than I do", reverse item) (four items, McDonald's ω = .78). The Attractiveness subscale assesses feelings of attractiveness and sexual desirability (e.g., "I am confident that people find me attractive") (six items, McDonald's ω = 0.67).

The measure of Sexual Attitudes consists of four subscales. The Arousal subscale assesses feelings of sexual desire (e.g., "I have a lot of sexual energy") (ten items,

McDonald's ω = .84). The Anxiety subscale assesses anxiety related to sexual situations (e.g., "I would feel bad about having sex") (ten items, McDonald's ω = .76). The Exploration subscale assesses sexual adventurousness and openness (e.g., "I would like an adventurous sexual partner") (ten items, McDonald's ω = .77). The Commitment subscale assesses the preference for one committed sex partner over multiple partners (e.g., "I like to commit myself to a relationship") (nine items, McDonald's ω = .74).

The Sexual Self-Efficacy measure consists of three subscales. The Resistive subscale assesses the perceived ability to say no to unwanted sex (e.g., "Could you refuse to do something with your sexual partner which you don't feel comfortable about?") (ten items, McDonald's ω = .89). The Precautions subscale assesses the perceived ability to use and discuss sexually transmitted disease (STD) protection (e.g., "Are you able to buy condoms in a store?") (five items, McDonald's ω = .71). The Assertiveness subscale assesses the perceived ability to be assertive in achieving sexual satisfaction (e.g., "Could you insist your partner respect your sexual needs?") (five items, McDonald's ω = .77).

Sexual satisfaction Sexual satisfaction was assessed using the Global Measure of Sexual Satisfaction (GMSEX; Lawrance & Byers, 1995), a five-item measure assessing satisfaction on a seven-point scale (e.g., 1 = '*unsatisfying*' and 7 = '*satisfying*'). Scores ranged from 7 to 35, with higher scores indicating higher sexual satisfaction. The scale showed sufficient reliability in our sample (McDonald's ω = .96).

Sexual self-concept discrepancies We developed a concise measure of two types of sexual self-concept discrepancies (based on Higgins, 1987): actual/ideal and actual/ought. The following text was presented to the participants for the actual/ideal item:

"Think about your actual sexual self-concept, and your ideal sexual self-concept. Your actual self-concept entails all the ideas and feelings you have about who you currently are as a sexual person. Your ideal sexual self-concept entails all the ideas and feelings you have about who you ideally would want to be as a sexual person. How far away is your actual sexual self-concept from your ideal sexual self-concept?"

The phrasing was identical for the actual/ought item, except 'ought' was used instead of 'actual', and 'who you should be' instead of 'who you ideally would want to be'. Participants used a sliding scale to indicate how large the discrepancies between their self-concepts are. The positions on the scale were coded into a score ranging from 0 = *Entirely overlapping* to 100 = *Very far away*, with higher scores indicating a higher SSC discrepancy.

General life satisfaction Life satisfaction was assessed using the Satisfaction With Life Scale (SWLS; Diener et al., 1985). The questionnaire consists of five items

(e.g., “So far I have gotten the important things I want in life”) (McDonald’s ω = .92) which had to be rated on a seven-point Likert scale ranging from 1 = *Strongly disagree* to 7 = *Strongly agree*. Sum scores ranged from 7 to 35, with higher scores indicating higher life satisfaction.

Anxiety and depression We assessed anxiety and depression using the Hospital Anxiety and Depression Scale (HADS; Zigmund & Snaith, 1983). The questionnaire interleaves a seven-item anxiety scale (e.g.; “I feel tense or ‘wound up’”) (McDonald’s ω = .87) with a seven-item depression scale (e.g., “I feel cheerful”, reverse item) (McDonald’s ω = .73), presenting participants four response options per statement. For each scale, scores range from 0 to 21, with higher scores indicating higher anxiety/depression.

Other questionnaires Participants who identified as transgender were asked what type of gender affirming treatment they still desired. Those who had already received some type of treatment also indicated when they started gender affirming hormone therapy /when they underwent gender affirming surgery, and how satisfied they were with the outcomes. Finally, transgender participants were asked about their motives for (not) wanting (more) treatment using multiple-choice items constructed in consultation with community members. Furthermore, transgender participants completed the T-WORRY questionnaire (Dharma et al. 2019) on trans-specific body image worries. However, these questionnaires were not directly relevant to the current study questions and will be analysed separately (see Chapters 3 and 4). For an overview of the questionnaires, please refer to Appendix A.

2.4 Analysis

All statistical analyses were performed using the software JASP (JASP team, 2020). We applied a significance threshold of p = .05 for all analyses. Group differences in the demographic measures and questionnaires other than the SSCQ were analyzed using one-way ANOVAs in case of continuous variables, and chi-square tests of independence in case of categorical variables. In case of a significant ANOVA outcome, post-hoc comparisons were analyzed applying the Tukey HSD test for multiple comparisons. All correlations reported were calculated using Pearson product-moment correlation coefficients.

Given the expected gender differences as well as the hypothesized differences between transgender and cisgender individuals in sexual self-concept, we performed two-way ANOVAs using gender identity (man vs. woman) and cisgender/transgender identity (cisgender vs. transgender) as factors for each sexual self-concept component, using Bonferroni correction for multiple testing (11 components; p = .0045). In order to assess mediation effects, we applied a regression approach (Baron & Kenny, 1986; Sobel, 1982)

to investigate whether self-concept discrepancies mediate the relation between gender dysphoria (i.e., UGDS score) and sexual self-concept components in transgender individuals, again applying Bonferroni correction for each component investigated. This approach consists of a series of four regression analyses to investigate the mediating effect of variable M on the relation between variables X and Y. First, Y is regressed on X (path c'). If the regression coefficient is significantly different from zero, the mediation analysis is continued by regressing M on X (path a) and Y on M (path b). In order to be able to speak of (at least partial) mediation, these regression coefficients also need to reach significance. Full mediation is indicated by the 'disappearance' of the significant relation between X and Y when controlling for their relation with M (the product of the regression coefficients path a and path b does not differ from zero), as well as by a significant Sobel test statistic (Sobel, 1982).

3. Results

3.1 Sample descriptives

Table 1 presents the group means and standard deviations for all four groups (cisgender men, cisgender women, transgender men, transgender women) as well as differences between the groups on age, gender dysphoria, general life satisfaction, sexual satisfaction, anxiety and depression, sexual self-concept discrepancies (actual/ideal and actual/ought), and sexual orientation (attraction to men and women). About half of the total sample indicated being in a romantic relationship (N = 211, 52.49%). The majority of the participants indicated having received at least some form of higher education (college or university; N = 239, 59.45%). Most participants were working full time (N = 164, 40.80%), studying (N = 132, 32.84%), or working part time (N = 47, 11.69%). In terms of living situation, participants were mostly living with their partner (N = 126, 31.34%), alone (N = 110, 27.36%), or with their parents/family (N = 81, 20.15%). Chi-square tests indicated that our sample was balanced in terms of educational level (X^2(3, N=399) = 7.79, p = .254). Regarding occupational status, a significant group difference was found (X^2 (3, N=400) = 71.93, p < .001), with cisgender women and transgender men mostly being students (50.48% of cisgender women and 40% of transgender men) and cisgender men and transgender women mostly working full time (65.31% of cisgender men and 45.83% of transgender women). Furthermore, group differences occurred with regard to relationship status (X^2 (3, N=402) = 9.86, p = .020), with 64.29% of the cisgender men indicating being in a romantic relationship and 56.8% of the transgender men indicating being single.

Of the participants who indicated having a transgender identity (N = 190, 47.26%), 42.63% indicated currently being on a waiting list for gender affirming treatment (N = 81). Most transgender participants indicated receiving gender affirming

hormone therapy (*N* = 141, 74.21%). Most transgender women had not undergone any gender affirming surgery (*N* = 40, 55.56%). In terms of gender affirming surgery, most transgender men indicated having undergone mastectomy (*N* = 71, 60.68%), while rates for genital surgery were rather low (e.g., for phalloplasty, *N* = 8, 6.84%). Of the transgender women, 70.8% indicated ever having been diagnosed with gender dysphoria or gender incongruence (*N* = 51). For transgender men, this figure was 77.6% (*N* = 97).

Table 1.

D*escriptive statistics and group differences for age, gender dysphoria (UGDS), general life satisfaction (SWLS), sexual satisfaction (GMSEX), anxiety and depression (HADS), sexual self-concept discrepancies, and sexual orientation.*

	Group					Group differences
	CM *M* *SD* (*N*)	CW *M* *SD* (*N*)	TM *M* *SD* (*N*)	TW *M* *SD* (*N*)	*F* *p* η^2	post-hoc significant comparisons
Age	31.91 11.18 (98)	26.83 8.86 (107)	27.22 9.09 (125)	37.74 12.17 (72)	21.58 <.001 .140	TW vs. TM (p < .001), TW vs. CW (p < .001), TW vs. CM (p < .001), TM vs. CM (p = .004), CW vs. CM (p = .002)
Gender dysphoria	1.24 .55 (71)	1.76 .47 (103)	3.97 .73 (122)	3.71 .90 (68)	374.53 <.001 .757	TW vs. CW (p < .001), TW vs. CM (p < .001), TM vs. CW (p < .001), TM vs. CM (p < .001), CW vs. CM (p < .001)
General life satisfaction	24.20 7.15 (64)	21.82 7.69 (96)	19.07 7.39 (107)	17.84 7.47 (57)	9.96 <.001 .085	TW vs. CW (p = .044), TW vs. CM (p < .001), TM vs. CM (p < .001)
Sexual satisfaction	29.06 5.56 (67)	27.60 6.68 (96)	23.72 9.48 (106)	20.79 9.10 (56)	15.08 < .001 .124	TW vs. CW (p < .001), TW vs. CM (p < .001), TM vs. CW (p = .003), TM vs. CM (p < .001)
Anxiety	6.55 3.54 (67)	8.36 3.97 (97)	9.35 4.90 (107)	8.36 4.48 (56)	5.80 <.001 .051	TM vs. CM (p < .001), CW vs. CM (p = .042)

Depression	5.87 2.58 (67)	5.85 2.67 (97)	5.88 3.84 (107)	6.27 3.99 (56)	0.23 .002	
Actual/ideal SSC discrepancy	30.59 25.73 (83)	38.30 26.13 (95)	54.89 28.65 (103)	57.74 28.69 (53)	18.02 <.001 .141	TW vs. CW (p < .001), TW vs. CM (p < .001), TM vs. CW (p < .001), TM vs. CM (p < .001)
Actual/ought SSC discrepancy	29.09 22.86 (81)	34.17 28.35 (94)	50.39 29.87 (101)	48.28 29.95 (50)	11.68 <.001 .082	TW vs. CW (p = .008), TW vs. CM (p < .001), TM vs. CW (p < .001), TM vs. CM (p < .001)
Attraction to men	35.54 39.60 (57)	65.04 34.08 (93)	58.84 35.57 (121)	42.67 34.30 (69)	11.11 <.001 .090	TW vs.TM (p = .015), TW vs. CW (p < .001), TM vs. CM (p < .001), CW vs. CM (p < .001)
Attraction to women	59.40 39.55 (57)	39.13 32.39 (93)	64.71 34.94 (121)	71.51 30.99 (69)	14.50 <.001 0.115	TW vs. CW (p < .001), TM vs. CW (p < .001), CW vs. CM (p = .003)

CM = cisgender men, CW = cisgender women, TM = transgender men, TW = transgender women, M = mean, SD = standard deviation, n = sample size, SSC = sexual self-concept.
Post-hoc significance thresholds are Tukey corrected for multiple comparisons of a family of four.

3.2 Differences in Sexual Self-Concept

Table 2 presents the descriptive statistics for the SSC components for each group. We conducted a series of two-way ANOVAs (one for each SSC component) to investigate the effects of gender identity (2 levels: man, woman) and cisgender/transgender identity (2 levels: cisgender, transgender) on SSC. The results of these analyses are presented in Table 3. Because most participants indicated living in the United States of America or the Benelux, and cisgender participants were overrepresented in the former group while transgender participants were overrepresented in the latter group, we performed additional ANOVAs controlling for this factor. This did not change the outcomes presented in Table 3, except for the Sexual Attitudes – Exploration component, where the effect of cisgender/transgender identity became non-significant (p = .666) after controlling for country of residence. All SSC components correlated positively with sexual satisfaction ($p \leq .001$ for all correlations, r values ranging between .18-.63, n ranging between 305-322). The Attitudes – Anxiety (r = -.45, p < .001, n = 322) and Attitudes – Commitment (r = -.17, p = .002, n = 322) components correlated negatively with sexual satisfaction.

Table 2.
Descriptive statistics for the sexual self-concept components.

		CM *M* *SD* (*N*)	CW *M* *SD* (*N*)	TM *M* *SD* (*N*)	TW *M* *SD* (*N*)
Sexual esteem	Behavior	3.94 1.20 (67)	4.14 .77 (99)	3.59 .95 (109)	3.42 .87 (58)
	Body perception	3.49 .77 (67)	3.64 .57 (99)	3.25 .65 (109)	3.34 .63 (58)
	Conduct	3.81 1.05 (66)	3.61 1.133 (99)	2.98 1.16 (109)	3.04 1.00 (58)
	Attractiveness	3.54 .81 (66)	3.61 .83 (99)	3.15 .86 (109)	3.20 .85 (58)
Sexual attitudes	Anxiety	1.92 .70 (64)	2.18 .76 (99)	2.48 .77 (109)	2.43 .71 (58)
	Arousal	3.79 .79 (64)	3.43 .84 (99)	3.47 .93 (109)	2.97 .86 (58)
	Exploration	3.85 .85 (64)	3.48 .81 (99)	3.50 .74 (109)	3.19 .75 (58)
	Commitment	2.95 .68 (64)	3.36 .86 (99)	3.48 .69 (109)	3.61 .69 (58)
Sexual self-efficacy	Resistive	3.36 1.29 (53)	3.91 .83 (96)	3.63 1.06 (103)	3.70 1.01 (55)
	Precautions	4.10 1.09 (53)	4.09 1.02 (96)	3.67 1.06 (103)	3.84 1.07 (55)
	Assertiveness	3.60 1.28 (53)	3.86 .91 (96)	3.44 1.08 (103)	3.34 1.24 (55)

CM = cisgender men, CW = cisgender women, TM = transgender men, TW = transgender women, *M* = mean, *SD* = standard deviation, *N* = sample size.

3.3 Mediation analysis

Within the transgender group, gender dysphoria (UGDS score) correlated significantly with four SSC components: Sexual Esteem - Body Perception (r = -.23, p = .002, n = 167), Sexual Esteem - Attractiveness (r = -.24, p = .002, n = 167), Sexual Esteem - Conduct (r = -.22, p = .004, n = 167), and Attitudes - Anxiety (r = .27, p < .001, n = 167). Therefore, we performed four mediation analyses to assess whether actual/ideal SSC discrepancy mediates the relationship between gender dysphoria and these SSC components. The results presented in Figure 1 and Table 4 indicate that actual/ideal SSC discrepancies indeed do fully mediate all four relationships in the transgender sample.

In the cisgender group, UGDS score correlated significantly with the SSC components of Sexual Esteem - Conduct (r = -.36, p < .001, n = 162), Sexual Esteem - Attractiveness (r = -.24, p = .002, n = 162), Attitudes - Anxiety (r = .39, p < .001, n = 160), Attitudes - Arousal (r = -.35, p < .001, n = 160), and Attitudes - Exploration (r = -.23, p = .004, n = 160). However, since cisgender men and women differed significantly on UGDS score, we further investigated whether these correlations remained significant within each subgroup (cisgender men and cisgender women). They did not, indicating that these correlations might be caused by a baseline difference in UGDS score between cisgender men and women. Furthermore, due to the lack of a significant correlation between UGDS score and actual/ideal SSC discrepancy (r = .10, p = .227, n = 154) in the cisgender group as a whole, the latter factor could not be examined as a mediating factor in these relations.

Table 3.
Sexual Self-Concept scales as a function of gender identity (2 levels: man, woman) and cisgender/transgender identity (2 levels: cisgender, transgender).

Sexual self-concept component		ME gender identity F η^2	ME cisgender/transgender identity F η^2	Interaction F η^2
Sexual esteem	Behavior	.02 .000	25.09* .070	3.02 .008
	Body perception	2.63 .008	13.28* .038	.16 .000
	Conduct	.32 .001	30.52* .085	1.07 .003
	Attractiveness	.38 .001	17.92* .052	.01 .000

Sexual attitudes	Anxiety	1.60 .005	22.73* .064	3.23 .009
	Arousal	19.34* .054	15.46* .043	.51 .001
	Exploration	14.56* .041	12.50* .035	.09 .000
	Commitment	9.89* .028	20.89* .058	2.76 .008
Sexual self-efficacy	Resistive	6.33 .020	.06 .000	4.00 .013
	Precautions	.42 .001	7.32 .024	.56 .002
	Assertiveness	.36 .001	6.88 .022	1.87 .006

ME = main effect.

*p < .0045; Bonferroni correction for multiple comparisons (.05/11). Note: After controlling for country of residence, all significant effects remained significant except for the ME cisgender/transgender identity for Sexual attitudes – Exploration.

4. Discussion

This study investigated different dimensions of the sexual self-concept (SSC) in binary identifying transgender and cisgender individuals, and the role of sexual self-concept discrepancies in explaining the role of gender dysphoria regarding the SSC in transgender individuals. Transgender individuals scored lower than cisgender individuals on all sexual esteem scales (behavior, body perception, conduct, and attractiveness) and one sexual attitudes scale (arousal), while they scored higher on two sexual attitudes scales (anxiety and commitment). No group differences were found on the sexual self-efficacy scales (resistive, precautions, and assertiveness) and the remaining sexual attitudes scale (exploration). Furthermore, transgender individuals showed larger actual/ideal and actual/ought SSC discrepancies than cisgender individuals. Overall, our results indicated that transgender individuals have a more negative sexual self-concept. For four of the seven SSC components on which transgender and cisgender individuals differed (sexual esteem – attractiveness, sexual esteem – body perception, sexual esteem – conduct, and sexual attitudes – anxiety), we found a correlation with the level of gender dysphoria in the transgender sample. This relation between gender dysphoria and the SSC components was fully mediated by actual/ideal SSC discrepancies.

Table 4.
Regression outcomes for the four mediation models.

Model		R^2	Adjusted R^2	F	β	95% CI	
						Lower	Higher
UGDS → EstP		.06	.05	9.67**	-.20**	-.33	-.07
UGDS → SSCD		.12	.11	20.17***	12.85***	5.81	19.20
SSCD → EstP		.17	.16	30.52***	-.01***	-.01	-.01
(UGDS and SSCD) → EstP	UGDS	.18	.17	16.51***	-.10	-.24	.03
	SSCD				-.01***	-.01	-.00
UGDS → EstC		.05	.05	8.74**	-.33**	-.54	-.05
UGDS → SSCD		.12	.11	20.17***	12.85***	5.81	19.20
SSCD → EstC		.32	.32	73.01***	-.02***	-.03	-.02
(UGDS and SSCD) → EstC	UGDS	.32	.32	36.34***	-.03	-.15	.19
	SSCD				-.02***	-.03	-.02
UGDS → EstA		.06	.05	10.32**	-.27**	-.46	-.09
UGDS → SSCD		.12	.11	20.17***	12.85***	5.81	19.20
SSCD → EstA		.31	.31	68.77***	-.02***	-.02	-.01
(UGDS and SSCD) → EstA	UGDS	.31	.31	34.78***	-.07	-.25	.08
	SSCD				-.02***	-.02	-.01
UGDS → AttAn		.08	.07	13.83***	.27***	.14	.41
UGDS → SSCD		.12	.11	20.17***	12.85***	5.81	19.20
SSCD → AttAn		.22	.22	43.75***	.01***	.01	.02
(UGDS and SSCD) → AttAn	UGDS	.24	.23	24.11***	.14	.01	.27
	SSCD				.01***	.01	.02

UGDS = Utrecht Gender Dysphoria Scale, SSCD = sexual self-concept discrepancy, EstP = Sexual esteem – body perception, EstC = Sexual esteem – conduct, EstA = Sexual esteem – attractiveness, AttAn = Sexual attitudes – anxiety, CI = confidence interval, SE = standard error. Confidence intervals were acquired using a bootstrap method over 5000 replications.
* = p < .05, ** = p < .01, *** = p <.001

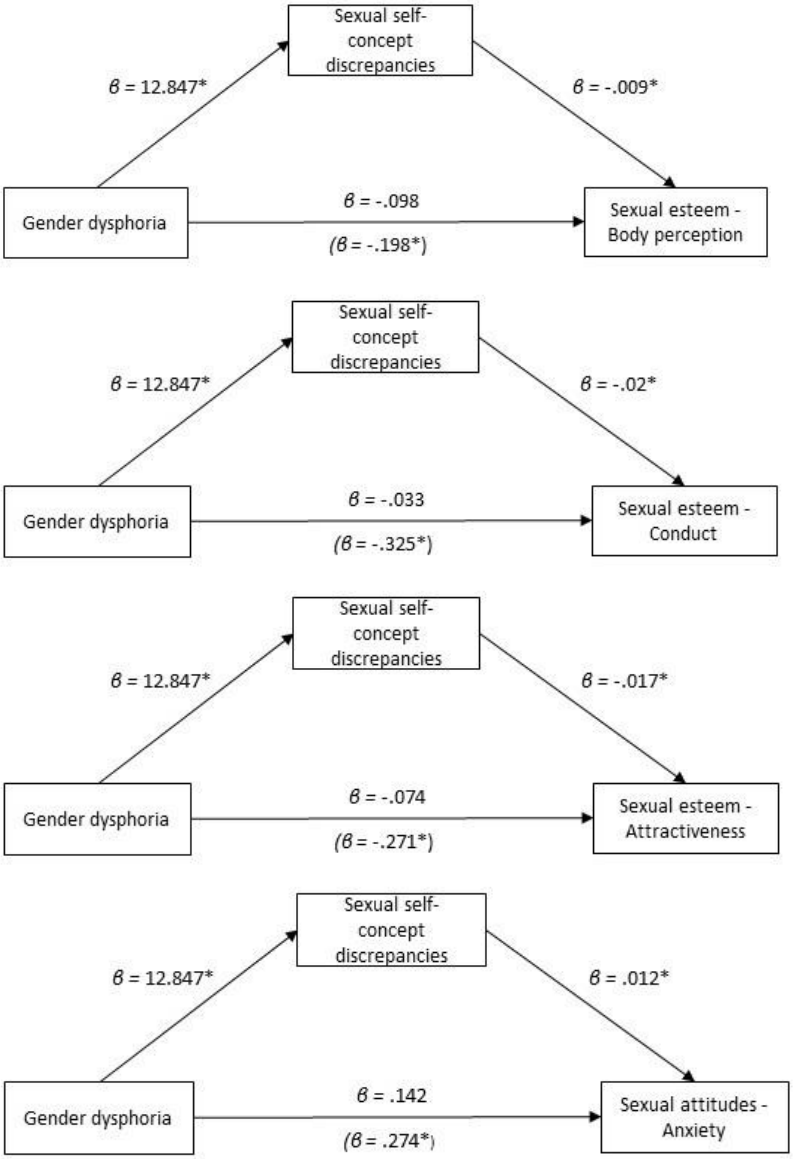

Figure 1. Coefficients for mediation models assessing the mediating effect of actual/ideal sexual self-concept discrepancies on the relationship between gender dysphoria and Sexual Esteem - Body Perception, Sexual Esteem - Conduct, Sexual Esteem - Attractiveness, and Sexual Attitudes – Anxiety in the transgender sample. The values in parentheses present the direct (i.e. unmediated) path. Sobel test values for the four models: z = -3.18 (Sexual Esteem – Body Perception model), z = -3.83 (Sexual Esteem – Conduct model), z = -3.97 (Sexual Esteem – Attractiveness model), and z = 3.60 (Sexual Attitudes – Anxiety model) (p < .001* for all values). Betas are unstandardized.
*p < .0125; Bonferroni correction for multiple comparisons (.05/4).

Given that most studies on sexuality in transgender individuals so far did not include a cisgender sample as a comparison, it is difficult to relate our findings to the existing empirical literature on the sexual experiences of transgender people. Overall, it has been shown that many transgender individuals struggle with their sexuality. Kerckhof et al. (2019), for instance, found that 69% of the transgender women and 54% of the transgender men in their sample reported at least one sexual dysfunction, which is considerably higher compared to 11-27% in cisgender women and 11-19% in cisgender men (Christensen et al., 2011; Shifren et al., 2008). In both transgender groups, fear of sexual contacts was frequently reported, which fits with the current finding that transgender individuals report more sexual anxiety as part of their self-concept. Another study investigating sexual function in transgender women who had undergone gender affirming surgery also found that this group shows elevated rates of sexual dysfunctions (Weyers et al., 2009), such as problems with arousal. This coincides with our finding of lower scores on sexual attitudes – arousal in the transgender sample. In the following paragraphs, we will elaborate on our findings and their clinical implications.

4.1 Sexual self-concept discrepancies in transgender individuals

Transgender individuals showed larger discrepancies between their actual and ideal SSC, which fits with our predictions. It seems that transgender people perceive themselves as being further away from who they want to be sexually than cisgender individuals. This could be because they are unsatisfied with who they are, especially when they have not received their desired gender affirming care yet (Nikkelen & Kreukels, 2018). In a qualitative study, trans masculine individuals indicated how they indeed thought they would benefit sexually from having different body parts, and how they believed gender affirming care would increase their sexual satisfaction (Lindley et al., 2020). It may well be that the larger actual/ideal discrepancy score results from internalized transphobia (Scandurra et al., 2019; Cooper et al., 2020), which is the process of individuals internalizing the negative prejudices they commonly encounter in society about their (sexual) minority status. This is also indicated by the larger actual/ought SSC discrepancies that were observed in the transgender group. Although the actual/ideal discrepancy is most relevant in light of the current research questions, the higher scores on actual/ought discrepancy are also interesting. It is possible that when transgender individuals constantly receive a message from society that they are unworthy and they should change (which they do; see White Hughto et al., 2015), they start to believe that they are not who they should be. Future studies could investigate which norms transgender people experience when it comes to their SSC, and why their actual SSC is not in line with their ought SSC.

4.2 The role of actual/ideal sexual self-concept discrepancies in explaining the relation between gender dysphoria and SSC

To advance current treatment aiming to develop a more positive SSC in transgender individuals, it is necessary to understand the mechanisms via which gender dysphoria affects SSC components. For many, the most common and effective way to treat gender dysphoria will include gender affirming surgery (World Professional Association of Transgender Health, 2013), but this type of care is not always accessible for all transgender people (because of financial, social, or other circumstances) and often the waiting lists are long. Additionally, even after receiving the desired gender affirming surgery, some transgender individuals will still experience an incongruence between their gender identity and body (Doorduin & van Berlo, 2014). Therefore, some transgender individuals have to live with their gender dysphoria for a long time or even forever, which increases the need for additional treatment targets in order to improve sexual wellbeing.

For four of the seven SSC components on which transgender and cisgender individuals differed (after controlling for country of residence), we found a correlation with gender dysphoria scores in the transgender sample. For the sexual esteem – attractiveness and sexual esteem – body perception components, this can likely be explained by the link between gender dysphoria and body image/satisfaction (Mofradidoost & Abolghasemi, 2020; van de Grift et al., 2016). Individuals with higher gender dysphoria might be less likely to value their body in a sexual context because of their poor overall body image, which becomes more salient in a sexual context. The relationship between gender dysphoria and the sexual esteem – conduct component indicates that on top of the body image worries, transgender individuals struggle with how to behave in a sexual situation. Mainstream sexual scripts (e.g., in the media or during sex education) typically assume an alignment between a person's gender identity and body, which is a key missing factor in people with gender dysphoria. Finally, the sexual attitudes – anxiety component correlated with gender dysphoria. This indicates that the more gender dysphoria one experiences, the more one worries about not being able to enjoy sex. This lends further support for the importance of feeling comfortable in your own body in sexual situations in order to experience sexual pleasure (Sanchez & Kiefer, 2007). Interestingly, sexual esteem – conduct, sexual esteem – attractiveness, and sexual attitudes – anxiety were also correlated with gender dysphoria scores in the cisgender sample as whole, but not in the subgroups of cisgender men and cisgender women. It is possible that the gender dysphoria scale employed in this study partly captures body dissatisfaction, which could then be related to SSC in both transgender and cisgender individuals. We recommend that future studies quantitatively investigating the relation between gender dysphoria and other variables in transgender individuals include

a cisgender sample as well, to further investigate which components of gender dysphoria are transgender-specific, and to further establish the validity of gender dysphoria measures in cisgender samples.

To explore whether SSC discrepancies can further explain the relation between gender dysphoria and these four SSC components, we tested a series of models in which actual/ideal SSC discrepancies mediate the relation between gender dysphoria and the SSC in transgender individuals. We found that actual/ideal discrepancies fully mediated the association between gender dysphoria and sexual esteem – attractiveness, sexual esteem – body perception, sexual esteem – conduct, and sexual attitudes – anxiety. This implies that the discrepancy transgender people experience between who they are and who they want to be plays a crucial role in explaining the interrelation between their sexual self-perception and feelings of gender dysphoria. Indeed, previous studies have shown that transgender individuals can make their sexual experiences more enjoyable by bringing their current self closer to their experienced gender identity, for instance by the use of prosthetics or by recoding their body terminology in a way that matches their identity (Martin & Coolhart, 2019). Our results suggest that actual/ideal discrepancies might be a central target of intervention to reduce the potentially negative impact of gender dysphoria on SSC. For instance, it has been shown that Self Discrepancy Monitoring (SDM), in which individuals focus on the discrepancy between their actual and ideal self-concept even in positive situations, has a negative effect on psychological wellbeing (Caselli et al., 2014). This indicates that ruminating over and focusing on SSC discrepancies can exacerbate the negative effects of gender dysphoric feelings on the SSC. Because of this, an effective therapeutic approach could be to help transgender individuals to reorient their attention away from these discrepancies, which might help them stop behaving in a (maladaptive) way to reduce these discrepancies (Higgins, 1994). This idea is in line with previous findings in the literature on how transgender individuals try to avert their focus away from the discrepancy between their body and their gender identity during sexual activities by, for instance, turning the lights off or by asking their partner(s) not to touch body parts incongruent with their gender identity (Martin & Coolhart, 2019). The latter indicates the importance of consent plans and communication with the sexual partner(s) in order to help decrease the negative effect of SSC discrepancies and gender dysphoria on sexual wellbeing (Lindley et al., 2020). It has even been suggested that clinical interventions targeting partner interactions might be more effective than medical interventions to increase sexual wellbeing in transgender individuals (Lindley et al., 2021).

It should be noted that given the cross-sectional design of our study, no definite conclusions about the directions of the effects can be made. One could also argue that SSC discrepancies cause gender dysphoria, and not the other way around. In any case,

targeting these SSC discrepancies in a therapeutic setting could then still have a positive effect on transgender individuals' SSC.

4.3 Other factors explaining sexual self-concept differences

There were three SSC components on which transgender and cisgender individuals differed significantly, but for which no correlation was found with gender dysphoria in the transgender sample (sexual esteem – behavior, sexual attitudes – arousal, and sexual attitudes – commitment). For these components, the SSC discrepancies related to gender dysphoria can thus not explain the negative SSC patterns in transgender individuals. In these cases, the categorical distinction of (not) having a transgender identity (as opposed to the continuous differences in gender dysphoria) might better explain the observed differences. For instance, the fact that transgender participants scored higher on the sexual attitudes – commitment scale than cisgender participants, suggests that transgender individuals have a higher need to commit to a sexual partner. One likely explanation for this finding is that transgender individuals feel the need for a safe environment to express their sexuality, without having to fear how their sexual partner(s) react(s). This is supported by studies showing that transgender individuals sometimes report anxiety around sexually engaging with new people (Lindley et al., 2020). Partners who understand the transgender person's gender identity and boundaries can provide more positive sexual experiences (Lindley et al., 2021), and these things are possibly more easily understood by (a) committed partner(s). Additionally, compared to cisgender people, transgender people have a higher risk to become a victim of sexual harassment (Mitchell et al., 2014), which could explain their need to be with a person whom they know they can trust. Furthermore, given that for most transgender individuals it is harder to 'pass' when taking off their clothes (due to not having undergone gender affirming surgery or due to surgery scars), it is possible that transgender individuals will need to disclose their past to a potential sexual partner, elevating the threshold of engaging in sexual activities with a new person. This is in line with previous reports of transgender individuals indicating that they experience a hypervigilance for transphobia and a strong fear of rejection (Goldberg et al., 2019). Future studies should include measurements of experienced stigmatization and fear of sexual harassment to investigate whether such factors explain the differences in SSC between transgender and cisgender individuals further.

Interestingly, in contrast to the Sexual Esteem and Sexual Attitudes scales, transgender and cisgender individuals did not differ in the Sexual Self-Efficacy components. This indicates that transgender individuals feel just as in control as cisgender individuals when it comes to saying no to unwanted sexual situations (sexual self-efficacy – resistive), negotiating STD protection (sexual self-efficacy – precautions), and communicating their sexual needs (sexual self-efficacy – assertiveness). Compared to

sexual esteem and sexual attitudes, which mostly pertain affective components, the sexual self-efficacy component is more cognitive in nature (Deutsch et al., 2014), indicating that the emotional differences regarding their experience of sexuality between transgender and cisgender individuals might not necessarily pervade into the cognitive level. Another explanation could be that while gender dysphoria does have a negative effect on sexual self-efficacy, this is compensated by a positive effect in transgender people. For instance, their sexual development might not have been as evident as for cisgender people (e.g., due to the lack of appropriate scripts or due to body dysphoria) and looking back at this journey might leave transgender people with a higher sense of self-efficacy. However, this is only speculative, since our data provide no indications of factors such as sexual development, so this possible explanation should be explored in future research. It should also be noted that the sexual self-efficacy scale was measured in a different format than the other two scales. While for the latter, participants had to simply rate statements on a Likert scale, the sexual self-efficacy questionnaire consisted of two steps (first indicating whether one thinks they are able to show a certain behavior, then indicating their certainty about this only if they think they can do it). The fact that this questionnaire was less straightforward is reflected in the attrition rates. This implies that we cannot rule out that psychometric differences are responsible for this finding. Finally, we want to point out that the statistical methods we employed were relatively strict in order to rule out false positive findings. The finding of a lack of differences in sexual self-efficacy hence needs replication in order to support our results, and our current interpretation should be considered tentative.

4.4 Gender differences

Gender differences have traditionally attracted much attention in research on sexuality (Petersen & Hyde, 2011; Dewitte, 2016). In our sample, we found gender differences (regardless of transgender or cisgender identity) on three SSC components: sexual attitudes – commitment, sexual attitudes – arousal, and sexual attitudes – exploration. Regarding the sexual attitudes – commitment component, cisgender and transgender women scored higher than cisgender and transgender men, indicating that women have a stronger preference for one committed sexual partner than men. Although this finding is often explained using an evolutionary psychological approach (Buss, 1998), it is also likely that this response pattern reflects social expectations. Historically, in both Western and other societies, there is a sexual double standard in which having multiple sexual partners is more acceptable for cisgender men than for cisgender women (Milhausen & Herold, 1999; Crawford & Popp, 2003). The fact that men scored higher than women on sexual attitudes – arousal and sexual attitudes – exploration is in line with previous findings (Deutsch et al., 2014) and is usually ascribed to higher levels of testosterone in men. As most transgender men in our sample were undergoing gender affirming hormone therapy, it could be that higher perceptions of sexual arousability results from sudden

increases in testosterone levels. It is likely that the stronger and more frequent experience of sexual arousal will become integrated in one's self-concept, leading to individuals perceiving themselves as sexually more arousable.

We would like to point out that no gender differences were found on the majority of the SSC components. For the sexual esteem components, this contradicts previous research indicating that men have higher sexual esteem (Rosenthal et al., 1991; although the opposite has also been found when it comes to attractiveness, see Garcia & Carrigan, 1998). Furthermore, previous studies have shown that women have more negative affect regarding sexuality (Petersen & Hyde, 2010), while in our study there were no gender differences on the sexual attitudes- anxiety component. Although these inconsistencies might be due to methodological differences (e.g., different questionnaires and the fact that we included transgender individuals), it is also plausible that the difference between men and women is decreasing over time as societies change (Petersen & Hyde, 2011). The fact that the men and women in our sample show more similarities than differences regarding sexuality goes against many societal stereotypes and questions the binary classification of two very different genders.

4.5 Strengths and limitations

To our knowledge, this is the first study to apply the SSC as well as the self-concept discrepancy literature to transgender individuals. In contrast to previous studies on sexuality in transgender individuals, this study investigated many psychological experiences related to the sexual self-concept. Furthermore, we forwarded an explanatory mechanism through which gender dysphoria can have a negative effect on sexual wellbeing, offering valuable insights for the clinical setting.

Nevertheless, some limitations apply to our study. First of all, the fact that this was an online study about sexuality likely induced a selection bias, mostly targeting people who feel comfortable in an online environment and are open to report about their sexual lives, explaining the relatively young and mostly Western sample. Secondly, participants were free to skip questionnaires or leave the study before finishing, resulting in different sample sizes for the different questionnaires and scales. We decided not to remove any participants who had not completed the full set of questionnaires in order to avoid bias. Thirdly, not all questionnaires have been formally validated for a transgender population, but we adjusted them where necessary to make them appropriate for this group. Furthermore, the cross-sectional nature of this study warrants caution when making strong causal claims. Another methodological shortcoming considers the assessment of sexual orientation. We made no distinction between romantic and physical attraction and participants did not have the option to indicate attraction to non-binary individuals. Finally, it should be noted that the findings from this study might not

generalize to the full transgender population, since for now we only analyzed the data from binary identifying individuals. Furthermore, the questionnaires were not tailored to asexual people or individuals with polyamorous relations. We will take these populations into account in our future studies and encourage other researchers to do the same.

5. Conclusion

Binary transgender and cisgender individuals show differences in their sexual self-concept, with transgender individuals presenting a more negative sexual self-perception. For several components of sexual esteem (related to conduct, body perception, and attractiveness) and for sexual anxiety, experiencing a mismatch between who one is and who one wants to be explains the relation between gender dysphoria and the sexual self in transgender people. While transgender individuals also differed significantly from cisgender individuals on sexual esteem related to behaviour and on several sexual attitudes (related to arousal and commitment), this was not related to gender dysphoria in the transgender group. Finally, no group differences were found on sexual self-efficacy and sexual attitudes related to exploration. This indicates that actual/ideal discrepancies could be a promising treatment target to improve transgender individuals' sexual self-concept, specifically the components related to sexual esteem and sexual anxiety.

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Chapter 3

Mental and sexual well-being in non-binary and genderqueer individuals

Based on: **Kennis, M.**, Duecker, F., T'Sjoen, G., Sack, A. T., & Dewitte, M. (2022). Mental and sexual well-being in non-binary and genderqueer individuals. *International Journal of Transgender Health*, *23*(4), 442-457. https://doi.org/10.1080/26895269.2021.1995801

Abstract

Non-binary and genderqueer (NBGQ) individuals do not identify with a binary gender identity. Some but not all NBGQ individuals identify as transgender, and it is currently unclear on which aspects of mental and sexual well-being NBGQ and binary transgender individuals may differ. The aim of this study was to compare NBGQ, binary transgender and cisgender individuals on variables related to mental well-being, sexual well-being, and sexual self-concept discrepancies. We conducted an online questionnaire study in 125 transgender men, 72 transgender women, 78 NBGQ individuals, 98 cisgender men, and 107 cisgender women. For most variables, NBGQ individuals did not differ from binary transgender individuals. These two groups differed only on gender dysphoria and transgender specific body image worries, which were both lower in the NBGQ group. Compared to the cisgender group, NBGQ individuals scored higher on gender dysphoria, actual/ought sexual self-concept discrepancies, and actual/ideal sexual self-concept discrepancies, and lower on general life satisfaction and sexual esteem related to body perception. These results offer a first quantitative analysis of sexual well-being in NBGQ individuals, and highlight that – while both groups face unique challenges – NBGQ individuals encounter similar difficulties concerning mental and sexual well-being as binary transgender individuals.

1. Introduction

The term ‘transgender person’ refers to individuals whose gender identity is incongruent with their sex assigned at birth. Transgender men, for example, identify as men and had a female sex assigned at birth, while transgender women identify as women and had a male sex assigned at birth. Other individuals do not identify (entirely) as a man or a woman but situate themselves somewhere else on the ‘gender spectrum’. These individuals are often referred to as non-binary and genderqueer (NBGQ) (Richards et al., 2016). Some NBGQ individuals even experience their identity as outside of the continuum between man and woman, which leads to many different identities and identity markers such as ‘bigender’, ‘gender neutral’, ‘pangendered’, and ‘gender fluid’ (Bockting, 2008; Davidson, 2016). In this paper, we will use the term ‘binary transgender individuals’ to indicate individuals who identify as transgender and as either man or woman, and we will use the term ‘NBGQ individuals’ for individuals whose gender identity falls outside of the gender binary, regardless of transgender identity.

Estimates of the prevalence of NBGQ identities vary (Goodman et al., 2019). Figures based on clinical samples are considered underestimates, because only a small proportion of this group seeks gender affirmative treatment (Beek et al., 2015; Richards et al., 2016). Van Caenegem et al. (2015) reported a prevalence of non-binary identities of 1.8% and 4.1% in participants with a male or female sex assigned at birth, respectively, in the general Belgian population. In a large Dutch population sample, it was found that 4.6% of participants with a male sex assigned at birth and 3.2% of participants with a female sex assigned at birth indicated experiencing an ‘ambiguous gender identity’ (Kuyper & Wijsen, 2014). However, some authors argue that issues related to language and discrimination may stand in the way of obtaining a correct estimate, for instance because NBGQ individuals are forced to define their identity in terms of a binaried language system (Nicholas, 2018). In general, it seems that especially younger people (Clark et al., 2018) and people with a female sex assigned at birth (Burgwal et al., 2019; Jones et al., 2019) identify as NBGQ.

While not all NBGQ individuals identify as transgender, NBGQ and binary transgender individuals have several things in common, in the sense that they do not fully identify with their sex assigned at birth (Fiani & Han, 2018), might consider gender affirming therapy such as hormone therapy or surgery (Eyssel et al., 2017), and often face stigmatization and discrimination related to their gender minority status (White Hughto et al., 2015). Research investigating these parameters in binary identifying transgender individuals (i.e., trans women and trans men) revealed, in general, worse mental (Dhejne et al., 2016) and sexual well-being (Kerckhoff et al., 2019) compared to cisgender individuals (i.e., individuals whose gender identity is congruent with their sex assigned at birth). Gender affirming treatment seems to have a positive effect on these factors

(Dhejne et al., 2016; Murad et al., 2010). Yet, there is less consensus on mental health in NBGQ individuals. They report worse mental health than binary transgender individuals in terms of general wellbeing (Burgwal et al., 2019) and anxiety and depression (Thorne et al., 2019) according to some studies, while others have indicated that NBGQ individuals report better mental health in terms of psychological functioning (Jones at el., 2019) and satisfaction with life (Rimes et al., 2017). The Minority Stress Model (MSM; Meyer, 1995, 2003) explains why it is likely for NBGQ individuals to suffer from mental and physical health problems. In short, the MSM holds that being part of a societal minority results in worse health because of discrimination and a phobic culture (Meyer, 1995, 2003). Indeed, the conflict with their environment/culture that NBGQ experience has been well documented in a qualitative study (Fiani & Han, 2018). In this study, NBGQ individuals described how living in their true gender was often unattainable in their environment, how they felt social pressure to conform with traditional gender labeling processes, and how – especially compared to binary transgender individuals – they felt as if they lacked a sense of community. Another frequently reported mechanism by which the societal minority status of NBGQ individuals adds to their distress, is the use of incorrect pronouns, which are often binary and hence misgendering NBGQ individuals (Eyssel et al., 2017; Guss et al., 2017). However, some studies have suggested that NBGQ individuals might show forms of resilience unique to them compared to binary transgender individuals, such as reclaiming their name, body and identity away from societal norms (Fiani & Han, 2019), which could explain the elevated mental health in NBGQ individuals reported by Jones et al. (2019) and Rimes et al. (2017).

Even less is known about sexual well-being (which is closely related to mental health; see Coelho et al., 2022; Forbes et al., 2016; Rosen & Althof, 2008) in this group. Sexual well-being is defined as encompassing individual affective components (e.g., sexual satisfaction), interpersonal components (e.g., relationship satisfaction), and socio-cultural components (e.g, public stigma) (Lorimer et al., 2019). A qualitative study by Lindley et al. (2020) has indicated that interpersonal and socio-cultural components can have a negative effect on sexual satisfaction in NBGQ individuals, for instance through limitations placed on participants' gender fluidity by their partner. To our knowledge, there are no quantitative studies investigating sexuality of NBGQ individuals, despite the fact that the World Health Organization considers sexual satisfaction/health and important determinant of quality of life (WHOQOL Group, 1994). However, the struggles described in the study by Fiani and Han (2018), such as the experience of lack of role models, could possibly relate to actual/ought (sexual) self-concept discrepancies. These discrepancies were first described by Higgins (1987) and refer to the discrepancy between one's actual self-concept ("Who am I?") and one's ought self-concept ("Who should I be?"). While NBGQ individuals' actual sexual self-concept is likely based on their actual gender identity, their ought sexual self-concept is influenced by common

ideas about sexuality in society (i.e., "sexual situations and scripts mainly involve binary identifying individuals"). This discrepancy, like all self-concept discrepancies, can cause distress and frustration if they grow too large and the individual does not manage to cope with them (Higgins, 1987). Previous research has shown that actual/ought self-discrepancies can negatively influence sexual adjustment in cohorts of White women (Katz & Farrow, 2000), and that actual/ought sexual self-concept discrepancies influence feelings of dejection in study groups of Black women (Holmes, 2002), indicating the close connection between self-concept discrepancies, identity (and associated minority status) and sexuality.

Given that so little is known about the mental and sexual well-being of NBGQ individuals, this study aims to give a broad overview of factors related to these concepts. We conducted an online questionnaire study including NBGQ individuals as well as binary transgender and cisgender individuals. In this study, we explore mental well-being (anxiety, depression, and general life satisfaction), sexual well-being (sexual self-esteem, sexual satisfaction, and sexual worries), and actual/ideal and actual/ought sexual self-concept discrepancies. Given the explorative nature of this study, which is the first to explicitly address this question empirically, we restrained from formulating concrete a priori hypotheses about group differences and their directions. We hope this study might inform clinicians about mental health and sexuality challenges specific for NBGQ people, as well as identify relevant variables for future studies involving this population.

2. Methods

2.1 Participants

Participants had to be at least 18 years old. In total, 514 participants completed at least part of the survey. From these, three were removed from the dataset because they were younger than 18 years old; three were removed because they did not enter their age; five were removed because they did not enter any information on gender identity; 21 were removed because of a clearly invalid response profile; and two were removed because they indicated having an intersex condition assigned at birth (i.e., at birth their sex could not be assigned as either male or female). The final sample consisted of 480 participants (age; M = 30.208, SD =11.297), that fell into one of five groups: transgender men (n = 125), transgender women (n = 72), cisgender men (n = 98), cisgender women (n = 107), non-binary/genderqueer (NBGQ) (n = 78). Two hundred fifty five participants completed the questionnaire in English and 225 participants completed it in Dutch (all questionnaires were back-to-back translated).

2.2 Procedure

After approval by the Ethics Review Committee Psychology and Neuroscience (ERCPN) of Maastricht University (approval code: 225_95_07_2020), the survey was programmed in Qualtrics. The study was administered online between July 16th and October 2nd 2020. Transgender participants were mainly recruited online via social media in the LGBTQI+ community, including the use of Facebook groups, Twitter, and support organizations advertising the study. In order to reach cisgender people, we advertised the study within the broader university and sex research community. Finally, we asked participants who had completed the survey to spread the link among potentially interested people in their network.

Participants declared informed consent at the beginning of the survey, which took 15-25 minutes in total per participant. As a reward, participants could enter a raffle for a €10 gift voucher at the end of the survey (one voucher per 20 participants; participants were made aware of the odds). The email addresses provided for the raffle were stored separately from the questionnaire responses.

2.3 Measures

Demographics We developed a questionnaire including open questions on age, country of residence, mother tongue, and the number of children participants had, as well as multiple choice questions on educational level, occupation, housing (e.g., living with family, living alone), and relationship status and length. Sex assigned at birth was assessed via a multiple-choice question including *Male*, *Female*, *Intersex*, and an open option. Gender identity was assessed via a multiple-choice question including *Man*, *Woman*, *Non-Binary*, and an open option. Based on these two questions, participants were assigned to the binary cisgender group (in case responses were Male+Man, or Female+Woman), the binary transgender group (in case responses were Male+Woman, or Female+Man), or the NBGQ group (in case they indicated identifying as Non-Binary). Responses from participants who indicated identifying with another gender identity using the open option were all inspected, with any indication of the participant not identifying fully within the gender binary resulting in an assignment to the NBGQ group (e.g., 'non-binary transman' being assigned to the NBGQ group). Furthermore, participants were asked whether they identified as transgender, in which case they were also asked when they had first become aware of their transgender identity and whether they had received a diagnosis of gender dysphoria, which is defined as the clinically significant distress one can feel due to the incongruence between sex assigned at birth and gender identity (American Psychiatric Association, 2013). Sexual orientation was assessed by presenting two sliding scales (one for men, one for women) on which participants could indicate

how much they were attracted to these genders in general (scored from 0 to 100, with lower scores indicating lower attraction). For instance, someone who is generally attracted to women but not to men could put the slider close to 100 for women and close to 0 for men; someone who is generally attracted to both could put them both close to 100; and someone who feels no attraction to either men or women could put both sliders close to 0. Finally, participants who indicated identifying as transgender were asked whether they were on a waiting list for gender affirming treatment (GAT) at the time of filling in the survey and what type of GAT they had already received (gender affirming hormone therapy (GAHT) and/or gender affirming surgery (GAS)), and whether they (still) desire receiving GAT in the future. Because the data on treatment (desire) in the transgender group is not of relevance for our current research questions, they will not be presented in this chapter.

Mental well-being Feelings of gender dysphoria were assessed using the Utrecht Gender Dysphoria Scale (UGDS; Cohen-Kettenis & Van Goozen, 1997; Steensma et al. 2013), which has two different versions depending on the sex assigned at birth of the respondent (male/female). Each version consists of 12 items (e.g., "I would prefer not living to living as a boy/man", assigned male at birth version) which participants had to rate on a five-point scale ranging from *Entirely disagree* to *Entirely agree*. Because some of the questions would not apply to transgender people who have already undergone certain types of GAT (e.g. "I hate having breasts" for a transgender men who has undergone mastectomy), we included the response option *not applicable*, which was scored to one (low gender dysphoria). Participants' final score on the UGDS was calculated by averaging the scores for all items, with the final scores ranging from one (no gender dysphoria) to five (high gender dysphoria). Both versions had high reliability in our sample (Cronbach's α = .98 for male sex assigned at birth version; Cronbach's α = .95 for female sex assigned at birth version).

Because the UGDS does not only include items indicating dysphoria related to the sex assigned at birth (e.g., "I feel unhappy because I have a masculine body" for the male sex assigned at birth version), but also items referring to desiring to live according to the 'opposite side' of the gender binary (e.g., "Only as a girl/woman, my life would be worthwhile" for the male sex assigned at birth version), it is possible that lower UGDS scores in the NBGQ group compared to the binary transgender group would not reflect differences in experienced incongruence with their sex assigned at birth per se, but differences in the identification with the opposite gender from a binary perspective. In order to check whether differences in gender identity (instead of differences in dysphoria related to the sex assigned at birth) could explain possible differences in UGDS scores, we performed an exploratory factor analysis on the female sex assigned at birth version of the UGDS scale (since there were too little NBGQ participants with a male sex assigned at birth) using the data from the binary transgender and NBGQ participants. Of the

resulting three factors, the first one did indeed consist of items referring to identification with a male gender (e.g., "I prefer to behave like a boy/man"), while the second factor consisted of items referring to dissatisfaction with the female sex assigned at birth (e.g., "Living as a girl/woman is something positive to me") and the third consisted of items referring to body image (e.g., "I hate seeing myself naked in the mirror"). Therefore, investigating differences on the factor scores, we can explore whether the (female sex assigned at birth) groups differ in identification with a male gender (factor 1), distress related to the female sex assigned at birth (factor 2), or body image (factor 3).

We assessed anxiety and depression using the Hospital Anxiety and Depression Scale (HADS; Zigmund & Snaith, 1983). The questionnaire consists of a seven-item anxiety scale (e.g., "Worrying thoughts go through my mind") (Cronbach's α = .84) and a seven-item depression scale (e.g., "I feel as if I am slowed down") (Cronbach's α = .66), presenting participants four response options that varied per statement. For each scale, scores range from 0 to 21, with higher scores indicating higher anxiety/depression. A score under 7 is considered normal, scores between 8 and 10 are considered borderline, and scores higher than 10 are considered abnormal.

General life satisfaction was assessed using the Satisfaction With Life Scale (SWLS; Diener et al., 1985). The questionnaire consists of five items (e.g., "In most ways my life is close to my ideal") (Cronbach's α = .91) which had to be rated on a seven-point Likert scale ranging from *Strongly disagree* to *Strongly agree*. Sum scores ranged from 7 to 35, with higher scores indicating higher life satisfaction.

Sexual well-being The measure of Sexual Esteem, which is defined as a person's self-evaluation of worth as a sexual being, was taken from a larger questionnaire on sexual self-concept (Buzwell & Rosenthal, 1996; adapted by Deutsch et al., 2014). All items were statements that had to be rated on a five-point scale ranging from *Strongly disagree* to *Strongly agree*. The scale consists of four subscales. The Behavior subscale assesses perceptions about one's sexual behavior (five items, e.g., "I feel comfortable with my sexuality", Cronbach's α = .80). The Body Perception subscale assesses body satisfaction and feelings of bodily maturity (nine items, e.g., "When other people look at me they must think I have a poorly developed body", Cronbach's α = .66). The Conduct subscale assesses feelings of adequacy in sexual situations and with a partner (four items, e.g., "It is very hard for me to know how to behave in a sexual situation", Cronbach's α = .78). The Attractiveness subscale assesses feelings of attractiveness and sexual desirability (six items, e.g., "I am confident that people find me attractive", Cronbach's α = 0.68). A score ranging from one to five was calculated for each subscale by averaging all the item scores.

Trans-specific body image worries were assessed using the T-WORRY (Dharma et al. 2019), which was only presented to participants identifying as transgender. The scale consists of seven items (Cronbach's α = .79), representing worries transgender people could have while having sex, that had to be rated on a five-point scale ranging from *Not at all* to *Very*. The T-WORRY questionnaire covers both general body image anxiety (e.g., "When I think about having sex, I worry that other people think my body is unattractive") and trans-related anxiety (e.g., "When I think about having sex, I worry that once I'm naked, people will not see me as the gender I am"). Sum scores ranged from 5 to 35, with higher scores indicating more worries.

Sexual satisfaction was assessed using the Global Measure of Sexual Satisfaction (GMSEX; Lawrance & Byers, 1995), a five-item measure assessing satisfaction on a seven-point scale. Scores ranged from 7 to 35, with higher scores indicating higher sexual satisfaction. The scale showed sufficient reliability in our sample (Cronbach's α = .96).

Sexual Self-Concept discrepancies We developed a concise measure of two types of sexual self-concept discrepancies (based on Higgins, 1987): actual/ideal and actual/ought. After having read a short description of the definition of the actual (i.e., all the ideas a person has about who they currently are as a sexual person), ideal (i.e., all the ideas a person has about who they want to be as a sexual person), and ought (i.e., all the ideas a person has about who they should be as a sexual person) sexual self-concept, participants used a sliding scale to indicate how large the discrepancies between their self-concepts are. The positions on the scale were coded into a score ranging from 0 to 100, with higher scores indicating a higher SSC discrepancy.

2.4 Analysis

All statistical analyses were performed using the software JASP (JASP team, 2020). We applied a significance threshold of p = .01 for all analyses, with a Bonferroni correction per variable cluster (mental well-being, sexual well-being, and sexual self-concept discrepancies). Group differences on continuous variables were analyzed using one-way ANOVAs, while chi-square tests of independence were applied in case of categorical variables. In case of a significant ANOVA outcome, post-hoc comparisons were analyzed applying the Tukey HSD test for multiple comparisons.

3. Results

3.1 Sample descriptives

Sample descriptives are presented in Table 1 (continuous variables) and Table 2 (categorical variables). Sixty of the NBGQ participants (77%), 125 of the binary transgender participants (63.4%), and 107 of the cisgender participants (52.2%) had a

female sex assigned at birth, which was a significant difference ($X^2(2, N=480) = 15.46$). The groups did not differ in terms of age. Most participants indicated living in the Netherlands ($n=261$, 54.4%), in the United States of America ($n=90$, 18.8%), or in Belgium ($n=62$, 12.9%).

The three groups differed significantly with regard to attraction to women (with the cisgender group scoring lower than both other groups; $p < .001$ for both), but not regarding attraction to men. Chi-square tests indicated that the groups differed significantly in terms of occupation and housing, but not in terms of education or relationship status. For occupation, this difference was mainly driven by relatively high unemployment rates in the NBGQ and binary transgender groups, and relatively high fulltime employment rates in the cisgender groups. For housing, the difference was mainly driven by the NBGQ and binary transgender groups more frequently indicating they lived with their parents or family, while the cisgender group indicated mostly living with a partner.

Table 1.
Descriptive statistics and group differences for age and sexual orientation.

	NBGQ *M* *SD* *(n)*	Binary transgender *M* *SD* *(n)*	Cisgender *M* *SD* *(n)*	Group difference
Age	30.55 13.10 (78)	31.06 11.48 (197)	29.26 10.33 (205)	$F(477,2) = 1.32$ $p = .267$
Attraction to men	57.89 37.31 (71)	52.97 35.88 (190)	53.83 38.90 (150)	$F(408,2) = .46$ $p = .633$
Attraction to women	71.38 32.37 (71)	67.18 33.64 (190)	46.833 36.516 (150)	$F(408,2) = 18.85$ $p < .001$*

NBGQ = non-binary/genderqueer individuals, *M* = mean, *SD* = standard deviation, *n* = sample size
Age is presented in years; attraction is expressed on a scale from 0 to 100. The significance threshold is $p < .017$ (significant differences indicated with *).

Table 2.
Descriptive statistics and group differences for romantic relationships, education, occupation, and housing.

		NBGQ *n* (%)	Binary transgender *n* (%)	Cisgender *n* (%)	Group difference
Relationship	Yes	45 (57.69)	91 (46.19)	120 (58.54)	$X^2(2, N=480) = 6.86$ $p = .032$
	No	33 (42.31)	106 (53.81)	85 (41.46)	
Education	No high school	1 (1.28)	6 (3.08)	2 (.95)	$X^2(2, N=477) = 9.06$ $p = .060$
	High school	19 (24.36)	78 (40)	74 (36.27)	
	College/ University	58 (74.36)	111 (56.92)	128 (62.75)	
Occupation	Employed	34 (43.59)	99 (50.25)	113 (55.39)	$X^2(2, N=478) = 25.36$ $p = .001$*
	Student	28 (35.9)	61 (30.96)	71 (34.8)	
	Unemployed/ retired	16 (20.51)	37 (18.78)	20 (9.8)	
Housing	Alone	17 (21.79)	64 (32.49)	46 (22.44)	$X^2(2, N=480) = 27.26$ $p = .002$*
	With partner	26 (33.33)	51 (25.89)	75 (36.59)	
	With parents/ family	20 (25.64)	52 (26.4)	29 (14.15)	
	Student housing/ friends	15 (19.23)	28 (14.21)	55 (26.83)	
	Other	0 (0)	2 (1.02)	0 (0)	

NBGQ = non-binary/genderqueer individuals, *n* = sample size.
The significance threshold is $p < .013$ (significant differences indicated with *).

Of the participants in the NBGQ group, 62 indicated having a transgender identity (79.5%), and 26 of them had received a diagnosis of gender dysphoria. In the NBGQ group, sixteen participants were receiving hormone treatment (27.12%) and

twelve had received some form of gender affirming surgery (20.34%). In the binary transgender group, 140 participants indicated receiving hormone treatment (81.87%) and 87 indicated having received some form of gender affirming surgery (50.88%).

3.2 Mental well-being

Table 3 presents the descriptive statistics and outcomes of the one-way ANOVA group comparisons on anxiety, depression, general life satisfaction, and gender dysphoria. We applied a significance threshold of $p = .01/4 = .003$. The NBGQ and binary trans- and cisgender groups differed significantly on general life satisfaction and gender dysphoria, but not on depression and anxiety (although there was a trend for the latter). Post-hoc Tukey HSD tests indicated that all pairwise comparisons on gender dysphoria were significant ($p < .001$), with the NBGQ group scoring higher than the cisgender group, but lower than the binary transgender group. Post-hoc comparisons for general life satisfaction indicated that the NBGQ scored lower than the cisgender group ($p = .001$) but not different from the binary transgender group ($p = .945$). Additionally, the binary transgender group scored lower than the cisgender group ($p < .001$).

3.3 Follow-up analyses Utrecht Gender Dysphoria Scale

As shown in Table 3, the binary transgender and the NBGQ group differ significantly in UGDS scores, with the binary transgender group scoring higher on gender dysphoria. We therefore investigated possible differences between the transgender and NBGQ on the three factors of the female version of the UGDS (items referring to identification with a male gender; items referring to dissatisfaction with the female sex assigned at birth; and items referring to body image). Independent sample t-tests indicated that the NBGQ and binary transgender groups differed significantly on all three factors ($p < .001$ for all three tests), indicating that while the groups did indeed differ in the degree to which they identify with a male gender identity, the NBGQ group also scored lower on distress concerning their female sex assigned at birth. This supports the conclusion that the NBGQ individuals in our sample did indeed report less gender dysphoria than the binary transgender participants (with female sex assigned at birth).

Table 3.
Descriptive statistics and group differences on anxiety and depression (HADS), general life satisfaction (SWLS), and gender dysphoria (UGDS).

	NBGQ *M* *SD* *(n)*	Binary transgender *M* *SD* *(n)*	Cisgender *M* *SD* *(n)*	Group difference
Anxiety	9.04 4.90 (71)	8.90 4.84 (165)	7.62 3.89 (164)	$F(397,2) = 4.21$ $p = .016$
Depression	6.28 3.57 (71)	5.94 3.92 (165)	5.85 2.62 (164)	$F(397,2) = 0.41$ $p = .667$
General life satisfaction	18.99 7.30 (68)	18.64 7.42 (164)	22.78 7.54 (160)	$F(389,2) = 13.93$ $p < .001$*
Gender dysphoria	3.47 0.75 (77)	4.34 0.60 (190)	1.58 0.61 (173)	$F(437,2) = 869.22$ $p < .001$*

NBGQ = non-binary/genderqueer individuals, *M* = mean, *SD* = standard deviation, *n* = sample size.
The significance threshold is $p < .013$ (significant differences indicated with *).

3.4 Sexual well-being

Table 4 presents the descriptive statistics and outcomes of the one-way ANOVA group comparisons on the four sexual self-esteem components, transgender specific body worries, and sexual satisfaction. We applied a significance threshold of $p = .01/6 = .002$. The three groups differed significantly on all six variables. Post-hoc group comparison indicated that the NBGQ group and the binary transgender group did not differ on any of the variables except for transgender specific body worries ($p < .001$), with only a trend towards a difference in sexual satisfaction ($p = .066$, with NGBQ individuals scoring higher). Compared to the cisgender group, the NBGQ scored lower on all variables ($p = .007$ for Sexual esteem – body perception), although for most this remained only at trend level ($p = .023$ for Sexual esteem – behavior; $p = .013$ for Sexual esteem – conduct; $p = .037$ for Sexual esteem – attractiveness; $p = .026$ for sexual satisfaction). The cisgender group scored significantly higher than the binary transgender group on all variables ($p < .001$ for all).

Table 4.
Descriptive statistics and group differences on sexual esteem (behavior, body perception, conduct, and attractiveness), transgender specific body image worries (TWORRY), and sexual satisfaction (GMSEX).

	NBGQ *M* *SD* *(n)*	Binary transgender *M* *SD* *(n)*	Cisgender *M* *SD* *(n)*	ANOVA *F*
Sexual esteem – behavior	3.71 0.96 (71)	3.53 0.93 (167)	4.06 0.97 (166)	13.26 $p < .001$*
Sexual esteem – body perception	3.30 0.64 (71)	3.28 0.64 (167)	3.58 0.66 (166)	9.84 $p < .001$*
Sexual esteem – conduct	3.24 1.11 (69)	3.00 1.11 (167)	3.69 1.10 (165)	16.36 $p < .001$*
Sexual esteem – attractiveness	3.28 .91 (70)	3.16 0.85 (167)	3.58 0.82 (165)	10.37 $p < .001$*
Transgender specific body worries	13.89 6.46 (55)	17.18 6.14 (158)	n.a.	11.37 $p < .001$*
Sexual satisfaction	25.25 7.96 (71)	22.70 9.42 (162)	28.20 6.27 (163)	19.26 $p < .001$*

NBGQ = non-binary/genderqueer individuals, *M* = mean, *SD* = standard deviation, *n* = sample size. Note: the TWORRY questionnaire was only completed by individuals who identify as transgender, hence there was no data from the cisgender group. The significance threshold is $p < .001$ (significant differences indicated with *).

3.5 Sexual self-concept discrepancies

Table 5 presents the descriptive statistics and outcomes of the one-way ANOVA group comparisons on actual/ideal sexual self-concept discrepancies and actual/ought sexual self-concept discrepancies. We applied a significance threshold of $p = .01/2 = .005$. Post-hoc group comparisons indicated that for both discrepancies, the NBGQ group scored significantly higher than the cisgender group ($p < .001$), but not different from the binary transgender group ($p = .247$ for actual/ideal, $p = .979$ for actual/ought). Additionally, the binary transgender group scored higher than the cisgender group for both discrepancies ($p < .001$).

Table 5.
Descriptive statistics and group differences on actual/ideal and actual/ought sexual self-concept discrepancies.

	NBGQ *M* *SD* *(n)*	Binary transgender *M* *SD* *(n)*	Cisgender *M* *SD* *(n)*	ANOVA *F*
Actual/Ideal SSCD	49.41 28.10 (66)	55.86 28.60 (156)	34.70 26.16 (178)	25.54 $p < .001$*
Actual/Ought SSCD	49.19 30.21 (64)	50.02 29.99 (152)	31.82 26.00 (175)	19.47 $p < .001$*

NBGQ = non-binary/genderqueer individuals, *M* = mean, *SD* = standard deviation, *n* = sample size, SSCD = sexual self-concept discrepancy.
The significance threshold is $p < .025$ (significant differences indicated with *).

4. Discussion

In this study, we investigated mental well-being, sexual well-being, and sexual self-concept discrepancies in NBGQ individuals using an online questionnaire. We compared this group to a group of binary identifying transgender individuals and a group of binary identifying cisgender individuals. In terms of mental well-being, we found that the groups did not differ in their level of anxiety and depression, but the NBGQ group did score lower on general life satisfaction than the cisgender group. Their anxiety and depression scores did, however, not differ from binary transgender individuals. NBGQ individuals scored higher on gender dysphoria than cisgender individuals, but lower than binary transgender individuals. In terms of sexual well-being, the binary identifying transgender group scored significantly higher on transgender specific body-image worries than the NBGQ group, but there were no differences in terms of sexual esteem or satisfaction between these two groups. Compared to the cisgender group, the NBGQ only scored lower on sexual esteem related to body perception. Interestingly, for the variables related to sexual well-being on which the NBGQ did not significantly differ from the other two groups (sexual esteem related to behaviour, conduct, and attractiveness, and sexual satisfaction), a non-significant pattern emerged in which the NBGQ scores seem to fall in between the scores from the other two groups. Finally, for both actual/ideal and actual/ought sexual self-concept discrepancies, NBGQ participants scored significantly higher than cisgender participants, but not different from binary transgender participants. In the following paragraphs, we will elaborate on this pattern of findings.

4.1 Mental well-being in NBGQ individuals

In the current sample, we found significant group differences for gender dysphoria, on which the NBGQ group scored higher than the cisgender group, but lower than the binary transgender group. It has previously been pointed out that the UGDS we employed possibly fails to reflect NBGQ individuals' experiences (McGuire et al., 2020), as some items reflect a desire to live in the gender (role) 'opposite' to the one assigned at birth. We therefore conducted a factor analysis to investigate whether the differences between the NBGQ and binary transgender group might have been driven by a difference in gender role desire rather than a difference in gender dysphoria/congruence. We found that NBGQ individuals with a female sex assigned at birth did indeed score lower than transgender men on all factors, including the items relating to actual dissatisfaction with their sex assigned at birth. This is in line with the findings by Jones et al. (2019a), who found that NBGQ showed higher gender congruence related the chest, genitalia, and secondary sex characteristics than binary transgender individuals, but lower gender congruence on these aspects than cisgender individuals. Note, however, that the same study also revealed that there were no differences between NBGQ and binary transgender individuals on gender congruence related to appearance or social gender role recognition, which was lower in both groups than in their cisgender sample (Jones et al., 2019a). This is inconsistent with our findings, because many of the items of the UGDS also refer to social roles and appearance. It is difficult to explain this inconsistency because Jones et al.'s (2019a) sampling method and sample size were similar to ours, and the samples even showed similar distributions in terms of sex assigned at birth and age. We did, however, rely on a different questionnaire, which indicates the importance of using standardized questionnaires that have been validated in both binary and non-binary individuals to assess gender dysphoria in the future. Nevertheless, the current data indicate that NBGQ do not suffer from gender dysphoria to the same degree as binary transgender individuals. This suggests that there is a need for clinicians to develop treatment paths different from the ones applied to binary transgender individuals, as those might not be sufficiently adapted to the wishes and needs of NBGQ individuals in terms of alleviating gender dysphoria (Jones et al., 2019a; Taylor et al., 2018).

In terms of general life satisfaction, the NBGQ group scored significantly lower than the cisgender group, but not different from the binary transgender group. This corresponds with the findings of Jones et al. (2019a), who found the same pattern in terms of life satisfaction and quality of life. However, another study (using the same questionnaire assessing general life satisfaction as the current study) found that binary transgender individuals scored lower than NBGQ individuals (Rimes et al., 2019). Although this study did not directly compare the gender minority groups to a cisgender group, they did report that the scores from the NBGQ and binary transgender groups were lower than in general population studies (Diener et al., 1985; Rimes et al., 2019). The

inconsistency in findings regarding the NBGQ and binary transgender individuals might be related to differences in sample, as Rimes et al. (2019) focused on gender binary youth, while Jones et al.'s (2019a) and our study also included older individuals. If this is the case, this could either mean that older binary transgender individuals show more general life satisfaction, or older NBGQ individuals show less general life satisfaction, or a combination of both. Future studies should investigate how general life satisfaction differs in gender minorities across various age groups and which factors could explain possible fluctuations.

In the literature on transgender individuals, differences in general life satisfaction and mental health are often explained using the Minority Stress Model (Meyer, 1995; 2003). Our finding that NBGQ and binary transgender groups reported less life satisfaction than the cisgender group fits this model, thereby explaining how a (gender) minority status can lead to lowered mental and physical health through experiences of discrimination. These experiences of discrimination are possibly reflected in our sample too, with the binary transgender and NBGQ group reporting higher unemployment rates and more often living with their parents or family. However, while both gender minority groups might share some of the factors that negatively affect life satisfaction, such as experiences with transphobia, interpersonal challenges and discrimination in public spaces, qualitative studies did suggest different pathways for NBGQ compared to binary transgender individuals (Fiani & Han, 2018). For instance, NBGQ individuals can feel excluded from binary transgender spaces (Fiani & Han, 2018) and might experience more societal intolerance due to violating the gender binary norm (Burgwal et al., 2019). However, the lack of a difference in general life satisfaction between the NBGQ and binary transgender groups in our sample suggests that NBGQ individuals can counteract these unique challenges. For instance, Fiani & Han (2019) reported resilience in NBGQ individuals who manage to redefine and reclaim their identities regardless of societal norms. The mechanisms affecting general life satisfaction for NGBQ individuals specifically should be a focus of future research.

Interestingly, the three groups in our sample did not differ significantly in terms of anxiety or depression. While Jones et al. (2019a) found that NBGQ scored lower on mental health than cisgender individuals but higher than binary transgender individuals, Thorne et al. (2018) found that NBGQ individuals scored higher on both anxiety and depression than binary transgender individuals. However, the latter study included only treatment seeking NBGQ individuals in their sample, which are likely to encounter very specific challenges compared to treatment seeking binary transgender individuals. Warren et al. (2016), who recruited a community sample of NBGQ individuals, binary transgender individuals, and sexual minority cisgender individuals, found that the NBGQ group did not differ from either two other groups in terms of anxiety and depression, while the binary transgender group scored higher than the cisgender group. The lack of

differences between any of the groups in our sample was thus rather unexpected. It should be noted that, especially for the anxiety subscale, the scores in our cisgender sample are relatively high compared to other community samples (e.g., Hinz & Brähler, 2011; Hinz et al., 2013), even reaching scores above the cut-off of normality (Zigmund & Snaith, 1983). Perhaps this was due to the fact that our study was conducted in the middle of the COVID-19 pandemic, which posed serious threats to mental health for many (Wang, Kala & Jafar, 2020) and might have elevated the scores in our cisgender sample, affecting the difference with the other two groups. However, it has been suggested that the pandemic negatively affected mental health in (young) trans and gender diverse individuals as well, specifically by elevating anxiety and depression (Jones et al., 2021).

4.2 Sexual well-being in NBGQ individuals

In terms of sexual well-being, the only differences between the NBGQ group and the other two groups were that they scored lower on sexual esteem related to body perception compared to the cisgender group, and lower on transgender-specific body worries than the binary transgender group. The binary transgender and the cisgender group differed much more, with the binary transgender group scoring lower on sexual esteem related to body perception, attractiveness, conduct and behavior, and on sexual satisfaction. For these variables, the scores of the NBGQ groups seemed to fall in between the two other groups (see Table 4), resulting in marginally significant differences with the cisgender group.

The fact that sexual esteem related to body perception was lower in NBGQ and binary transgender individuals compared to cisgender individuals is in line with findings form qualitative research on sexual well-being in gender minorities. For instance, Martin and Coolhart (2019) described how for many NBGQ and transgender individuals body dysphoria interferes with their sexual experiences. Participants described a disconnection between body and mind, leading to distressing thoughts during sexual encounters. Similarly, Lindley et al. (2020) indicated how gender minority individuals sometimes desire different body parts in order to reach sexual satisfaction. Our study provides the first quantitative data to confirm that sexual esteem related to body perception is lower in NBGQ individuals. However, it should be indicated that gender and body dysphoria are not the only components affecting sexual well-being in NBGQ and binary transgender individuals, but that relationship and partner factors might be just as important (Lindley et al., 2021), which is something we did not specifically address in this study.

Lindley et al. (2021) showed that sexual well-being in NBGQ and transgender individuals is influenced by both universal determinants and trans-specific factors, such as bodily comfort. While the NBGQ and binary transgender groups in our sample did not differ from each other on any of the sexual esteem components or on sexual satisfaction,

the binary transgender group scored higher on trans-specific body image worries. It should be noted that the T-WORRY questionnaire was presented only to those identifying as transgender, which applied to only a subgroup of the NBGQ individuals. This makes the difference between the two groups even more interesting, because they share a transgender identity. Our results indicated that binary transgender individuals worry more about their bodies in a sexual context. While these worries have been described in the literature before (Dharma, Scheim, & Bauer, 2019; Lindley et al., 2020; 2021; Martin & Coolhart, 2019), our study is the first to map differences between binary and non-binary transgender individuals. Possibly, this difference is explained by the fact that our NBGQ sample reported lower gender dysphoria compared to the binary transgender sample, since the T-WORRY questionnaire includes items related to gender dysphoria (e.g., "When I think about having sex, I worry that I cannot have the sex I want until I have a(nother) surgery"). Whether these differences can be ascribed to less gender dysphoria in NBGQ individuals or to other factors should be explored in further research. Interestingly, the difference in transgender specific body worries between the two groups does not directly translate into a difference in sexual satisfaction. This suggests that either the binary transgender group has developed mechanisms to cope with their transgender specific body worries, or that these worries are not directly related to sexual satisfaction.

Finally, we want to point out the pattern of scores on sexual esteem related to behaviour, conduct, and attractiveness, and sexual satisfaction. While the NBGQ group did not differ from the other two groups on these variables, the scores in Table 4 present a pattern in which the NBGQ seems to fall in between the other two groups, with the binary transgender group scoring lowest and the cisgender group scoring highest. While this lack of significant differences indeed possibly indicates that there are no differences, it is also plausible that our results failed to reach significance due to the use of conservative statistics (Bonferroni correction) and a sample size too low to reach sufficient power. Future studies could therefore further investigate this pattern with larger samples of NBGQ individuals.

4.3 Sexual self-concept discrepancies in NBGQ individuals

Sexual self-concept discrepancies refer to the discrepancy between one's actual sexual self-concept and either their ideal or their ought sexual self-concept. We found that for both actual/ideal and actual/ought discrepancies, NBGQ and binary transgender individuals scored higher than cisgender individuals, but that the two gender minority groups did not differ from each other. This means that for both NBGQ and binary transgender people, their actual sexual self-concept (all the ideas about who they are as a sexual person) is further away from their ideal sexual self-concept (all the ideas about who they want to be as a sexual person) and their ought sexual self-concept (all the ideas about who they should be as a sexual person) compared to cisgender individuals. This is

hinted upon in the few qualitative studies on sexuality in NBGQ individuals, which have described strategies NBGQ and transgender individuals employ to diminish their confrontation with how they are not who they want to be (Martin & Coolhart, 2019). For instance, they can turn the light off and limit touch to body parts that they are comfortable with. Interestingly, while in our sample the NBGQ individuals scored lower on gender dysphoria compared to the binary transgender group, this does not translate to a difference in sexual self-concept discrepancies between these two groups, indicating the possibility that factors other than gender dysphoria affect these discrepancies. For actual/ought sexual self-concept discrepancies, this seems rather intuitive: it is possible that these are mostly affected by societal and other social messages gender minority individuals receive about who they should be as a sexual person and that gender dysphoria itself stays out of the equation, which is something to be explored in future research. However, we did expect such societal influences to affect NBGQ individuals' actual/ought sexual self-concept discrepancies more, since previous studies have reported how they face unique challenges compared to binary transgender individuals (Fiani & Han, 2018). The lack of differences in actual/ideal sexual self-concept discrepancies between NBGQ and binary transgender individuals is also difficult to explain. Given that NBGQ individuals reported less gender dysphoria than binary transgender individuals, it is unlikely that the large actual/ideal self-concept discrepancies in the former group are merely influenced by gender incongruence. This indicates that factors other than gender incongruence related distress stand in the way of NBGQ individuals to sexually be who they want to be. Future studies should investigate what factors facilitate (e.g., experiences of discrimination, body dissatisfaction) or inhibit (e.g., partner dynamics, role models, sense of community) actual/ideal sexual self-concept discrepancies for both groups in order to investigate how to diminish those discrepancies.

4.4 Limitations

Although this was the first study to provide quantitative data on sexual well-being in NBGQ individuals, there are several limitations we need to take into account. First, by recruiting via the internet, we have mainly reached young, Western people, which limits generalizability of our results. Similarly, it was clearly communicated to potential participants that the study addressed issues related to sexuality, which also likely induced a self-selection bias. For instance, this could have caused the study to mostly attract participants who are fairly comfortable with their sexuality, or participants who experience sexual problems and want this to be given scientific attention. Second, while all questionnaires showed sufficient reliability in all subgroups, not all questionnaires were previously validated for gender minorities. Specifically, the gender dysphoria measure we used was developed within a binary framework. Where needed, we tailored all questions to be appropriate for NBGQ and binary transgender individuals. Nevertheless, we received feedback that the questionnaire was not always suitable for

asexual or polyamorous individuals, which we will take into account in future studies. Third, participants were allowed to leave questions open or leave the survey early, resulting in dropout throughout the survey.

5. Conclusion

We conducted an online survey on mental well-being, sexual well-being, and sexual self-concept discrepancies in NBGQ, binary transgender, and cisgender individuals. NBGQ individuals scored similar to binary transgender individuals on most aspects, except for gender dysphoria and transgender specific body image worries, on which binary transgender individuals scored higher. Compared to cisgender individuals, NBGQ individuals score lower on general life satisfaction and sexual esteem related to body perception, and higher on gender dysphoria and sexual self-concept discrepancies. Future studies should focus on whether lower mental and sexual well-being as well as higher sexual self-concept discrepancies in NBGQ and binary transgender individuals are caused by the same mechanisms in order to provide tailored solutions for various gender diverse groups.

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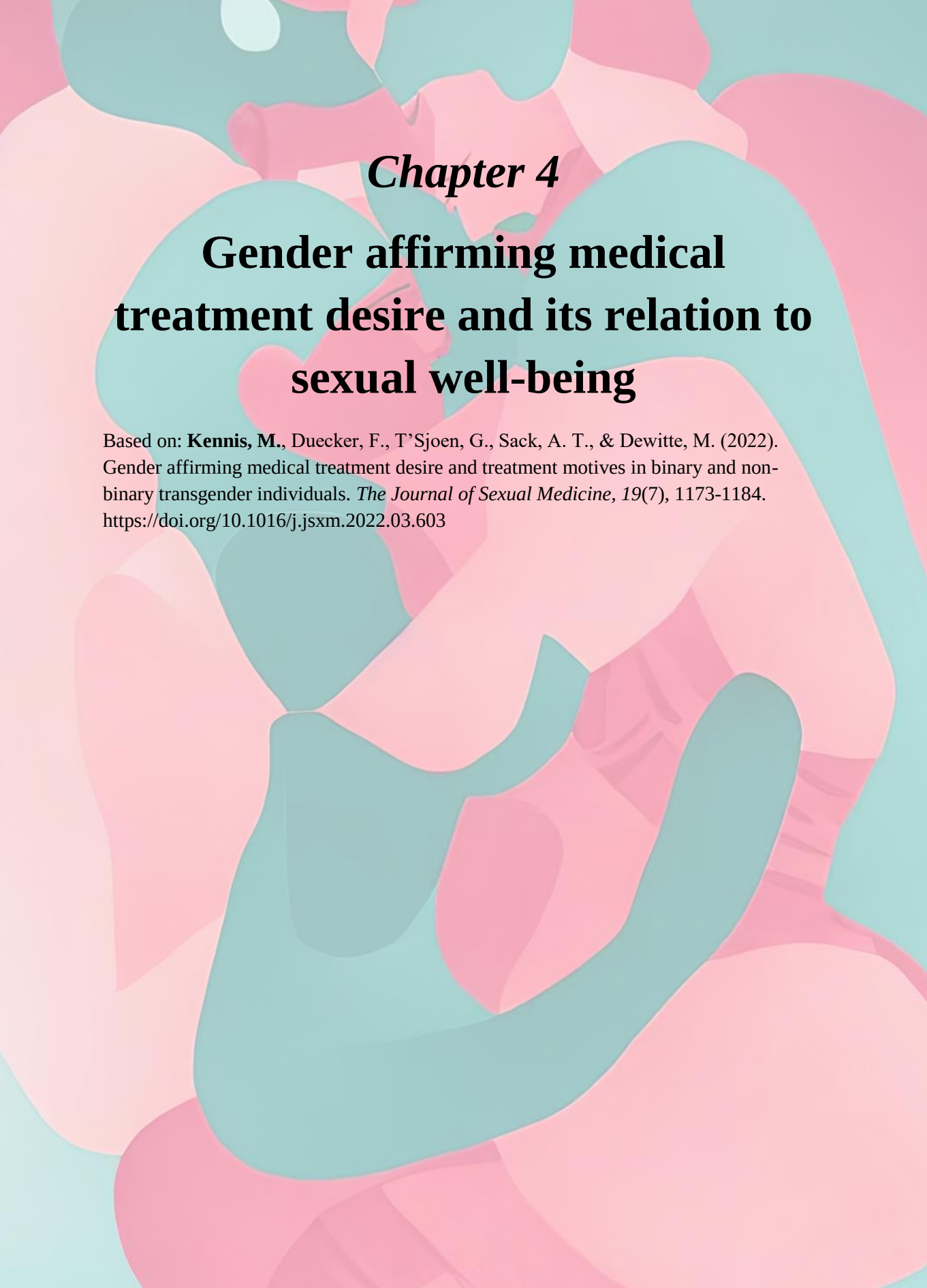

Chapter 4

Gender affirming medical treatment desire and its relation to sexual well-being

Based on: **Kennis, M.**, Duecker, F., T'Sjoen, G., Sack, A. T., & Dewitte, M. (2022). Gender affirming medical treatment desire and treatment motives in binary and non-binary transgender individuals. *The Journal of Sexual Medicine, 19*(7), 1173-1184. https://doi.org/10.1016/j.jsxm.2022.03.603

Abstract

It is currently unknown whether there are differences in desire for gender affirming medical treatment (GAMT) between binary and non-binary transgender individuals, although the latter seek treatment less prevalently. The aim of this study was to investigate differences between binary and non-binary individuals on received GAMT, desire for GAMT, and motives for (not) wanting GAMT, and to explore the association between having an unfulfilled treatment desire and general and sexual well-being. We conducted an online questionnaire in a community sample of 125 transgender men, 72 transgender women, and 62 non-binary transgender individuals. The questionnaire measured undergone GAMT, GAMT desire, motives for (not) wanting (further) GAMT, Utrecht Gender Dysphoria Scale, Satisfaction With Life Scale, Hospital Anxiety and Depression Scale, Global Measure of Sexual Satisfaction, transgender-specific body image worries, and sexual self-concept discrepancies. Binary transgender participants reported having undergone more GAMT procedures than non-binary transgender participants (both gender affirming hormone treatment (GAHT) and gender affirming surgery (GAS)). While binary participants reported a stronger desire for GAHT compared to non-binary participants, the groups did not differ in their desire for GAS. Binary and non-binary participants reported similar reasons for wanting treatment, mostly related to body/gender incongruence and gender affirmation. In terms of not wanting treatment, the non-binary group reported their gender identity as the most important reason, while the binary group mostly mentioned possible medical complications. The majority of both groups had an unfulfilled treatment desire (69% of binary participants and 64.5% of non-binary participants), which was related to lower levels of general life satisfaction and sexual satisfaction, more anxiety and transgender-specific body image worries, and larger sexual self-concept discrepancies. These results indicate that systemic barriers to GAMT (especially GAS) should be removed not only for binary but also for non-binary identifying transgender individuals to decrease the discrepancy between treatment desire and actually seeking treatment.

1. Introduction

'Transgender' is often used as an umbrella term to indicate individuals who do not (always or completely) identify with the gender that was assigned to them at birth. Most transgender individuals identify within the gender binary (European Union Agency for Fundamental Rights, 2014; Grant et al., 2011), being a man or a woman. Recently, however, transgender individuals whose identity is outside the traditional binary have become more visible, leading to a better understanding of gender diversity (Richards et al., 2016). While sometimes these individuals identify themselves as non-binary, they can apply various labels to themselves, such as 'agender', 'genderqueer', or 'third gender' (Bockting, 2008; Davidson, 2016), and might not identify as transgender (James et al., 2016). Throughout this manuscript, we use the term 'binary transgender' to indicate individuals who identify as transgender and identify with a binary gender (i.e., trans men and trans women), and we use the term 'non-binary transgender' to indicate individuals who identify as transgender and do not identify with a binary gender.

Some transgender individuals, but not all (Fiani & Han, 2019), experience gender dysphoria, which refers to distress caused by the incongruence between gender identity and sex assigned at birth (American Psychiatric Association, 2013). In order to alleviate this distress, some transgender individuals opt for gender affirming medical treatment (GAMT). This includes various medical procedures as described by the World Professional Association of Transgender Health (2022), such as gender affirming hormone treatment (GAHT) and gender affirming surgeries (GAS). For instance, individuals with a female sex assigned at birth can receive testosterone as GAHT to de-feminize and/or masculinize their body, while individuals with a male sex assigned at birth can receive androgen blockers and estrogen. In terms of GAS, various procedures are available, targeting both primary sex characteristics (e.g., vaginoplasty, phalloplasty) and secondary sex characteristics (e.g., mastectomy, facial feminization surgery). In Western Europe and North America, GAMT is typically provided by an interdisciplinary team including endocrinologists, surgeons, psychologists, speech therapists, and sexologists (Eyssel et al., 2017; World Professional Association of Transgender Health, 2022).

Previous studies have shown that non-binary transgender individuals are less likely to seek GAMT at a gender clinic than binary transgender individuals (Beek et al., 2015; Clark et al., 2018; Doan, 2016; Jones et al., 2017; Thorne et al., 2018). It has not yet been systematically investigated whether this is truly the case because non-binary individuals have less treatment desire, as some have suggested (Scheim & Bauer, 2015), or because they cannot access GAMT. For instance, Jones et al. (2019) suggested that non-binary identifying individuals experience less body dissatisfaction and gender incongruence than binary transgender individuals, which might indicate that GAMT is

less crucial for their well-being. Specifically, this study found that non-binary individuals report higher levels of body satisfaction with sex-specific body parts such as chest and genitalia, which are typically targeted by GAMT. However, other authors (Eysell et al., 2017; Koehler, Eyssel, & Nieder, 2018) have argued that lower rates of non-binary individuals receiving GAMT are not due to a lower need in this group, but due to an implicit binary framework in gender clinics and other obstacles to GAMT for non-binary individuals. Such obstacles can lead to non-binary transgender individuals hiding their non-binary identity in order to be eligible for GAMT (Richards et al., 2016). This might then distort figures on treatment desire in non-binary individuals.

It is of great importance to understand what transgender individuals' motives are for undergoing treatment and why non-binary transgender individuals are less likely to apply for GAMT than binary transgender individuals. Several studies have indicated that in binary transgender individuals, GAMT improves mental (Aldridge et al., 2021; Baker et al., 2021; Dhejne et al., 2016) and sexual well-being (Constantino et al., 2013; Klein & Gorzalka, 2009). A recent study has suggested that it is not GAMT in itself that improves sexual well-being, but that it is the fulfillment of treatment desire that positively affects factors such as sexual agency, sexual pleasure, and sexual esteem (Nikkelen & Kreukels, 2018). For instance, transgender women with a fulfilled treatment desire reported more sexual pleasure than those with an unfulfilled treatment desire, and transgender men with a fulfilled treatment desire reported more sexual esteem than those with an unfulfilled treatment desire. It is therefore essential to investigate how prevalent an unfulfilled treatment desire is in both binary and non-binary individuals, and whether an improvement in sexual well-being is an important motive to undergo GAMT.

For the current study, we conducted an online survey in a community sample of adult binary and non-binary transgender individuals in order to investigate differences in undergone GAMT and treatment desire between binary and non-binary transgender individuals. Based on previous literature, we expect to find that the non-binary sample reports having undergone less GAMT (as in Koehler et al., 2018), and having less desire for such treatment (as in Burgwal et al., 2019, where participants were briefly asked about treatment desire). We also investigated the most common motives for (not) wanting GAMT and differences herein between binary and non-binary transgender individuals. Given that Jones et al. (2019) reported lower gender incongruence and higher body satisfaction in non-binary individuals, we expect that binary transgender individuals will more often report motives related to gender dysphoria and body incongruence for wanting treatment than non-binary transgender individuals, and that the latter will more often report not having the need for GAMT compared to binary transgender individuals as a reason for not wanting treatment. Finally, we investigated the association between treatment desire status and general and sexual well-being by comparing groups of binary and non-binary transgender individuals with no treatment desire, an unfulfilled treatment

desire, and a fulfilled treatment desire. We thereby focused on variables that are typically targeted by GAMT (gender dysphoria and transgender-specific body image worries), variables that are typically more negative in transgender individuals than in cisgender individuals (anxiety, depression, and general life satisfaction; Andersen et al., 2020), and variables that are likely to be affected by GAMT (actual/ideal sexual self-concept discrepancies and sexual satisfaction; Zavlin et al., 2018).

2. Methods

2.1 Participants

Participants were required to be at least 18 years old and could complete the questionnaire in Dutch or English (all questionnaires were back-to-back translated). In total, 514 participants completed at least part of the survey. Six were removed from the dataset because they were too young or did not provide information about their age; five were removed because they did not enter any information on gender identity; 21 were removed because of a clearly invalid response profile (e.g., no variation in response throughout the questionnaires, or completing the survey in less than 5 minutes). Based on the information about sex assigned at birth and gender identity provided, participants were assigned to one of five groups: transgender men (those who indicated a female sex assigned at birth and a male gender identity, $N = 125$), transgender women (those who indicated a male sex assigned at birth and a female gender identity, $N = 72$), cisgender men (those who indicated a male sex assigned at birth and a male gender identity, $N = 98$), cisgender women (those who indicated a female sex assigned at birth and a female gender identity, $N = 107$), non-binary/other (those who indicated a gender identity other than ‘man’ or ‘woman’, $N = 80$). We also included a question on whether participants identified as transgender. All transgender men and women replied ‘yes’ to this question, and all cisgender men and women replied ‘no’ to this question, confirming the group assignments. Of the non-binary/other identity group, 18 participants indicated not identifying as transgender. For the current analyses, we included only participants who explicitly indicated having a transgender identity, resulting in a total sample size of 259 participants (125 transgender men, 72 transgender women, and 62 non-binary transgender individuals).

2.2 Procedure

This study was approved by the Ethics Review Committee Psychology and Neuroscience (ERCPN) of Maastricht University (approval code: 225_95_07_2020). The survey was programmed in Qualtrics and was administered online between July 16th and October 2nd 2020. Transgender participants were mainly recruited online via social media in the LGBTQI+ (Lesbian, Gay, Bisexual, Transgender, Queer, Intersex, plus others) community (e.g., Facebook groups targeted towards the transgender community, Twitter

messages including transgender-related hashtags, Facebook pages of transgender support organizations). Recruitment materials were presented in English and Dutch, reflecting the languages the survey could be completed in. We asked participants who had completed the survey to spread the link among potentially interested people in their network.

All participants declared informed consent at the beginning of the survey. Participants could enter a raffle for a €10 gift voucher at the end of the survey (one voucher per 20 participants; participants were made aware of the odds). The email addresses provided for the raffle were stored separately from questionnaire responses and removed after the vouchers had been distributed. In total, the procedure took 15-25 minutes per participant.

2.3 Measures

Demographics The survey included open questions on age, country of residence, mother tongue, and number of children, and multiple-choice questions on educational level, occupation, housing, and relationship status and length. Sexual orientation was assessed by presenting two sliding scales (one for men, one for women) on which participants could indicate how much they were attracted to these genders in general (scored from 0 to 100, with lower scores indicating lower attraction). Sex assigned at birth was assessed via a multiple-choice question including *Male*, *Female*, *Intersex*, and an open option. Gender identity was assessed via a multiple-choice question including *Man*, *Woman*, *Non-Binary*, and an open option. Responses from participants who indicated identifying with another gender identity using the open option were all inspected, with any indication of the participant not identifying fully within the gender binary resulting in an assignment to the non-binary group (e.g., 'non-binary transman'). Finally, participants were asked whether they identified as transgender, in which case they were also asked when they had first become aware of their transgender identity and whether they had received a diagnosis of Gender Dysphoria.

Received and desired gender affirming medical treatment First, all transgender participants indicated whether they were currently on a waiting list for an intake consultation, GAHT, and/or GAS. Then, participants were asked whether they had already received some form of GAMT. Those who indicated that they did, completed further questions about how long ago this had been and how satisfied they were with the GAMT. Participants also indicated whether they desired (further) GAMT.

Based on the responses on the questions outlined above, we divided participants into three groups. The No Treatment Desire (No TD) group consisted of those who indicated not having received GAHT or undergone GAS, and not planning to do so in the future. The Unfulfilled Treatment Desire (Unfulfilled TD) group consisted of participants who indicated wanting GAHT and/or (further) GAS in the future. The Fulfilled Treatment

Desire (Fulfilled TD) group consisted of those who indicated already having received GAHT and/or undergone GAS, and not wanting any further treatment in the future.

Motives for (not) wanting treatment Based on participants' responses on the questions about received GAMT and treatment desire, we presented multiple-choice questions asking why participants had already received GAMT, why they desired (further) GAMT, or why they did not desire (further) GAMT. These items were based on expert opinion and were checked with people from the transgender community before launching the study. All questions about treatment motives included an open option where participants could describe motives that were not presented in the lists.

Gender dysphoria Feelings of gender dysphoria were assessed using the Utrecht Gender Dysphoria Scale (UGDS; Cohen-Kettenis & Van Goozen, 1997; Steensma et al. 2013), which has two different versions depending on sex assigned at birth (male/female). Each version consists of 12 items which participants rated on a five-point scale ranging from 1 = '*Entirely disagree*' to 5 = '*Entirely agree'*. Because some of the questions would not apply to transgender people who have already undergone certain types of GAMT (e.g. "I hate having breasts" for a transgender man who has undergone mastectomy), we included the response option 'Not applicable', which was scored to one (low gender dysphoria). Participants' final score on the UGDS was calculated by averaging the scores for all items, with the final scores ranging from one (no gender dysphoria) to five (high gender dysphoria). Both versions had high reliability in our sample (Cronbach's α = .88 for male sex assigned at birth version; Cronbach's α = .85 for female sex assigned at birth version).

Sexual satisfaction Sexual satisfaction was assessed using the Global Measure of Sexual Satisfaction (GMSEX; Lawrance & Byers, 1995), a five-item measure assessing satisfaction on a seven-point scale (e.g., 1 = '*Unsatisfying*' and 7 = '*Satisfying*'). Scores ranged from 7 to 35, with higher scores indicating higher sexual satisfaction. The scale showed sufficient reliability in our sample (Cronbach's α = .96).

Sexual self-concept discrepancies We developed a concise measure of two types of sexual self-concept (SSC) discrepancies (based on Higgins, 1987): actual/ideal and actual/ought. Actual/ideal SSC discrepancies indicate how far away people consider themselves to be from whom they ideally would want to be sexually. Actual/ought SSC discrepancies, on the other hand, indicate how far away people consider themselves to be from whom they think they should be sexually. The following text was presented to participants for the actual/ideal item:

"Think about your actual sexual self-concept, and your ideal sexual self-concept. Your actual self-concept entails all the ideas and feelings you have about who you currently are as a sexual person. Your ideal sexual self-concept entails all the ideas and

feelings you have about who you ideally would want to be as a sexual person. How far away is your actual sexual self-concept from your ideal sexual self-concept?"

The phrasing was identical for the actual/ought item, except 'ought' was used instead of 'actual', and 'who you should be' instead of 'who you ideally would want to be'. Participants used a sliding scale to indicate how large the discrepancies between their self-concepts are. Positions on the scale were coded into a score ranging from 0 = '*Entirely overlapping*' to 100 = '*Very far away*', with higher scores indicating a higher SSC discrepancy.

Transgender-specific body image worries We assessed transgender-specific body image worries using the T-WORRY (Dharma et al. 2019). The scale consists of seven items (Cronbach's α = .79), representing worries transgender people could have while having sex, to be rated on a five-point scale ranging from 1 = '*Not at all*' to 5 = '*Very*'. The T-WORRY questionnaire covers both general body image anxiety (e.g., "When I think about having sex, I worry that other people think my body is unattractive") and trans-related anxiety (e.g., "When I think about having sex, I worry that once I'm naked, people will not see me as the gender I am"). Sum scores ranged from 5 to 35, with higher scores indicating more worries.

General life satisfaction Life satisfaction was assessed using the Satisfaction With Life Scale (SWLS; Diener et al., 1985). The questionnaire consists of five items (e.g., "So far I have gotten the important things I want in life") (Cronbach's α = .89) which are rated on a seven-point Likert scale ranging from 1 = '*Strongly disagree*' to 7 = '*Strongly agree*'. Sum scores ranged from 7 to 35, with higher scores indicating higher life satisfaction.

Anxiety and depression We assessed anxiety and depression using the Hospital Anxiety and Depression Scale (HADS; Zigmund & Snaith, 1983). The questionnaire interleaves a seven-item anxiety scale (e.g.; "I feel tense or 'wound up'") (Cronbach's α = .86) with a seven-item depression scale (e.g., "I feel cheerful", reverse item) (Cronbach's α = .77), presenting participants four response options per statement. For each scale, scores range from 0 to 21, with higher scores indicating higher anxiety/depression.

Others questionnaires Participants also completed a questionnaire on Sexual Self-Concept (Buzwell & Rosenthal, 1996; adapted by Deutsch et al., 2014). This questionnaire will however not be included in the analyses presented in this manuscript, as it was described in Chapter 2 and Chapter 3. For an overview of the questionnaires, please refer to Appendix A.

2.4 Analysis

All statistical analyses were performed using the software JASP (JASP team, 2020). We applied a significance threshold of $p = .05$ for all analyses, and applied a Bonferroni correction when investigating multiple variables at once (such as variables on general and sexual well-being). Group differences were analyzed using independent-samples t-tests in the case of continuous variables, and chi-square tests of independence in the case of categorical variables.

Table 1.
Descriptive statistics and group differences on age, attraction, relationship status, educational level, employment status, housing, sex assigned at birth, time of realization of trans identity, gender dysphoria/gender incongruence diagnosis, and country of residence.

		Binary transgender group	Non-binary transgender group	Group difference
Continuous variables		*M* *SD*	*M* *SD*	*T* *p*
Age		31.06 11.48	28.32 10.60	1.67 .097
Attraction to women		67.18 33.64	72.93 31.28	-1.14 .255
Attraction to men		52.97 35.88	62.41 36.66	-1.72 .086
Categorical variables		*N* (%)	*N* (%)	X^2 *p*
Relationship status	In a relationship	91 (16.19)	35 (56.45)	1.99 .159
	Single	106 (53.81)	27 (53.55)	
Educational level	No HS degree	6 (3.10)	1 (1.61)	5.92 .052
	HS degree	78 (40)	15 (24.19)	
	Higher education	111 (56.92)	46 (74.19)	
Employment status	Employed	100 (50.76)	26 (41.94)	1.65 .439
	Student	61 (30.96)	24 (38.71)	
	Unemployed/retired	36 (18.27)	12 (19.36)	
Housing	Living alone	64 (32.82)	15 (24.19)	

	Partner	51 (26.15)	19 (30.65)	2.89 .410
	With parents/family	52 (26.67)	15 (24.19)	
	Student housing/with friend	28 (14.36)	13 (20.97)	
Sex assigned at birth	Female	125 (63.45)	50 (80.65)	6.36 .012*
	Male	72 (36.55)	12 (19.36)	
Realization of trans identity	Early childhood	26 (13.90)	1 (1.61)	26.29 < .001*
	Mid childhood	54 (28.88)	8 (12.90)	
	Late childhood	22 (11.77)	9 (14.52)	
	Start puberty	30 (16.04)	8 (12.90)	
	Adolescence	26 (13.90)	17 (27.42)	
	Young adulthood	14 (7.49)	14 (22.58)	
	Mid adulthood	11 (5.88)	4 (6.45)	
	Late adulthood	4 (2.14)	1 (1.61)	
GD/GI diagnosis	Yes	148 (79.57)	26 (41.94)	31.46 < .001*
	No	38 (20.43)	36 (58.07)	
Country of residence	The Netherlands	122 (61.93)	44 (70.97)	4.23 .237
	Belgium	42 (21.32)	6 (9.68)	
	United States of America	22 (11.17)	8 (12.90)	
	Other	11 (5.58)	4 (6.45)	

M = mean, *SD* = standard deviation, GD = gender dysphoria, GI = gender incongruence. Significant *p*-values (<.05) are marked with a *.

3. Results

3.1 Sample descriptives

Descriptive statistics are presented in Table 1. The mean age of the total sample was 30.4 years (*SD* = 11.31, range 18-69, *N* = 259). Binary and non-binary transgender groups did not differ in terms of age, attraction to men, and attraction to women. Groups also did not differ on educational level, relationship status, and housing. The two groups did differ, however, on sex assigned at birth. While in both groups there was a majority of participants indicating they had a female sex assigned at birth, this proportion was higher in the non-binary sample than in the binary sample. Furthermore, the groups differed on

when they indicated becoming aware of their transgender identity, with most binary participants indicating this happened during mid childhood or around the start of puberty and most non-binary participants indicating that this happened later, during adolescence or young adulthood. Finally, groups differed in the frequency with which they indicated having a diagnosis of gender dysphoria or gender incongruence, with the majority (79.57%) of the binary sample indicating that they had such a diagnosis and the majority (58.07%) of the non-binary sample indicating that they had not.

3.2 Differences in received and desired GAMT between binary and non-binary transgender participants

The non-binary and binary groups differed in frequency with which participants reported already having received GAHT ($X^2(1, N=249) = 47.89$, $p < .001$) and undergone GAS ($X^2(1, N=244) = 15.77$, $p < .001$). In the binary group, 74.9% ($N = 140$) of participants indicated already having received GAHT, compared to only 25.8% ($N = 16$) in the non-binary group. Similarly, the proportion of those who indicated already having undergone (one or multiple) GAS was higher in the binary group ($N = 97$, 53.3%) compared to the non-binary group ($N = 15$, 24.2%).

Among the participants that indicated not (yet) having received GAHT, we also found a difference between the binary and non-binary groups in the frequency with which participants reported having a desire for GAHT in the future ($X^2(1, N=93) = 32.63$, $p < .001$), with most binary participants indicating that they would still want this ($N = 39$, 83%), compared to a lower proportion of the non-binary participants ($N = 11$, 23.9%). In terms of (additional) GAS, however, the groups did not differ in the extent to which they indicated having a desire for this ($X^2(1, N=247) = 0.68$, $p = 0.411$), with 67% ($N = 124$) of the binary sample expressing such a desire, and 61.3% ($N = 38$) of the non-binary sample.

In the binary group, 69% ($N = 123$) of the participants were allocated to the Unfulfilled TD group, 29.4% ($N = 55$) to the Fulfilled TD group, and 1.6% ($N = 3$) to the No TD group. In the non-binary group, these percentages were respectively 64.5% ($N = 40$), 16.1% ($N = 10$), and 19.4% ($N = 12$). Hence, the binary and non-binary groups differed significantly in their treatment desire status ($X^2(2, N=249) = 27.64$, $p < .001$), since binary participants more often reported Fulfilled TD and non-binary participants more often reported No TD.

3.3 Motives for wanting GAMT and differences between binary and non-binary transgender participants

Table 2 presents how frequently participants indicated having a certain motive for already receiving or still wanting GAHT. “I want(ed) to change my body”, “I want(ed) to feel more masculine/feminine”, and “I want(ed) people to see me for a man/woman” were

most frequently indicated by both binary and non-binary participants. The table also presents the frequency of the motives for having undergone or still wanting GAS. For the binary group, the most common motives were similar to those for receiving/wanting GAHT. For the non-binary group, however, "It would make it easier to wear the clothes that fit my gender identity" was most frequently indicated, together with "I want(ed) to change my body".

For both GAHT and GAS, motives related to norms and group assimilation such as "It is what transgender people do" and "Others expect(ed) me to" were rarely selected by both groups (between 0 and 3.9%).

Table 2.
Frequencies with which participants indicated having (had) a certain motive for having received GAMT or wanting to receive GAMT.

	GAHT		GAS	
	Binary transgender group	Non-binary transgender group	Binary transgender group	Non-binary transgender group
I want(ed) to change my body	142 (79.8%)	23 (62.2%)	148 (74%)	31 (68.9%)
I hate(d) my body without it	93 (52.2%)	6 (16.2%)	119 (59.5%)	23 (51.1%)
I want(ed) to feel more masculine/feminine	139 (78.1%)	17 (45.9%)	147 (73.5%)	19 (42.2%)
I want(ed) people to see me for a man/woman	143 (80.3%)	9 (24.3%)	118 (59%)	11 (24.4%)
It would make it easier to wear the clothes that fit my gender identity			105 (52.5%)	28 (62.2%)
It is/was required for a legal sex change			14 (7%)	0 (0%)
It is what transgender people do	7 (3.9%)	0 (0%)	7 (3.5%)	1 (2.2%)
Others expect(ed) me to	3 (1.7%)	0 (0%)	1 (0.5%)	1 (2.2%)
I want(ed) to improve my sex life	24 (13.5%)	4 (10.8%)	68 (34%)	7 (15.6%)

GAMT = gender affirming medical treatment, GAHT = gender affirming hormone treatment, GAS = gender affirming surgery.
Note: participants could indicate multiple answers.

3.4 Motives for not wanting GAMT and differences between binary and non-binary transgender participants

Table 3 presents the motives for not wanting GAHT and for not wanting (additional) GAS. In the binary group, the most common motive for not wanting GAHT was "I am afraid of other people's reactions" and the most common motive for not wanting GAS was "I am afraid of negative medical consequences". Non-binary participants, however, indicated "I don't entirely feel like a man/woman" as the most important motive for not wanting GAHT or GAS.

Table 3.
Frequencies with which participants indicated not wanting to receive GAMT.

	GAHT		GAS	
	Binary transgender group	Non-binary transgender group	Binary transgender group	Non-binary transgender group
I am happy with my body as it is	0 (0%)	6 (17.1%)	19 (25.3%)	9 (30%)
I don't need it to feel more masculine/feminine	2 (25%)	7 (20%)	23 (30.7%)	9 (30%)
My environment does not approve of it	2 (25%)	7 (20%)	4 (5.3%)	4 (13.3%)
I am afraid of other people's reactions	3 (37.5%)	5 (14.3%)	4 (5.3%)	3 (10%)
It might affect my fertility	0 (0%)	2 (5.7%)	7 (9.3%)	3 (10%)
I am afraid of negative medical consequences	2 (25%)	7 (20%)	43 (57.3%)	13 (43.3%)
I think it might have a negative influence on my sex life	1 (12.5%)	5 (14.3%)	13 (17.3%)	5 (16.7%)
My doctor discourages it	0 (0%)	0 (0%)	3 (4%)	0 (0%)
It is too expensive	1 (12.5%)	2 (5.7%)	22 (29.3%)	7 (23.3%)
From a practical viewpoint it hasn't been convenient	0 (0%)	2 (5.7%)	14 (18.7%)	8 (26.7%)
I'm afraid I might regret it later	1 (12.5%)	4 (11.4%)	14 (18.7%)	10 (33.3%)
I don't entirely feel like a man/woman	0 (0%)	22 (62.9%)	5 (6.7%)	16 (53.3%)

GAMT = gender affirming medical treatment, GAHT = gender affirming hormone treatment, GAS = gender affirming surgery.
Note: participants could indicate multiple answers.

3.5 Differences in general and sexual well-being between UTD and FTD

Because the sample size of the No TD group was too small (n = 15), we only compared groups with Unfulfilled TD and Fulfilled TD on general and sexual well-being (see Table 4). The Fulfilled TD group scored significantly better than the Unfulfilled TD group on general life satisfaction, anxiety, sexual satisfaction, transgender-specific body image worries, and actual/ideal and actual/ought sexual self-concept discrepancies. Follow-up analyses of the transgender-specific body image worries measure revealed that the two groups differed on the trans-related anxiety subscale only (p = .002), and not on the general body image anxiety subscale (p = .06). There were no group differences on gender dysphoria and depression scores.

Table 4.
Group differences between FTD and UTD on gender dysphoria (UGDS), general life satisfaction (GLS), anxiety and depression (HADS), sexual satisfaction (GMSEX), transgender-specific body image worries (T-WORRY), and actual/ideal and actual/ought sexual self-concept discrepancies.

	FTD *M (SD)*	UTD *M (SD)*	*t*	*p*
Gender dysphoria	4.08 (.76)	4.27 (.59)	-2.07	.040
General life satisfaction	22.07 (7.22)	17.49 (7.00)	4.07	<.001*
Anxiety	7.35 (4.38)	9.47 (4.93)	-2.77	.006*
Depression	5.20 (3.97)	6.35 (3.79)	-1.88	.062
Sexual satisfaction	26.48 (7.76)	22.36 (9.51)	2.85	.005*
Transgender-specific body image worries	14.09 (5.64)	17.54 (6.33)	-3.51	<.001*
Actual/ideal sexual self-concept discrepancy	41.38 (27.73)	59.22 (27.15)	-4.03	<.001*
Actual/ought sexual self-concept discrepancy	37.81 (28.43)	56.05 (27.89)	-3.97	<.001*

FTD = fulfilled treatment desire, UTD = unfulfilled treatment desire, *M* = mean, *SD* = standard deviation. Significance threshold is p < .006 (Bonferroni correction: .05/8) and significant *p*-values are marked with a *.

4. Discussion

The current study aimed to investigate differences in (motives for) gender affirming medical treatment desire between binary and non-binary transgender individuals, and to examine the relation between a(n) (un)fulfilled treatment desire and general and sexual well-being. Overall, we found that binary and non-binary transgender individuals differ little in the extent to which they desire GAMT, specifically GAS, and in the reasons for desiring this. Furthermore, we found that having an unfulfilled treatment desire is

negatively associated with variables related to general and sexual well-being. We will discuss our findings in detail below.

4.1 Differences in treatment (desire) between binary and non-binary transgender individuals

For both GAHT and GAS, the majority of our binary sample indicated having received/undergone these forms of GAMT, while the majority of the non-binary sample did not. This is in line with our prediction that non-binary participants would have undergone GAMT less often compared to binary participants. When it comes to treatment desire, we found that non-binary participants desired GAHT less often compared to binary participants, but we found no difference for GAS. The majority of both binary and non-binary participants indicated having a desire for GAS, contrary to our prediction that non-binary participants would not as often desire GAMT procedures. In our sample, this was driven by many non-binary participants (who mostly had a female sex assigned at birth) desiring mastectomy (breast removal).

The fact that many non-binary participants desired GAS suggests that the majority of both binary and non-binary participants had an Unfulfilled TD. This is especially striking in the non-binary group given the relatively low rates at which this group actually seeks GAMT. There seems a discrepancy between the rate at which non-binary transgender people report wanting GAMT, and the rate at which they receive this. Historically this could be explained by the diagnostic criteria for gender dysphoria (Eyssel et al., 2017), which in the Diagnostic and Statistical Manual of Mental Disorders, 4th Edition (DSM; American Psychiatric Association, 1994) and International Classification of Diseases, 10th Revision (ICD-10, World Health Organization, 1993) explicitly stated that someone had to identify with the gender opposite to the one assigned at birth in order to receive the diagnosis. While this criterion has been abolished in the most recent updates of the DSM (American Psychiatric Association, 2013) and ICD (World Health Organization, 2018), several authors have argued that more recently GAMT is still relatively restricted for non-binary identifying individuals (Koehler et al., 2018), especially when healthcare providers assume ‘traditional’ trajectories for a transition (Nieder & Richter-Appelt, 2011).

Finally, the two groups differed in the extent to which they reported having No TD. While the percentage of participants in the binary group was close to zero, about one in five non-binary participants indicated having No TD. While most non-binary individuals indicate that they have an Unfulfilled TD, there seems to be a considerable proportion that manages to live according to their gender identity without medical procedures (see also Nikkelen & Kreukels, 2018). This finding highlights that having a

transgender identity cannot be equated with having a desire for GAMT, and warrants individualized treatment procedures for transgender individuals.

4.2 Motives for wanting treatment

Previous research has suggested that non-binary transgender individuals suffer less from body dissatisfaction and gender incongruence than binary transgender individuals (Jones et al., 2019). We therefore expected that binary and non-binary participants would report different motives for wanting GAMT, with non-binary participants less frequently mentioning motives related to body/gender dysphoria. This was however not confirmed: motives such as wanting to change one's body, wanting to feel more masculine or feminine, and wanting to be seen as a woman or a man by other people were most prevalent in both participant groups when it came to desiring GAHT. This is not necessarily in contradiction with Jones et al.'s (2019) findings as it is plausible that although non-binary transgender people experience less body incongruence than binary transgender people, they still experience sufficient incongruence to prompt a desire for GAMT. The fact that non-binary transgender individuals struggle with body/gender dysphoria to such an extent that it prompts a desire for GAMT, implicates that this variable is an important therapeutic focus not only in binary identifying transgender individuals, but in non-binary individuals as well.

In the context of desiring GAS, binary participants reported similar motives as for wanting GAHT. Non-binary participants, however, often indicated that they wanted to change their body via surgery so it would be easier to wear the clothes that fit their gender identity. Van de Grift et al. (2016) showed that in binary transgender men, mastectomy has positive effects that go beyond satisfaction with chest appearance, indicating that this procedure can have great social impact on people who desire it. By having a mastectomy, non-binary individuals can more easily wear certain clothes without looking feminine, not only increasing body satisfaction but facilitating gender affirmation in social interactions as well.

Several treatment motives were hardly selected by any of our participants. The least frequently selected motives related to norms and group assimilation. This suggests that our participants did not desire GAMT because they want to be part of a 'transgender group', and that they did not feel peer pressure or want to be part of a trend. Finally, only a small group of our participants indicated that improving their sex life is/was a motive for desiring GAMT. While several studies have shown that GAMT can improve sexual well-being (Constantino et al., 2013; Klein & Gorzalka, 2009), this does not seem to be the main reason for transgender individuals to undergo such treatment.

4.3 Motives for not wanting treatment

While most participants in our study had an UTD, a considerable part of the sample indicated not desiring (further) GAMT. We predicted that non-binary participants would indicate more often not having the need for GAMT, but, similarly to binary participants, they did not often select motives such as "I am happy with my body as it is" or "I don't need it to feel more masculine/feminine". This suggests that not having a treatment desire does not necessarily indicate satisfaction with one's body (Nikkelen & Kreukels, 2018). Instead, they most frequently indicated that not identifying within the gender binary is what keeps them from desiring GAMT. Many GAMT procedures target secondary sex characteristics, such as breasts in transgender women and facial hair in transgender men. For non-binary identifying transgender individuals, these characteristics might be considered undesirable because they do not fit their gender identity better than the sex characteristics associated with their sex assigned at birth.

In the binary sample, fear of medical consequences was often mentioned as a motive for not wanting GAS. This is possibly related to fact that especially masculinizing genital surgery (metoidioplasty and/or phalloplasty) may sometimes result in complications (Falcone et al., 2021; Waterschoot et al., 2021). Therefore, transgender men in our sample might have opted not to pursue this GAMT step.

4.4 Relation between treatment desire and general and sexual well-being

We found that, compared to individuals with a Fulfilled TD, individuals with an Unfulfilled TD reported lower levels of general life satisfaction, sexual satisfaction, and more anxiety, body image worries, sexual satisfaction, and sexual self-concept discrepancies. They did not, however, report more gender dysphoria or depression.

These findings are in line with previous studies indicating that GAMT can improve general (Aldridge et al., 2021; Baker et al., 2021; Dhejne et al., 2016) and sexual well-being (Constantino et al., 2013; Klein & Gorzalka, 2009). However, while most previous studies focus on the effects of GAMT in itself, this is one of the first studies that focuses on the fulfillment of treatment desire instead. While these two approaches are highly related, one could argue that the latter is more inclusive. For instance, as previously reported (Beek et al., 2015; Koehler et al., 2018) and as shown in our sample, only a minority of non-binary transgender individuals will opt for GAHT. Studies investigating the effects of GAHT itself are therefore likely to miss out on the experiences of non-binary individuals. When studying (the fulfillment of) treatment desire and its effects on well-being, participants with more variable treatment paths and GAMT wishes should be included.

The finding that the group with an Unfulfilled TD scored lower on sexual well-being variables than the FTD group is in line with Nikkelen and Kreukels (2018). Interestingly, the Unfulfilled TD and Fulfilled TD groups did not differ on depression and gender dysphoria. Especially the lack of a difference on gender dysphoria is striking, as GAMT typically aims to alleviate gender dysphoria. Possibly, this is due to the proportion of participants that had already received GAMT in the Unfulfilled TD group, alleviating part of the gender dysphoria in this group. Another explanation is that even when individuals desire no further GAMT, they may still experience gender dysphoria to a certain degree. In any case, the lack of a difference on gender dysphoria indicates that a gender dysphoria score only cannot be considered a good indicator of an individual's need for GAMT.

Overall, the differences between the Unfulfilled TD and Fulfilled TD groups highlight the negative consequences of having an Unfulfilled TD for general and sexual well-being. Given that most participants reported having an Unfulfilled TD, this finding is worrisome. Our findings emphasize the importance of deconstructing treatment barriers for all transgender and gender diverse individuals. Previous research has shown that these barriers can be both personal (e.g., unsupportive family members) and structural (e.g., unsuited treatment protocols) (Ross et al., 2021), indicating the need for interventions aimed both at creating greater acceptance of gender diversity and at improving accessibility of GAMT at the level of healthcare providers.

4.5 Future directions

Future research should aim to further understand why some transgender individuals are not accessing the treatment they desire, and how these individuals can cope with an unfulfilled treatment desire. Specifically, interventions targeting general and sexual well-being should be designed for individuals with an unfulfilled treatment desire. In this context, it would be useful to investigate a larger sample with no treatment desire in order to map how they cope with gender incongruence without having GAMT. Additionally, research should target the development of interventions effective at removing treatment barriers, such as trainings for health care providers specifically aimed at understanding non-binary identities. Furthermore, we found in our study that very few individuals indicate motives related to norms or group assimilation as a reason for desiring GAMT. Since certain movements frame transgender identities as an 'ideology' or 'hype', we consider it important that future research aims to replicate and expand our findings by specifically investigating these narratives. Finally, given the relatively high proportion of transgender men in our sample indicating fear of medical consequences as the main motive for not wanting GAS, future studies should aim at developing methods that lower the risk of medical complications associated with masculinizing genital surgery (Falcone et al., 2021; Waterschoot et al., 2021).

4.6 Limitations

Although this is the first study to map differences in GAMT, treatment desire, and treatment motives between binary and non-binary transgender individuals as well as the consequences of an Unfulfilled TD in a transgender community sample, some limitations need to be taken into account. First, conducting the study via an online survey creates a selection bias, only reaching participants who feel comfortable in an online environment and have (private) access to internet. This resulted in a relatively young, Western sample, limiting generalizability. The snowball sampling method likely amplified this bias (Waters, 2015). Second, while all questionnaires showed sufficient reliability in all subgroups, only our measures of transgender-specific body image worries and gender dysphoria were validated in transgender samples. The latter, unfortunately, is tailored towards binary identifying individuals (making it less appropriate and non-validated for non-binary individuals), although a revised version has recently been published (McGuire et al., 2020). We tailored all questions to be appropriate for binary and non-binary transgender individuals where needed. Nevertheless, we received feedback that the questionnaire was not always suitable for asexual or polyamorous individuals, and that our assessment of sexual orientation relied on a binary framework. This excludes perspectives of individuals who are attracted to non-binary individuals, or who are attracted to gender non-conformity, which we will take into account in future studies. Third, participants were allowed to leave questions open or leave the survey early, resulting in dropout throughout the survey. However, the dropout was relatively small (15%), and the participants who dropped out of the survey did not differ on any of the demographic or other variables compared to participants who did complete the entire survey.

5. Conclusion

In this online questionnaire study investigating GAMT desire (motives), the majority of binary and non-binary transgender participants indicated having an unfulfilled treatment desire. Both groups indicated that their motives for GAMT were mostly related to body/gender incongruence and a need for gender affirmation. Among those that reported not wanting (further) GAMT, binary participants mostly indicated this to be the case because of worries about medical consequences, while non-binary participants indicated that they desire no GAMT because of their non-binary identity. Finally, we found that having an unfulfilled treatment desire is related to lower levels of general and sexual well-being. This indicates that, just like binary transgender individuals, many non-binary transgender individuals have a desire for GAMT, and that not being able to receive GAMT has a negative effect on their mental health. Further efforts should be made to make GAMT accessible for all transgender individuals, regardless of gender identity.

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Chapter 5

Daily sexual behavior, sexual esteem, and body image in transgender and cisgender individuals: A diary study

Based on: **Kennis, M.**, Duecker, F., T'Sjoen, G., Elaut, E., Loeys, T., Sack, A., & Dewitte, M. (2022) Daily sexual behavior, sexual esteem, and body image in transgender and cisgender individuals. *The Journal of Sex Research*. https://doi.org/10.1080/00224499.2022.2158172

CHAPTER 5

Abstract

Multiple surveys have suggested that transgender individuals show lower sexual well-being than cisgender individuals. Most studies, however, are limited in terms of ecological validity and memory bias and cross-sectional in nature. These issues are less prevalent in diary studies monitoring responses over time at home. For three weeks, 47 transgender and 52 cisgender individuals reported daily on their sexual behavior, sexual esteem and body image. Using multilevel model analyses, we investigated the daily associations between these variables, and addressed differences between transgender and cisgender individuals. We found that in transgender individuals, intimacy predicts sexual esteem; sexual openness predicts sexual esteem and body image; and sexual esteem predicts intimacy, masturbation, and sexual openness on the daily level. While transgender individuals scored lower on daily sexual esteem and body image than cisgender individuals, groups did not differ in daily sexual behavior. They also did not differ in any of the predictive relations described above, but we did find that the association between masturbation and body image was moderated by a cisgender identity, and sexual esteem predicted sexual activity more positively in cisgender compared to transgender individuals. These results complement findings from cross-sectional studies and indicate how transgender individuals struggling with sexuality can increase sexual openness. Implications for clinical practice are that clinicians discussing sexuality with their transgender patients should not define sexual activity too narrowly, and that sexual esteem might be a relevant factor in determining sexual behavior.

1. Introduction

Transgender people experience an incongruence between their experienced and assigned gender, contrary to cisgender individuals. When this incongruence causes significant distress, this experience is referred to as gender incongruence (World Health Organization, 2022). Some transgender individuals might want to alleviate the distress accompanying their gender incongruence by gender affirming medical treatment (GAMT), which often comprises gender affirming hormone therapy and/or surgery (World Professional Association for Transgender Health, 2022). Gender incongruence can potentially affect sexuality and sexual well-being (Elaut & Nieder, in print). For instance, compared to cisgender individuals, transgender individuals have lower sexual esteem (see Chapter 2) and a higher prevalence of sexual dysfunctions (Kerckhof et al., 2019). These negative sexual outcomes in transgender people have been explained by low body image or body satisfaction (Nikkelen & Kreukels, 2018) and a need for GAMT (see Chapter 4).

While these scientific findings are valuable for transgender individuals and clinicians working with this population, they all stem from cross-sectional questionnaire studies. Such studies, especially when conducted in the lab or a clinical setting, have their shortcomings in terms of ecological validity, memory bias, and their ability to reveal temporal interrelations between study variables (Bolger et al., 2013; Laurenceau & Bolger, 2005). Given that sexual experiences are variable and context-dependent (Dewitte et al., 2015), we need to move beyond questionnaire studies that provide only a snapshot of sexual responding. Diary study methods, in which participants provide repeated data entries on consecutive days, are well suited for this purpose, and have become increasingly popular in the field of sex research. By applying this method, researchers have been able to investigate how sexuality and sexual well-being relates to a great variety of variables (e.g., mood, Dewitte et al., 2015; dyadic sexual desire discrepancies, Joudouin et al., 2021; fatigue, Tan, 2021; oral contraceptives, Elaut et al., 2016), and they have done so in various populations (e.g., college students, Ford et al., 2021; newlywed couples, Gadassi et al., 2016; women with pelvic pain, Glowacka et al., 2018; men who have sex with men, Sarno et al., 2017). To our knowledge, transgender individuals have not been included in diary studies so far.

In order to start mapping a more ecologically valid picture of sexuality in transgender individuals, and to investigate how variables might influence each other from day to day, we conducted a first explorative diary study in transgender and cisgender men and women. We investigated how variables related to sexual esteem and body image affect sexual behavior and vice versa. While this study is explorative in nature, we selected these variables based on their conceptual relevance for a transgender population. For instance, sexual esteem (a person's self-evaluation of worth as a sexual being) has

been shown to be lower in transgender compared to cisgender individuals (see Chapter 2), related to gender dysphoria in transgender individuals (see Chapter 2), and lower in transgender individuals with an unfulfilled compared to a fulfilled treatment desire (Nikkelen & Kreukels, 2018). Similarly, body image has been shown to be lower in transgender individuals (transgender men in this case) compared to cisgender individuals, and to improve after GAMT (van de Grift et al., 2016). Furthermore, issues related to body satisfaction and sexual esteem often emerge in qualitative studies, where transgender individuals describe which factors affect their sexual well-being (Lindley et al., 2020; Lindley et al., 2021; Martin & Coolhart, 2022).

Because 'sex' and 'sexual behavior' have different meanings for different people, we make a distinction between sexual activity, intimate activity, masturbation, and sexual openness. In this study, sexual activity is defined as activities that include genital touching, e.g., oral sex. Intimate activity is defined as activities that include (non-genital) touching such as kissing, caressing and cuddling. Masturbation is defined as solitary genital touching. Finally, we included self-reported sexual openness (the degree to which participants report to be open to engage in sexual activity), since an absence of sexual activity does not necessarily mean that the individual had no desire for this; it might have been that, for instance, there was no partner available or that other circumstances precluded sexual activity. We investigated how these sexual behaviors affect sexual esteem and body image from day to day, and how sexual esteem and body image in their turn affect sexual behavior. Finally, we also investigated whether and how these relations differ between transgender and cisgender individuals. For instance, it could be that while sexual activity predicts a more positive body image in cisgender individuals (Woertman & van den Brink, 2012), there is no such association for transgender individuals because sexual activity might actually elicit gender dysphoria (Lindley, Anzani, & Paz Galupo, 2020).

2. Methods

2.1 Participants

All participants were required to be at least 18 years old, have a binary gender identity, and be fluent in Dutch. There were no criteria with regards to sexual orientation or partner availability/relationship status. Furthermore, participants were required to have access to a smartphone in order to install the app presenting the questionnaires.

Transgender participants were mainly recruited via the Center for Sexology and Gender at Ghent University Hospital, Belgium, as well as via social media advertisements in channels directed towards the transgender community in the Netherlands and Belgium. In total, 56 transgender individuals enrolled in the study. Seven participants encountered technical issues, and two completed less than 50% of the daily questionnaires and were

hence dropped from the analyses, resulting in a final sample of 47 transgender participants.

After the transgender sample was recruited, Dutch panel organization Flycatcher recruited cisgender participants. Of the 6137 respondents they reached, 1761 fit the criteria and expressed interest in participating after receiving preliminary info about the study. Of this group, a sample of 186 cisgender individuals similar to the transgender sample in terms of gender, age, occupation, and educational level was contacted with more information about the study. Of this group, 63 individuals enrolled in the study, of which eleven had to drop out due to technical issues, resulting in a final sample of 52 cisgender participants. Participants that were excluded due to technical or drop-out reasons did not differ from included participants on sociodemographic variables such as age, educational level, occupation, living situation, or group (cis woman vs. cis man vs. trans woman vs. trans man).

2.2 Procedure

After having read an information letter, all participants gave informed consent and completed a pre-questionnaire via Qualtrics. Afterwards, they installed the application mEMA, which was developed for the assessment of daily questionnaires and experience sampling methods (mEMA; ilumivu, Inc., Cambridge, MA; www.ilumivu.com). Participants were instructed to indicate a three-week period during which their life would be relatively 'regular', i.e., during which they would not be on a holiday, receiving surgery, or something similarly breaking routine. During this three-week period, which always started on a Monday and ended on a Sunday, participants received a daily morning and evening questionnaire. After completing the study, participants received a debriefing and €30 as reimbursement.

The study protocol was approved by the Commission for Medical Ethics at Ghent University Hospital [approval code: 2019/0652] and the Ethical Review Committee Psychology and Neuroscience at Maastricht University [approval code: 204_10_02_2019]. Participants were made aware that they could discontinue their participation any time without any repercussions. All study data was collected between July 2019 and November 2021.

2.3 Measures

Pre-questionnaire Participants completed single items on age, educational level, occupation, number of children, relationship status and duration, and housing.

Sex assigned at birth was assessed via a multiple choice question, presenting '*Male*' and '*Female*' as response options. Gender identity was assessed using a multiple choice

question, presenting *'(Trans) man*', '*(Trans) woman'*, '*Genderqueer/polygender/agender/gender fluid/non-binary*', and '*I do not know, I have no preference*' as response options. The last two were selected by none of our participants, since they were recruited to have a binary gender identity. We grouped participants according to their responses on the questions about sex assigned at birth and gender identity: those who selected 'Male' and 'Man' were considered cisgender men; those who selected 'Male' and 'Woman' respectively were considered transgender women; those who selected 'Female' and 'Woman' were considered cisgender women; and those who selected 'Female' and 'Man' were considered transgender men. Sexual orientation was assessed using two scales on which participants could indicate their attraction towards men and women, ranging from 0 ('*Not at all attracted'*) to 100 ('*Extremely attracted'*).

Transgender participants were presented with a questionnaire on GAMT, inquiring whether they had received/undergone gender affirming hormone treatment (GAHT) and/or gender affirming surgery (GAS) and how long ago this was; how satisfied they were with these procedures if so; and whether they were planning to undergo (further) GAMT.

Daily questionnaires We mostly duplicated the questionnaire design from Dewitte et al. (2015). Morning questionnaires were accessible for participants between 08:00 and 13:00. As a measure of sexual openness, participants were asked to indicate how open they would have been to engage in sexual activity in case the opportunity would have occurred on a scale from 1 ('*Not at all'*) to 7 ('*Very much'*). They also indicated whether they had masturbated, had engaged in intimacy, and had had sexual activity via Yes/No questions. The difference between intimate and sexual activities was clearly indicated by providing a specific definition of intimacy as entailing cuddling, caressing, and kissing, and sexual activity as entailing genital touching.

Evening questionnaires were accessible for participants between 20:00 and midnight. As a measure of daily sexual esteem, participants rated five positive (e.g., "Today I felt sexy") and four negative (e.g., "Today I felt like a disappointment in bed") items on a scale ranging from 1 ('*Not at all'*) to 7 ('*Extremely*'). After reverse scoring the negative items, all items were averaged to obtain a score on daily sexual esteem, with higher scores indicating higher esteem (Cronbach's α = .88). As a measure of body image, participants were presented with three items (e.g., "To what extent were you satisfied with your body today?") which were to be rated on a scale from 1 ('*Not at all'*) to 7 ('*Very much'*), which were averaged to obtain the measure. Higher scores indicate higher body image (Cronbach's α = .73).

Questionnaires excluded from the current analyses As part of the pre-questionnaire, participants completed measures on general and mental well-being, sexual esteem and sexual pre-occupation, and genital self-image. During the morning questionnaires, participants were presented with follow-up questions on their reasons for (not) engaging in sexual activity, and how they felt during intimate and sexual activities. During the evening questionnaires, they also completed items about stress, mood, and self-concept discrepancies. The data related to these questionnaires and items are not included in this manuscript and will be reported elsewhere.

2.4 Analyses

Descriptive statistical analyses were performed using the software JASP (JASP team, 2020). Group differences were analyzed using independent-samples t-tests in the case of continuous variables, and chi-square tests of independence in the case of categorical variables.

The diary data analysis included a total of 3772 observations (which is 90.76% of the total potential 4156 observations). Multilevel model analyses were performed using R (v. 4.1.2, R Foundation of Statistical Computing) using the lme4 package (Bates et al., 2015). The scores of the daily outcome variables (sexual esteem, body image, sexual activity, intimate activity, masturbation, and sexual openness) were group-mean centred to determine the within-subjects (level 1) effects, and means of the participants' daily scores were used as between-subjects (level 2) effects when used as predictors. We investigated whether evening variables (sexual esteem and body image) would predict morning variables (sexual activity, intimate activity, masturbation, and sexual openness), and vice versa. Multilevel linear regression models were fitted to predict continuous variables (sexual esteem, body image, sexual openness), and multilevel logistic regression models were fitted to predict variables with binary outcomes (sexual activity, intimate activity, masturbation; all coded '*Yes*' = 1 and '*No*' = 0). We estimated β coefficients reflecting the predictive effect of all predictor variables on both the within- (level 1) and between-subjects (level 2) level, while investigating the main effects of (and controlling for) having a cisgender or transgender identity, and relationship status. Interaction terms were included in the same models to investigate whether the relationships between variables differed between transgender and cisgender participants. Given the explorative nature of this study, a separate model was fitted for each outcome variable, and we applied a significance threshold of $p = .05$ for every analysis.

3. Results

3.1 Demographics, transition status, and study compliance

The sample included 29 transgender men (TM), 18 transgender women (TW), 27 cisgender men (CM), and 25 cisgender women (CW). Participants' age ranged between 18 and 65 years old, with M = 31.05 and SD = 11.64, and no difference between transgender and cisgender participants ($t(97) = 1.68$, $p = .096$, Cohen's $d = .339$). Participant characteristics on education, occupation, housing, and number of children are presented in Table 1, which indicates no differences between transgender and cisgender participants on any of these variables. Fifty participants (51%) had a relationship during the study period (with no differences in relationship status between transgender and cisgender participants; $X^2(1, N=99) = 2.26$, $p = .132$, $\varphi = .151$), with most participants indicating that their relationship had a duration of 2 to 5 years (30%) or more than 5 years (42%). In terms of sexual orientation, the four groups (TM, TW, CM, and CW) did differ on how high they rated their attraction to men ($F(99,3) = 12.70$, $p < .001$, $\eta^2 = .288$) and women ($F(99,3) = 9.56$, $p < .001$, $\eta^2 = .236$), with post-hoc tests showing that CW scored higher on attraction to men and lower on attraction to women compared to the three other groups ($p < .005$), with no other pairwise differences.

Twenty-nine (62%) of the transgender participants were receiving GAHT, for an average of 40.76 months (SD = 24.78). Only four of the TW (24%) had received some form of GAS, and 17 of the TM (61%) had received some form of GAS (mostly mastectomy, by 57% of the TM).

Participants showed high compliance by having completed 38.03 of 42 daily questionnaires on average (SD = 3.77), with no differences between transgender and cisgender participants ($t(97) = 0.55$, $p = .580$, Cohen's $d = .112$). Table 2 presents group averages on the study variables.

3.2 Influence of sexual behavior and sexual openness on sexual esteem and body image on a daily level

Table 3 presents the outcomes of the linear mixed models fitted to assess the day-to-day relations between sexual behavior and openness and sexual esteem and body image, and to investigate differences between the transgender and cisgender groups in these relations.

Table 1.
Participant characteristics and group differences on education, occupation, housing, and number of children.

		Transgender group	Cisgender group	Group difference
Education	No high school degree	1 (2%)	0 (0%)	$X^2(1, N=99) = 2.12$, $p = .347$
	High school degree	21 (45%)	29 (56%)	
	College or university degree	25 (53%)	23 (44%)	
Occupation	Student	18 (38%)	13 (25%)	$X^2(1, N=99) = 2.09$, $p = .352$
	Employed	17 (36%)	24 (46%)	
	Unemployed	12 (26%)	15 (29%)	
Housing	Alone	16 (34%)	19 (37%)	$X^2(1, N=99) = 5.07$, $p = .166$
	Parents/family	13 (28%)	20 (38%)	
	Partner	12 (26%)	12 (23%)	
	Friends/student housing	6 (13%)	1 (2%)	
Number of children	0	38 (81%)	39 (75%)	$X^2(1, N=99) = 1.77$, $p = .779$
	1	3 (6%)	3 (6%)	
	2	2 (4%)	6 (12%)	
	3	3 (6%)	3 (6%)	
	4	1 (2%)	1 (2%)	

The analyses showed that at average levels of sexual behavior and sexual openness, the mean differences between transgender and cisgender participants on sexual esteem ($\beta = 1.21$, $SE = 0.45$, $t(88) = 2.67$, $p = .009$) and body image ($\beta = 1.64$, $SE = 0.70$, $t(85) = 2.34$, $p = .022$) were statistically significant, with cisgender participants scoring higher. Furthermore, in transgender participants, having had intimate activity on a given day positively predicted sexual esteem ($\beta = 0.21$, $SE = 0.08$, $t(1606) = 2.51$, $p = .012$). Additionally, in transgender participants, sexual openness positively predicted sexual esteem on the within- ($\beta = 0.12$, $SE = 0.02$, $t(1606) = 5.68$, $p < .001$) and between-subjects level ($\beta = 0.68$, $SE = 0.12$, $t(1606) = 5.76$, $p < .001$). Similarly, sexual openness positively predicted body image on the within- ($\beta = 0.06$, $SE = 0.02$, $t(1508) = 2.71$, $p = .007$) and between-subjects level ($\beta = 0.51$, $SE = 0.18$, $t(85) = 2.84$, $p = .006$) in the transgender group.

Table 2.
Descriptive statistics on study variables.

	Transgender group *M (SD)*	Cisgender group *M (SD)*
Sexual esteem	4.25 (1.17)	4.83 (1.11)
Body image	4.68 (1.36)	5.38 (1.30)
Sexual openness	3.15 (1.34)	3.70 (1.57)
	%	%
Sexual activity	10	16
Intimate activity	30	34
Masturbation	38	31

M = mean, *SD* = standard deviation. Percentages present the percentage of days on which sexual behavior was reported.

As Table 3 indicates, none of these relations differed between the transgender and cisgender groups. However, in the cisgender group, the daily effect of having masturbated on body image was significantly different (β = -0.21, *SE* = 0.09, $t(1508) = -2.23$, $p = .026$) compared to the transgender group (Figure 1).

To summarize, intimate activity positively predicted sexual esteem on a daily level, and this is the case in both transgender and cisgender participants. Similarly, the groups did not differ in how sexual openness positively predicted both sexual esteem and body image on a daily level.

3.3 Influence of sexual esteem and body image on sexual behavior and sexual openness on a daily level

Table 4 presents the results of the (generalized) linear mixed models assessing the influence of sexual esteem and body image on sexual behavior and sexual openness. In transgender participants, having a relationship was related to more sexual activity (β = 1.69, *SE* = 0.41, $z = 4.13$, $p < .001$) and intimate activity (β = 4.10, *SE* = 0.46, $z = 8.94$, $p < .001$), and to less masturbation (β = -1.10, *SE* = 0.37, $z = -2.96$, $p = .003$) and lower sexual openness (β = -0.58, *SE* = 0.23, $t(89) = -2.50$, $p = .015$). On a daily level, sexual esteem positively predicted intimate activity (β = 0.75, *SE* = 0.19, $z = 4.01$, $p < .001$), masturbation (β = 0.42, *SE* = 0.16, $z = 2.65$, $p = .008$) and sexual openness (β = 0.55, *SE* = 0.08, $t(1440) = 7.08$, $p < .001$) in transgender participants. This effect was also found on a between-subjects level for masturbation (β = 0.99, *SE* = 0.28, $z = 43.50$, $p < .001$) and sexual openness (β = 0.90, *SE* = 0.17, $t(88) = 5.25$, $p < .001$). Body image did not predict any of the sexual behavior and openness variables on the daily level, but

positively predicted intimate activity on a between-subjects level (β = 0.66, *SE* = 0.27, *z* = 2.43, *p* = .015).

Table 3.
Multilevel coefficients (β) and standard errors (SE) representing the effects of sexual behavior and sexual openness on sexual esteem and body image on a within- (i.e. daily) and between-subject level.

	Sexual esteem		**Body image**	
	β (SE)		*β (SE)*	
Predictor	**Main effects**			
Cisgender versus transgender identity	1.21 (.45) **		1.64 (.70) *	
Relationship versus single	.42 (.23)		-.42 (.37)	
	Within	**Between**	**Within**	**Between**
Sexual activity	.03 (.10)	-1.04 (.96)	.03 (.10)	-1.38 (1.46)
Intimacy	.21 (.08)*	.89 (.49)	.07 (.09)	1.64 (.75)
Masturbation	-.07 (.06)	.21 (.51)	.10 (.07)	.28 (.78)
Sexual openness	.12 (.02) ***	.68 (.12) ***	.06 (.02) **	.51 (.18) **
Cis x Sexual activity	.16 (.13)	1.52 (1.43)	-.12 (.15)	1.50 (2.17)
Cis x Intimacy	-.16 (.12)	-1.00 (.67)	.08 (.13)	-.94 (1.03)
Cis x Masturbation	-.01 (.09)	-.59 (.71)	-.21 (.09) *	-.82 (1.10)
Cis x Sexual openness	-.01 (.03)	-.20 (.15)	-.01 (.03)	-.20 (.24)

*** = $p < .001$; ** = $p < .01$; * = $p < .05$

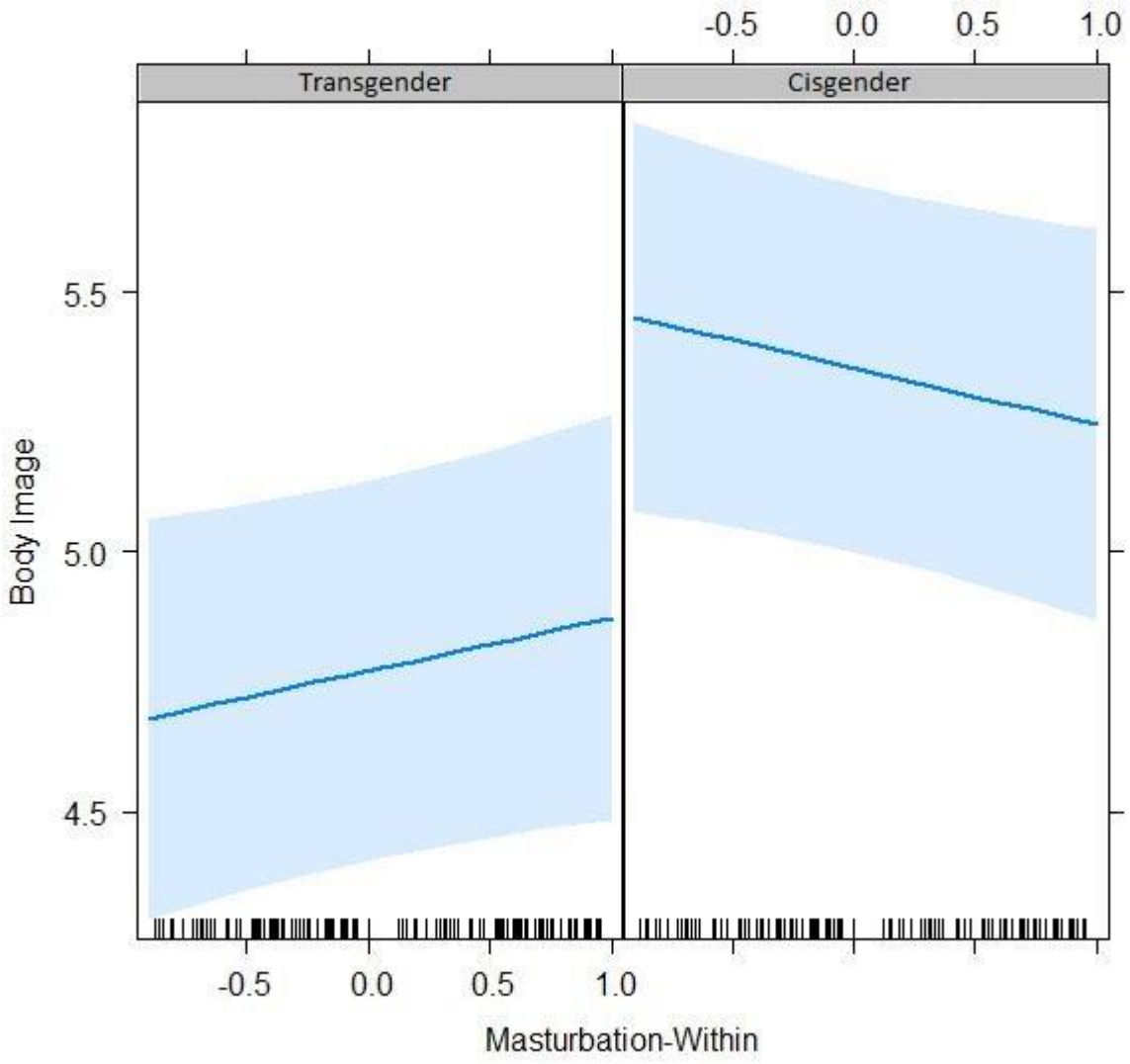

Figure 1. The daily effect of having masturbated or not (on the x-axis; values represent subject-centered values) on body image (on the y-axis) differed significantly between transgender (left panel) and cisgender (right panel) participants (β = -0.21, *SE* = 0.09, $t(1508) = -2.23$, $p = .026$). Shadings indicate 95% confidence intervals. Note that while the figure suggests there is a positive effect in transgender individuals and a negative effect in cisgender individuals, none of these effects in themselves were significant, and only the interaction reached a significance of $p < .05$.

None of these relationships differed between transgender and cisgender participants, except for the relation between sexual esteem and sexual activity. Here, in cisgender individuals, there was a significantly larger positive influence of sexual esteem on sexual activity on the daily level ($\beta = 0.63$, *SE* = 0.30, $z = 2.11$, $p = .035$) (Figure 2).

In sum, in both transgender and cisgender participants, higher sexual esteem on a given day predicted they were more likely to engage in intimate activity or masturbation, and to report higher sexual openness later on. In cisgender (but not transgender) participants, sexual esteem also positively predicted sexual activity on the daily level. Body image, on the other hand, did not play a role in sexual behavior and openness on the daily level.

4. Discussion

In this study, we applied a 21-day diary method to investigate the association between sexual esteem, body image, and sexual behavior in transgender and cisgender individuals. We found that transgender individuals score lower on daily sexual esteem and body image than cisgender individuals, but the groups did not differ in levels of sexual activity, intimate activity, masturbation, or sexual openness. We also showed that having intimate activity positively predicts sexual esteem on a daily level, and that being more open to engage in sexual behavior is related to higher sexual esteem and body image. Sexual esteem positively predicted intimate activity, masturbation, and sexual openness, whereas body image did not predict any of the sexual behavior variables. Interestingly, sexual activity (defined as genital touching) did not relate to either sexual esteem or body image. Most of these day-to-day relations were similar in the transgender and cisgender groups, with the only difference being that masturbation predicted body image significantly differently, and that sexual esteem positively predicted sexual activity in the cisgender but not the transgender group.

4.1 Day-to-day associations between psychological variables and sexual behavior in transgender individuals

Given that sexual esteem (Nikkelen & Kreukels, 2018; see also Chapter 2) and body image (Mofradidoost & Abolghasemi, 2020; van de Grift et al., 2016) are considered relevant concepts in the lives of transgender people, we investigated how these variables predict sexual behavior on a day-to-day basis and how (engaging in or being open to) sexual behavior contribute to self-esteem and body image. While a more positive body image has been associated with more sexual activity in various studies (see Gillen & Markey, 2019, for a review), we do not find this relation in our study. On a within-subjects level, body image did not predict any of the sexual behavior variables in the transgender group and the cisgender group. This suggests that participants' choices on whether to engage in sexual activity, intimate activity, or masturbation were not directly associated with body image. The fact that body image did not predict sexual openness either, provides further support for this, since this variable is less likely to be influenced by contextual factors (such as no partner being available or physical constraints).

Table 4.
Multilevel coefficients (β) and standard errors (SE) representing the effects of sexual esteem and body image on sexual behavior and sexual openness on a within- (i.e. daily) and between-subject level.

	Sexual activity *β (SE)*		**Intimacy** *β (SE)*		**Masturbation** *β (SE)*		**Sexual openness** *β (SE)*	
Predictor					**Main effects**			
Cisgender versus transgender identity	-1.12 (1.68)		-.30 (1.79)		2.56 (1.59)		-.48 (.96)	
Relationship versus single	1.69 (.41) ***		4.10 (.46) ***		-1.10 (.37) **		-.58 (.23) **	
	Within	**Between**	**Within**	**Between**	**Within**	**Between**	**Within**	**Between**
Sexual esteem	.37 (.21)	.10 (.30)	.75 (.19) ***	-.27 (.32)	.42 (.16) **	.99 (.28) ***	.55 (.08) ***	.90 (.17) ***
Body image	.20 (.20)	.24 (.27)	.05 (.17)	.66 (.27) *	.03 (.14)	.06 (.24)	-.01 (.07)	-.07 (.15)
Cis x Sexual esteem	.63 (.30) *	.34 (.45)	.17 (.27)	.45 (.47)	-.15 (.22)	-.24 (.40)	-.04 (.11)	.27 (.25)
Cis x Body image	.12 (.30)	-.12 (.40)	.28 (.25)	-.50 (.42)	-.03 (.22)	-.41 (.36)	.19 (.11)	-.12 (.22)

*** = $p < .001$; ** = $p < .01$; * = $p < .05$
Note: Since multilevel logistic regression models are used to predict sexual activity, intimacy, and masturbation, the estimated regression coefficients reported for these variables should be interpreted on the log odds ratio scale. A positive (negative) coefficient corresponds to a higher (lower) probability for the event of interest.

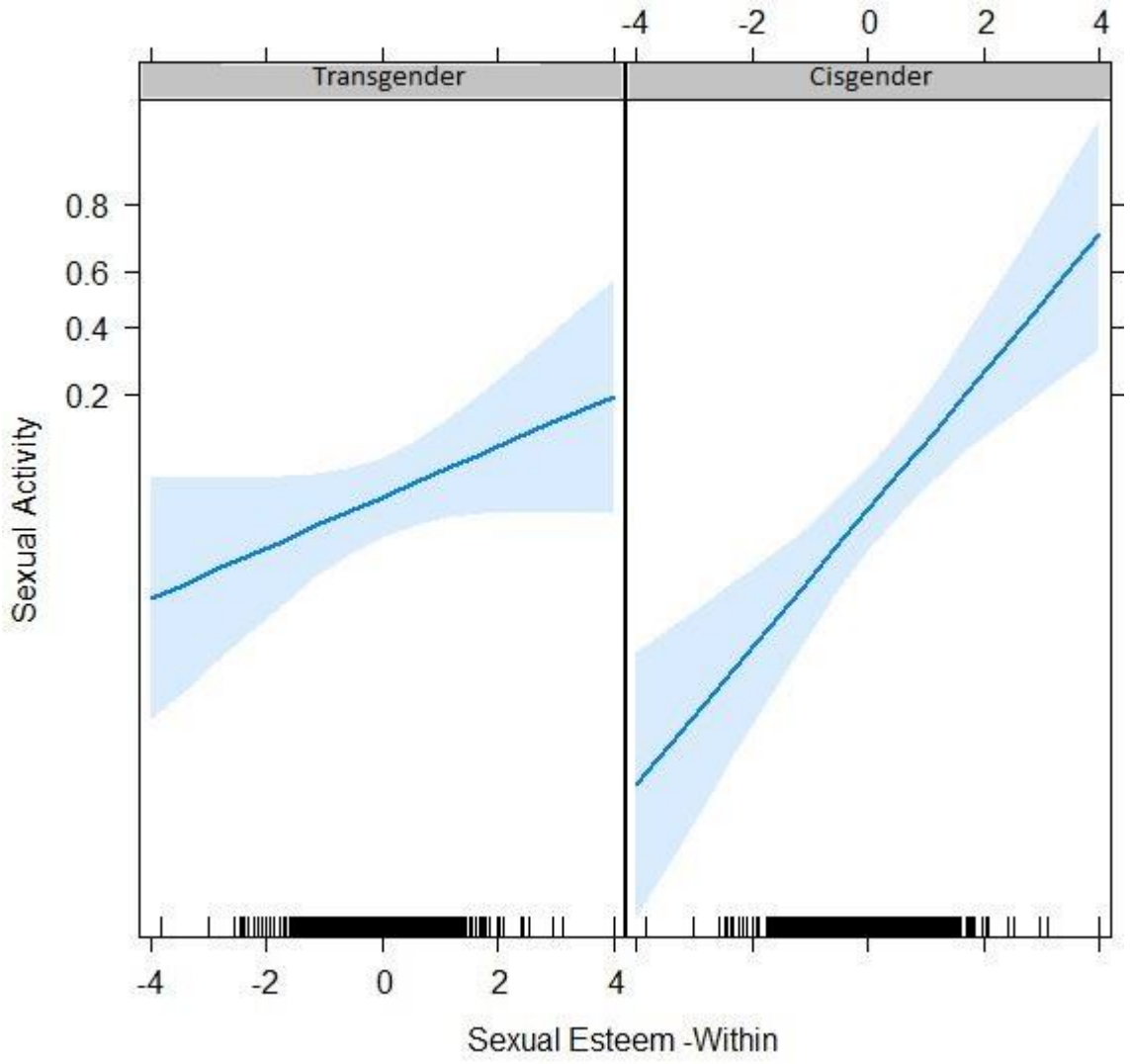

Figure 2. The daily effect between sexual esteem (on the x-axis; values represent subject-centered values) and the chance of engaging in sexual activity (on the y-axis; values represented on a logit scale) differed significantly between transgender (left panel) and cisgender (right panel) participants ($\beta = 0.63$, $SE = 0.30$, $z = 2.11$, $p = .035$). Shadings indicate 95% confidence intervals. Note that the positive effect of daily sexual esteem on the chances of engaging in sexual activity was significant in cisgender participants only.

4.1 Day-to-day associations between psychological variables and sexual behavior in transgender individuals

Given that sexual esteem (Nikkelen & Kreukels, 2018; see also Chapter 2) and body image (Mofradidoost & Abolghasemi, 2020; van de Grift et al., 2016) are considered relevant concepts in the lives of transgender people, we investigated how these variables predict sexual behavior on a day-to-day basis and how (engaging in or being open to)

sexual behavior contribute to self-esteem and body image. While a more positive body image has been associated with more sexual activity in various studies (see Gillen & Markey, 2019, for a review), we do not find this relation in our study. On a within-subjects level, body image did not predict any of the sexual behavior variables in the transgender group, and this was not different in the cisgender group. This suggests that participants' choices on whether to engage in sexual activity, intimate activity, or masturbation were not directly associated with body image, regardless of having a transgender or cisgender identity. The fact that body image did not predict sexual openness either, provides further support for this, since this variable is less likely to be influenced by contextual factors (such as no partner being available or physical constraints).

This inconsistency with previous findings is likely related to the fact that we applied a longitudinal, within-subjects design, whereas most previous studies applied cross-sectional, between-subject designs (Gillen & Markey, 2019). Indeed, on the between-subject level, we did find an association between body image and intimate activity, indicating that individuals with higher body image are more likely to engage in intimate activity in general. This between-subjects finding suggests that improving one's body image might be a means of increasing intimate or sexual activity, however, our within-subjects results suggest that this is not the case. This inconsistency illustrates how complementing cross-sectional findings with results from diary studies can contribute to a better understanding of which variables might have a possible causal influence on sexual responding.

Interestingly, we found no day-to-day associations between sexual activity and masturbation on sexual esteem and body image, while we did find predictive effects of sexual openness (on both psychological variables) and intimate activity (on sexual esteem). This emphasizes the relevance of defining sexual behavior as more than just one sexual act (Dewitte et al., 2015), especially since for some transgender individuals sexual satisfaction can also constitute not having (genital-related) sex (Lindley et al., 2021).

4.2 Differences between transgender and cisgender individuals

In our sample, we found lower daily sexual esteem and body image in transgender individuals compared to cisgender individuals. This is in line with previous findings such as Mofradidoost and Abolghasemi's study (2020), which reported lower body image, and our findings in Chapter 2, where we reported lower sexual esteem in transgender individuals compared to cisgender individuals. The fact that our findings are in line with these cross-sectional questionnaire studies further supports their conclusions, as this diary study method reduces the likelihood of retrospection influencing the results. Since subjects' reports are closer in time to their actual experience, they are less likely to rely

on the peak-end rule, in which participants grant more weight to the most intense and most recent experiences in a certain time frame (Bolger et al., 2003).

Transgender and cisgender individuals did not differ in the proportion of days on which they reported sexual activity, intimate activity, or masturbation, and they did not differ on their daily levels of sexual openness. For all these variables, relationship status was a more important factor, with individuals in a relationship reporting more sexual and intimate activity but less masturbation and lower sexual openness than single individuals.

In terms of within-subject associations between variables, transgender and cisgender individuals showed very little differences in how psychological variables on a given day predict sexual activity, and vice versa. The only significant differences in our models were related to the daily association between masturbation and body image, which was significantly different between cisgender and transgender participants, and the daily association between sexual esteem on sexual activity, which was absent in transgender participants but positive in cisgender participants. The latter is interesting because sexual esteem positively predicted all other sexual behavior components (intimate activity, masturbation, and sexual openness) in both groups, whereas it affected sexual activity only in the cisgender sample. This suggests that while sexual esteem is strongly associated with most components of sexual behavior, it does not explain actual genital sexual activity in transgender individuals. It is likely that there is another variable more closely related to sexual activity on the daily level, such as gender dysphoria, perceived partner support, or partner desire.

4.3 Clinical implications

Given that body dysphoria is one of the core elements of gender dysphoria (van de Grift et al., 2017), body image is a strong focus in the literature regarding transgender experiences (e.g., Mofradidoost & Abolghasemi, 2020; van de Grift et al., 2016), and the concept has been described as an important factor when supporting sexuality in transgender individuals (Holmberg et al., 2019). In qualitative studies addressing sexual experiences of transgender people, topics related to body image and body dysphoria are some of the most important themes described by participants (Lindley et al., 2020; Lindley et al., 2021; Martin & Coolhart, 2022). Our study, however, suggests that when it comes to explaining sexual behavior, body image might not be as important as suggested. We found that body image had no daily predictive effect on any of the sexual behavior components on the within-subject level. This is in line with one of the few quantitative studies to address the link between body image and sexuality in transgender individuals (Garz et al., 2021), in which it was reported that body image was not related to sexual desire. The authors suggested that for transgender individuals, satisfaction with gender-specific body parts specifically is central to their sexual desire. Body image in the more

general sense (as measured in our study and Garz et al., 2021), on the other hand, might not play an important role given the strong focus on secondary sex characteristics.

Hypoactive sexual desire has been described as a common sexual problem in transgender individuals, especially transgender women (Defreyne et al., 2021; Elaut et al., 2008; Kerckhof et al., 2019). Our study suggests that instead of focusing on body image, clinicians working with transgender individuals who want to increase their sexual openness and sexual activity levels should focus on sexual esteem instead. Furthermore, our results suggest that this can be achieved by encouraging people to engage in intimate activity, as this was found to positively predict sexual esteem, which then in turn positively predicts sexual openness and feeds back into intimate activity in a circular way.

Finally, sexual activity is often considered as an indicator of 'treatment success' following gender affirming medical treatment (e.g., Constantino et al., 2013; Klein & Gorzalka, 2009; Wierckx et al., 2011). In most studies, sexual activity is often narrowly defined as penetrative sex or partnered sex involving the genitals. However, contrary to intimate activity, masturbation, and sexual openness, we found that sexual activity was not related to any of the psychological variables on the daily level in our study, indicating that if we would have used a narrow definition of sexual activity, most effects would have remained undetected. As previously suggested (Dewitte et al., 2015), this indicates that both researchers and clinicians should aim to define sexual behavior broadly when describing sexuality in transgender or cisgender individuals, in order to fully capture their experiences and all associations with relevant outcome variables.

4.4 Limitations

While this is the first diary study assessing sexuality in a group of binary transgender individuals, the study has several limitations. An issue inherent to longitudinal studies with daily assessments over multiple weeks, is the high participant commitment and dedication (Bolger et al., 2003), posing a high risk of drop-out. However, our daily questionnaires were very brief, and we believe the high compliance rates reflect good participant commitment, which we also sensed in our contact with participants when debriefing them. Secondly, we included only binary identifying transgender and cisgender participants, excluding individuals with non-binary or genderqueer gender identities. Furthermore, the transgender sample was very heterogeneous in terms of GAMT, with some individuals receiving hormone therapy for several years already, and others none at all. Unfortunately, we did not have sufficient power to test statistical differences between these groups. Additionally, we did not include partners and partner effects in this study, while partner variables have been shown to be important in explaining daily sexual behavior (Dewitte et al., 2015), and factors such as the partner's gender might influence the outcomes. Furthermore, we did not include a measure to

address social desirability bias in response to the questionnaires, while such a bias is not uncommon in sexuality research (King, 2022). Another limitation is that transgender and cisgender participants were not matched on sexual orientation and partner status, since cisgender participants were recruited via a research panel. However, the groups did not differ in partner status, and hardly differed in sexual orientation. Finally, even though within-subject effects give more insight into what could possibly be causal relations compared to between-subject effects, all significant predictive effects in this study are based on associations, warranting reservations in considering them causal.

4.5 Future directions

Future diary study designs assessing sexual behavior in transgender individuals should include non-binary identifying individuals and participants from cultures other than Belgium and the Netherlands to improve generalizability of our results. Furthermore, by increasing sample size, future studies could investigate differences between transgender individuals based on the GAMT they receive. Finally, in order to confirm whether the associations found in this study are causal, studies applying an experimental design could shed light on if and how transgender individuals who, for instance, want to increase their sexual openness can do so via engaging in more intimate activities.

5. Conclusion

On a daily level, transgender individuals showed lower sexual esteem and a more negative body image than cisgender individuals, but they did not differ in sexual behavior as displayed in a daily context. In transgender individuals, intimacy predicted sexual esteem; sexual openness predicted sexual esteem and body image; and sexual esteem predicted intimacy, masturbation, and sexual openness on a daily level. None of these daily associations were different in cisgender individuals, contrary to the association between masturbation and body image, which was significantly different, and the association between sexual esteem and sexual activity, which was positive in cisgender but not transgender individuals. These findings indicate that sexual esteem is a more important determinant of sexual behavior than body image in transgender individuals, and that improving sexual esteem might be a possible target to improve sexual openness in this group.

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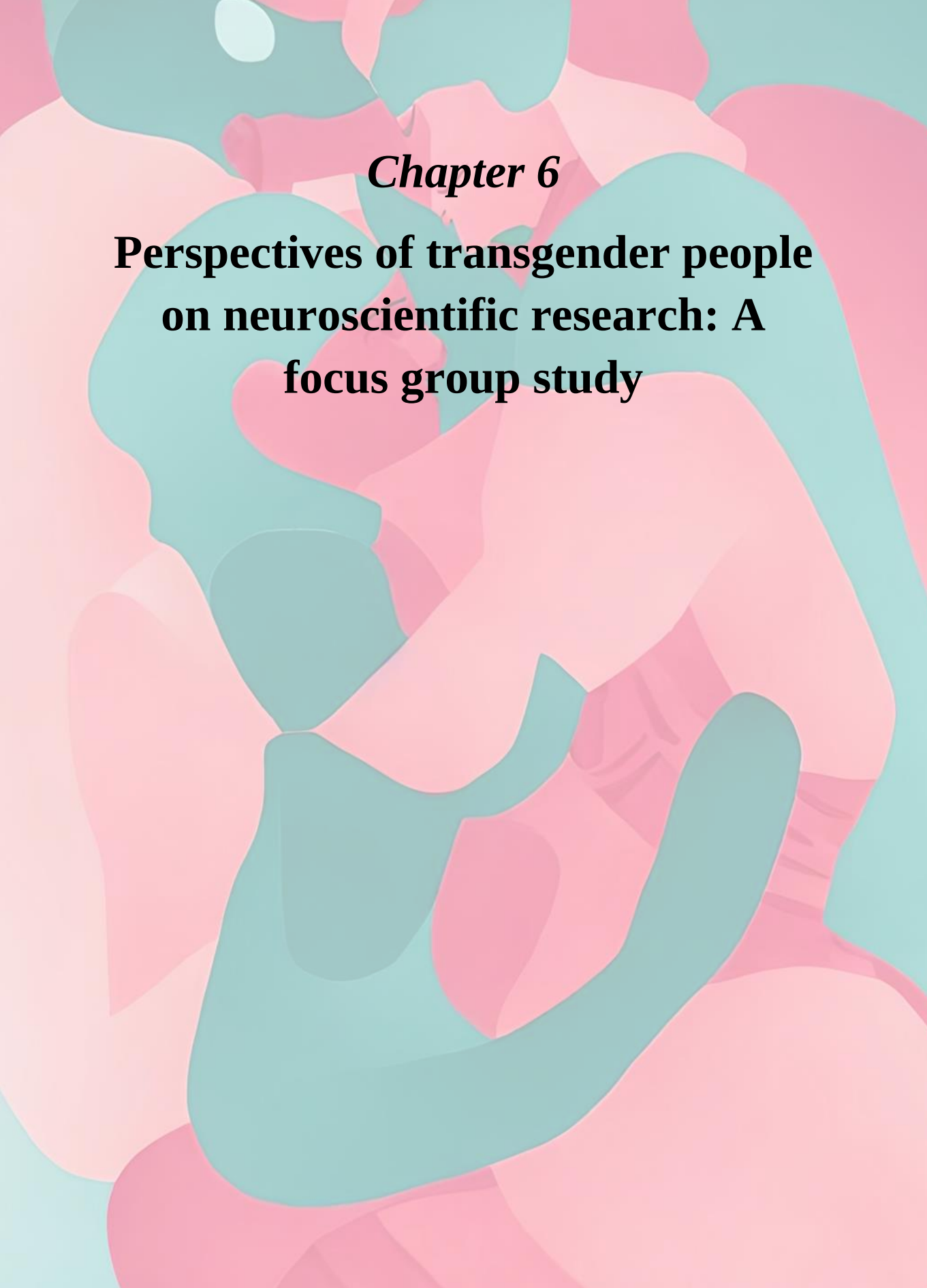

Chapter 6

Perspectives of transgender people on neuroscientific research: A focus group study

Abstract

Over the last two decades, neuroscientists have paid increasing attention to transgender individuals, studying them to find a potential neural correlate of a transgender identity. Despite calls from both researcher and transgender community members to involve the transgender community in research, this involvement has been minimal in neuroscientific studies, to our knowledge. In this study, we aim to bridge the gap between neuroscientists working with transgender participants and the community by conducting focus groups in which we inquired about transgender individuals' opinions regarding neuroscientific studies with transgender participants. The results indicate that participants saw both advantages and disadvantages to such studies. The advantages were mostly related to validation and health improvements, and the disadvantages were mostly related to intolerance towards transgender individuals and (medical) gate-keeping. For instance, participants indicated that they would be very interested in the outcomes from studies assessing the effects of hormone treatment on the brain, but also that they were concerned neuroimaging outcomes might lead to new diagnostic criteria in order to access such treatment. In the discussion, we describe these findings a social context and their implications for neuroscientists wanting to work with transgender people.

1. Introduction

Over the last two decades, the number of neuroscientific studies about transgender individuals has been rising steadily. 'Transgender' is an umbrella term indicating individuals who do not always and/or completely identify with the sex assigned to them at birth. In order to alleviate the distress accompanying this incongruence, some transgender individuals will opt for gender affirming medical treatment (GAMT), including gender affirming hormone treatment (GAHT) and gender affirming surgery (GAS) (World Professional Association for Transgender Health, 2022). In many countries, individuals require an official diagnosis of Gender Dysphoria (American Psychiatric Association, 2013) or Gender Incongruence (World Health Organization, 2018) in order to be eligible for GAMT. Often, such a diagnosis is also required in case individuals want a legal recognition of their gender, such as by changing the gender marker on their passport. This implies that health care professionals, who can officially diagnose individuals, have a crucial role in transgender individuals' medical and social transition (Ashley, 2019).

Upon reviewing the current scientific output from neuroimaging studies with transgender participants, one can discern several recurring research lines/questions. A first one draws on a model by Bao & Swaab (2011), relying on the premise that several brain characteristics show marked sex differences. They propose that in transgender people, these characteristics are in line with their identified sex, due to diverging hormonal influences during different prenatal phases. For instance, they suggest that transgender women's (female gender identity, male sex assigned at birth) brains are more similar to those of cisgender women (female gender identity, female sex assigned at birth) than to those of cisgender men (male gender identity, male sex assigned at birth), and vice versa for transgender men (male gender identity, female sex assigned at birth). Several studies have addressed this hypothesis, with inconsistent findings (Smith et al., 2015). For instance, Rametti et al. (2011) and Zubiaurre-Elorza et al. (2013) confirmed the hypotheses related to this theory, while Luders et al. (2009) and Savic & Arver (2011) failed to find such support.

A second research line does not rely on a neurobiological sex dimorphism, but instead frames transgender identities as resulting from disrupted connectivity in so-called "own body perception networks" (Manzouri, Kosidou, & Savic, 2017). This theory suggests that certain brain networks that are involved in 'connecting' a person's body with their sense of self, show alterations in transgender individuals compared to cisgender individuals. Other research lines do not focus on examining differences between cisgender and transgender individuals, but instead investigate the effects of GAHT on the brain (Burke et al., 2017), or even attempt to develop predictions of GAMT success based on brain connectivity (Moody et al., 2021). Additionally, a handful of fMRI studies have

addressed sexual arousal in transgender individuals (Gizewski et al., 2009; Kim et al., 2016; Mueller et al., 2015; Oh et al., 2012). Despite scientific efforts to map the neural correlates of a transgender identity (which are becoming more large-scaled and collaborative; see Mueller et al., 2021), so far results have been inconsistent and even contradictory (Smith et al., 2015).

Recently, several professionals working in transgender health research have called for a close involvement of the transgender community at all research stages (Adams et al., 2017; Bouman, 2018; T'Sjoen et al., 2017). These authors argue that this would not only improve the quality of studies about transgender individuals by decreasing bias and facilitating access to participants (Bouman, 2018), but that it is a matter of research ethics to involve the population that will ultimately be affected by research outcomes (Adams et al., 2017; T'Sjoen et al., 2017). By involving the transgender community in transgender research, scientists can focus their research on areas that are most relevant for the community, build trust, and facilitate their interpretation of study results (Bouman, 2018). However, to our knowledge, involvement of the transgender community in neuroscientific study design and interpretation has been minimal, or small-scaled and informal to say the least. Social scholars have argued that the fact that neuroscientific studies about transgender people have mainly been conducted by cisgender researchers with a rather reductionist approach, has lead to epistemic injustice (Casselles, 2021), discarding transgender people as epistemic agents and disregarding their lived reality. They argue that, especially in the earliest brain studies of (trans)gender identities, researchers ignored biosocial, mosaicist, and depathologizing approaches, and that these studies were flawed by internal conceptual inconsistency and the upholding of questionable paradigms.

So far, there have been little structural opportunities for dialogue between the neuroscientific and transgender communities. This study therefore aims to bridge this gap by interviewing transgender people about their views on neuroscience via focus groups. By qualitatively addressing the research question "What are transgender people's opinions on neuroscientific research about them?", we aim to evaluate our own research groups' ideas for neuroscientific studies, and inform (especially cisgender) researchers who want to conduct neuroscientific studies with transgender people on how such research is perceived by the transgender community.

2. Methods

2.1 Participants

Participants were recruited via social media groups targeting the transgender community, and transgender community network contacts of the authors. To be eligible, participants had to be at least 18 years old, identify as transgender, be in the opportunity to come to

the research site, and be fluid in either Dutch or English. From the respondents, ten individuals were selected and participated in two groups that varied in gender identity and age. Of these ten participants, one cancelled their participation due to COVID-19, and one did not show up at the appointed time. This resulted in a final sample of eight participants, divided over two focus groups. Basic participant characteristics are presented in Table 1. Participants varied in how familiar they were with neuroscientific research about transgender people, with three participants indicating they had not heard about this before; three participants indicating they had heard about one study (Zhou et al., 1995; which was one of the first studies to suggest that transgender brain characteristics are more in line with their gender identity than their sex assigned at birth); one participant indicating they had once attended a lecture on the topic; and one participant indicating they were part of a journal club on transgender studies, which had also covered neuroscientific studies. Furthermore, participants had a varied profile in terms of medical transition, ranging from none, over receiving gender affirming hormone treatment and still desiring gender affirming surgery, to considering their medical transition complete. Participants lived in the Netherlands or Belgium, and had a Dutch, Belgian, or German nationality. Educational level varied from high school degree to university degree.

Table 1.
Participant characteristics.

Participant	Gender identity	Pronouns	Age
Participant 1	trans feminine/non-binary	she/her	31
Participant 2	trans man	he/him	21
Participant 3	trans woman	she/her	37
Participant 4	trans man	he/him	21
Participant 5	trans masculine/gender queer	he/him and they/them	18
Participant 6	trans man	he/it	18
Participant 7	trans woman	she/her	37
Participant 8	non-binary, perhaps gender fluid	any pronouns	21

2.2 Procedure

Participants were invited to the Faculty of Psychology and Neuroscience of Maastricht University to attend a focus group on one of two dates in January/February 2022 and provided written informed consent. Both focus groups were conducted in English, with one participant sometimes speaking in Dutch, which was directly translated by the main researcher to the group. Each focus group was conducted by one main researcher, who moderated the discussion and introduced the topics and questions (see below), and one research assistant, who did not participate in the discussion. The main researcher and research assistant did not know any of the participants beforehand.

At the beginning of the focus group, the main researcher explained the objective and procedure of the study, and that the audio recording of the study would be deleted after transcription to ensure anonymity. Afterwards, a short introduction round was held in which participants, main researcher, and research assistant shared their gender identity, pronouns, age, and anything else they wanted to share such as occupation and hobbies. Finally, participants held a discussion about neuroscientific research about transgender people, moderated by the main researcher.

The discussion itself was structured in three parts, which all started with the main researcher giving a short explanation on a certain topic and posing pre-determined questions. The first part had no prior explanation, but started with questions only. In the second part, participants received some explanation about neuroimaging techniques, the difference between MRI and fMRI, and were given short examples of three neuroimaging studies about transgender individuals. The first study was about sex dimorphism in the brain (Savic & Arver, 2011), the second one about body perception (Feusner et al., 2016), and the third one about gender affirming hormone treatment effects on the brain (Burke et al., 2017). In the third part, participants were shown example stimuli of body morphs, such as the ones in Feusner et al. (2016), and similar stimuli including face morphs. These stimuli consisted of bodies and faces morphed into a more stereotypical ‘male’ and ‘female’ direction. Table 2 lists the questions that were addressed. Participants were made aware that the questions were guidelines, and that they could talk about related topics not directly addressed in the questions. Each discussion lasted about 75 minutes in total.

Participants received €15 as a compensation for their time, and an optional travel reimbursement. They were aware that they could discontinue their participation at any time without repercussions, that there were no right or wrong answers, and that they should all respect the confidentiality of the discussion. The entire procedure was tested once with a pilot group of transgender participants, who were also reimbursed, to ensure that the information and questions presented were accessible and understandable. No field notes were made during the discussions, and transcripts were not returned to participants to check for correctness.

Table 2.
Questions presented to participants during the discussions.

	Questions
Part 1: Prior to receiving any information about neuroimaging methods and studies about transgender individuals	• Have you heard about brain research with transgender people before? • Did you ever participate in such a study? Would you want to participate? Why (not)? • What could be a purpose/benefit of brain research? • What are potential negative consequences or dangers? • Which questions about the brains of transgender people would you like to see answered?
Part 2: After receiving information about neuroimaging methods and studies about transgender individuals	• How do you feel about these research lines/questions? • What could be a purpose/benefit of these research lines? • What are potential negative consequences or dangers? • Do these research lines spark new inspiration on questions about the brains of transgender people you would like to see answered?
Part 3: After having been presented example stimuli of body and face morphs	• How do you feel about the material we just showed you? • Are researchers allowed to show pictures that could potentially 'trigger' gender dysphoria? • What kind of questions, tasks, or pictures should definitely not be used in (brain) research with transgender individuals?

2.3 Analyses

We relied on a thematic analytical framework as outlined by Braun & Clarke (2006). First, each discussion was transcribed word-to-word, including hesitations, vocalizations, and unfinished sentences. Then, each transcript was cleaned of instances such as hesitations (e.g., 'Uhm') and unnecessary repetitions (e.g., 'So, so, so I believe […]) to produce clean transcripts to be used for the thematic analyses. These analyses were performed by two coders (MK and RS) using NVivo software (QSR International Pty Ltd., 2020).

Before starting the coding process, both coders extensively familiarized themselves with the data by repeatedly reading the transcripts. Then, each of the coders separately performed an initial coding of the transcripts and made a first outline of potential themes. After this step, the coders compared their work and agreed on potential themes, after which each would again perform an individual coding round. This recursive process was repeated for four rounds. When coders agreed on the themes and the items belonging to them, the themes were reviewed for internal homogeneity (i.e., all items belonging to the themes relating to something similar) and external heterogeneity (i.e., themes being sufficiently different from each other). Finally, the themes were defined and named in order to refine the specifics of each theme and the narrative of the analysis. We did not ask our participants to provide feedback on the themes, or any other part of our

analysis. Throughout the coding process, only items (directly or indirectly) related to the research questions were coded. Furthermore, both coders kept memos during the analyses to account for biases, identify obstacles, preserve ideas, and produce a paper trail of the analytical process (Birks, Chapman, & Francis, 2008). Given that the topics and themes covered in the two discussions were very similar, we considered the data saturated and did not organize any additional focus groups.

In this thematic analysis, we did not rely on any theoretical framework (which essentially means relying on realism; Braun & Clark, 2006). All codes and the overarching themes were derived inductively from the data and were not a priori determined. Below, we report the themes that we believe offer an answer to our research question, and we do so on the semantic level, describing participants' viewpoints and an interpretation of their implication only (as opposed to reporting the results on a latent level, identifying underlying ideologies or conceptualizations).

2.4 Coder positionality

While none of the researchers involved in this study has a conflict of interest, we would like to briefly describe the backgrounds of the two researchers who conducted the study and coded the analyses (in terms of neuroscientific research experience and affiliation with the transgender community) in order to be transparent about potential biases. The main researcher and author, MSc, identifies as a cisgender woman; is part of the ENIGMA Transgender Persons Working Group (Mueller et al., 2021) and has co-authored on a neuroscientific paper including transgender participants; has received a research grant to conduct neuroscientific studies about transgender people; and participates in activism and volunteering work benefiting the LGBTQ+ community. The research assistant who assisted the focus group and coding process, BSc, identifies as non-binary; obtained a Master in Cognitive and Clinical Neuroscience; and is a vocal activist in the transgender community.

3. Results

In what follows, we have organized the results thematically, illustrating each (sub)theme with related participant quotes. Table 3 presents an overview of all themes and subthemes, covering negative and positive attitudes towards neuroscientific studies with transgender individuals, as well as recommendations from participants.

Table 3.
Themes that answer the questions "What are transgender people's opinions on neuroscientific research about them?", as identified by the researchers.

Theme	**Definition**
Negative attitudes	When participants expressed a negative attitude towards neuroscience with transgender people
- Absence of benefits	There is no good reason to do neuroscience with transgender people
- Could support transphobic narratives	Research findings could contribute to transphobic narratives, leading to more stigmatization and discrimination
- Focus on differences	Neuroscientific research focuses too much on differences between transgender and cisgender people, singling transgender people out as 'different'
- Pathologizing	Transgender people are conceptualized as different from cisgender people in a way that frames them as having an illness
- Gate-keeping	Research findings might be used to limit opportunities for transgender people
- Medical gate-keeping	Brain scans might become part of a diagnostic process, in which transgender people need to present certain neurobiological characteristics in order to get access to GAMT
- Identity gate-keeping	Neuroscientific research might feed into a narrative that claims that you need certain brain characteristics in order to be considered transgender
- Skepticism towards reductionism	Neuroscientific methods are not appropriate or valid to help/understand transgender people
- No neurobiological origin of identity	A transgender identity is not something you can measure with neuroscientific methods
- Methodological flaws	Even if there was a neural correlate of a transgender identity, current neuroscientific methods have too many shortcomings to find this
Positive attitudes	When participants expressed a positive attitude towards neuroscience with transgender people
- Positive impact on mental health	Neuroscientific studies might have a positive impact on transgender people's mental health
- Identity confirmation	Brain scans could be useful on an individual level, in helping people who are questioning to see whether they have a certain 'transgender brain characteristic'
- Explanations	Research findings can lead to a better understanding of how transgender identities originate, and what it means to be transgender
- Validation	Neuroscience can contribute to the validation of transgender identities by proving they are 'real'
- Positive impact on physical health	Neuroscientific studies might have a positive impact on transgender people's physical health, mainly through better understanding of the effects of GAHT
Recommendations	When participants expressed certain recommendations for neuroscientists who want to include transgender participants
- After-care	Give participants information about/access to support in case they feel distressed after their participation
- Compensation	Compensate participants financially
- Conceptual clarity	Distinguish and define terms related to sex, gender, and sexual orientation
- Informed consent	Inform participants of the study procedure and stimulus material, and acquire written consent
- Accessible outcomes	Make research findings accessible for the transgender community
- Opportunity to discontinue participation	Allow participants to discontinue their participation at any time without any negative consequences
- Inclusion of transgender researchers	Have transgender researchers on the study team

3.1 Negative attitudes

Absence of benefits When asked how they felt about neuroscientific research, several participants indicated not being in favor of such research with transgender individuals because they saw no benefit in it. For instance:

"Maybe there is something positive in them, but I don't really see it right now." (Participant 5)

And:

"If it does not actively do anything positive for the community, if it cannot be used to make sure that we are healthy and happy, I think the question does not necessarily need to be asked." (Participant 2)

Could support transphobic narratives Several participants expressed worries about how outcomes from neuroscientific studies could contribute to transphobic narratives, which would support people who try to discriminate against or invalidate transgender individuals. For instance, participants expressed how such studies could be interpreted as indicating that trans women are not 'real' women, limiting their access to 'female' spaces:

"What if it comes out that the brain of trans women is more like the brain of [cis] men? Like, what then? Then, does that mean that they're like locked out of bathrooms forever, or something?" (Participant 2)

In this context, participants would often refer to so-called 'TERFs' (transgender exclusive radical feminists):

"I think transphobes and TERFs in general will find anything *against us. If there is a* slight *indication like 'This can affect your brain in a bad way' […] [they will] be like: "Yeah, you see! It's dangerous for you! Don't do that!" or "God, they are dangerous!"."* (Participant 5)

Similarly, participants expressed concerns that research outcomes could contribute to transphobic narratives that might prevent parents from allowing their children to transition:

"I would not want to contribute towards research that could then potentially be used by transphobes to discard people's identities, especially if it's, for example, parents - if a child comes out to their parent, and the parent wants to do research on their child's identity – finds a research [that] happens to be transphobic, or lean more towards the

transphobic side, and then take every negative aspect from that research, and then tell their child that they are not valid or they cannot transition…" (Participant 6)

However, several participants remarked that even without neuroscientific studies, people with a transphobic attitude will spread their narratives:

"The thing about people like that is though, even if they don't have research to back it up, they'll pretend to have research to back it up, so… […] It's very good to be cautious about this, but I also kind of feel that, like, no amount of caution is ever going to completely rule out that they're going to make these claims anyway, honestly." (Participant 1)

Focus on differences Several participants described how they felt neuroscientific research focusses too much on differences between transgender and cisgender individuals, singling out transgender people as 'different':

"If it's just to go "Now we can pinpoint this and now we can tell that you are different and you are different than the majority of us", that's when it becomes a problem." (Participant 6)

Pathologizing. Especially when discussing studies that look for the etiology of transgender identities, participants worried that such studies could have a pathologizing effect:

"We don't ask "Why is someone's favorite color blue?". These are questions that come from wanting to pathologize." (Participant 2)

Gate-keeping

Medical gate-keeping. Several participants indicated worry with the possibility of neuroimaging outcomes contributing to new diagnostic criteria:

"I feel that in the trans community there is also a bit of a discomfort that, when some physical aspect of transgenderness is discovered, that people might end up using it as a diagnostic criterion, and then they will tell people: "No you're not trans, because your brain is not like this and that" and this is something I'm very uncomfortable about." (Participant 1)

Participants expressed negative attitudes especially towards the scenario that adding neurobiological diagnostic criteria could prevent people from accessing GAMT:

"[Study results] should not be used to diagnose if someone is transgender or not. This is a real danger, that they would do a brain investigation of people indicating "I am

transgender", and that they get rejected based on the outcomes. This should not be the purpose, and I am afraid this could happen." (Participant 3)

Identity gate-keeping. Next to concerns about gate-keeping in a medical context, participants indicated being worried about neuroimaging studies contributing to social or identity gate-keeping, which could potentially invalidate transgender people's identity:

"If a research paper says like "This is how a trans person acts" or "This is what a trans person does" – there's always going to be people who will suddenly start hawk-eyeing trans people and be like "You don't do that thing!" or "You did that thing wrong once, so you're not trans!" And it's going to give transphobic people just more and more reason to just […] find a way to tell them that they're not valid." (Participant 6)

In this context, participants mentioned that the way to 'determine' if someone is transgender should always be by asking them:

"Yeah, the emphasis should always remain that you tell whether someone is trans by asking them, right? You don't tell people "oh you're trans because your brain is like this"." (Participant 1)

Skepticism towards reductionism

No neurobiological origin of identity. Some participants mentioned how they doubt that a transgender identity originates from the brain. For instance:

"For me 'transgender' has really a more spiritual meaning. And it's totally not…testable, researchable. […] It's something more on a spiritual dimension actually instead of, for example, something in your DNA, your genes, or…in the brain or so, whatever." (Participant 7)

Methodological flaws. Participants who considered the possibility of a transgender identity originating in the brain expressed doubts about the feasibility of discovering this origin using current neuroscientific methods. In this context, participants mentioned several possible methodological problems, such as functional data being open to interpretation, conflating correlation with causation, confounding effects of medication and hormones, and great variability within the transgender population. For instance:

"Even if you find something that might be statistically valid, doesn't mean that it's necessarily truthful, I guess, in some ways. And, I mean, if you have huge chunks of data, you can always find something. Doesn't necessarily make it right." (Participant 2)

3.2 Positive attitudes

Positive impact on mental health

Identity confirmation. Several participants indicated that neuroscientific progress might have a positive impact on mental health in transgender individuals who are questioning their identity. For instance, if studies were to find a neurobiological 'marker' of a transgender identity, some participants argued that this could help people in figuring out who they are:

"To be fair, though, I do think it would be cool if there's a proof like "Hey, this gene or this part of the brain proves you're trans" and if you can get it easily checked, it would be really cool to just have that worry gone…" (Participant 8)

Explanations. Participants argued that research findings could lead to a better understanding of how transgender identities originate, and what it means to be transgender:

"Why do I feel feminine, and not masculine, then? […] I think this must have something to do with the brain." (Participant 3)

And:

"Yeah, I think for me, [it is about] having more to be known about what it means to be trans or like what being trans does to someone, whether mentally or physically or any of that." (Participant 8)

Validation. Several participants indicated that neuroimaging study outcomes might contribute to greater tolerance and acceptance of transgender identities through validating them. They argued that people would find it easier to accept this phenomenon if there is 'biological proof':

"My motivation [to participate in a neuroscientific study] would be to hopefully find something that could confirm that people like me are real. That it's not mental." (Participant 7)

Positive impact on physical health Participants were positive about how neuroimaging studies could contribute to knowledge about how to improve physical health in transgender people, specifically regarding effects of GAHT on the brain:

"If someone is already starting their testosterone [treatment], then why not keep an eye on it and see how it develops and functions. Because that could also help people pre-transition and you could be like "Here's a list of things that it does, and we know it does this because we've done research on it"." (Participant 6)

3.3 Recommendations

After-care Participants agreed that neuroscientists should make sure participants have access to after-care or support resources after participating in a study:

"Make sure, like [participant 3] said, to have a psychologist nearby to help [participants] through it if [their gender dysphoria] happens to be triggered." (Participant 4)

Compensation A participant mentioned the importance of (financially) compensating participants:

"[You should be] compensating people, also." (Participant 2)

Conceptual clarity Several participants described how researchers should distinguish and define terms related to sex, gender, and sexual orientation:

"In anything where you use sex as a determinant, or trans people, people need to define it at the beginning. […] This just needs to be defined so that when anyone reads it, they have a definition." (Participant 2)

Informed consent Participants were firm about researchers needing to acquire informed consent from participants, especially when a study includes potentially triggering material:

"I feel like if a participant would agree, they have to be at least 18 plus, or of consenting age, no mental problems going on either way that could worsen the situation. So if they fully consent to it, by free will, I'd feel like, sure. "Have fun"." (Participant 4)

Accessible outcomes Several participants indicated the importance of making research outcomes accessible for the transgender community:

"I think that it's also important to try and ensure that [research findings are] somewhere available in easy language, and open source." (Participant 2)

Opportunity to discontinue participation According to the participants, transgender participants in neuroscientific studies should always have the option of discontinuing their participation at any time:

"If you're doing this type of research, I think it's important to – same as we all agreed here – that if you feel uncomfortable, you can leave." (Participant 6)

Inclusion of transgender researchers One participant expressed that having transgender researchers on the team could potentially improve the quality of a study:

"I think it's very important to have people that are trans making executive decisions in a study. […] I do just kind of think that every study that has trans people in it, not just interns, but that they feel free to make changes. That's just gonna make it better." (Participant 2)

4. Discussion

In this focus group study, transgender participants described their attitude towards neuroscience about their community. They reported both positive and negative attitudes, with the ambivalence reflecting both differences between participants (with some participants having a more negative attitudes than others), as well as ambivalence within participants (with individual participants recognizing both advantages and disadvantages). Furthermore, they phrased recommendations for scientists conducting such research. Below, we will summarize these findings, place them in context, relate them to previous neuroscientific studies, and formulate advice for researchers in this field.

4.1 Positive attitudes: a need for validation and explanations

Stigma against and discrimination of transgender people have been extensively described in the scientific literature (White Hughto et al., 2015). Transgender people report high rates of verbal violence, physical violence, and employment discrimination (Bockting et al., 2013; Fernández-Rouco et al., 2017; Lombardi et al., 2002). Previous studies have shown how these stigma negatively affect transgender people's mental health (Bockting et al., 2013; White Hughto et al., 2015). Therefore, it does not come at a surprise that several participants hoped that neuroscience could aid in validating transgender identities. In this regard, some participants believed that society would become more tolerable towards transgender people if there was physical 'proof' of their identity. While it is questionable to make moral judgments based on how 'natural' or 'biological' a certain phenomenon is, it has indeed been shown that people tend to be more tolerable towards homosexual (Hegarty & Pratto, 2001) or transgender individuals (Ching & Chen, 2022) when they belief their identities have a biological origin.

Interestingly, the other two themes related to improved mental health contradicted some themes related to negative attitudes. For instance, the theme related to identity confirmation (in which participants expressed that it would be beneficial if brain scans could be used to help people figure out their gender identity) contradicts the theme of social gate-keeping (in which participants expressed that it would be dangerous to decide people's identities through brain scans). Similarly, the theme related to explanations (in which participants expressed that they would want to learn about the

etiology of transgender identities through neuroscience) seems incongruent with concerns about pathologization (where participants argued that questions about etiology are inherently wrong). These ambivalences indicate that while transgender people would like to get answers to (neuroscientific) questions about themselves, they currently do not feel that their societal environment is safe enough for these answers not to backfire.

Finally, one of the themes participants were most equivocal about, was the possible benefits of studies investigating the effects of GAHT on the brain. Participants indicated how outcomes from such studies could help in transgender people's decision-making process regarding GAMT, as well as support medical clinicians caring for these people. This indicates that studies such as those conducted by Burke et al. (2017), who investigated the effect of testosterone on for instance cortical thickness in trans men, and Rametti et al. (2012), who investigated the effect of testosterone on structural connectivity in this group, are likely to receive support from the transgender community.

4.2 Negative attitudes: fear of stigmatization and restricted GAMT access

Next to expressing a certain apathy (in the theme related to an absence of benefits) and skepticism towards neuroscientific methods (in the theme related to skepticism towards reductionism), participants described concerns about how research outcomes could have a negative effect on transgender people. According to them, such a disadvantage could manifest as either an increase in stigmatization, or a decrease in GAMT access.

Considering a possible increase in stigmatization driven by neuroscience, participants described themes related to a focus on differences (especially when this results in pathologization) and related to research findings feeding transphobic narratives. These concerns again point to transgender people's vulnerable position in society (White Hughto et al., 2015) and how this renders them hesitant to participate in (neuroimaging) studies that could contribute to knowledge about their identities. In this context, participants often mentioned trans-exclusive movements, which claim transgender women are not 'real' women. Participants indicated great discomfort with the possibility of finding 'male' characteristics in transgender women's brain, which would then support these narratives. Indeed, scholars on research ethics have previously pointed out how certain transphobic movements rely on 'scientific-sounding language to achieve respectability' (Ashley, 2020). In this context, participants often referred to how they might be denied access to public spaces such as public restrooms, which is known to often be the point of discussion in political debates regarding the validation and recognition of trans identities, and to be a great source of distress for many transgender people (Herman, 2013).

Considering a possible decrease in GAMT access, we discerned a theme related to medical gate-keeping, describing how brain scans could become involved in a

diagnostic process in which clinicians decide who is eligible for GAMT. While these concerns might seem unrealistic to researchers working in neuroscience (due to the difficulty of translating results on a group level to the individual level, plus practical constraints such as high MRI costs), researchers have already published neuroimaging reports hinting at using fMRI to determine who would 'benefit most' from GAHT (Moody et al., 2021). In this context, our participants were often referring to the negative impact having to prove ones gender identity has on mental health, and how they would prefer an Informed Consent Model to access GAMT (Ashley, 2019). This call for an Informed Consent Model is not at all uncommon in the transgender community, and the debate regarding a 'gate-keeping' versus 'informed consent' model for GAMT access is often strained and presented in a black-or-white fashion, putting both clinicians and transgender individuals in an uncomfortable position (Richards et al., 2014). In order to truly reach *informed* consent, clinicians will still play an important role in the counseling of transgender individuals who consider GAMT, making it crucial to guard the relationships between the scientific, health care, and transgender communities (Richards et al., 2014).

4.3 Recommendations

Participants described several recommendations on how to conduct neuroscientific research with transgender people. Many of these themes, including after-care, compensation, informed consent, and the opportunity to discontinue participation are in line with international guidelines for research ethics, such as the Declaration of Helsinki (World Medical Association, 2013). The other recommendation themes, including accessible outcomes, inclusion of transgender researchers, and conceptual clarity, have also been expressed by researchers working in the transgender health field (Adams et al., 2017; Bouman, 2018; Galupo, 2017; T'Sjoen et al., 2017; Veale, 2017). This indicates that current practices and opinions regarding ethical research protocols are mostly in line with what our participants considered desirable conduct.

5. Conclusion

In this focus group study, we interviewed transgender people about their attitudes towards neuroscientific research about their identities. While participants recognized how such research could contribute to their well-being and societal knowledge in general, they expressed concerns regarding how research findings might be applied in a way limiting transgender people's opportunities and rights. In this regard, participants mentioned that they would not support neuroscientific findings being translated to criteria for GAMT access, and that they feared that some findings might render credibility to certain transphobic narratives. Researchers should be sensitive about these issues and be aware of how their findings will be perceived by the transgender community and society in

general, and always comply with international research ethics guidelines to protect their participants.

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Chapter 7

The behavioral component of sexual inhibition and its relation to testosterone levels: An fMRI study in transgender and cisgender individuals

Abstract

Many transgender individuals report having difficulties with initiating and seeking sexual contacts. Relatively to cisgender individuals, transgender individuals are more likely to avoid sexual activity, indicating that the groups might differ in the neural underpinnings of the behavioral component of sexual inhibition. In this fMRI study, 33 transgender and 34 cisgender participants performed an Approach Avoidance Task (AAT) assessing sexual inhibition. We found that over the entire sample, the task elicited brain activation commonly associated with general and sexual inhibition, for instance in the bilateral insula, right inferior parietal lobule, and right inferior and middle frontal gyri. Upon investigating group differences between transgender and cisgender participants, we mainly found similarities in neural activation during the task. However, there were group differences in regions involved in decision making processes (left middle temporal gyrus) and sexual response inhibition (right anterior cingulate cortex and left inferior parietal lobule). In order to investigate whether these group differences were modulated by testosterone levels, we performed ROI-analyses assessing the relationship between testosterone and neural activation during the AAT, but found no correlations. On the whole brain level, however, we found that testosterone correlated positively with cerebral activation in the right claustrum (a region associated with sexual arousal) during the approach of sexual stimuli in the transgender group. Overall, these findings indicate that transgender and cisgender individuals mostly show similarities in their neural response to a sexual Approach-Avoidance task, and that testosterone levels are unlikely to play an important role.

1. Introduction

Human sexuality and sexual responding are complex phenomena, affected by many interacting determinants related to biology, psychology, and social variables (Althof et al., 2005; Rosen & Barsky, 2006). This becomes especially prominent in transgender individuals, who experience an incongruence between their gender identity and sex assigned at birth. This incongruence and variables such as the related body image concerns and gender affirming hormone treatment (GAHT) are likely to affect sexual behavior in complex ways (Holmberg et al., 2019). In some transgender individuals, these interactions can lead to the avoidance of sexual activity. For instance, Gil-Llario et al. (2021) report that 59.2% of transgender women (female gender identity, male sex assigned at birth) and 37% of transgender men (male gender identity, female sex assigned at birth) who are waiting for gender affirming medical treatment (GAMT) avoid sexual intercourse. Even after starting GAMT, transgender individuals might still show an inhibited sexual response profile, as having difficulties with initiating and seeking sexual contacts has been found to be one of the most common struggles with sexuality in transgender individuals (Kerckhof et al., 2019).

These findings related to avoidance of sexual activity in transgender individuals rely on questionnaire studies, where participants explicitly reply to questions about their own behavior. However, such explicit measures can be greatly affected by social desirability and a participant's conscious and easily accessible beliefs about their own behavior (De Houwer, 2006), while sexual behavior relies on responding processes that can operate without conscious control (Bargh & Barndollar, 1996; Dewitte, 2016). In order to measure avoidance behavior without the distortion of conscious processes, researchers have developed the implicit Approach Avoidance Task (AAT). In this task, participants are instructed to approach or avoid certain stimuli as quickly and accurately as they can, after which their reaction times are analyzed to make inferences about their underlying avoidance tendencies. The task was first developed in the context of fear of spiders (Rinck & Becker, 2007), where it was found that the AAT results predicted fear-related behavior independently from questionnaire scores. Since then, the paradigm has been successfully applied to various fields of study such as emotion regulation (Eisma et al., 2015; Heuer et al., 2007) and substance abuse (Cousijn et al., 2011; Watson et al., 2013; Wiers et al., 2009).

The AAT has also been adapted to the field of sex research (Dewitte, 2006; Hofmann et al., 2009) and has recently been framed as measuring the behavioral (as opposed to cognitive) component of sexual inhibition, and to rely on a distinct neural system. For instance, in cisgender men, the behavioral component of sexual inhibition recruits the inferior frontal gyrus and inferotemporal cortex, and is further characterized by a hypoactivation in the anterolateral prefrontal cortex (Rodriguez-Nieto et al., 2019).

The complexity of this inhibitory system has been illustrated by the suggestion that testosterone might play an important role as modulator of the neural activity underlying behavioral sexual inhibition, as testosterone levels correlate positively with activity in the ventrolateral prefrontal cortex, putamen, middle temporal gyrus, and precentral gyrus during the avoidance of sexual stimuli in cisgender men (Rodriguez-Nieto et al., 2017). This involvement of testosterone is of relevance for transgender individuals, as many (but not all) of them might at some point consider GAHT, by which they increase or decrease their testosterone levels (Coleman et al., 2022). However, to date, there are no studies investigating the behavioral component of sexual inhibition, its possible underlying neuronal mechanisms, and a possible modulatory effect of testosterone in transgender individuals.

In this study, we aim to offer an exploration of the association between the approach and avoidance of sexual stimuli, brain activation, and testosterone levels in transgender and cisgender individuals, in order to build a biopsychological framework of sexual responding in transgender individuals. Our main objectives are to 1) investigate whether the neural mechanisms underlying behavioral sexual inhibition reported in cisgender men (Rodriguez-Nieto et al., 2019) can be replicated and generalized to cisgender women and transgender individuals, 2) investigate whether these neural mechanisms differ between transgender and cisgender individuals, and 3) explore whether testosterone can explain these differences by investigating the modulating effect of testosterone on brain activation during the AAT.

2. Methods

2.1 Participants

We included both cisgender and transgender participants. All participants had to be at least 18 years old, fluent in either English or Dutch, and in the ability to travel to Maastricht University. Exclusion criteria included medical disorders related to sex hormones (e.g., congenital adrenal hyperplasia), neurological disorders (e.g., prosopagnosia, aphasia), and features not considered safe in the MRI scanner environment (e.g., blood vessel clips, metal prosthetic implants, permanent make-up). Transgender participants were recruited via social media and online forums; via the personal network of the main researcher; via snowballing; and via Ziekenhuis Oost-Limburg at Genk, Belgium, which is a hospital that offers gender affirming care. Towards those recruited via the hospital, it was clearly communicated that no medical data would be linked to the study data, and that no individual outcomes would be shared with the clinicians. Cisgender participants were recruited via the SONA system of Maastricht University (through which students can earn credits by participating in scientific research) and via personal contacts of the main researcher. In total, 80 individuals participated in

the MRI study. Since during twelve of those sessions we encountered technical problems related to the Approach-Avoidance Task, and one additional participant made mistakes on more than 20% of the trials, the final sample presented in this chapter includes 67 participants.

2.2 Procedure

Study procedure This study was approved by the Ethics Review Committee Psychology and Neuroscience (ERCPN) of Maastricht University (approval code: 213_05_10_2019). Additionally, we gathered feedback from the transgender community on our research design via focus groups (see Chapter 6). Individuals expressing interest in the study first received an extensive information letter containing an outline of the study procedure and information about the study aim and participants' rights (e.g., the right to discontinue participation at any time during the study without having to provide a reason). If individuals still expressed interest in participating after having received this information, the main researcher would check for inclusion and exclusion criteria via email, and schedule the MRI session with the participant. One week before the MRI session, participants would receive a link to an online questionnaire to be completed before the session. This questionnaire took approximately 30-45 minutes. Furthermore, they received instructions regarding personalized stimuli (which were used for an MRI task not included in this chapter, so we will currently not further report on this).

MRI sessions were conducted at Scannexus, Maastricht, the Netherlands. Upon arrival, participants provided written informed consent, received an elaborate explanation of the study procedure and had the opportunity to ask questions. Then, a saliva sample was collected to measure testosterone levels. After this, participants would go into the 3T MRI scanner. The scanning session consisted of an anatomical scan (approx. 7 minutes), two resting-state scans (each approx. 10 minutes; data not reported in this chapter), an Approach Avoidance Task (approx. 22 minutes), and a Face Adaptation Task (approx. 18 minutes; data not reported in this chapter). After the scanning session, participants completed a final behavioral task on a computer (approx. 15 minutes; data not reported in this chapter). Finally, participants were debriefed with more background information about the research questions and methods, potential support resources in case they felt upset after the study, and how to follow up on study outcomes. Participants received €30 as a reimbursement for their participation, and if applicable, travel reimbursement.

Saliva samples were frozen and stored at -20 degrees Celsius until analysis (which was performed in Dresden, Germany). After thawing, samples were centrifuged at 3,000 rpm for 5 min, which resulted in a clear supernatant of low viscosity. Salivary concentrations were measured using commercially available chemiluminescence immunoassay with high sensitivity (LOQ 1.05 pg/ml; Tecan - IBL International,

Hamburg, Germany). For each sample, a duplicate analysis was performed (inter-assay CV 5.1%), and the measures reported in this chapter represent the average of those two outcomes per participant. For some cisgender women, testosterone values were too low to be detectable. In those cases, their value was set to 0.

MRI acquisition MRI data were acquired with a 3T Siemens Prisma Scanner. After a short localizer scan, T1-weighted images were acquired in the sagittal plane, TR = 2300 ms, TE = 2.98 ms, TI = 900ms, 192 slices, FOV = 256 mm, matrix sixe = 256 x 256, 1 mm isotropic voxel. During the Approach Avoidance Task, a total of 1022 T2*-weighted echo planar images were acquired with TR = 1300 ms, TE = 32.60 ms, flip angle = 70 deg, slice thickness = 2 mm, FOV = 208 mm, 60 slices, multi-band acceleration factor = 4, and a total scan time of 22 minutes and 8 seconds.

2.3 Materials

Online questionnaires

Demographics. A short demographic questionnaire assessed participants' age, country of residence, first language, and number of children using open questions. Multiple choice questions assessed educational level, living situation (e.g., living with partner, family, or alone), and whether participants had a romantic relationship (and if so, the duration of the relationship).

Sex assigned at birth was assessed using a multiple choice question presenting the options *Male*, *Female*, or *Other (please specify)*. The latter option was selected by none of the participants. Gender identity was assessed using a multiple choice question presenting the options *Man*, *Woman*, *Non-binary*, or *Other (please specify)*. We divided participants into five groups based on their answers on these two questions: cisgender men (CM; Male + Man), cisgender women (CW; Female + Woman), transgender men (TM; Female + Man), transgender women (TW; Male + Woman), and non-binary (NB; when selected Non-binary or Other on the second question). Furthermore, participants were asked whether they identified as transgender and whether they had ever received a diagnosis of Gender Incongruence or Gender Dysphoria via *Yes*/*No* questions. Transgender participants also indicated around what age they became aware of their transgender identity via a multiple-choice question. Sexual orientation was briefly assessed using two sliding scales, one to indicate attraction to men and one to women, ranging from 0 to 100.

Participants with a female sex assigned at birth additionally answered two questions about whether they were taking hormonal contraception, and about their menstrual phase (indicating in which phase they were in case they had a menstrual cycle). Finally, all participants indicated whether they currently had a mental health diagnosis

(and if so, which one(s)), and whether they would be taking medication at the time of the MRI session.

Gender affirming medical treatment. Transgender participants were presented questions regarding GAMT. First, they indicated whether they were on any waiting lists for GAMT (for an intake consultation, GAHT, or GAS). They then indicated whether they were receiving GAHT, and if so, for how many months already, how satisfied they were with the treatment, and what had been their main motives for starting this treatment. In case they did not receive GAHT (yet), they were asked whether they were planning to initiate this in the future, and what their main motives for (not) wanting this were. Similarly, participants were asked whether they had undergone any GAS procedures, and if so, how many months ago this was, how satisfied they were with the outcomes, and what had been their main motives. They were also asked whether they planned to undergo any (further) GAS, and indicated their main motives for (not) wanting this.

Gender dysphoria. Gender dysphoria was assessed using the Utrecht Gender Dysphoria Scale – Gender Spectrum (UGDS-GS; McGuire et al., 2020). This questionnaire consists of 18 statements that participants rate on a five point scale ranging from *Completely disagree* to *Completely agree*. Items include statements such as 'The bodily functions of my assigned sex are distressing for me (i.e., erection, menstruation)' and 'I hate my birth assigned sex'. For every participant, ratings from all items were averaged, resulting in scores ranging from 1 (low gender dysphoria) to 5 (high gender dysphoria). The scale showed high reliability in this sample (Mc Donald's ω = .962).

Sexual esteem. The measure of sexual esteem, which is defined as a person's self-evaluation of worth as a sexual being, was taken from a broader questionnaire on sexual self-concept (Buzwell & Rosenthal, 1996; adapted by Deutsch et al., 2014). All items were statements that had to be rated on a five-point scale ranging from *Strongly disagree* to *Strongly agree*. The scale consists of 24 items belonging to four subscales (behavior, body perception, conduct, and attractiveness), which we combined into one general Sexual Esteem measure (Mc Donald's ω = .913). A score ranging from one to five was calculated by averaging all the item scores.

Sexual satisfaction. We used the Global Measure of Sexual Satisfaction (GMSEX; Lawrance & Byers, 1995) to assess sexual satisfaction. The scale presents five sets of antonyms to describe one's sex life, such as Good vs. Bad and Satisfying vs. Unsatisfying. Participants are asked to indicate which antonym applies most to them using a seven point scale. The ratings on the items are summed, resulting in scores ranging from 7 (low sexual satisfaction) to 35 (high sexual satisfaction). The scale showed high reliability in this sample (Mc Donald's ω = .947).

General life satisfaction. General life satisfaction was assessed using the Satisfaction With Life Scale (SWLS; Diener et al., 1985). The scale consists of five items such as 'In most ways my life is close to my ideal', which participants rate on a seven point scale ranging from *Strongly disagree* to *Strongly agree*. Item sum scores range from 7 (low general life satisfaction) to 35 (high general life satisfaction), and the scale showed high reliability in the current sample (Mc Donald's ω = .897).

Anxiety and depression. The Hospital Anxiety and Depression Scale (HADS; Zigmund & Snaith, 1983) was used to assess anxiety and depression. The scale interleaves seven items regarding anxiety (e.g., 'I get a sort of frightened feeling as if something awful is about to happen') with seven items regarding depression (e.g., 'I look forward with enjoyment to thing', reverse item). Participants indicated for each item how applicable it is to them using four options that are scored from 0 to 3. Sum scores range from 0 to 21 for both anxiety and depression, with higher scores indicating higher anxiety/depression. The anxiety scale (Mc Donald's ω = .775) and depression scale (Mc Donald's ω = .840) each showed sufficient reliability in our sample.

Other questionnaires. In addition to the questionnaires described above, participants completed several other questionnaires that will not be analyzed in the current chapter. These included questionnaires on self-concept discrepancies (Higgins et al., 1986; Lynch, La Guardia & Ryan, 2009) and sexual attitudes and sexual self-efficacy (Deutsch et al., 2014).

Approach Avoidance Task During the scanning session, participants performed an Approach Avoidance Task (AAT) (Figure 1) in the scanner, during which they were instructed to respond to sexual stimuli and non-sexual stimuli with a joystick. Participants were assigned one of three sexual stimuli sets, based on their own indication of what they preferred/found most arousing. They could choose between a set depicting a woman and a man; two women; or two men. Stimuli were found on the internet and were selected on the basis of presenting couples with various body types and ethnicities engaging in naked kissing and caressing, manual or oral sex, and penetrative sex; not including thumbnails; having the couple as the main focus of the picture; and not including sexual practices that would potentially be found aversive or extreme by participants (e.g., BDSM). The set of non-sexual stimuli was identical for each participant, and presented a man and a woman dancing (taken from Rodriguez et al., 2018). These pictures of dancing couples were chosen as control stimuli to match the sexual stimuli in terms of visual complexity (body composition, color, ...). Both stimulus sets consisted of 48 pictures, of which 24 were presented vertical (257.6x400 pix) and 24 horizontal (337.9x272.5 pix).

The AAT consisted of four blocks, each with 48 randomized trials (24 sexual and 24 non-sexual stimuli). In two blocks, participants were instructed to approach sexual

stimuli and avoid non-sexual stimuli, and vice versa in the other two blocks. For each condition (approaching sexual stimuli and avoiding sexual stimuli), one block included vertical stimuli and the other horizontal stimuli, resulting in four unique blocks (approach sex with vertical stimuli; approach sex with horizontal stimuli; avoid sex with vertical stimuli; and avoid sex with horizontal stimuli) which were randomized across participants. In each trial, a stimulus was shown for 1300 ms during which participants had to make an approach or avoidance response. Approaching a stimulus entailed pulling the joystick towards them, while avoiding entailed pushing it away. During the next 1300 ms, the stimulus would change size depending on the participant's response, increasing in size after an approach response (to 515.2x800 pix for vertical stimuli, 675.8x545 pix for horizontal stimuli), decreasing in size after an avoidance response (to 128.8x200 pix for vertical stimuli, 168.95x135.25 pix for horizontal stimuli), and not changing in size when no response was made or the reaction time was above 1300 ms. Next, a fixation cross was shown during the inter trail interval, which was jittered around 2600, 3900, and 5200 ms. Including instructions and breaks between blocks, task duration totaled to 22 minutes and 8 seconds. For behavioral and fMRI analyses, only correct trials were analyzed. Trials were considered incorrect when participants made a faulty response, or when they responded after more than 1300 ms.

2.4 Analyses

Questionnaire and behavioral analyses All statistical analyses were performed using the software JASP (JASP team, 2020). We applied a significance threshold of p = .05 for all analyses. For the AAT, an Approach Avoidance Index was calculated by subtracting reaction times in blocks where sexual stimuli had to be avoided from reaction times in blocks where sexual stimuli had to be approached. A higher index hence indicates a stronger control over sexual approach behavior. Group differences between the transgender and cisgender groups on the questionnaires and behavioral AAT outcomes were analyzed using independent sample t-tests in case of continuous variables, and chi-square tests of independence in case of categorical variables. When we were interested in differences between the five groups (CM, CW, TM, TW, and NB), we applied one-way ANOVAs for continuous variables. In case of a significant ANOVA effect, post-hoc comparisons were analyzed applying the Tukey HSD test for multiple comparisons. Paired t-tests were applied to make within-subject comparisons regarding behavioral AAT outcomes (to check for differences between conditions within subjects). All correlations reported were calculated using Pearson product-moment correlation coefficients.

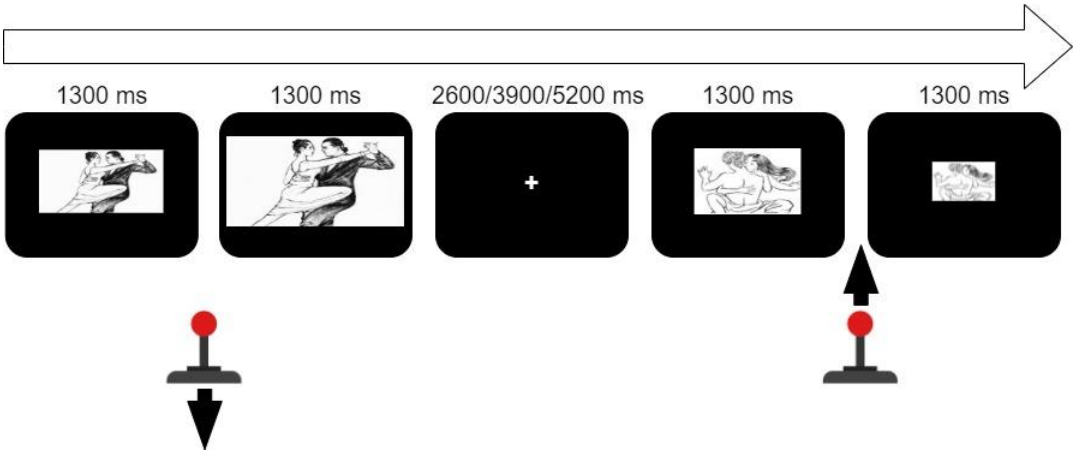

Figure 1. Design of the Approach Avoidance Task. The timeline presents two trials in a block in which participants were instructed to approach non-sexual and avoid sexual stimuli. When seeing a non-sexual picture, participants had to pull the joystick towards themselves, after which the picture would become larger. When seeing a sexual picture, participants had to push the joystick away, after which the picture would become smaller. The opposite reaction was required in blocks where participants were instructed to approach sexual and avoid non-sexual stimuli. While in this figure stimuli are presented as black and white drawings, during the actual task, they were pictures in colors.

fMRI analyses The neuroimaging data were pre-processed and analyzed with Brain Voyager QX Version 21.4 (Brain Innovation, Maastricht, Netherlands). The images were motion-corrected (trilinear / sinc interpolation and aligned to the first functional volume) and corrected for slice timing skew using cubic spline interpolation. A temporal high pass filter (two cycles) was applied. Images were co-registered to the individual T1 weighted images and normalized to Talairach stereotaxic space. Volume time courses were spatially smoothed using a 6 mm full width half-maximum Gaussian kernel.

We conducted a random-effects general linear model (GLM) analysis with correction for serial correlations to analyze AAT effects. Each condition was entered as a regressor in the design matrix (Approach Sex, Avoid Dance, Approach Dance, Avoid Sex). Task effects were analyzed by contrasting Approach Sex with Approach Dance trials to investigate activation during the approach of sexual stimuli, and by contrasting Avoid Sex with Avoid Dance trials to investigate activation during the avoidance of sexual stimuli. In order to investigate differences in brain activation during the AAT, a random-effects GLM analysis was performed with the four conditions as within-subjects factor and cisgender vs. transgender on the between-subjects level. These analyses were all performed on the whole-brain level. The resulting maps were corrected for multiple comparisons by means of cluster threshold level estimation (p set at $< .001$, 1000 Monte Carlo simulation iterations; Forman et al., 1995), and the nomenclature of the cluster peak values was defined with the software tool Talairach Client (Lancaster et al., 1997, 2000). Finally, we performed ROI analyses investigating the correlation between testosterone

levels and beta values in the regions found to show significant activation differences between cisgender and transgender participants during the AAT to investigate a possible modulating effect of testosterone during this task.

3. Results

3.1 Demographics

The sample included 17 cisgender men (CM), 17 cisgender women (CW), 8 transgender men (TM), 14 transgender women (TW), and 11 non-binary individuals (NB; 7 with a female sex assigned at birth, 4 with a male sex assigned at birth). The average age of the sample was 27.72 (*SD* = 8.89, range 18-56), with cisgender participants (*M* = 24.85, *SD* = 5.53) being significantly younger than transgender participants (*M* = 30.67, *SD* = 10.66) ($t(65) = -2.813$, $p = .006$). To further inspect this group difference on age, we conducted an additional ANOVA with five instead of two groups, which also indicated a significant group difference ($F(4, 62) = 4.283$, $p = .004$) that post-hoc tests revealed to be driven by the TW group being older than the CW ($p = .002$) and CM groups ($p = .035$). Most participants' current country of residence was the Netherlands (*N* = 52, 78%) or Belgium (*N* = 12, 18%), and the most common first languages were Dutch (*N* = 38, 57%) and German (*N* = 14, 21%). Table 1 presents descriptive statistics and group differences on several categorical variables. This table indicates that compared to cisgender participants, transgender participants were more likely to have received a mental health diagnosis and to be taking medication at the time of the scanning session. However, this difference was mostly due to transgender participants with a diagnosis of Gender Incongruence or Gender Dysphoria, and due to transgender participants listing their GAHT as medication. Furthermore, the table indicates that there was a slight difference in distribution according to living situation and number of children, with cisgender participants more often indicating living with (a) friend(s) and not with a partner, and having no children compared to transgender participants. This likely follows from the age difference reported above.

Cisgender participants rated their attraction to men 49.52 on average (*SD* = 42.98), and transgender participants 46.03 (*SD* = 33.64), which was not significantly different ($t(64) = 0.367$, $p = .715$). There was a difference, however, in how the two groups rated their attraction to women ($t(65) = -3.726$, $p < .001$), with the cisgender group having lower ratings (*M* = 39.27, *SD* = 40.41) than the transgender group (*M* = 72.24, *SD* = 31.31). This was mostly driven by CW showing much lower attraction to women than the other groups. In this group, 9 CW indicated taking hormonal contraception and 7 CW indicated not doing so. None of the TM or NB individuals with a female sex assigned at birth indicated taking hormonal contraception. In terms of menstrual phase, the CW group showed a varied profile, with 3 participants indicating they had no menstrual

phase; 1 indicating being in the follicular phase; 2 indicating they were in the menstrual phase; 4 indicating they were in the ovulation phase; and 6 indicating they were in the luteal phase. This profile was less varied in the TM and NB (female sex assigned at birth) groups, with 6 TM indicating they did not menstruate and 1 indicating he was in the menstrual phase, and 5 NB individuals indicating they did not menstruate and 2 indicating they were in the luteal phase.

Table 1.
Descriptive statistics and group differences on categorical variables education, employment, relationship, living situation, number of children, having received a mental health diagnosis, and taking medication at the time of the scanning session.

		Cisgender *N*	Transgender *N*	Group difference
Highest obtained education	High school	15	12	$X^2(1, N=67) = 0.419, p = .518$
	College/university	19	21	
Employment	Employed	14	16	$X^2(2, N=67) = 5.605, p = .061$
	Student	20	13	
	Unemployed	0	4	
Currently in a relationship	No	11	15	$X^2(1, N=67) = 1.210, p= .271$
	Yes	23	18	
Living situation	Alone	12	11	$X^2(4, N=67) = 13.134, p = .011$
	Friend(s)	9	0	
	Parents/family	3	10	
	Partner	5	7	
	Student housing	5	5	
Number of children	0	34	26	$X^2(3, N=67) = 8.054, p = .045$
	1	0	2	
	2	0	4	
	5	0	1	
Mental health diagnosis	No	14	17	$X^2(1, N=50) = 4.529, p = .033$
	Yes	3	16	
Taking medication	No	25	6	$X^2(1, N=64) = 24.971, p < .001$
	Yes	6	27	

Of 33 transgender participants, 21 indicated having received a diagnosis of Gender Incongruence or Gender Dysphoria (64%), and most had become aware of their transgender identity before adolescence (N = 23, 70%). GAMT profiles are presented in Table 2, which illustrates that while there is great heterogeneity among the sample, most participants were receiving GAHT at the time of the scanning session.

3.2 Questionnaires

Table 3 presents descriptive statistics for the cisgender and transgender groups for the questionnaires. Transgender participants scored significantly higher on gender dysphoria and lower on general life satisfaction and sexual esteem compared to cisgender participants. There were no group differences on sexual satisfaction, anxiety, or depression.

Table 2.
Group profiles in terms of received gender affirming medical treatment (GAMT).

Treatment received	Transgender men	Transgender women	Non-binary individuals
No GAMT	1	3	6
GAHT only	3 (started on average 22.86 months ago, *SD* = 18.43, range 1-48 months ago)	9 (started on average 15.83 months ago, *SD* = 12.35, range 5-40 months ago)	2 (started on average 73.25 months ago, *SD* = 62.15, range 5-144 months ago)
GAS only	0	0	1
GAHT and GAS	4	2	2

Numbers indicate the number of participants indicating having the described GAMT profile. GAHT = gender affirming hormone treatment, GAS = gender affirming surgery, *SD* = standard deviation.

Table 3.
Descriptive statistics for gender dysphoria, sexual esteem, sexual satisfaction, general life satisfaction, anxiety, and depression.

	Cisgender *M (SD)*	Transgender *M (SD)*	Group difference
Gender dysphoria	1.76 (0.35)	3.93 (0.36)	$t(65) = -24.819$, $p < .001$
Sexual esteem	3.98 (0.49)	3.38 (0.70)	$t(65) = 4.076$, $p < .001$
Sexual satisfaction	28.21 (7.28)	24.76 (7.06)	$t(65) = 1.97$, $p = .053$
General life satisfaction	26.74 (4.93)	19.64 (7.38)	$t(65) = 4.643$, $p < .001$
Anxiety	7.47 (3.47)	8.58 (4.13)	$t(65) = -1.188$, $p = .239$
Depression	3.91 (3.06)	5.18 (4.59)	$t(65) = -1.336$, $p = .186$

M = mean, *SD* = standard deviation

3.3 Testosterone measures

Descriptive statistics for the testosterone levels measured in saliva are presented in Table 4. An ANOVA test indicated that testosterone values differed significantly between the five groups ($F(62,4) = 3.176$, $p = .019$). Post-hoc tests indicated that this was driven by TM having significantly higher values than CW ($p = .015$) and than TW ($p = .031$). As Table 4 indicates, there was high variability in testosterone levels, especially in transgender participants with a female sex assigned at birth. This was likely driven by the GAHT most of these participants were receiving (e.g., shortly after receiving a testosterone shot).

Table 4.
Descriptive statistics for testosterone levels measured in saliva samples.

Group	*M* (in pg/ml)	*SD*	Range
Cisgender men	48.63	16.13	20.99-79.25
Cisgender women	2.34	1.77	0.00-4.77
Transgender men	242.81	378.27	2.39-1072.39
Transgender women	14.27	22.366	0.22-61.1
Non-binary individuals	102.60	286.09	0.00-962.86

Values are expressed in pg/ml and represent averages from duplicate analyses. *M* = mean, *SD* = standard deviation.

3.4 Behavioral Approach Avoidance Task outcomes

The cisgender and transgender groups differed significantly on which of the three stimulus sets they chose to be shown during the AAT ($X^2(2, N=67) = 16.345$, $p < .001$), with most transgender participants choosing the set depicting two women, and most cisgender participants choosing the set depicting a man with a woman. Participants made an average of 8.96 misses/mistakes during the task (which had a total of 192 trials), with a standard deviation of 7.57 (range 0 to 39). Transgender and cisgender participants did not differ on the amount of mistakes they made ($t(65) = 1.722$, $p = .090$), and participants were not inclined to make more or less mistakes on blocks in which they had to approach sexual stimuli compared to blocks in which they had to avoid sexual stimuli ($t(66) = -.183$, $p = .855$). Furthermore, transgender and cisgender participants did not differ on the Approach Avoidance Index ($t(65) = -.228$, $p = .820$), indicating that both groups had equal control over the behavioral component of sexual inhibition. To explore whether behavioral AAT outcomes were directly related with neuroendocrine or sexual self-concept measure, we calculated the correlations between the Approach Avoidance Index and testosterone level ($r = -.014$, $p = .913$) and between the index and sexual esteem ($r = -.152$, $p = .219$), which were both non-significant.

Table 5 presents the average reaction times according to reaction and stimulus type. A repeated measures ANOVA with two within-subjects variables (reaction, 2 levels: Approach vs. Avoid; stimulus type, 2 levels: Sex vs. Dance) and one between-subjects variable (group, 2 levels: cisgender vs. transgender) indicated a main effect of stimulus type ($F(65, 1) = 7.381$, $p = .008$) and a significant interaction between reaction and stimulus type ($F(65, 1) = 13.825$, $p < .001$). Post-hoc tests indicated that participants were faster to react to sexual compared to non-sexual trials, and that they were quicker in approaching sexual trials compared to approaching non-sexual trials ($p < .001$) (which is consistent with previous studies: see Rodriguez-Nieto et al., 2019; Hofmann et al., 2009; Dewitte 2009).

Table 5.
Average reaction times Approach Avoidance Task.

	Approach *M* (*SD*)	Avoid *M* (*SD*)
Sexual stimuli	1141 (142)	1159 (130)
Non-sexual stimuli	1174 (129)	1149 (135)

Reaction times are presented in ms.

3.5 MRI analyses

Activation during approach and avoidance of sexual stimuli Aiming to identify the brain activation profiles during the AAT in the entire sample, we contrasted Approach Sex trials with Approach Dance trials in order to capture activation during the approach

of sexual stimuli, and Avoid Sex trials with Avoid Dance trials in order to capture activation during the avoidance of sexual stimuli (Table 6). The approach of sexual stimuli resulted in activation of clusters in the right middle occipital gyrus, left and right precentral gyrus, and left inferior parietal lobule (Figure 2). Furthermore, there was a decrease in activation in the left and right insular cortices, right inferior parietal lobule, and right inferior and middle frontal gyri. The avoidance of sexual stimuli activated clusters in the left inferior occipital gyrus, and left anterior and posterior cingulate, and deactivated clusters in the right and left transverse temporal gyri, right inferior parietal lobule, right medial frontal gyrus, and left middle frontal gyrus (Figure 3).

Table 6.
Neural activation profiles during the approach and avoidance of sexual stimuli (n = 67).

	x	y	z	Brodmann area	*t*	*p*
Approach Sex > Approach Dance						
R insula	41	-25	19	13	-5.010	.000001
R middle occipital gyrus	35	-75	12	19	9.667	.000000
R inferior parietal lobule	51	-52	40	40	-4.449	.000014
R precentral gyrus	44	1	30	6	5.853	.000000
R inferior frontal gyrus	40	50	1		-5.361	.000000
R middle frontal gyrus	36	13	51	6	-5.260	.000000
L precentral gyrus	-44	-3	55	6	4.285	.000029
L insula	-42	-22	18	13	-4.729	.000004
L precentral gyrus	-44	0	30	6	5.125	.000001
L inferior parietal lobule	-59	-27	35	40	5.889	.000000
Avoid Sex > Avoid Dance						
R transverse temporal gyrus	45	-22	15	41	-5.040	.000001
L inferior occipital gyrus	-40	-76	0	19	8.367	.000000
R inferior parietal lobule	49	-47	43	40	-4.116	.000057
R medial frontal gyrus	4	31	41	8	-4.385	.000019
L anterior cingulate	0	2	-3	25	4.930	.000002
L posterior cingulate	-2	-51	25	23	5.951	.000000
L middle frontal gyrus	-42	52	8	10	-4.733	.000004
L transverse temporal gyrus	-41	-30	12	41	-4.583	.000008

X, y, and z present cluster peak coordinates in standardized Talairach space. R = right, L = left.

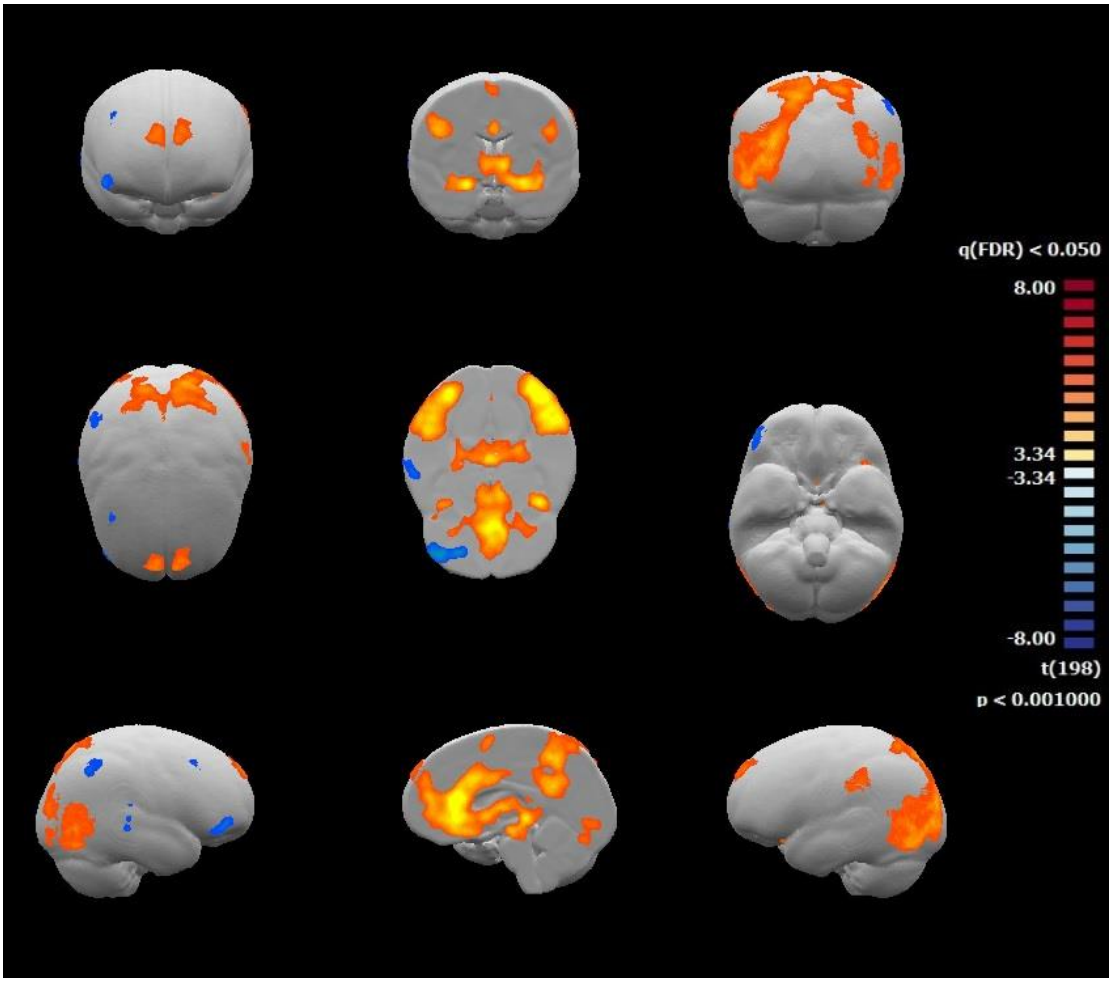

Figure 2. Brain activation at the group level during the approach of sexual stimuli (Approach Sex > Approach Dance trials, cluster level threshold corrected at p <.001). Top row: anterior perspective, coronal view from anterior perspective, posterior perspective. Middle row: superior perspective, transverse view from superior perspective, inferior perspective. Bottom row: right lateral perspective, left medial perspective, left lateral perspective.

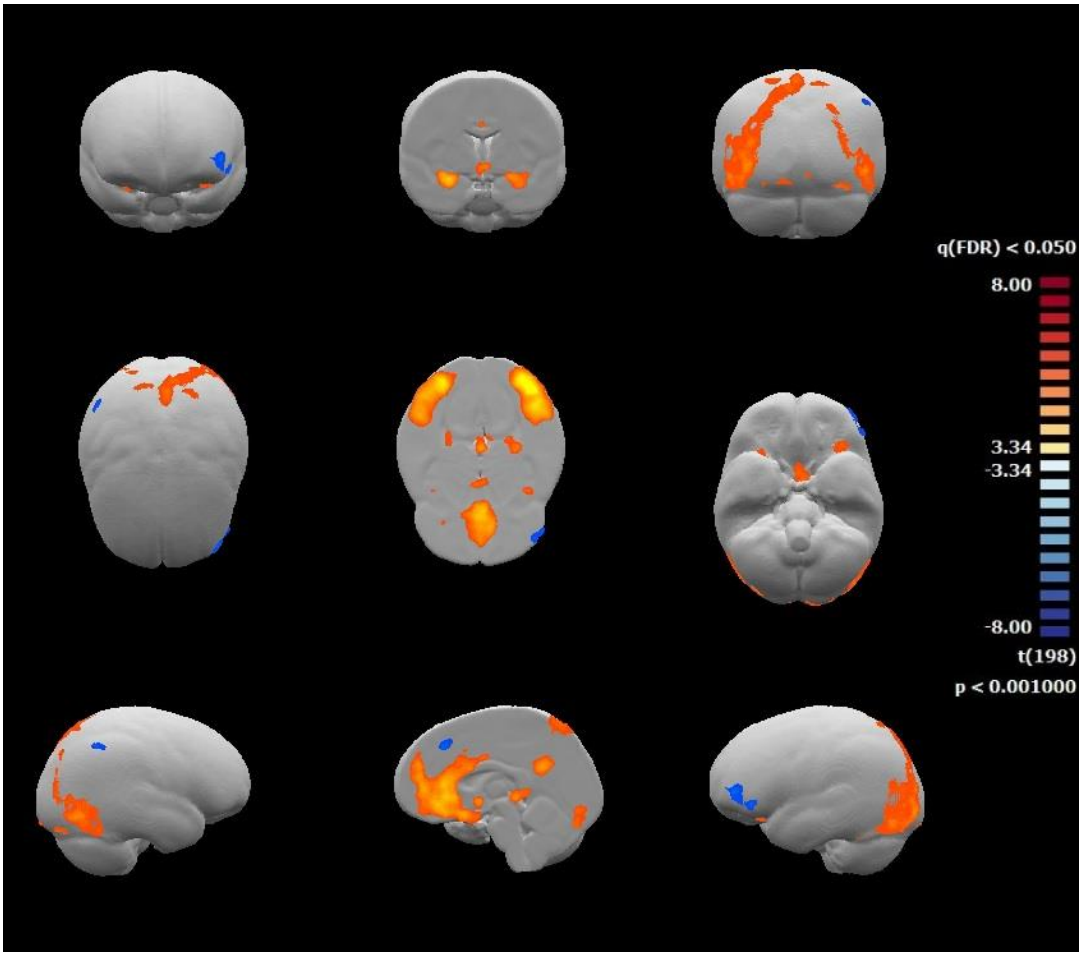

Figure 3. Brain activation at the group level during avoidance of sexual stimuli (Avoid Sex > Avoid Dance trials, cluster level threshold corrected at p <.001). Top row: anterior perspective, coronal view from anterior perspective, posterior perspective. Middle row: superior perspective, transverse view from superior perspective, inferior perspective. Bottom row: right lateral perspective, left medial perspective, left lateral perspective.

Differences between cisgender and transgender groups In order to investigate whether cisgender and transgender participants showed differential neural activation during the AAT, we performed a random effects GLM analysis with condition (4 levels: Approach Sex, Avoid Dance, Approach Dance, Avoid Sex) as within-subjects factor and cisgender/transgender (2 levels: cisgender, transgender) as between-subjects factor (Table 7). To further inspect these interactions, we performed ROI analyses on the significant clusters, performing a repeated-measures ANOVA for each separate cluster. The results are presented in Figure 4, which displays various patterns, that were further investigated using post-hoc tests (see Appendix B for statistics). In the cisgender group, there was higher activation in the left medial frontal gyrus during the avoidance of non-sexual stimuli compared to the approach of non-sexual stimuli, which was not the case in the transgender group. Similarly, the left precentral gyrus showed higher activation during the avoidance of non-sexual trials compared to the approach of sex trials in the cisgender but not the transgender group. Additionally, the left inferior parietal lobule showed higher activation during both types of non-sexual trials compared to trials in which sexual stimuli were approached in the cisgender group, but not the transgender group. The right anterior cingulate and left middle temporal gyrus showed differential activation according to response rule in the transgender group, which was not the case in the cisgender group. Finally, transgender participants showed higher activation in the left fusiform gyrus when approaching compared to avoiding non-sexual trials, which was not the case in the cisgender group.

Table 7.
Brain regions containing clusters showing differential activations between cisgender (n=34) and transgender (n = 33) participants during the Approach Avoidance Task.

	x	y	z	Brodmann area	*F*	*p*
R anterior cingulate	13	28	-10	32	8.227	.000035
L medial frontal gyrus	-3	27	35	6	7.152	.000140
L fusiform gyrus	-49	-72	-13	19	9.000	.000013
L inferior parietal lobule	-54	-56	41	40	6.342	.000400
L precentral gyrus	-57	13	2	40	6.994	.000172
L middle temporal gyrus	-64	-49	6	21	6.782	.000226
Outside grey matter	41	-7	71		9.478	.000007

X, y, and z present cluster peak coordinates in standardized Talairach space. R = right, L = left.

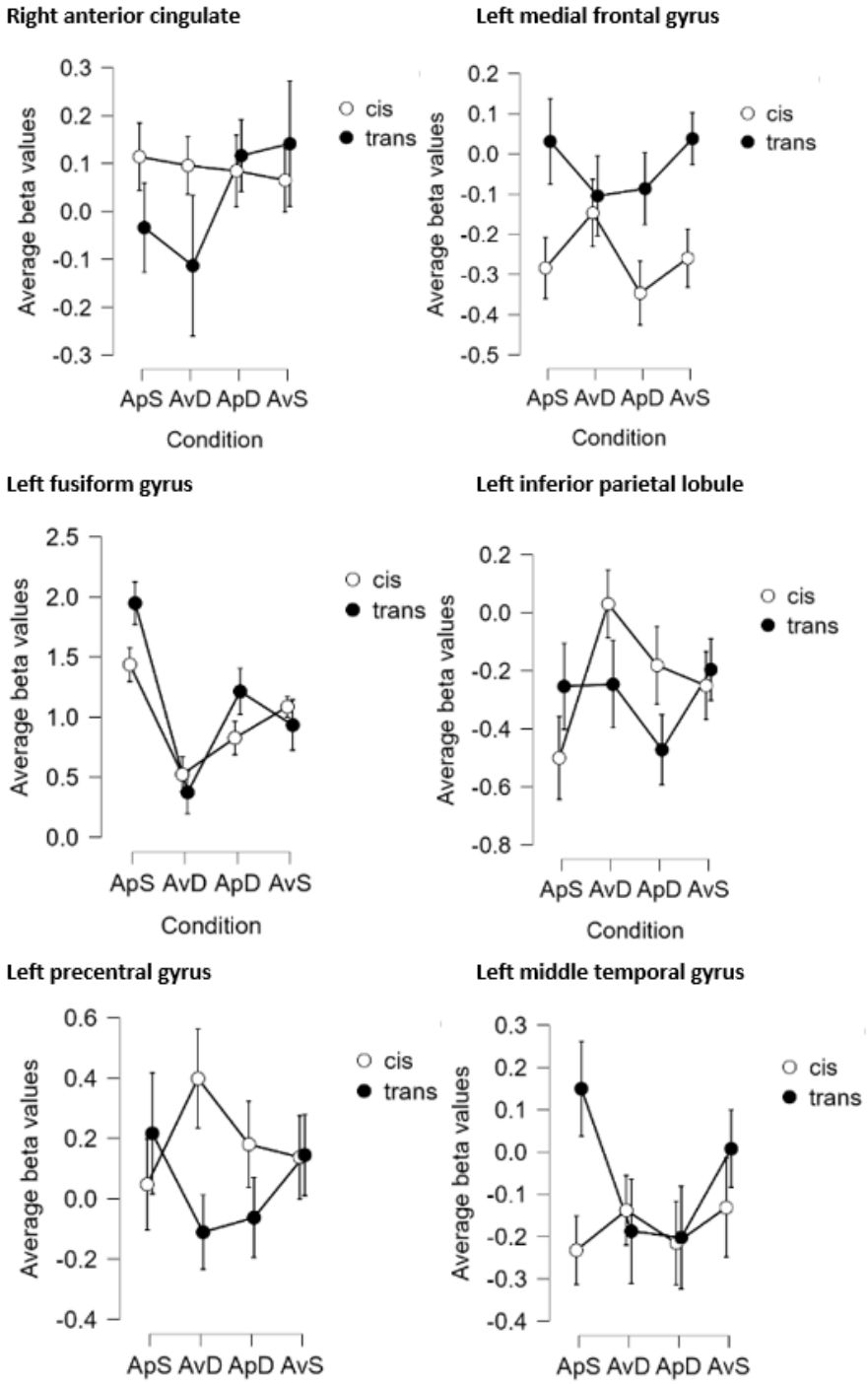

Figure 4. Interaction between Approach Avoidance Task conditions and having a cisgender or transgender identity. ApS = Approach Sex, AvD = Avoid Dance, ApD = Approach Dance, AvS = Avoid Sex

Testosterone analyses Given that, due to their GAHT, four transgender participants showed a very high testosterone value (> 100 pg/ml), these participants were excluded from the current analyses. We investigated whether testosterone modulated the neural response during the AAT in the six ROIs that showed significant differences between cisgender and transgender participants, by performing correlational analyses between participants' testosterone values and average cluster beta values when approaching sexual stimuli (Approach Sex > Approach Dance) and avoiding sexual stimuli (Avoid Sex > Avoid Dance). Regardless of whether these correlations were calculated for the entire sample or for the cisgender and transgender groups separately, there were no significant outcomes (all $p > .001$, see Appendix B), indicating that the neural response in these ROIs does not seem to be modulated by testosterone in either of the two groups.

Additionally, we performed an ANCOVA analysis (with testosterone as covariate) on the GLM maps for approaching and avoiding sexual stimuli on the whole-brain level as an explorative analysis. In the transgender group, testosterone was positively correlated with activation levels during the approach of sexual stimuli (Approach Sex > Approach Dance) in the right claustrum (cluster peak TAL coordinates: x = 34, y = 11, z = 1; $r = 0.645$, $p = .000157$; Figure 5). In the cisgender group, testosterone correlated negatively with activation levels during the approach of sexual stimuli in the left amygdala (cluster peak TAL coordinates: x = -25, y = -2, z = -13; $r = -0.661$, $p = .000021$; Figure 6). Finally, during the avoidance of sexual stimuli (Avoid Sex > Avoid Dance), there was a negative correlation between testosterone and activation levels in the right postcentral gyrus (cluster peak TAL coordinates: x = 52, y = -25, z = 44; $r = -0.591$, $p = .000236$; Figure 7) in the cisgender group, and there were no significant clusters in the transgender group.

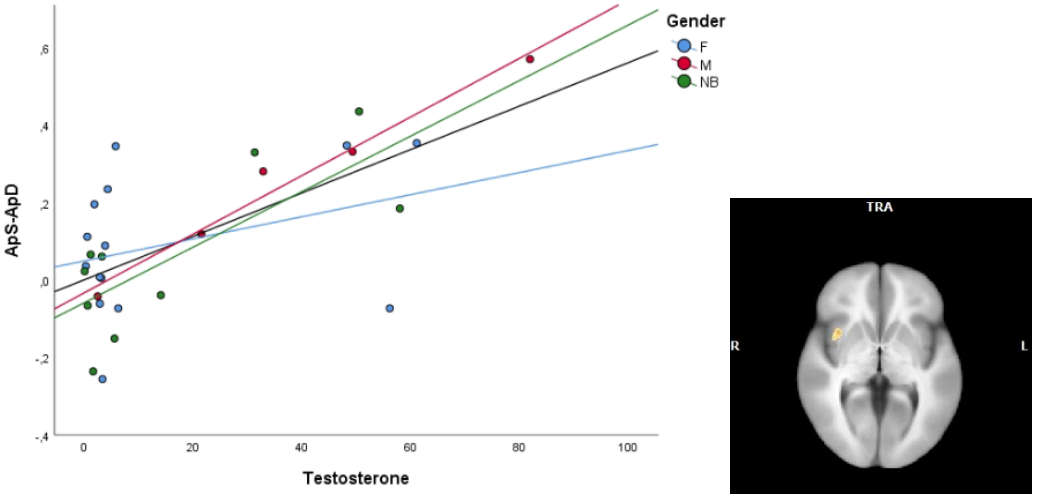

Figure 5. Scatterplot (left) presenting the relation between testosterone levels (x-axis, pg/ml) and activity in the right claustrum (right) during the approach of sexual stimuli (y-axis, beta values corrected for serial correlations) in the transgender group (black regression line represents entire group). In each subgroup (colored regression lines), the correlation went into the same (positive) direction, indicating that it is unlikely the overall group results is based on a spurious correlation (r = .344, p = .229 in transgender women; r = 0.987, p = .002 in transgender men; and r = .761, p = .010 in non-binary participants). F = transgender women, M = transgender men, NB = non-binary participants.

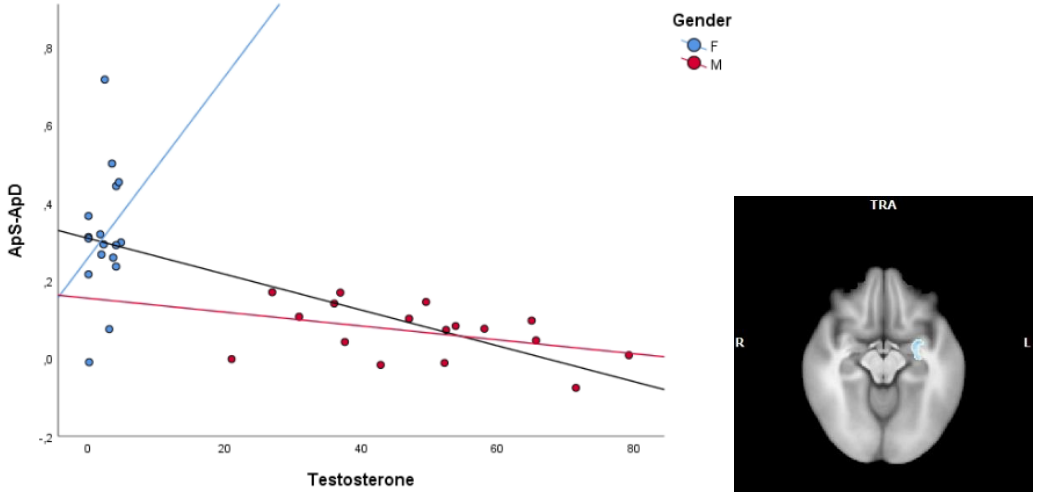

Figure 6. Scatterplot (left) presenting the relation between testosterone levels (x-axis, pg/ml) and activity in the left amygdala (right) during the approach of sexual stimuli (y-axis, beta values corrected for serial correlations) in the cisgender group (black regression line represents entire group). Note the bimodal distribution of testosterone based on gender (F = cisgender women, M = cisgender men). When calculating the correlation within each subgroup (colored regression lines), the association went in the same (negative) direction in cisgender men (r = -.407, p = .105), but not in cisgender women (r = .354, p = .325).

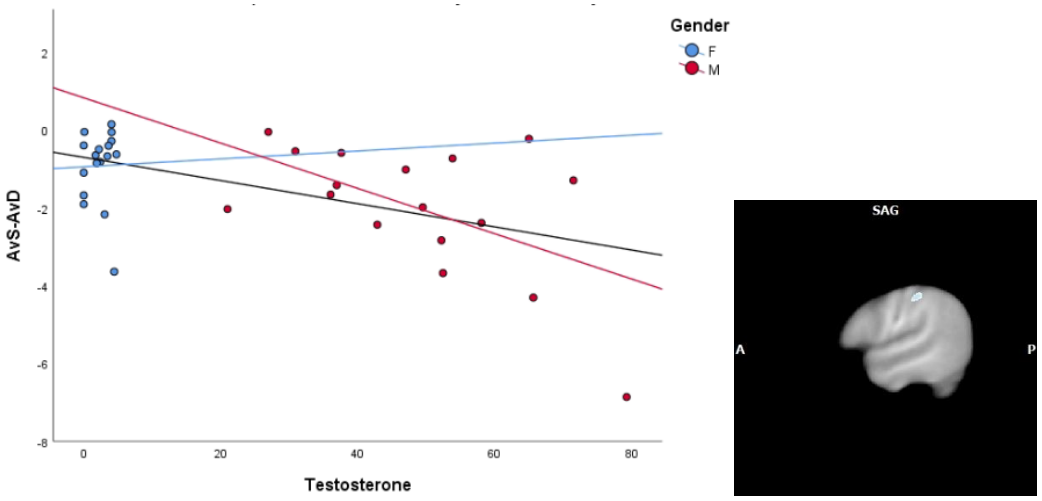

Figure 7. Scatterplot presenting the relation between testosterone levels (x-axis, pg/ml) and activity in the right postcentral gyrus during the avoidance of sexual stimuli (y-axis, beta values corrected for serial correlations) in the cisgender group (black regression line represents entire group). Note the bimodal distribution of testosterone based on gender (F = cisgender women, M = cisgender men). When calculating the correlation within each subgroup (colored regression lines), the association went in the same (negative) direction in cisgender men (r = -.546, p = .024), but not in cisgender women (r = .019, p = .943).

4. Discussion

In this study, we investigated the associations between brain regions underlying the behavioral component of sexual inhibition and testosterone levels in transgender and cisgender participants. Functional MRI analyses of an Approach Avoidance Task indicated that the approach of sexual stimuli resulted in the activation of clusters in the right middle occipital gyrus, bilateral precentral gyrus, and left inferior parietal lobule, and a deactivation in the bilateral insular cortices, right inferior parietal lobule, and right frontal regions. The avoidance of sexual stimuli activated the left inferior occipital gyrus, and left anterior and posterior cingulate, and deactivated clusters in the bilateral transverse temporal gyri, right inferior parietal lobule, and bilateral frontal regions. Activational differences between transgender and cisgender participants were found in the left medial frontal and middle temporal gyri, left inferior parietal lobule, left precentral and fusiform gyri, and right anterior cingulate. When investigating whether brain activation in these regions during the AAT was related to testosterone levels, this was found not to be the case. However, on the whole brain level, testosterone levels modulated activation in the right claustrum during the approach of sexual stimuli in the transgender group, and in the left amygdala in the cisgender group. Finally, testosterone levels were negatively correlated to activity in the right postcentral gyrus in the cisgender group during the avoidance of sexual stimuli. Below, we will discuss these findings and their implications, as well as study strengths and limitations.

4.1 Neural activations underlying approach and avoidance of sexual stimuli: consistent with previous studies

When reviewing the extant literature on the neural bases of general and sexual inhibition, our findings regarding task activation during the AAT are very much in line with previous outcomes. For instance, we replicated findings by Rodriguez-Nieto et al. (2019), who reported deactivation of the right inferior parietal lobule and frontal regions during the avoidance of sexual stimuli, and activation of the right middle occipital gyrus during the approach of sexual stimuli. Furthermore, all regions that showed diminished activation during the approach of sexual stimuli in our study (bilateral insula, right inferior parietal lobule, right inferior and middle frontal gyri) have previously been associated with general response inhibition (Dambacher et al., 2014a, 2014b; Chambers et al., 2009; Swick et al., 2011). This confirms that the AAT was able to activate behavioral sexual inhibitory processes in our sample.

Additionally, the task recruited brain regions that are not typically associated with inhibitory processes. The bilateral precentral gyri activation seen when approaching sexual versus non-sexual stimuli is likely related to the faster reaction times in blocks where sexual stimuli had to be approached compared to avoided, indicating a faster or stronger motor response when approaching sexual stimuli relative to approaching non-sexual stimuli. Furthermore, both the approach and the avoidance of sexual versus non-sexual stimuli activated occipital regions, which is likely related to the fact that these regions have been found to process information on the sexual arousing character of such stimuli (Stoleru et al., 2012).

4.2 Minimal differences in neural activation profile between transgender and cisgender participants

Analyses investigating group differences between transgender and cisgender participants revealed a few brain regions that showed differential activation between groups during the AAT. Follow-up analyses indicated that for some of these regions, these differences were only related to conditions including non-sexual stimuli and not sexual stimuli. We will not further discuss these differences, and will only focus on brain regions showing group differences related to sexual stimuli.

The right anterior cingulate cortex showed higher activation during blocks in which participants were instructed to avoid sexual stimuli relative to blocks in which they were instructed to approach sexual stimuli in the transgender group only. This is not surprising, as this brain region has previously been shown to be active during general and sexual response inhibition (Beauregard et al., 2001; Xue et al., 2018). It is intriguing that this neural response is more pronounced in transgender participants than it is in cisgender participants. This could indicate that the AAT required more neural ‘effort’ from

transgender participants (although more neural activation cannot always straightforwardly be interpreted as such, especially in the absence of behavioral group differences in reaction times as is the case here). Similarly, the left middle temporal gyrus showed differential activation based on task response rule in the transgender and the cisgender group. Interestingly, this region has previously been associated with a perceptual Go/No-Go task (also assessing inhibition processes), in which left hemispheric activation was mostly linked to task instructions based on *what* participants saw (while right hemispheric activation in this regions was more related to task instructions based on *when* participants saw a stimuli) (Talari & Hirsch, 2000). Therefore, activation in these brain regions is likely related to the decision process related to the AAT performance, which is (similarly to the pattern in the right anterior cingulate cortex) more pronounced in the transgender compared to cisgender group.

However, the opposite pattern was present in the left inferior parietal lobule. In this brain region, brain activity differed based on condition and response rule in the cisgender group, but not the transgender group. The inferior parietal lobule is associated with the execution of the AAT in our study and previous studies (Rodriguez-Nieto et al., 2019), and in this case seems to be recruited more pronouncedly in cisgender compared to transgender participants. Together, these findings related to group differences in brain activation during the AAT indicate that while transgender and cisgender show similar response patterns on the task, they might arrive there via slightly different neural processes.

4.3 No evidence for a modulatory role of testosterone in the approach and avoidance of sexual stimuli

Given previous reports that neural activation during behavioral sexual inhibition is modulated by testosterone in cisgender men (Rodriguez-Nieto et al., 2017), and indications that testosterone influences neural responses underlying sexual arousal in transgender individuals (Kim et al., 2016), we investigated whether task activations in the regions showing differential activation between cisgender and transgender participants were related to testosterone levels. Contrary to our expectations, we did not find any such associations. One possible explanation for this is that Rodriguez-Nieto et al. (2017) found these associations in regions partly different from our ROIs, such as the ventrolateral prefrontal cortex and putamen. However, they did find a modulatory effect of testosterone in the middle temporal gyrus and precentral gyrus, which were included as ROIs in our analyses. Perhaps the findings of Rodriguez-Nieto et al. (2017) were too preliminary, representing a small sample of only thirteen participants, or there was too much variability in our sample with regards to gender identity, testosterone level, or factors such as age. Therefore, including more participants could provide more insights. Alternatively, our lack of significant findings might simply indicate that testosterone

levels are not implicated in the neural differences between cisgender and transgender people during sexual inhibition, and that other biological or psychological/social variables are the main drivers of these differences.

However, we did find associations between testosterone levels and activity during the AAT in brain regions that did not show any differences between cisgender and transgender participants, and that have not previously been indicated in sexual inhibition. In the transgender group, testosterone correlated positively with activity in the right claustrum during the approach of sexual stimuli. This brain region has previously been associated with sexual arousal (Stoleru et al., 2012), indicating that transgender participants with higher testosterone levels might have experienced greater arousal at the approach of sexual stimuli than those with lower levels, or that an approach reaction lead to more arousal in this group. Interestingly, ours is not the first study to find an association between testosterone and claustrum activation during a task involving sexual stimuli, as Redouté et al. (2005) found the same association during a passive viewing task. Even more intriguing is that their sample consisted of hypogonadal patients, of whom some were treated (and thus had higher testosterone levels induced by hormonal treatment) and others were not. Taken together with the fact that we did not find this association in our cisgender sample, this suggests that the modulatory effect of testosterone on brain activation during the appraisal of sexual stimuli is only (or mostly) present when these testosterone levels are induced by hormone therapy, which offers interesting insights for clinical practice. Alternatively, this lack of an effect in the cisgender sample is a matter of statistics, as there is less variability in testosterone levels in the cisgender group, with all cisgender women showing very low values.

In the cisgender group, testosterone was negatively correlated with activity in the left amygdala during the approach of sexual stimuli, and with activity in the right postcentral gyrus during the avoidance of sexual stimuli. Both brain regions are thought to be involved in the emotional component of appraising sexual stimuli, and the postcentral gyrus is additionally thought to be involved in the regulation of endocrine responses to sexual stimuli (Stoleru et al., 2012). It is likely that these results reflect a spurious correlation, since cisgender men and cisgender women differ highly in testosterone level, and have also been shown to differ in cerebral activation levels in the amygdala and postcentral gyrus during sexual arousal (Stoleru et al., 2012).

4.4 Strengths and limitations

This is the first fMRI study assessing sexual responding in transgender individuals using an active paradigm contrary to passive viewing. The validity of our AAT paradigm is supported by the fact that the neural activation we observed is in line with previous studies, and is likely further strengthened by the fact that participants were shown stimuli

with a certain degree of individualization. Furthermore, to our knowledge, this is the first MRI study including non-binary transgender participants, expanding generalizability beyond the gender binary. Nevertheless, we would briefly like to describe some study limitations. First of all, the transgender sample was very heterogeneous in terms of GAMT profile and testosterone levels, possibly complicating some analyses, especially those with relation to testosterone. Similarly, the cisgender women in our sample showed a heterogeneous picture in terms of oral contraceptive use and menstrual phase. Furthermore, we did not perform any analyses based on sex assigned at birth or gender identity (as this was not the focus of our objectives), although these factors are also likely to influence results. With regards to the testosterone samples, we did not manage to take blood samples, which are considered to be more reliable than saliva samples. However, we attempted to mitigate this issue by performing duplicate analyses of each sample, and by opting for LC-MS/MS analyses instead of immune-assay/enzyme-assay analyses. Finally, the transgender sample was significantly older than the cisgender sample, which was mainly driven by the transgender women being older than some other groups. However, we do not expect age to significantly affect brain activity in regions typically associated with our current paradigm.

5. Conclusion

In this study, we investigated which brain regions underlie the behavioral component of sexual inhibition in transgender and cisgender participants using an fMRI paradigm including a sexual Approach Avoidance Task. We further investigated whether these neural bases differ between the two groups, and whether they are related to testosterone levels. The brain regions recruited during our task were mainly consistent with previous literature on general and sexual inhibition, involving areas such as the bilateral insula, left anterior cingulate cortex, and frontal regions. Transgender and cisgender mainly showed similarities in neural activation during the task, except for a few regions involved in decision making processes (left middle temporal gyrus) and sexual response inhibition (right anterior cingulate cortex and left inferior parietal lobule). This indicates that, while the groups are mostly similar in their neurobiological response to the AAT, there are slight differences that suggest that transgender individuals are more likely to recruit brain areas associated with decision making (the left middle temporal gyrus) than cisgender individuals. In none of these regions was the response to the AAT modulated by testosterone levels, although we did find that in the transgender group, testosterone correlated positively with cerebral activation in the right claustrum (a region associated with sexual arousal) during the approach of sexual stimuli. The fact that this association was lacking in the cisgender sample, indicates that this association might be unique to GAHT affected testosterone levels. Overall, these findings indicate that transgender and cisgender individuals mostly show similarities in their neural response to a sexual inhibition task, and that exogenous testosterone levels are unlikely to play an important

role. This suggests that previous clinical findings related to greater avoidance of sexual activity in transgender individuals relative to cisgender individuals are more likely to be explained by social and psychological factors. However, as the transgender and cisgender groups seemed to arrive at similar behavioral outcomes via slightly different neurobiological routes (with the transgender group recruiting brain regions related to decision making, contrary to the cisgender group), this might indicate that approaching and avoiding sexual stimuli might have different meanings for the two groups. Furthermore, the findings suggest that a change in testosterone level via GAHT might affect neural responses underlying the approach and avoidance of sexual stimuli only slightly, and the lack of behavioral group differences in our sample indicate that it is unlikely that these slight changes ultimately affect sexual responding.

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Chapter 8

Summary and general discussion

Sexuality is a complex but important aspect in the lives of many transgender individuals (Holmberg et al., 2019). In order to fully grasp this complexity, sexuality and sexual well-being in transgender individuals should be studied using a biopsychosocial framework (Althof et al., 2005; Rosen & Barsky, 2006; Holmberg et al., 2019), including biological, psychological, and socio-cultural factors. Most studies addressing sexuality in transgender people so far have mostly focused on biological variables in a medical context (e.g., Becasen et al., 2019; Kerckhof et al., 2019), using cross-sectional questionnaire designs (e.g., Wierckx et al., 2011). Ideally, these studies' findings should be complemented by evidence on psychological and social variables, applying research designs that offer more insight into underlying mechanisms, such as longitudinal designs and experimental studies. In this dissertation, I report on four studies addressing sexuality in transgender people mainly from a psychological perspective, attempting to further unravel how to better understand and support sexual well-being in this group. Below, I will shortly summarize my findings, and discuss their relevance in a larger context. Finally, I will suggest future research directions.

1. Summary

Chapters 2, 3, and 4 presented the data from a large-scale online questionnaire study. In **Chapter 2**, I investigated differences in Sexual Self-Concept (SSC) between binary transgender and cisgender individuals. Compared to the cisgender group, the transgender group scored lower on sexual esteem related to behavior, body perception, conduct, and attractiveness, and sexual attitudes related to arousal. The transgender group scored higher than the cisgender group on sexual attitudes related to anxiety and commitment. There were also SSC components that did not show group differences, namely sexual attitudes related to exploration, and sexual self-efficacy related to being resistive, precautions, and assertiveness. In addition to this finding that transgender individuals generally show a more negative SSC than cisgender individuals, we found that several of these differing components were not related to gender dysphoria scores in the transgender group, namely sexual esteem related to behavior, and sexual attitudes related to arousal and commitment. For these components, gender dysphoria did not seem to explain the difference between cisgender and transgender participants, and it was suggested that here social factors might explain the lower sexual esteem and arousal, and higher sexual commitment in transgender individuals. On the other hand, the SSC components of sexual esteem related to body perception, conduct, and attractiveness, and sexual attitudes related to anxiety were associated with gender dysphoria in the transgender sample. Additionally, I indicated that these relationships are mediated by actual/ideal SSC discrepancies (which were found to be larger in the transgender compared to cisgender group). This suggests that addressing SSC discrepancies (for instance when it is difficult to target feelings of gender dysphoria) might improve sexual esteem and anxiety in binary transgender individuals.

Chapter 3 described a first quantitative study investigating sexual well-being in non-binary/genderqueer (NBGQ) transgender individuals. While NBGQ participants scored lower on gender dysphoria than binary transgender participants, the two groups did not differ on sexual esteem, SSC discrepancies, or sexual satisfaction. Regarding general mental well-being, the two groups showed no differences either, showing similar scores on anxiety, depression, and general life satisfaction. The only sexual variable on which NBGQ participants scored lower than binary transgender participants, was transgender specific body worries. The two transgender groups did differ from a sample of cisgender participants on most variables related to general mental and sexual well-being, with the cisgender sample showing a more positive picture related to general life satisfaction, gender dysphoria, sexual esteem, sexual satisfaction, and SSC discrepancies. This is the first study to show that, while NBGQ and binary transgender individuals face unique challenges, they nevertheless mostly show similar struggles when it comes to sexual well-being.

The association between GAMT desire and sexual well-being was addressed in **Chapter 4**. I questioned both binary and non-binary transgender individuals about their GAMT desire, treatment motives, general well-being, and sexual well-being, and addressed similarities and differences between the two groups. Binary transgender individuals more often had a history of GAHT and GAS compared to NBGQ individuals, and they also more often reported a desire for GAHT. Reported desire for GAS did not differ between the two groups, which was mostly driven by a frequent desire for mastectomy in the NBGQ group. In terms of wanting GAMT, the two groups reported similar treatment motives, mostly related to body/gender incongruence and gender affirmation. Motives related to sexual well-being or group assimilation/peer pressure were not often selected. Those who were not planning any GAMT, however, reported different reasons for this: in the NBGQ this was mostly due to their (non-binary) gender identity, and in the binary group this was mostly due to fear of medical complications. Importantly, the majority of both groups reported an unfulfilled treatment desire, which was related to lower general life satisfaction and sexual satisfaction, more anxiety and transgender-specific body image worries, and larger SSC discrepancies.

In order to collect more ecologically valid data regarding sexual well-being in transgender individuals, we conducted a diary study, which is reported in **Chapter 5**. This study is unique in the research field of sexuality in transgender people, because we followed a sample of binary transgender and cisgender individuals for a period of 21 days, mapping their sexual behavior, sexual esteem, and body image from day to day. This allowed the investigation of temporal relations between these variables, and differences herein between the two groups. In transgender individuals, intimacy predicted sexual esteem; sexual openness predicted sexual esteem and boy image; and sexual esteem predicted intimacy, masturbation, and sexual openness on the daily level. These

daily relationships did not differ in cisgender individuals. However, the daily relationship between masturbation and body image was moderated by a cisgender identity, and sexual esteem predicted sexual activity more strongly in cisgender compared to transgender individuals. Furthermore, we found no differences in daily sexual behavior, but the transgender groups did score lower on daily sexual esteem and body image than cisgender individuals. This study suggests that sexual esteem might be a more important determinant of sexual behavior in transgender individuals than body image. It also indicates that while transgender and cisgender people might differ on certain variables on the between-subject level (for instance, lower sexual esteem and body image in transgender people), the within-subject relations between these variables and sexual behavior appeared similar between the two groups.

Contrary to the other empirical chapters, **Chapter 6** presented the results of a qualitative study. For the final empirical chapter, we planned to include a neuroimaging study with transgender participants. In order to receive feedback from the transgender community on such a study design, we performed a focus group study, which is reported in Chapter 6. In this study, we asked transgender participants about their opinions concerning brain research with their community. Thematic analyses revealed that these opinions are layered and nuanced, presenting both negative and positive attitudes. Negative attitudes were mostly related to concerns regarding stigmatization (e.g., pathologizing language, or study results contributing to transphobic narratives) or a possible decrease in GAMT access (e.g., brain scans becoming part of a diagnostic process needed to acquire GAMT). Positive attitudes were mostly related to gaining knowledge about the effects of GAHT on the brain, and to validations of transgender identities. Furthermore, participants phrased recommendations for researchers working in this field, and most of these recommendations were in line with standard research practices (e.g., acquiring informed consent and providing financial compensation). This study offers a unique scientific self-reflection, addressing the sometimes tense relationship between (neuro)scientific and transgender communities. I carefully conclude that transgender individuals would appreciate neuroscientific studies regarding their identities, but that they are currently worried how results from such studies might play out in the ‘real world’, given the current societal context that still poses many challenges for this community.

This brings us to **Chapter 7**, presenting the results from a neuroimaging study assessing the behavioral component of sexual inhibition and the relation between its neural underpinnings and testosterone. The study included 33 transgender participants (of whom most were receiving GAHT) and 34 cisgender participants, who performed an Approach Avoidance Task (AAT) in a 3T MRI scanner. This task assesses the motivational/behavioral processes underlying sexual inhibition, and was found to show brain activations in our sample consistent with previous literature regarding general and

sexual inhibition (for example in the bilateral insula, left anterior cingulate cortex, and frontal regions). Cisgender and transgender participants showed no behavioral differences (in terms of reaction times and number of mistakes) on the task. There were slight differences, however, in which brain regions they recruited during the various conditions of the task. For instance, there were group differences in regions involved in decision making processes (left middle temporal gyrus) and sexual response inhibition (right anterior cingulate cortex and left inferior parietal lobule). As the transgender and cisgender groups seemed to arrive at similar behavioral outcomes via slightly different neurobiological routes (with the transgender group recruiting brain regions related to decision making, contrary to the cisgender group), this might indicate that approaching and avoiding sexual stimuli might have different meanings for the two groups. When further investigating whether task activity in these regions was associated with testosterone levels, we found no significant results. However, brain activity during the approach of sexual stimuli was positively correlated with testosterone levels in the right claustrum in the transgender group. The claustrum is associated with sexual arousal, indicating that testosterone modulates a more aroused response in transgender participants when approaching sexual stimuli. Overall, both the behavioral and neurobiological results point to only few differences with regards to the approach and avoidance of sexual stimuli between transgender and cisgender individuals. Furthermore, in the light of GAHT, individuals receiving or considering this therapy should not expect a great influence of altering testosterone levels in itself on their behavioral sexual inhibition levels or its neurobiological underpinnings. Changes in sexual well-being and behavior in relation to GAHT previously reported are more likely to rely on other factors; most probably an interplay of biological, psychological, and social variables.

2. Sexual well-being in transgender individuals

2.1 Going beyond biological variables and binary identities

Many studies investigating sexual well-being in transgender individuals apply a medical/functional perspective, for instance focusing on sexually transmitted diseases (STDs) (Baral et al., 2013) or sexual dysfunctions (Kerckhof et al., 2019). Such studies are important because they bring insight into which biological problems with sexuality transgender individuals face, which is an obvious first step in treating those problems. Furthermore, studies assessing sexual functioning in the context of GAMT (e.g., Constantino et al., 2013; Wierckx et al., 2011) offer valuable information for transgender people considering medical treatment, in the sense that they offer a realistic view of what these people can expect in terms of treatment outcomes. However, sexual well-being and health entail more than the mere absence of problems and disease (World Health Organization, 2006), and sexuality in transgender individuals is also affected by other than medical variables (Holmberg et al., 2019). Furthermore, transgender healthcare is

provided in a multidisciplinary context (World Professional Association for Transgender Health, 2022), so research should be multidisciplinary as well. Interestingly, there are also quite some studies presenting in-depth qualitative data on sexual well-being in this group (e.g., Martin & Coolhart, 2019; Lindley et al., 2020, 2021), but in-between lies a whole window of opportunity for exploring psychological concepts on the quantitative level.

Such an exploration was the main objective of this dissertation. For instance, by including a broad and holistic concept such as the Sexual Self-Concept (SSC), we drew a first picture of differences ànd similarities between cisgender and transgender individuals on a broad range of feelings related to sexuality, and explored how this relates to gender dysphoria. The findings in Chapter 2 indicated that while transgender individuals show a more negative SSC than cisgender individuals, there are also aspects on which the groups do not differ, such as sexual self-efficacy. It is important to also consider these similarities, as they indicate that transgender individuals have strengths and resilience as well, and these results nuance the often negative narrative surrounding sexual well-being in this group. Furthermore, since sexuality and gender dysphoria are closely linked, it is sometimes assumed that they are *always* and *determinedly* linked on *every aspect* of sexuality (Holmberg et al., 2019). Chapter 2 has put this in perspective, by indicating that several components of the SSC are not related to gender dysphoria scores in transgender individuals, such as their sexual attitudes related to commitment. While we did not explicitly include social variables in this study, I suggest that findings such as a higher need for sexual commitment in transgender compared to cisgender individuals is related to social factors, again illustrating the need for interdisciplinary approaches when studying sexuality.

Another way in which I have attempted to address the complexity of sexuality in transgender people, is by recognizing the diversity of gender identity and GAMT wishes. Most quantitative studies on sexual well-being in transgender individuals have excluded non-binary and genderqueer individuals, and have mostly focused on ‘traditional’ GAMT paths when investigating the outcomes of such treatment. The advertisements for participant recruitment for the studies reported in this dissertation typically attracted a fair amount of non-binary identifying individuals, which I personally interpret as this group being greatly motivated to participate in scientific research on sexual well-being in order to fill this gap and to be seen. While including non-binary identities is a matter of inclusion and recognizing human rights regardless of gender identity (World Association of Sexual Health, 2014), it is also scientifically and clinically interesting, as several outcomes regarding non-binary identities reported in this dissertation put the link between gender dysphoria and sexual well-being in perspective. For instance, I reported in Chapter 3 that non-binary transgender individuals typically have lower gender dysphoria scores than binary transgender individuals. However, both transgender groups show similar

challenges with regards to sexual well-being compared to cisgender participants. This again indicates that gender dysphoria cannot and should not be considered the sole factor explaining lower sexual well-being in transgender individuals.

Another way of recognizing gender diversity in the field of sex research with transgender participants, is by rethinking how we frame studies on the effects of GAMT on sexual well-being. Traditionally, this has been studied by including binary participants who have followed 'traditional' treatment paths (e.g., Constantino et al., 2013; Zavlin et al., 2018), which is not surprising as historically, these were the only paths a transgender person could walk. However, transgender health care and medicine are evolving to allow more personalized treatment paths (World Professional Association for Transgender Health, 2022), and in Chapter 4 I have demonstrated how to investigate the relevance of GAMT for general and sexual well-being while doing justice to today's diversity in GAMT desire. I did this by following the approach of Nikkelen & Kreukels (2018), who already suggested that investigating treatment desire instead of treatment in itself could greatly compliment the extant literature. Indeed, while previous studies have indicated that GAMT has a beneficial effect on sexual well-being in those pursuing 'traditional' trajectories including GAHT and GAS (Constantino et al., 2013), Chapter 4 has generalized these findings to a more diverse group of individuals with more diverse treatment wishes, illustrating the usefulness of this approach.

2.2 Including a wider range of research methods

Another way in which I argued research could move forward in unraveling the dynamics underlying sexual well-being in transgender individuals, is by applying a wider range of research methods. The field of sex research in general has developed many interesting methods and paradigms to investigate human sexuality, including experiments with writing exercises (Jabs & Brotto, 2022), implicit behavioral tasks (Dewitte, 2016), role play (Maheux et al., 2022), active regulation of sexual arousal (Pawlowska et al., 2020), and cleverly constructed devices to measure for instance the pleasantness of genital sensations (Melles et al., 2017). The study of sexuality in transgender people, however, has mostly relied on cross-sectional questionnaire studies, often in a clinical setting. This approach has clear advantages, in the sense that questionnaire studies are a relatively low-threshold and low-cost manner of collecting information on a wide range of variables. However, these designs also have their shortcomings with regards to ecological validity, memory bias, and their ability to reveal temporal interrelations between study variables (Bolger et al., 2013; Laurenceau & Bolger, 2005).

The fact that cross-sectional questionnaire studies assessing sexual well-being in transgender individuals are subject to memory bias, is suggested by the outcomes of a few longitudinal studies. For instance, early cross-sectional reports indicated that trans women

retrospectively experience a decrease in sexual desire after GAHT, while trans men report an increase (Wierckx et al., 2014). However, a longitudinal study in which transgender individuals were asked about their sexual desire before and several times after initiating GAHT, indicated that in the long-term, sexual desire returns to baseline (Defreyne et al., 2020). Similarly, findings regarding a relatively high proportion of transgender individuals reporting a retrospective change in sexual orientation after GAMT (Auer et al., 2014) have been nuanced by a longitudinal study that indicated that such a change is quite rare (Defreyne et al., 2021).

In Chapter 5, I reported on a study applying a method that not only tackles the issue of memory bias, but also accounts for the fact that sexual experiences are variable and context-dependent (Dewitte et al., 2015). We applied a daily diary study design, and similarly to previous longitudinal studies on sexuality in transgender individuals, the outcomes nuance previous cross-sectional findings. For instance, a central theme in the literature on transgender experiences is body image (e.g., van de Grift et al., 2016), and body image is considered an important factor in understanding sexual well-being in this group (Holmberg et al., 2019). However, in Chapter 5 I illustrated that body image is actually not related to transgender individuals' decision to engage in sexual or intimate activity or not, indicating that body image worries might not be standing as much in the way as previously thought. Instead, the variable sexual esteem was more closely related to sexual behavior on the daily level. Of course, it is very well possible that body image is not related to sexual behavior as measured in Chapter 5, but that it is related to other variables, such as daily sexual satisfaction and experienced sexual pleasure, which we did not address in this study. Additionally, daily body image was lower in transgender compared to cisgender participants, which is enough reason in itself to develop ways to improve this factor in transgender individuals. However, our study did not support the common idea that body image plays an important role in (the avoidance of) sexual behavior in transgender individuals (Holmberg et al., 2019). Another way in which our diary study findings complement insights from questionnaire studies, is by not only reporting on differences between cisgender and transgender individuals on the between-subjects level, but also on the within-subjects level. There are many studies indicating that transgender individuals show lower sexual well-being than cisgender individuals (e.g., Kerckhof et al., 2019; Becasen et al., 2019), which was reflected in the between-subject level differences found in Chapter 5. For instance, we found that transgender participants scored lower on daily sexual esteem than cisgender participants. However, there were hardly any differences on the within-subjects level, indicating that how variables fluctuate together from day to day is not that different between transgender and cisgender people. This is valuable information because it questions the narrative of how different cisgender and transgender individuals are with regards to sexuality, and indicates that the processes underlying sexual well-being in these two groups might not

be as different from each other as is sometimes assumed given the many reports on between-subjects level differences.

Chapter 7 presented another approach going beyond questionnaire data by reporting on an experimental neuroimaging study, combining measures from psychology, neuroscience, and endocrinology. The study showed that while cisgender and transgender participants did not differ on behavioral measures of sexual inhibition, they did show a slightly different pattern of brain activation during a task assessing such inhibition, indicating that the process puts different neurocognitive demands on the two groups. Specifically, the transgender group recruited a brain area associated with decision making processes, contrary to the cisgender group, possibly indicating that – while behavior on the task is similar among the two groups – the task has a slightly different meaning for the two groups. While this pattern was not modulated by testosterone levels, we did find that testosterone levels correlated positively with task activity in a brain region involved in sexual arousal in the transgender group. This offers an interesting insight into how neuroendocrine and psychological parameters interact with each other. Testosterone has a popular reputation of being hyper-determinant when it comes to sexuality and the human brain, which is often enough supported by scientific data (Archer et al., 2006; Höfer et al., 2013; Rodriguez-Nieto et al., 2017, 2021). However, especially for transgender individuals considering GAHT who have questions about how a change in testosterone levels will affect their sexuality, it is important to nuance this reputation and provide evidence-based information. In this case, Chapter 7 suggests that a change in testosterone level via GAHT might affect neural responses underlying the behavioral component of sexual inhibition only slightly, and that it is unlikely that these slight changes ultimately affect sexual responding.

3. From scientific objects to actors

Chapter 6 was the only chapter is this dissertation not investigating sexual well-being in transgender individuals, but instead focused on the relationship between the (neuro)scientific and transgender communities. While in this work the chapter is presented as a prelude to Chapter 7, the topic deserves a dissertation of its own. There is a history of tension between the scientific and transgender communities, with the controversial story of the *autogynephilia* theory being one of the most painful illustrations of this tension. The term autogynephilia was first coined by Blanchard (1989), who made a distinction between two different types of trans women based on their sexual orientation. According to his studies and theory, trans women that are mainly attracted to women (whom he called ‘nonhomosexual’, indicating his non-affirmative stance towards the trans women’s identities) might actually not have a ‘real transgender identity’. Instead, their transgender identity is framed as a paraphilia, in the sense that Blanchard described their desire to live as a woman to be triggered by sexual arousal elicited by

one's own expression of femininity (Blanchard, 1989). This theory hence frames the identity of transgender women attracted to women as a fetish, not surprisingly evoking disagreement from the transgender community, but also from other scholars (Serano, 2010). This was met by adepts of Blanchard's ideas being inspired to write scientific articles with not-so scientific approaches and titles such as "*What many transgender activists don't want you to know*" (Bailey & Triea, 2007), further kindling the controversy. Today, Blanchard's ideas are mostly considered outdated in the broader scientific community since they rely on non-scientific essentialist, heteronormative, and male-centric presumptions (Serano, 2020). However, this theory has created a lot of suffering in the transgender community (Nieder & Richter-Appelt, 2011; Richards et al., 2014).

The field of neuroscience with transgender participants has also already seen some controversies, clashing with certain parts of transgender activist movements. I personally became aware of this in 2019, after receiving an email from a transgender person expressing her worries related to the neuroimaging studies we were planning for this dissertation. In this long and carefully drafted email, she urged me not to run an fMRI study, as the outcomes might one day prevent some transgender people from accessing GAMT. An example further away from home followed two years later, when a neuroimaging study with transgender participants was suspended in the U.S. after backlash from the transgender community. In this case, the concerns of the transgender community were mainly based on the fact that the study included stimuli presenting body morphs (see also Feusner et al., 2017), which activists considered unnecessarily triggering and even 'torture' (see online blog post "*Medical school suspends study that would have tortured transgender people for science"* on lgbtqnation.com). While participants in the focus groups reported in Chapter 6 indicated that showing such stimuli is appropriate as long as researchers acquired informed consent from their participants, this prerequisite was not sufficient according to the U.S. activists.

As indicated by these examples and the outcomes of Chapter 6, many of these controversies and the negative reactions of transgender individuals towards certain scientific ideas stem from their fear of being denied GAMT, or their fear of being framed in an invalidating way. I suggest that these fears are rooted in three phenomena: the reality of many transgender individuals experiencing barriers to accessing GAMT (Ross et al., 2021; Safer et al., 2016), the reality of transgender individuals being in a vulnerable position in society (Bockting et al., 2013; White Hughto et al., 2015), and the reality of academia (the environment where most scientific research occurs) lacking diversity (Johnston, 2019). The solutions to these issues – removing treatment barriers, improving societal acceptance of transgender identities, and increasing diversity among academic researchers – are complex and will likely require a lot of time and effort. What scientists working with transgender individuals can do today already, is establish a closer

involvement of the transgender community in their scientific work, at all research stages (Adams et al., 2017; Bouman, 2018; T'Sjoen et al., 2017). Researchers should think about how their results will be perceived in society at large, about what will happen with our work once we 'let it out in the world'. Understanding how our studies and results will ultimately affect transgender lives is incredibly complex, and probably impossible for a privileged researcher not in touch with what lives in transgender communities. Though we are mostly trained to perform science in an objective, standardized way, even taking some distance from our study object, I argue that history and the results from Chapter 6 indicate that this might not be the most optimal way to do research about transgender individuals. I therefore advocate that instead of viewing transgender people as merely objects of scientific study, they should be involved as actors.

4. Clinical implications

In the empirical chapters of this dissertation, I discussed clinical implications of the study outcomes, which I will briefly summarize. In Chapter 2, I reported that binary transgender individuals experienced a more negative SSC than cisgender individuals, and that several SSC components were related to gender dysphoria. As an explanatory mechanism, I suggested that SSC discrepancies (a measure of how far one's actual sexual self is from one's ideal sexual self) underlie this relationship, making such discrepancies an interesting target in therapy. Concretely, I suggested that for instance sex therapists can help their clients bring their actual sexual self more in line with their ideal sexual self by helping them explore prosthetics and rename body parts, or that they could support their clients in developing distraction mechanisms to make SSC discrepancies less salient. A similar concrete therapeutic suggestion was made in Chapter 5: here I suggested that sexual esteem might be an important factor in explaining sexual behavior in transgender individuals, and that sexual esteem might be increased by encouraging clients to engage in intimate activity.

Several outcomes indicated the importance of health care practitioners and policy makers guarding that GAMT is accessible for all transgender and gender diverse individuals. For instance, in Chapter 4 I reported high rates of unfulfilled treatment desire in non-binary identifying individuals, who might experience additional barriers compared to binary transgender individuals. The fact that such an unfulfilled treatment was related to worse mental and sexual well-being further emphasizes the importance of GAMT accessibility. Furthermore, several findings in Chapter 4 supported the idea of developing more individualized treatment paths for transgender individuals, as they might differ in how much gender dysphoria they experience and which medical procedures they see fit for their identity.

Additionally, our findings challenge some common assumptions health care practitioners working with transgender individuals might have. For instance, clinicians might be inclined to assume that sexuality in transgender people is problematic and plagued by difficulties, but I also reported on variables that did not differ between cisgender and transgender participants, such as sexual self-efficacy in Chapter 2. Similarly, sexual problems in transgender individuals do not necessarily have to be approached differently compared to in cisgender individuals, as Chapter 5 indicated that the mechanisms underlying daily sexual behavior in transgender and cisgender individuals are very similar. Another assumption one might have is that having a transgender identity equated having a desire for GAMT; this was challenged by Chapter 4, where several (mostly non-binary) transgender participants indicated not having a GAMT desire. However, this should not lead one to assume that these individuals are necessarily happy with their body, as I reported that only few of these individuals indicated being satisfied with their body. It is therefore still important to address body image issues in this group. Finally, clinicians should not restrict their definition of sexual activity to 'having penetrative sex', as Chapter 5 indicated that experiences related to sexuality are better captured by a broader definition also including other activities.

5. Strengths and limitations

One of the biggest strengths of the studies reported in this dissertation, are the affirmative and inclusive approach we aimed to apply. For instance, most chapters included non-binary identifying participants, and for each study, all questionnaires were checked with members from the transgender community before starting participant recruitment in order to make sure that the questions would not come across as gender-critical or pathologizing. The studies make unique contributions to the research field of sexuality in transgender individuals. For instance, we applied the concept of SSC for the first time in a transgender group; reported on a first quantitative study of sexual well-being in non-binary transgender individuals; described a first diary study including transgender participants; and included non-binary participants in an MRI study for the first time. Furthermore, we aimed to go beyond the merely descriptive level by investigating explanatory mechanisms, for instance by including mediation models in Chapter 2; including within-subject predictors in Chapter 5; and combining psychological with biological variables in Chapter 7. Additionally, we included cisgender participants in most studies as well, which allowed us to make comparisons between cisgender and transgender participants.

As with all scientific studies, several limitations apply as well. Most importantly, all studies reported are observational in nature and therefore do not allow definite causal conclusions. Furthermore, as this dissertation focused mostly on psychological variables, relationship variables contributing to sexual well-being have remained unexplored. Additionally, several studies were conducted online, which likely resulted in a selection

bias that favored participants who are comfortable in an online environment. A similar selection bias is present across all studies with regards to culture: as the studies were conducted in a Western-European context, most participants lived in this culture, limiting generalizability to other cultures and places. The studies addressing sexual well-being also suffered from shortcomings inherent to research in the field of sexuality; mostly, this pertains a selection bias in which individuals who are comfortable with sexuality are more likely to participate, and the fact that socially desirable response tendencies might have influenced the results. Finally, while we aimed to be inclusive of various identities, our questionnaires might not have been inclusive enough for people with diverse sexual orientations or relationship constructions. For instance, most questionnaires implicitly assumed that respondents had maximally one romantic partner at the time, and did not allow participants to indicate sexual attraction to non-binary individuals, as opposed to binary genders.

6. Future research directions

The importance of research into sexual well-being in transgender individuals is getting more and more recognition, as is illustrated by the inclusion of an entire chapter dedicated to sexual health in the most recent version of the Standards of Care for the Health of Transgender and Gender Diverse People (World Professional Association for Transgender Health, 2022). In line with the biopsychosocial model (Holmberg et al., 2019), researchers have already addressed variables associated with sexual well-being related to biology (e.g., Elaut et al., 2008) and psychology (e.g., Ristori et al., 2020), but the contribution of social and partner variables has remained mostly unexplored. However, relational variables can play an important role in sexual behavior (Dewitte et al., 2015), and social variables on the larger scale have a great influence on transgender well-being (White Hughto et al., 2015), making it crucial for future research to include more social variables. A concrete way to do this is to design diary studies in which not only responses from the transgender person, but also from their partner are recorded, which would allow the investigation of dyadic interactions (for examples with cisgender participants, see Dewitte et al., 2015; Pawlowska et al., 2022). Qualitative studies have suggested that gender affirmations (Galupo et al., 2019) as well as microaggressions (Pulice-Farrow et al., 2017) coming from a romantic partner are important themes for transgender individuals with regards to their relationship, so these are interesting examples of variables that could be included in such a diary study.

To my knowledge, Chapter 3 presented the first quantitative study investigating sexual well-being in non-binary transgender individuals, directly comparing them to binary transgender and cisgender individuals. This study showed that while binary and non-binary transgender individuals mostly show a similar profile in terms of general and sexual well-being, there are also subtle differences, such as the non-binary group

reporting fewer body image worries in a sexual context. This prompts the question of how generalizable previous findings regarding sexual well-being in binary transgender individuals are with regards to a more gender diverse population. I therefore suggest that researchers investigating sexuality in transgender people systematically include non-binary and genderqueer participants. This will require researchers to reconsider conventional framings and research designs, for instance regarding GAMT. Longitudinal studies investigating sexual well-being before and after GAMT carry a high amount of clinically relevant information (e.g., Defreyne et al., 2020), but typically rely on 'standardized' treatment paths in binary transgender individuals, which will be more challenging when including a population with individualized treatment paths. As Chapter 4 indicates, one way to circumvent this is by investigating the effect of an unfulfilled or fulfilled GAMT desire instead of GAMT in itself. For instance, one could design a longitudinal study assessing variables such as sexual esteem, sexual pleasure, sexual functioning, and sexual satisfaction in a diverse group of transgender individuals with an unfulfilled treatment desire, and follow-up on these variables once this desire has been fulfilled. The outcomes from such studies will offer clinically relevant information for a wider and more diverse group of people than has now typically been the case. In order to also include and investigate individuals who experience gender incongruence but who do not access GAMT, one should also investigate non-medical aids that transgender and gender diverse individuals might employ to improve their sexual experiences, such as prosthetics (Martin & Coolhart, 2019).

The findings and conclusions presented in this dissertation mostly rely on associative findings, which warrant caution when interpreting them on the causal level. For instance, in Chapter 5 I suggested that when transgender individuals struggle with sexual openness, they could be encouraged to engage in intimate activity, which could then increase their sexual esteem, which further increases sexual openness. As indicated, all these relationships were found mainly on the associative level, and only randomized-control intervention or repeated single case designs can indicate whether the suggested causal loop of events is valid. Similarly, the causal direction of the mediation relationships reported in Chapter 2 should be investigated using an experimental (instead of observational) study design. Overall, future research in this field should include more studies investigating underlying mechanisms and dynamics, and possible interventions, as these studies help us to make the step from establishing a certain problem (e.g., a high prevalence of STDs in transgender individuals, Becasen et al., 2019) to solving it.

Across time and cultures, transgender identities have constituted a minority facing discrimination and intolerance (White Hughto et al., 2015), which is linked to high rates of mental distress in this group (Bockting et al., 2013; Dhejne et al., 2016). It is important to map which kind of struggles and problems transgender individuals face when it comes to sex and relationships in order to learn how to address these issues. It

hence makes sense that researchers in this field have mostly focused on negative variables related to sexual well-being, such as STDs (Becasen et al., 2019), sexual dysfunctions (Kerckhof et al., 2019), and sexual violence (Fernández-Rouco et al., 2017). However, sexual health is defined more broadly than the mere absence of problems (World Health Organization, 2006), and various scholars have pointed out the importance of positive approaches in addressing sexuality (Ford et al., 2019). While some studies have started to address positive variables related to sexual well-being in transgender individuals (e.g., sexual pleasure, Gieles et al., 2022), these studies are still rare, and there is a need for more studies including positive variables such as sexual pleasure and sexual self-efficacy. Similarly, instead of mostly focusing on how gender dysphoria affects sexuality, it might be interesting to investigate the effects of gender *euphoria* (Beischel et al., 2022). Gender euphoria is described as a "joyful feeling of rightness in one's gender/sex" and is considered an important phenomenon for many transgender individuals (Beischel et al., 2022), making it an interesting research target with great potential impact.

Given the results and conclusions presented in Chapter 6, and the paragraph described above, it is likely no surprise that my final suggestion for future research directions entails that research with transgender individuals should be more community-driven. Whereas I described the results from focus groups discussing neuroscience, it would be equally interesting to learn about which topics related to sexual well-being transgender individuals themselves find important to investigate. Since research related to sexuality relies so heavily on self-report measures, it is crucial for scientists to re-establish a relation of trust with the transgender community, not only for the sake of these communities' well-being, but also in the light of validity. While focus groups or interviews are instrumental in this respect, research groups regularly working with transgender participants could and should also consider working with a community advisory board (e.g., Newman et al., 2011) that regularly provides feedback on the research directions of the group. This relatively 'new' way of performing science will no doubt confront researchers with challenges on the practical and theoretical level, but these are challenges we should be willing to tackle in order to ultimately improve the overall quality of life of transgender people.

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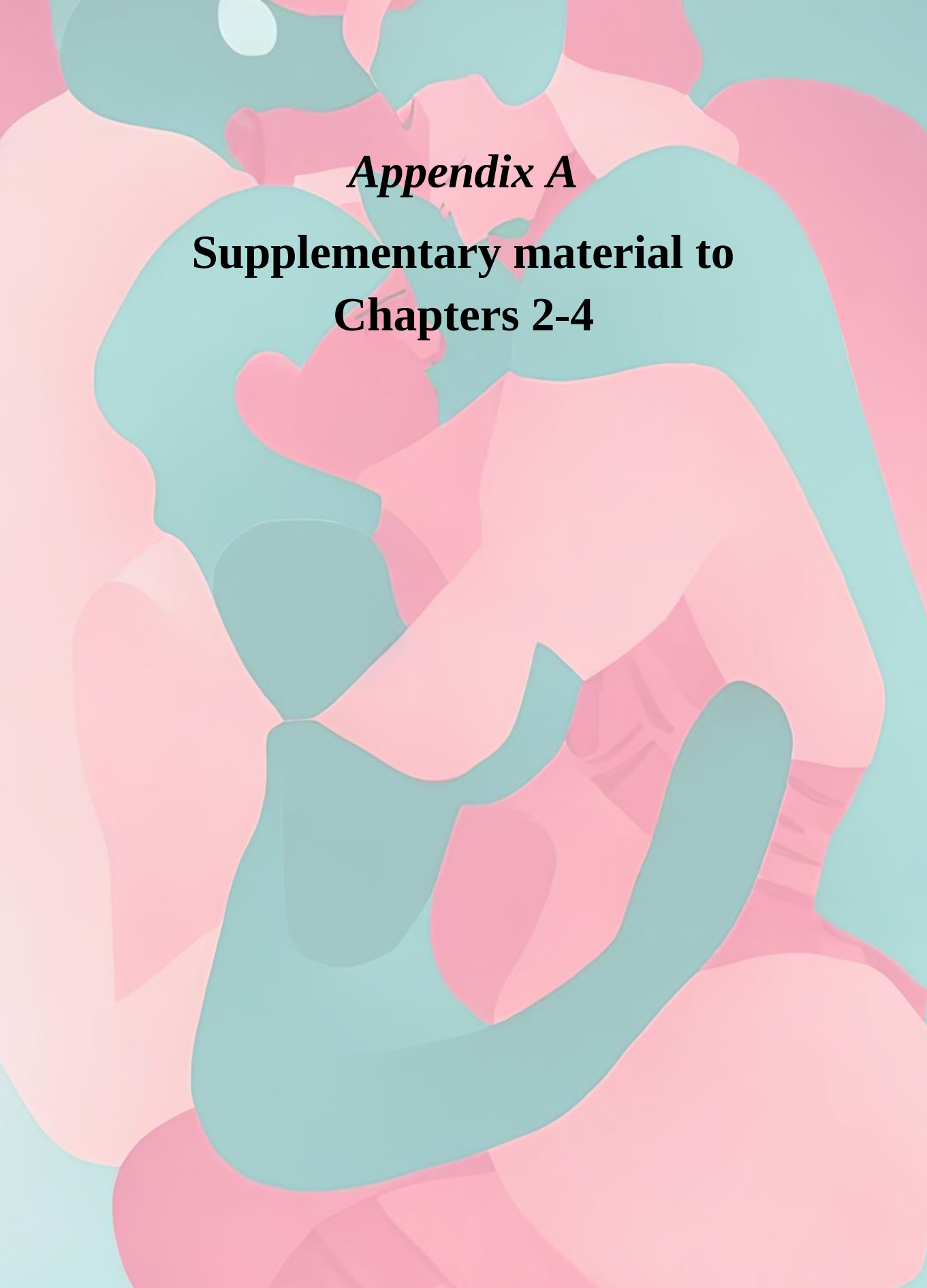


Appendix A

Supplementary material to Chapters 2-4

APPENDIX A

Below is an overview of the entire questionnaire presented to participants in Chapters 2, 3, and 4 (English version only).

1. Demographics

1. Please enter your age. (open)

2. What is your current country of residence? (open)

3. What is your first language? (open)

4. What is the highest educational level you completed?
Less than a high school degree
High school degree or the equivalent (for example: GED)
Some college, no degree
Trade/technical/vocational training
Associate degree
Bachelor's degree
Master's degree
Professional degree
Doctorate degree

5. What is your current working situation?
Student
Looking for work
Working part time
Working full time
Retired
Other, namely: ….

6. How many children do you have? (open)

7. Are you currently in a romantic relationship?
Yes
No

7a. How long have you and your partner been together?
Less than 3 months
3 to 6 months
6 to 12 months
Between 1 and 2 years
Between 2 and 5 years
Longer than 5 years

8. What is your current living situation?
Living with parents or family

Living together with partner
Living together with (a) friend(s)
Student housing/residence
Living alone
Other, namely: …

9. Which sex was assigned to you at birth?
Male
Female
Intersex

10. Which term describes your gender identity best?
Man
Woman
Non-binary
Other, namely: …

11. Do you identify as transgender?
Yes
No

11a. When have you become aware of your transgender identity? By this we mean the time at which you started to struggle with your sex assigned at birth. In case you consider/call yourself transgender since adulthood, but the accompanying feelings and distress where already there in childhood, please indicate 'Childhood'.
Early childhood (before age 4)
Mid childhood (age 4-8)
Late childhood (age 8-puberty)
Around start of puberty
Adolescence (age 13-18)
Young adulthood (age 18-twenties)
Mid adulthood (twenties, thirties)
Late adulthood (after age 40)

11b. Did you ever receive the diagnosis Gender Dysphoria or Gender Incongruence?
Yes
No

12. To what extent do you feel attraction towards people of the following gender?
(trans)men not at all ---------- very much
(trans)women not at all ---------- very much

2. Gender affirming medical treatment

1. Are you currently on a waiting list for gender affirming therapy? [multiple answers possible]
Yes, waiting list for intake consultation

Yes, waiting list for gender affirming hormone therapy
Yes, waiting list for gender affirming surgery
No

2. Are you currently receiving gender affirming hormone therapy?
Yes
No

2a. How many months has it been since you started the hormone therapy? (open)

2b. In general, how satisfied are you with your hormone therapy?
Very unsatisfied ---------- neutral ---------- very satisfied

2c. What were your reasons for starting gender affirming hormone therapy? (multiple answers possible)
I wanted to change my body
I wanted to feel more masculine/feminine
It is what transgender people do
I hate my body without it
I wanted people to see me for a man/woman
I wanted to improve my sex life
Others expected me to
Other, please explain: ….

2d. Are you planning to start gender affirming hormone therapy in the future?
Yes
No
Maybe, don't know

2e. What are your reasons for wanting to start gender affirming hormone therapy? (multiple answers possible)
I want to change my body
I want to feel more masculine/feminine
It is what transgender people do
I hate my body without it
I want people to see me for a man/woman
I want to improve my sex life
Others expect me to
Other, please explain: …

2f. Why don't you think/know you will be starting gender affirming hormone therapy? (multiple answers possible)
I am happy with my body as it is
My environment (family, friends, partner, …) does not approve of it
It might affect my fertility
I am afraid of other people's reactions

It is too expensive
I don't need it to feel more masculine/feminine
I am afraid of negative medical consequences
I'm afraid I might regret it later
I don't entirely feel like a man/woman
I think it might have a negative influence on my sex life
My doctor discourages it
From a practical viewpoint is hasn't been convenient
Other, please explain: …

3. Have you undergone one or more of the following surgeries? (multiple answers possible)
[female sex assigned at birth]
hysterectomy (removal of uterus)
ovariectomy/oophorectomy (removal of ovaries)
mastectomy (removal of breasts)
metoidioplasty
phalloplasty
testis prosthesis
erection prosthesis
none

[male sex assigned at birth]
orchiectomy/orchidectomy (removal of testes)
breast augmentation
facial feminization surgery
vaginoplasty
none

3a. How many months has it been since you have had this surgery? (open)

3b. In general, how satisfied are you with this surgery? –name surgery-
Very unsatisfied ---------- neutral ---------- very satisfied

3c. What were your reasons for having surgery? (multiple answers possible)
I wanted to change my body
I wanted to feel more masculine/feminine
It is what transgender people do
I hate my body without it
I wanted people to see me for a man/woman
It would make it easier to wear the clothes that fit my gender identity
It was required for a legal sex change
I wanted to improve my sex life
Others expected me to
Other, please explain: ….

4. Are you planning to undergo one of the following surgeries in the future?
[female sex assigned at birth]
hysterectomy (removal of uterus)
ovariectomy/oophorectomy (removal of ovaries)
mastectomy (removal of breasts)
metoidioplasty
phalloplasty
testis prosthesis
erection prosthesis
none/don't know yet

[male sex assigned at birth]
orchiectomy/orchidectomy (removal of testes)
breast augmentation
facial feminization surgery
vaginoplasty
none/don't know yet

4a. What are your reasons for wanting to have a(nother) surgery? (multiple answers possible)
I want to change my body
I want to feel more masculine/feminine
It is what transgender people do
I hate my body without it
I want people to see me for a man/woman
It would make it easier to wear the clothes that fit my gender identity
It is required for a legal sex change
I want to improve my sex life
Others expect me to
Other, please explain: ….

4b. Why don't you think/know you will undergo (another) surgery? (multiple answers possible)
I am happy with my body as it is
My environment (family, friends, partner, …) does not approve of it
It might affect my fertility
I am afraid of other people's reactions
It is too expensive
I don't need it to feel more masculine/feminine
I'm afraid I might regret it later
I don't entirely feel like a man/woman
I'm afraid of medical complications
I think it might have a negative influence on my sex life
My doctor discourages it
From a practical viewpoint is hasn't been convenient
Other, please explain: …

3. Gender Dysphoria

Based on: Steensma, T. D., Kreukels, B. P. C., Jürgensen, M., Thyen, U., de Vries, A. L. C., & Cohen-Kettenis, P. T. (2013). The Utrecht Gender Dysphoria Scale: A validation study. In T. D. Steensma (Ed.), From gender variance to gender dysphoria: Psychosexual development of gender atypical children and adolescents, Amsterdam, NL: Ridderprint, 41–56.

[male sex assigned at birth]
You will read statements concerning the sex that was assigned to you at birth. Please indicate to what degree you agree with each statement.

(to be rated: Entirely disagree – Somewhat disagree – Neutral – Somewhat agree – Entirely agree – Not applicable)

1. My life has no purpose if I have to live as a boy/man.
2. Every time someone treats me like a boy/man, I feel hurt.
3. I feel unhappy whenever someone calls me a boy/man.
4. I feel unhappy because I have a masculine body.
5. The idea of always being a boy/man makes me unhappy.
6. I hate myself because I am a boy/man.
7. I feel uncomfortable when I have to behave like a boy/man always and everywhere.
8. Only as a girl/woman, my life would be worthwhile.
9. I don't like peeing in standing position.
10. I am discontented with my beard growth because it makes me look like a boy/man.
11. I don't like having erections.
12. I would prefer not living to living as a boy/man.

[female sex assigned at birth]
You will read statements concerning the sex that was assigned to you at birth. Please indicate to what degree you agree with each statement.

(to be rated: Entirely disagree – Somewhat disagree – Neutral – Somewhat agree – Entirely agree – Not applicable)

1. I prefer to behave like a boy/man.
2. Every time someone treats me like a girl/woman, I feel hurt.
3. I like living as a girl/woman.
4. I always want to be treated like a boy/man.
5. The life of a boy/am is more attractive to me than the life of a girl/woman.
6. I feel unhappy because I have to behave like a girl/woman.
7. Living as a girl/woman is something positive for me.
8. I like seeing myself naked in the mirror.
9. I like behaving like a woman sexually.
10. I hate menstruating because it makes me feel like a woman.
11. I hate having breasts.
12. I wish I were born as a boy/man.

4. Sexual Self-Concept

Based on: Deutsch, A. R., Hoffman, L., & Wilcox, B. L. (2014). Sexual self-concept: Testing a hypothetical model for men and women. The Journal of Sex Research, 51(8), 932-945. https://doi.org/10.1080/00224499.2013.805315

You will now be asked some questions about your own feelings about sexual subjects. Please indicate how much you agree or disagree with the following statements.

(to be rated: Strongly disagree – Somewhat disagree – Neither disagree or agree – Somewhat agree – Strongly agree)

1. Intimate partners have found (or would find) me sexually satisfying.
2. Most of my friends are better looking than I am.
3. I feel comfortable with my sexuality.
4. I like my body.
5. I try to be healthy.
6. I like to take care of my appearance.
7. It is very hard for me to know how to behave in a sexual situation.
8. I am confident that people find me attractive.
9. I don't know how (or would not know how) to behave with a sexual partner.
10. I do (or would) enjoy engaging in sex.
11. When other people look at me they must think I have a poorly developed body.
12. I am confident about being able to get a partner.
13. In general, I do (or would) enjoy having my partner look at me when I have no clothes on.
14. I feel good about my sexual behavior.
15. Most of my friends are (or would) feel more comfortable sexually with their partners than I do.
16. I frequently feel ugly and unattractive.
17. It is important to me that my body is healthy and in good shape.
18. I don't think people of the gender I'm attracted to find me very interesting.
19. I find it hard to talk to people of the gender I'm attracted to.
20. I am comfortable being affectionate with dating partners.
21. I don't think I could be comfortable in a sexual situation.
22. My desire to be healthy influences a lot of my behavior.
23. People say I am good looking.
24. I am confident that I can have a sexual relationship.

You will now be asked some questions about your personal feelings and thoughts about sexual subjects. Please read each statement carefully and indicate how much you agree or disagree with each statement.

(to be rated: Strongly disagree – Somewhat disagree – Neither disagree or agree – Somewhat agree – Strongly agree)

1. I often feel pressured into having sex.
2. I worry about enjoying sex.

3. I would find it hard to relax while having sex.
4. I have a lot of sexual energy.
5. I don't need sex at all.
6. I don't think I could satisfy a partner sexually.
7. Most of the time I am very sexually active.
8. I would feel bad about having sex.
9. Even with condoms I would still worry about getting AIDS if I had sex.
10. I often have sex even though I don't feel like it.
11. I can feel quite frustrated if I don't have sex often.
12. I would worry about physically hurting my partner if I had sex.
13. Sexual fulfillment is very important to me.
14. I would like to experiment when it comes to sex.
15. I rarely feel that I would want to have sex with someone.
16. I have very strong sexual desires.
17. My sexual desires are less than most peoples'.
18. I would be too worried to have sex with someone I just met.
19. I would worry about physical pain if I had sex.
20. I would worry about showing fear or discomfort if I had sex.
21. If I had sex I would worry about someone finding out.
22. I don't think I could enjoy sex with someone I just met.
23. It doesn't matter who you have sex with as long as you enjoy it.
24. I don't want to be committed to sex with just one person.
25. I could be turned on by watching someone masturbate.
26. I constantly look for new sexual relationships.
27. Group sex might be fun.
28. I would like an adventurous sexual partner.
29. I think it is natural to have many sexual partners in life.
30. Pornography does not excite me.
31. I like to commit myself to a relationship.
32. I am very choosy about my sexual partners.
33. There needs to be commitment before I would have sex with someone.
34. I don't think I could like oral sex.
35. I would prefer to have one committed relationship than many sexual partners.
36. I would not like to watch other people having sex.
37. When it comes to sex I would try almost anything once.
38. I am easily aroused.
39. Masturbating with someone else could be pleasurable.
40. I think too many sexual partners is risky.

This section will ask you about your perceived ability to do certain activities or behaviors. Please mark only those you feel you CAN DO, and then rate your degree of confidence that you can do them. Even if the situation described is not applicable to you, try to imagine your ability to do the activity/behavior in case it occurred to you.

APPENDIX A

For example: if you could not jump over Mount Everest but you were absolutely certain you could jump over a small puddle your answers would look like this:

	CAN DO
Jump over mount Everest	
Jump over a small puddle	X

CONFIDENCE				
Very Uncertain	Somewhat Uncertain	Neither certain or uncertain	Somewhat Certain	Very Certain
				X

Could you:

1. Refuse a sexual advance by your partner?
2. Have a sexual encounter without feeling you had to have intercourse?
3. Put a condom on an erect penis?
4. Be the one to start sexual activities?
5. Discuss the use of condoms and/or contraceptives with a potential sex partner?
6. Ask someone to wait for sex if not protected at the time (for example, if you do not have a condom)?
7. Carry condoms with you "just in case"?
8. Control your sexual urges under the influence of alcohol or drugs?
9. Discuss with your partner the use of condoms for AIDS protection of you (or your partner) are already using a different type of contraception?
10. Choose when and with whom to have sex?
11. Tell your partner how to treat you sexually?
12. Refuse to do something with your sexual partner which you don't feel comfortable about?
13. Be able to buy condoms in a store?
14. Discuss precautions with a doctor or other health professional?
15. Admit to being sexually inexperienced to your sexually experienced peers?
16. Reject an unwanted sexual advance from someone other than your partner?
17. Ask your partner to provide the type and amount of sexual stimulation required?
18. Tell your partner you don't want to have sex?
19. Refuse to have sex with your partner even when they really wanted to?
20. Insist your partner respect your sexual needs?

5. Trans-specific body image worries

From: Dharma, C., Scheim, A. I., & Bauer, G. R. (2019). Exploratory factor analysis of two sexual health scales for transgender people: Trans-Specific Condom/Barrier Negotiation Self-Efficacy (T-Barrier) and Trans-Specific Sexual Body Image (T-Worries). Archives of Sexual Behavior, 48(5), 1563-1572. https://doi.org/10.1007/s10508-018-1383-4

When I think about having sex, I worry…
(to be rated: Not at all – Rather not – Neutral – Slightly – Very)

1. That other people think my body is unattractive.
2. That there are very few people who would want to have sex with me.
3. About my physical safety.
4. About feeling ashamed about my body.
5. That once I'm naked, people will not see me as the gender I am.
6. That people only want to have sex with me because I'm trans.
7. That I can't have the sex I want until I have a(nother) surgery.

6. Sexual satisfaction

From: Lawrance, K., & Byers, E. S. (1995). Sexual satisfaction in long-term heterosexual relationships: the interpersonal exchange model of sexual satisfaction. Personal Relationships, 2(4), 267-285. https://doi.org/10.1111/j.1475-6811.1995.tb00092.x

Overall, how would you describe your sex life?

Good	○	○	○	○	○	○	○	Bad
Pleasant	○	○	○	○	○	○	○	Unpleasant
Positive	○	○	○	○	○	○	○	Negative
Satisfying	○	○	○	○	○	○	○	Unsatisfying
Valuable	○	○	○	○	○	○	○	Worthless

7. Actual vs. Ideal vs. Ought Sexual Self-Concept Disrepancies

1. Think about your actual sexual self-concept, and your ideal sexual self-concept. Your actual self-concept entails all the ideas and feelings you have about who you currently are as a sexual person. Your ideal sexual self-concept entails all the ideas and feelings you have about who you ideally would want to be as a sexual person.

How far away is your actual sexual self-concept from your ideal sexual self-concept?
Very far away (I am not at all who I want to be sexually) ---------- Entirely overlapping (I am entirely who I want to be sexually)

2. Think about your actual sexual self-concept, and your ought sexual self-concept. Your actual self-concept entails all the ideas you have about who you currently are as a sexual person. Your ought sexual self-concept entails all the ideas you have about who you SHOULD be as a sexual person.

How far away is your actual sexual self-concept from your ought sexual self-concept?
Very far away (I am not at all who I should be sexually) ---------- Entirely overlapping (I am entirely who I should be sexually)

8. Life satisfaction

From: Diener, E., Emmons, R. A., Larsen, R. J., & Griffin, S. (1985). The Satisfaction With Life Scale. Journal of Personality Assessment, 49(1), 71-75. https://doi.org/10.1207/s15327752jpa4901_13.

Below are five statements with which you may agree or disagree. Using a 1-7 scale below, indicate your agreement with each item by placing the appropriate number on the line preceding the item. Please be open and honest in your responding.

(to be rated: Strongly disagree – Disagree – Slightly disagree – Neither agree nor disagree – Slightly agree – Agree – Strongly agree)
1. In most ways my life is close to my ideal.
2. The conditions of my life are excellent.
3. I am satisfied with my life.
4. So far I have gotten the important things I want in life.
5. If I could live my life over, I would change almost nothing.

9. Anxiety & Depression

From: Zigmund, A. S., & Snaith, R. P. (1983). The hospital anxiety and depression scale. Acta Psychiatrica Scandinavia, 67(6), 361-370. https://doi.org/10.1111/j.1600-0447.1983.tb09716.x

Tick the box beside the reply that is closest to how you have been feeling in the past week. Don't take too long over your replies: your immediate is best.

1. I feel tense or 'wound up'.
Most of the time
A lot of the time
From time to time, occasionally
Not at all

2. I still enjoy the things I used to enjoy.
Definitely as much
Not quite so much
Only a little
Hardly at all

3. I get a sort of frightened feeling as if something awful is about to happen.
Very definitely and quite badly
Yes, but not too badly
A little, but it doesn't worry me
Not at all

4. I can laugh and see the funny side of things.
As much as I always could

Not quite so much
Definitely not so much now
Not at all

5. Worrying thoughts go through my mind.
A great deal of time
A lot of the time
From time to time, but not too often
Only occasionally

6. I feel cheerful.
Not at all
Not often
Sometimes
Most of the time

7. I can sit at ease and feel relaxed.
Definitely
Usually
Not often
Not at all

8. I feel as if I am slowed down,
Nearly all the time
Very often
Sometimes
Not at all

9. I get a sort of frightened feeling like 'butterflies' in the stomach.
Not at all
Occasionally
Quite often
Very often

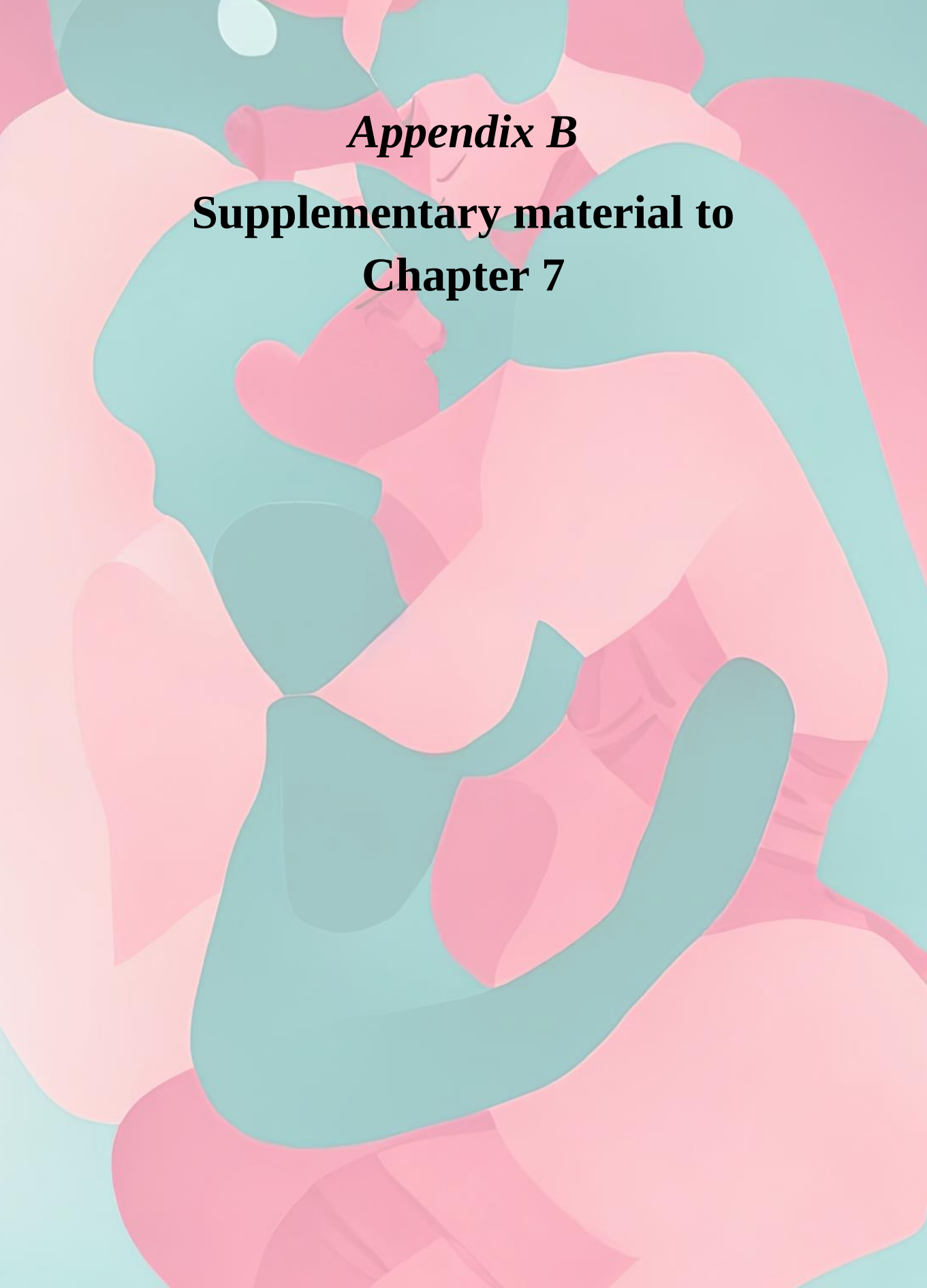
10. I have lost interest in my appearance.
Definitely
I don't take as much care as I should
I may not take quite as much care
I take just as much care as ever

11. I feel restless as I have to be on the move.
Very much indeed
Quite a lot
Not very much
Not at all

12. I look forward with enjoyment to things.
As much as I ever did
Rather less than I used to
Definitely less than I used to
Hardly at all

13. I get sudden feelings of panic.
Very often indeed
Quite often
Not very often
Not at all

14. I can enjoy a good book or radio or TV program.
Often
Sometimes
Not often
Very seldom



Appendix B

Supplementary material to Chapter 7

APPENDIX B

Table S1.

Statistics regarding the post-hoc tests of the interaction between condition (Approach Sex vs. Avoid Dance vs. Approach Dance vs. Avoid Sex) and cisgender/transgender groups in terms of brain activity in the right anterior cingulate (F(3,195) = 4.464, p = .005).

		Mean difference	*SE*	*t*	*p*
Cis, ApSex	Trans, ApSex	0.148	0.165	0.894	1.000
	Cis, AvDance	0.018	0.065	0.284	1.000
	Trans, AvDance	0.227	0.165	1.374	1.000
	Cis, ApDance	0.030	0.065	0.457	1.000
	Trans, ApDance	-0.002	0.165	-0.014	1.000
	Cis, AvSex	0.049	0.065	0.757	1.000
	Trans, AvSex	-0.027	0.165	-0.164	1.000
Trans, ApSex	Cis, AvDance	-0.130	0.165	-0.783	1.000
	Trans, AvDance	0.079	0.066	1.209	1.000
	Cis, ApDance	-0.118	0.165	-0.716	1.000
	Trans, ApDance	-0.150	0.066	-2.289	0.579
	Cis, AvSex	-0.099	0.165	-0.598	1.000
	Trans, AvSex	-0.175	0.066	-2.667	0.216
Cis, AvDance	Trans, AvDance	0.209	0.165	1.263	1.000
	Cis, ApDance	0.011	0.065	0.173	1.000
	Trans, ApDance	-0.021	0.165	-0.125	1.000
	Cis, AvSex	0.031	0.065	0.473	1.000
	Trans, AvSex	-0.046	0.165	-0.275	1.000
Trans, AvDance	Cis, ApDance	-0.198	0.165	-1.196	1.000
	Trans, ApDance	-0.230	0.066	-3.498	0.016
	Cis, AvSex	-0.178	0.165	-1.078	1.000
	Trans, AvSex	-0.255	0.066	-3.876	0.004
Cis, ApDance	Trans, ApDance	-0.032	0.165	-0.193	1.000
	Cis, AvSex	0.019	0.065	0.300	1.000
	Trans, AvSex	-0.057	0.165	-0.343	1.000
Trans, ApDance	Cis, AvSex	0.051	0.165	0.310	1.000
	Trans, AvSex	-0.025	0.066	-0.378	1.000
Cis, AvSex	Trans, AvS	-0.076	0.165	-0.460	1.000

Dependent variable presents average beta values representing brain activity in the brain region of interest during the separate conditions. *P*-values adjusted for comparing a family of 28. ApSex = Approach Sex, AvDance = Avoid Dance, ApDance = Approach Dance, AvSex = Avoid Sex, *SE* = standard error.

Table S2.

Statistics regarding the post-hoc tests of the interaction between condition (Approach Sex vs. Avoid Dance vs. Approach Dance vs. Avoid Sex) and cisgender/transgender groups in terms of brain activity in the left medial frontal gyrus (F(3,195) = 4.611, p = .004).

		Mean difference	*SE*	*t*	*p*
Cis, ApSex	Trans, ApSex	-0.315	0.121	-2.592	0.266
	Cis, AvDance	-0.137	0.058	-2.347	0.399
	Trans, AvDance	-0.179	0.121	-1.477	1.000
	Cis, ApDance	0.062	0.058	1.070	1.000
	Trans, ApDance	-0.197	0.121	-1.625	1.000
	Cis, AvSex	-0.024	0.058	-0.419	1.000
	Trans, AvSex	-0.322	0.121	-2.649	0.237
Trans, ApSex	Cis, AvDance	0.178	0.121	1.465	1.000
	Trans, AvDance	0.135	0.059	2.289	0.440
	Cis, ApDance	0.377	0.121	3.105	0.065
	Trans, ApDance	0.117	0.059	1.985	0.777
	Cis, AvSex	0.290	0.121	2.391	0.395
	Trans, AvSex	-0.007	0.059	-0.117	1.000
Cis, AvDance	Trans, AvDance	-0.043	0.121	-0.350	1.000
	Cis, ApDance	0.199	0.058	3.417	0.022
	Trans, ApDance	-0.060	0.121	-0.498	1.000
	Cis, AvSex	0.112	0.058	1.928	0.777
	Trans, AvSex	-0.185	0.121	-1.522	1.000
Trans, AvDance	Cis, ApDance	0.242	0.121	1.990	0.777
	Trans, ApDance	-0.018	0.059	-0.304	1.000
	Cis, AvSex	0.155	0.121	1.276	1.000
	Trans, AvSex	-0.142	0.059	-2.405	0.376
Cis, ApDance	Trans, ApDance	-0.260	0.121	-2.138	0.632
	Cis, AvSex	-0.087	0.058	-1.488	1.000
	Trans, AvSex	-0.384	0.121	-3.162	0.057
Trans, ApDance	Cis, AvSex	0.173	0.121	1.424	1.000
	Trans, AvSex	-0.124	0.059	-2.102	0.632
Cis, AvSex	Trans, AvS	-0.297	0.121	-2.448	0.373

Dependent variable presents average beta values representing brain activity in the brain region of interest during the separate conditions. *P*-values adjusted for comparing a family of 28. ApSex = Approach Sex, AvDance = Avoid Dance, ApDance = Approach Dance, AvSex = Avoid Sex, *SE* = standard error.

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Table S3.

Statistics regarding the post-hoc tests of the interaction between condition (Approach Sex vs. Avoid Dance vs. Approach Dance vs. Avoid Sex) and cisgender/transgender groups in terms of brain activity in the left fusiform gyrus (F(3,195) = 9.722, p <.001).

		Mean difference	*SE*	*t*	*p*
Cis, ApSex	Trans, ApSex	-0.511	0.289	-1.769	0.806
	Cis, AvDance	0.913	0.111	8.197	<.001
	Trans, AvDance	1.063	0.289	3.681	0.007
	Cis, ApDance	0.611	0.111	5.481	<.001
	Trans, ApDance	0.223	0.289	0.773	1.000
	Cis, AvSex	0.351	0.111	3.153	0.032
	Trans, AvSex	0.503	0.289	1.741	0.806
Trans, ApSex	Cis, AvDance	1.424	0.289	4.930	<.001
	Trans, AvDance	1.574	0.113	13.921	<.001
	Cis, ApDance	1.122	0.289	3.883	0.004
	Trans, ApDance	0.734	0.113	6.494	<.001
	Cis, AvSex	0.862	0.289	2.985	0.060
	Trans, AvSex	1.014	0.113	8.965	<.001
Cis, AvDance	Trans, AvDance	0.150	0.289	0.519	1.000
	Cis, ApDance	-0.303	0.111	-2.716	0.108
	Trans, ApDance	-0.690	0.289	-2.388	0.231
	Cis, AvSex	-0.562	0.111	-5.044	<.001
	Trans, AvSex	-0.411	0.289	-1.421	1.000
Trans, AvDance	Cis, ApDance	-0.453	0.289	-1.567	0.968
	Trans, ApDance	-0.840	0.113	-7.427	<.001
	Cis, AvSex	-0.712	0.289	-2.465	0.205
	Trans, AvSex	-0.561	0.113	-4.956	<.001
Cis, ApDance	Trans, ApDance	-0.387	0.289	-1.341	1.000
	Cis, AvSex	-0.259	0.111	-2.328	0.231
	Trans, AvSex	-0.108	0.289	-0.373	1.000
Trans, ApDance	Cis, AvSex	0.128	0.289	0.443	1.000
	Trans, AvSex	0.279	0.113	2.471	0.201
Cis, AvSex	Trans, AvS	0.151	0.289	0.524	1.000

Dependent variable presents average beta values representing brain activity in the brain region of interest during the separate conditions. *P*-values adjusted for comparing a family of 28. ApSex = Approach Sex, AvDance = Avoid Dance, ApDance = Approach Dance, AvSex = Avoid Sex, *SE* = standard error.

Table S4.

Statistics regarding the post-hoc tests of the interaction between condition (Approach Sex vs. Avoid Dance vs. Approach Dance vs. Avoid Sex) and cisgender/transgender groups in terms of brain activity in the **l***eft inferior parietal lobule (F(3,195) = 8.457, p < .001).*

		Mean difference	*SE*	*t*	*p*
Cis, ApSex	Trans, ApSex	-0.246	0.171	-1.440	1.000
	Cis, AvDance	-0.530	0.090	-5.912	<.001
	Trans, AvDance	-0.254	0.0171	-1.483	1.000
	Cis, ApDance	-0.319	0.090	-3.557	0.013
	Trans, ApDance	-0.028	0.171	-0.165	1.000
	Cis, AvSex	-0.249	0.090	-2.777	0.138
	Trans, AvSex	-0.304	0.171	-1.778	1.000
Trans, ApSex	Cis, AvDance	-0.284	0.171	-1.658	1.000
	Trans, AvDance	-0.007	0.091	-0.081	1.000
	Cis, ApDance	-0.073	0.171	-0.424	1.000
	Trans, ApDance	0.218	0.091	2.397	0.367
	Cis, AvSex	-0.003	0.171	-0.016	1.000
	Trans, AvSex	-0.058	0.091	-0.635	1.000
Cis, AvDance	Trans, AvDance	0.277	0.171	1.616	1.000
	Cis, ApDance	0.211	0.090	2.356	0.390
	Trans, ApDance	0.502	0.171	2.934	0.099
	Cis, AvSex	0.281	0.090	3.135	0.052
	Trans, AvSex	0.226	0.171	1.321	1.000
Trans, AvDance	Cis, ApDance	-0.065	0.171	-0.381	1.000
	Trans, ApDance	0.226	0.091	2.478	0.309
	Cis, AvSex	0.005	0.171	0.027	1.000
	Trans, AvSex	-0.051	0.091	-0.555	1.000
Cis, ApDance	Trans, ApDance	0.291	0.171	1.699	1.000
	Cis, AvSex	0.070	0.090	0.780	1.000
	Trans, AvSex	0.015	0.171	0.086	1.000
Trans, ApDance	Cis, AvSex	-0.221	0.171	-1.291	1.000
	Trans, AvSex	-0.276	0.091	-3.033	0.069
Cis, AvSex	Trans, AvS	-0.055	0.171	-0.322	1.000

Dependent variable presents average beta values representing brain activity in the brain region of interest during the separate conditions. *P*-values adjusted for comparing a family of 28. ApSex = Approach Sex, AvDance = Avoid Dance, ApDance = Approach Dance, AvSex = Avoid Sex, *SE* = standard error.

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Table S5.

Statistics regarding the post-hoc tests of the interaction between condition (Approach Sex vs. Avoid Dance vs. Approach Dance vs. Avoid Sex) and cisgender/transgender groups in terms of brain activity in the left precentral gyrus ($F(3,195) = 8.112$, $p < .001$).

		Mean difference	*SE*	*t*	*p*
Cis, ApSex	Trans, ApSex	-0.169	0.259	-0.655	1.000
	Cis, AvDance	-0.351	0.103	-3.393	0.023
	Trans, AvDance	0.158	0.259	0.612	1.000
	Cis, ApDance	-0.133	0.103	-1.285	1.000
	Trans, ApDance	0.110	0.259	0.425	1.000
	Cis, AvSex	-0.090	0.103	-0.869	1.000
	Trans, AvSex	-0.098	0.259	-0.377	1.000
Trans, ApSex	Cis, AvDance	-0.182	0.259	-0.702	1.000
	Trans, AvDance	0.328	0.105	3.120	0.056
	Cis, ApDance	0.036	0.259	0.141	1.000
	Trans, ApDance	0.279	0.105	2.660	0.220
	Cis, AvSex	0.079	0.259	0.307	1.000
	Trans, AvSex	0.072	0.105	0.683	1.000
Cis, AvDance	Trans, AvDance	0.509	0.259	1.969	1.000
	Cis, ApDance	0.218	0.103	2.108	0.835
	Trans, ApDance	0.461	0.259	1.782	1.000
	Cis, AvSex	0.261	0.103	2.523	0.311
	Trans, AvSex	0.253	0.259	0.980	1.000
Trans, AvDance	Cis, ApDance	-0.291	0.259	-1.126	1.000
	Trans, ApDance	-0.048	0.105	-0.461	1.000
	Cis, AvSex	-0.248	0.259	-0.960	1.000
	Trans, AvSex	-0.256	0.105	-2.437	0.377
Cis, ApDance	Trans, ApDance	0.243	0.259	0.939	1.000
	Cis, AvSex	0.043	0.103	0.415	1.000
	Trans, AvSex	0.035	0.259	0.137	1.000
Trans, ApDance	Cis, AvSex	-0.200	0.259	-0.773	1.000
	Trans, AvSex	-0.207	0.105	-1.976	1.000
Cis, AvSex	Trans, AvS	-0.008	0.259	-0.029	1.000

Dependent variable presents average beta values representing brain activity in the brain region of interest during the separate conditions. *P*-values adjusted for comparing a family of 28. ApSex = Approach Sex, AvDance = Avoid Dance, ApDance = Approach Dance, AvSex = Avoid Sex, *SE* = standard error.

Table S6.

Statistics regarding the post-hoc tests of the interaction between condition (Approach Sex vs. Avoid Dance vs. Approach Dance vs. Avoid Sex) and cisgender/transgender groups in terms of brain activity in the left middle temporal gyrus (F(3,195) = 6.927, p < .001).

		Mean difference	*SE*	*t*	*p*
Cis, ApSex	Trans, ApSex	-0.382	0.191	-2.005	1.000
	Cis, AvDance	-0.094	0.072	-1.313	1.000
	Trans, AvDance	-0.045	0.191	-0.237	1.000
	Cis, ApDance	-0.017	0.072	-0.241	1.000
	Trans, ApDance	-0.030	0.191	-0.158	1.000
	Cis, AvSex	-0.101	0.072	-1.404	1.000
	Trans, AvSex	-0.240	0.191	-1.260	1.000
Trans, ApSex	Cis, AvDance	0.288	0.191	1.509	1.000
	Trans, AvDance	0.337	0.073	4.613	<.001
	Cis, ApDance	0.365	0.191	1.914	1.000
	Trans, ApDance	0.352	0.073	4.819	<.001
	Cis, AvSex	0.281	0.191	1.475	1.000
	Trans, AvSex	0.142	0.073	1.945	1.000
Cis, AvDance	Trans, AvDance	0.049	0.191	0.259	1.000
	Cis, ApDance	0.077	0.072	1.072	1.000
	Trans, ApDance	0.064	0.191	0.338	1.000
	Cis, AvSex	-0.007	0.072	-0.091	1.000
	Trans, AvSex	-0.146	0.191	-0.764	1.000
Trans, AvDance	Cis, ApDance	0.028	0.191	0.146	1.000
	Trans, ApDance	0.015	0.073	0.206	1.000
	Cis, AvSex	-0.056	0.191	-0.293	1.000
	Trans, AvSex	-0.195	0.073	-2.669	0.206
Cis, ApDance	Trans, ApDance	-0.013	0.191	-0.067	1.000
	Cis, AvSex	-0.084	0.072	-1.163	1.000
	Trans, AvSex	-0.223	0.191	-1.169	1.000
Trans, ApDance	Cis, AvSex	-0.071	0.191	-0.372	1.000
	Trans, AvSex	-0.210	0.073	-2.875	0.117
Cis, AvSex	Trans, AvS	-0.139	0.191	-0.730	1.000

Dependent variable presents average beta values representing brain activity in the brain region of interest during the separate conditions. *P*-values adjusted for comparing a family of 28. ApSex = Approach Sex, AvDance = Avoid Dance, ApDance = Approach Dance, AvSex = Avoid Sex, *SE* = standard error

APPENDIX B

Table S7.
Correlation between testosterone values and brain activity during the approach and avoidance of sexual stimuli in the entire sample.

	ApSex – ApDance *r* *p*	AvSex – AvDance *r* *p*
Right anterior cingulate	-.005 .966	-.023 .851
Left medial frontal gyrus	.005 .967	.078 .529
Left fusiform gyrus	.170 .169	.080 .521
Left inferior parietal lobule	-.231 .061	.007 .956
Left precentral gyrus	-.012 .924	.058 .643
Left middle temporal gyrus	.100 .422	.086 .487

Represents entire sample minus outliers (n = 63). Testosterone was measured in pg/ml. Brain activity is conceptualized as average beta values, contrasted by Approach Sex > Approach Dance to reflect the approach of sexual stimuli, and by Avoid Sex > Avoid Dance to reflect the approach of dance stimuli.

Table S8.
Correlation between testosterone values and brain activity during the approach and avoidance of sexual stimuli, split per group.

	Transgender group (n = 29)		Cisgender group (n = 34)	
	ApSex – ApDance *r* *p*	AvSex – AvDance *r* *p*	ApSex – ApDance *r* *p*	AvSex – AvDance *r* *p*
Right anterior cingulate	.052 .772	-.002 .992	.218 .215	.080 .653
Left medial frontal gyrus	-.029 .872	-.012 .948	3156 .377	.052 .769
Left fusiform gyrus	.183 .307	.092 .609	.278 .112	.094 .597
Left inferior parietal lobule	-.526 .002	-.078 .668	.004 .984	-.120 .499
Left precentral gyrus	-.122 .501	-.063 .727	.125 .482	-.016 .929
Left middle temporal gyrus	.000 .999	.070 .700	.224 .203	-.149 .401

Testosterone was measured in pg/ml. Brain activity is conceptualized as average beta values, contrasted by Approach Sex > Approach Dance to reflect the approach of sexual stimuli, and by Avoid Sex > Avoid Dance to reflect the approach of dance stimuli

Appendix C

Impact paragraph

APPENDIX C

A four-year PhD project requires many resources. Not only were the studies in this thesis mostly funded by tax money; they also required great time investments from my talented collaborators, supervisors, and myself. While I certainly believe there should be room for 'unbound' scientific research driven by curiosity and experimental drive instead of clear objectives, I executed my studies while keeping their impact clearly in mind. Over the next paragraph, I would like to reflect on the scientific and social impact of my (our) work and approach.

Transgender identities stand in the middle of society and societal discourse – unfortunately mostly in the sense that many people still struggle with where to place these in their eyes 'new' identities and norms. I believe it is crucial for researchers in the field of transgender health to engage in outreach activities to help shape the societal narrative in an informed and evidence based manner. I have approached this proactively, by giving many open lectures for the UM student population; by giving multiple interviews to various media outlets and podcasts; and by participating in initiatives such as the Neuroethics Café, where we discussed the outcomes from our focus group study (Chapter 6) with a diverse audience. I have also ensured an accessible online presence, sharing updates about our projects on social media websites such as Facebook and LinkedIn.

Meanwhile, I remained aware of the fact that as an employee at a university, my social impact went further than what was related to my research per se, and that I also could and should have a positive impact as a teacher and UM community member. In that sense, I have made time to supervise students who wanted to write their thesis on a LGBTQI+ related topic, because it is important to me that they got the chance to write about a topic close to their heart. I have listened to the concerns expressed by my trans students, and where I could, I helped them feel more included in our university. This way I signaled the need for gender inclusive bathrooms to the Diversity & Inclusivity Office, which they actually took up so students and staff can now use all-gender toilets in most university buildings. I further aimed to shape our university culture in an affirmative way by being part of UM Pride and developing the LGBTQI+ Ally Training. Finally, I served as PhD representative at the department, faculty, and central level, and added my two cents in making sure the interests of junior researchers on a temporary contract were not overlooked whenever new policies were shaped.

As every PhD candidate, I was evidently aiming for scientific and clinical impact with my studies. The main aim of this thesis was to provide some valuable and solid puzzle pieces to further unravel the multi-faceted phenomenon of sexual well-being in transgender people. Chapter 2 illustrates just how multi-faceted and complex this phenomenon is, by applying the multidimensional Sexual Self-Concept (SSC) and related actual/ideal discrepancies. We showed that not every aspect of trans individuals' SSC is directly related to gender dysphoria. Furthermore, we hinted at how to dissolve a negative

SSC (via SSC discrepancies), which is valuable because it is crucial to find ways other than gender affirming medical treatment (GAMT) to alleviate gender dysphoria and its effects on sexual well-being. The clinical relevance of this study is illustrated by the fact that it was cited in the newest edition of the Standards of Care for the Health of Transgender and Gender Diverse People by the World Professional Association for Transgender Health, thereby making the study find its way to health professionals working with transgender people.

Another phenomenon currently affecting clinical transgender health practices is the increasing number of non-binary and genderqueer (NBGQ) individuals seeking gender affirming help. Chapter 3 informs health professionals on how this group compares to the binary transgender population when it comes to mental and sexual well-being. Chapter 4 further illuminates the treatment desires and treatment motives from both groups. GAMT is currently a touchy topic leading to heated societal debates (should people be able to access GAMT without a psychological evaluation? And from what age on? What to do with the long waiting lists?), so it is very important to have solid information on the effect of withdrawing or postponing the desired treatment. Chapter 4 indicates that having an unfulfilled GAMT desire leads to negative consequences when it comes to mental health and sexual well-being. Furthermore, the chapter illustrates how NBGQ individuals desire GAMT just as much as binary transgender individuals, but that they face more obstacles when accessing such treatment. In my opinion, the results from this study should make it apparent for policy makers that more resources are needed for GAMT centers to deal with this great demand and to lower the threshold for any individual desiring such treatment.

While most studies assessing sexual well-being in transgender individuals rely on cross-sectional questionnaire designs, Chapter 5 illustrates the advantages of more complex designs such as diary studies. It provides unique insights into the daily sexual well-being of trans individuals, leading to interesting findings for clinical practice. For instance, we found that engaging in intimate activities is linked to increased sexual esteem the next day, which in turn is related to more sexual openness. Interestingly, the outcomes from this study also defy the idea that transgender clients are very different from cisgender clients for sexologists, at least when it comes to the mechanisms we explored.

Chapter 6, presenting the results from a focus groups study, has a meta-scientific character, and I hope it will have an impact on researchers planning to conduct neuroimaging studies with transgender participants. It urges researchers to reflect on which research questions are most relevant for the community itself, and on how to be sensitive to the societal context. The study also serves as an example, an exercise in self-

reflection for scientists in any field related to humanities, whether it includes minorities or not.

Like Chapter 5, Chapter 7 further illustrates the value of including a wider range of research methods in this field. For instance, while cisgender and transgender people often show differences in sexuality on the explicit level (e.g., via questionnaires), this does not necessarily translate to behavioral differences on implicit tasks related to sexuality. In this chapter, we applied one of the findings from Chapter 6 (namely that transgender individuals are interested in neuroimaging studies assessing the relation between hormone treatment and neuronal function) and uniquely combined endocrine, neurobiological, and psychological factors in our design. Furthermore, this study has a unique scientific impact in the sense that it is the first to include NBGQ individuals in a neuroimaging study.

The outcomes from the studies presented in this dissertation were scientifically disseminated via open access peer-reviewed publications in specialized journals, and via oral and poster presentations at conferences. Importantly, I presented at conferences specifically in the field of transgender health, but also outside of that bubble to make psychology research and clinical practice in general more inclusive. For instance, I gave a presentation at the yearly conference of the Dutch Society for Behavioral and Cognitive Therapies on what they should know about transgender identities in case the attendants had transgender clients. On such occasions, I always made sure to bring a member of the transgender community to join me in my presentation, and I tried my best to have them properly reimbursed for their time and efforts.

Finally, I hope that my inclusive, affirmative, and self-reflective approach as a researcher will impact how other researchers reflect on their own work and biases. This approach is not always easy and can even be confrontational, but anno 2023, the interior of the ivory tower has really become too outdated. Time to redecorate it with all colours of the rainbow!

Appendix D

General summary

APPENDIX D

Transgender people experience an incongruence between their gender identity and their sex assigned at birth. Some, but not all transgender individuals might choose to alleviate this incongruence by gender affirming medical treatment (GAMT), including gender affirming hormone treatment (GAHT) and gender affirming surgery (GAS). It might seem obvious that factors that can play a role in a transgender person's live, such as gender dysphoria and hormone treatment, affect their sexuality, but not much is known yet about sexual well-being in this group. Most knowledge about this topic has been acquired via research applying a rather medical and functional focus. Much more needs to be known about psychological aspects, since they also make up a big part of someone's sexual well-being.

This thesis describes studies using different methodologies in order to provide some puzzle pieces to do the multidimensionality of sexuality in transgender people justice, and to better know how to support this group. Chapter 2 describes the result of a questionnaire study focusing on the Sexual Self-Concept (SSC). A SSC is a multidimensional phenomenon that describes how someone sees themselves as a sexual person. For instance, you can see yourself as an assertive sexual being, or as a shy one; as someone who is easily aroused, or as someone who requires more effort to get in the mood; as someone who is still figuring out how to sexually engage with a partner, or as someone who knows very well how to behave between the sheets. We compared the SSCs between transgender and cisgender people, and found that, in general, transgender individuals have a more negative SSC. They scored lower on sexual esteem related to behavior, body perception, conduct, and attractiveness, and sexual attitudes related to arousal. The transgender group also scored higher than the cisgender group on sexual attitudes related to anxiety and commitment. There were also SSC components that did not show group differences, namely sexual attitudes related to exploration, and sexual self-efficacy related to being resistive, precautions, and assertiveness. We also found that the SSC components of sexual esteem related to body perception, conduct, and attractiveness, and sexual attitudes related to anxiety were associated with gender dysphoria in the transgender sample. We further showed that these relationships are mediated by discrepancies between who one thinks they are as a sexual person compared to who one wants to be as a sexual person; such discrepancies were larger in the transgender compared to cisgender group. This suggests that addressing SSC discrepancies (for instance when it is difficult to target feelings of gender dysphoria) might improve sexual esteem and relieve sexual anxiety in binary transgender individuals.

While most studies on sexual well-being in transgender people focus on binary identifying individuals, we aimed to also include people who do not identify within the gender binary of man-woman. Chapter 3 described a first quantitative study investigating sexual well-being in non-binary/genderqueer (NBGQ) transgender individuals. While

NBGQ participants scored lower on gender dysphoria than binary transgender participants, the two groups did not differ on sexual esteem, SSC discrepancies, or sexual satisfaction. Regarding general mental well-being, the two groups showed no differences either, showing similar scores on anxiety, depression, and general life satisfaction. The only sexual variable on which NBGQ participants scored lower than binary transgender participants, was transgender specific body worries. This is the first study to show that, while NBGQ and binary transgender individuals face unique challenges, they nevertheless mostly show similar struggles when it comes to sexual well-being.

The association between GAMT desire and sexual well-being was addressed in Chapter 4. I questioned both binary and non-binary transgender individuals about their GAMT desire, treatment motives, general well-being, and sexual well-being, and addressed similarities and differences between the two groups. Binary transgender individuals more often had a history of GAHT and GAS compared to NBGQ individuals, and they also more often reported a desire for GAHT. Reported desire for GAS did not differ between the two groups, which was mostly driven by a frequent desire for mastectomy in the NBGQ group. In terms of wanting GAMT, the two groups reported similar treatment motives, mostly related to body/gender incongruence and gender affirmation. Those who were not planning any GAMT, however, reported different reasons for this: in the NBGQ this was mostly due to their (non-binary) gender identity, and in the binary group this was mostly due to fear of medical complications. Importantly, the majority of both groups reported an unfulfilled treatment desire, which was related to lower general life satisfaction and sexual satisfaction, more anxiety and transgender-specific body image worries, and larger SSC discrepancies.

In order to collect more ecologically valid data regarding sexual well-being in transgender individuals, we conducted a diary study, which is reported in Chapter 5. This study is unique in the research field of sexuality in transgender people, because we followed a sample of binary transgender and cisgender individuals for a period of 21 days, mapping their sexual behavior, sexual esteem, and body image from day to day. This allowed the investigation of temporal relations between these variables, and differences herein between the two groups. In transgender individuals, intimacy predicted sexual esteem; sexual openness predicted sexual esteem and boy image; and sexual esteem predicted intimacy, masturbation, and sexual openness on the daily level. These daily relationships did not differ in cisgender individuals. Furthermore, we found no differences in daily sexual behavior, but the transgender groups did score lower on daily sexual esteem and body image than cisgender individuals. This study suggests that sexual esteem might be a more important determinant of sexual behavior in transgender individuals than body image. It also indicates that while transgender and cisgender people might differ on certain variables on the between-subject level (for instance, lower sexual

esteem and body image in transgender people), the within-subject relations between these variables and sexual behavior appeared similar between the two groups.

Contrary to the other empirical chapters, Chapter 6 presented the results of a qualitative study. For the final empirical chapter, we planned to include a neuroimaging study with transgender participants. In order to receive feedback from the transgender community on such a study design, we performed a focus group study, which is reported in Chapter 6. In this study, we asked transgender participants about their opinions concerning brain research with their community. Thematic analyses revealed that these opinions are layered and nuanced, presenting both negative and positive attitudes. Negative attitudes were mostly related to concerns regarding stigmatization (e.g., pathologizing language, or study results contributing to transphobic narratives) or a possible decrease in GAMT access (e.g., brain scans becoming part of a diagnostic process needed to acquire GAMT). Positive attitudes were mostly related to gaining knowledge about the effects of GAHT on the brain, and to validations of transgender identities. Furthermore, participants phrased recommendations for researchers working in this field, and most of these recommendations were in line with standard research practices. This study offers a unique scientific self-reflection, addressing the sometimes tense relationship between (neuro)scientific and transgender communities. I carefully conclude that transgender individuals would appreciate neuroscientific studies regarding their identities, but that they are currently worried how results from such studies might play out in the 'real world', given the current societal context that still poses many challenges for this community.

This brings us to Chapter 7, presenting the results from a neuroimaging study assessing the behavioral component of sexual inhibition and the relation between its neural underpinnings and testosterone. The study included 33 transgender participants (of whom most were receiving GAHT) and 34 cisgender participants, who performed an Approach Avoidance Task (AAT) in a 3T MRI scanner. This task assesses the motivational/behavioral processes underlying sexual inhibition, and was found to show brain activations in our sample consistent with previous literature regarding general and sexual inhibition. Cisgender and transgender participants showed no behavioral differences (in terms of reaction times and number of mistakes) on the task. There were slight differences, however, in which brain regions they recruited during the various conditions of the task. For instance, there were group differences in regions involved in decision making processes (left middle temporal gyrus) and sexual response inhibition (right anterior cingulate cortex and left inferior parietal lobule). As the transgender and cisgender groups seemed to arrive at similar behavioral outcomes via slightly different neurobiological routes (with the transgender group recruiting brain regions related to decision making, contrary to the cisgender group), this might indicate that approaching and avoiding sexual stimuli might have different meanings for the two groups. When

further investigating whether task activity in these regions was associated with testosterone levels, we found no significant results. However, brain activity during the approach of sexual stimuli was positively correlated with testosterone levels in the right claustrum in the transgender group. The claustrum is associated with sexual arousal, indicating that testosterone modulates a more aroused response in transgender participants when approaching sexual stimuli. Overall, both the behavioral and neurobiological results point to only few differences with regards to the approach and avoidance of sexual stimuli between transgender and cisgender individuals. Furthermore, in the light of GAHT, individuals receiving or considering this therapy should not expect a great influence of altering testosterone levels in itself on their behavioral sexual inhibition levels or its neurobiological underpinnings. Changes in sexual well-being and behavior in relation to GAHT previously reported are more likely to rely on other factors; most probably an interplay of biological, psychological, and social variables.

Appendix E

About the author

APPENDIX E

Mathilde Kennis was born in 1993 in Turnhout, Belgium, as the youngest of three siblings. During her high school education in mathematics and science at the Sint-Dimpna College, Geel, she engaged in many extracurricular activities such as theatre, piano, guitar, ballet, and 'chiro', the local youth movement. In 2011, she was accepted at the Lemmens Institute, Leuven, to follow their Bachelor program in Music Therapy. During this study, Mathilde followed mostly musical classes and only few lectures on psychology, and realized she would rather have it the other way around. Music became a hobby again, and she started the Bachelor in Psychology at KU Leuven. She enjoyed the courses in statistics, neuroscience, and research methods most, leading her to enroll in the Research Master in Cognitive and Clinical Neuroscience at Maastricht University in 2016. In 2017-2018, she wrote her Master's thesis on brain functional connectivity in transgender adolescents on puberty suppressing medication under the supervision of Prof. Dr. Martin den Heijer, Prof. Dr. Baudewijntje Kreukels, and Dr. Marieke Dewitte.

In 2018, she graduated from the Research Master and was awarded a NWO Research Talent grant to conduct a PhD project on sexual well-being and neurobiology in transgender individuals, supervised by Prof. Dr. Alexander Sack, Dr. Marieke Dewitte, Dr. Felix Duecker, and Prof. Dr. Guy T'Sjoen. During this time, she continued to engage in many activities such as running, music production, piano, and volunteering in the field of veganism and LGBTQI+ rights. Today, Mathilde works as a statistical researcher for the Dutch Central Bureau for Statistics, and lives in Maastricht, the Netherlands, with her partner Stijn, daughter Cleo, and cat Pascal.

List of publications

Peer-reviewed journal articles:

Kennis, M., Kreukels, B.P.C., & Dewitte, M. (2023). Sex & relationships in trans people. *Best Practice & Research Clinical Obstetrics & Gynaecology, 86*, 102294. https://doi.org/10.1016/j.bpobgyn.2022.102294

Kennis, M., Duecker, F., T'Sjoen, G., Sack, A. T., & Dewitte, M. (2022). Gender affirming medical treatment desire and treatment motives in binary and non-binary transgender individuals. *The Journal of Sexual Medicine, 19*(7), 1173-1184. https://doi.org/10.1016/j.jsxm.2022.03.603

Kennis, M., Duecker, F., T'Sjoen, G., Sack, A. T., & Dewitte, M. (2022). Mental and sexual well-being in non-binary and genderqueer individuals. *International Journal of Transgender Health, 23*(4), 442-457. https://doi.org/10.1080/26895269.2021.1995801

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and sexual attitudes in binary transgender individuals. *The Journal of Sex Research, 59*(4), 524-236. https://doi.org/10.1080/00224499.2021.1951643

Kennis, M., Duecker, F., T'Sjoen, G., Elaut, E., Loeys, T., Sack, A., & Dewitte, M. (2022) Daily sexual behavior, sexual esteem, and body image in transgender and cisgender individuals. *The Journal of Sex Research.* https://doi.org/10.1080/00224499.2022.2158172

Mueller, S.C., Guillamon, A., …, **Kennis, M**., …, & Luders, E. (2021). The neuroanatomy of transgender identity: Mega-analytic findings from the ENIGMA Transgender Persons Working Group. *The Journal of Sexual Medicine, 18*(6), 1122-1129. https://doi.org/10.1016/j.jsxm.2021.03.079

Kennis, M. (2018) Sex differences in the effects of gonadotropin releasing hormone analogue treatment on adolescents' limbic system. *Maastricht Student Journal of Psychology and Neuroscience, 7*, 35-46.

Manuscripts submitted, in revision or in preparation:

Kennis, M., Staicu, R., Dewitte, M., T'Sjoen, G., Sack, A.T., & Duecker, F. Should scientists search for neural correlates of minority identities? Perspectives from the transgender community. *Submitted*

Kennis, M., Dewitte, M., T'Sjoen, G., Stinkens, K., Sack, A.T., & Duecker, F. The behavioral component of sexual inhibition and its relation with testosterone levels: An fMRI study in transgender and cisgender individuals. *In preparation*

Kennis, M., Dewitte, M., T'Sjoen, G., Stinkens, K., Sack, A.T., & Duecker, F. Adaptation effects to masculinized and feminized versions of one's own face: An fMRI study in transgender and cisgender individuals. *In preparation*

Kennis, M., Duecker, F., T'Sjoen, G., Elaut, E., Loeys, T., Sack, A., & Dewitte, M. Differences in motives for (not) engaging in sexual activities between transgender and cisgender individuals. *In preparation*

Kennis, M., Duecker, F., T'Sjoen, G., Sack, A. T., & Dewitte, M. Increasing well-being in transgender individuals by manipulating optimism: a Best Possible Self study. *In preparation*

Appendix F

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Completing a PhD: pretty hard. Having COVID hit during your PhD: even harder. Doing it on your own: entirely, absolutely, 100% impossible. I am grateful to have been surrounded by so many helpful and supportive people, both inside and outside of the academic context, and will try my best to honorably acknowledge them on the following pages.

Whenever I talk to someone who is considering starting a PhD trajectory, I notice people are mostly looking for the right topic or a spot at a prestigious lab. I believe, however, that the most important factor determining whether a PhD candidate will keep their head above the water, is the supervisory team; and have I been lucky with mine. **Alex**, it speaks volumes that when a slightly naïve master student knocks on your door; with an uhm, pretty unfeasible research proposal; about a topic you haven't explored yet; you say YES to giving this a shot as a promotor, simply because you are curious and interested. It is wonderful how you have experienced the good and bad of academia and science, but have never let the competitive and strategic environment kill your passion for finding out how things work. This passion is contagious, and I appreciate how you have helped me navigate my PhD while always keeping perspective and approaching things with a sense of humor. I am probably most grateful, however, that you appointed Felix as my daily supervisor. **Felix**, I cannot thank you enough for all the hours and effort you have put into our projects. You have taught me so much, not only about research methodology and ethics, but also about Life in general. You always managed to ask the right questions and I truly admire you as a scientist; I think you have the perfect mind for science. Most importantly, you are a great scientist that is also fantastic to work with on a personal level. Thank you for being patient when I was at a low, and for helping me deal with the pressure and my insecurities on the professional front. **Marieke**, I will always remember and appreciate how you rooted and stood up for me when I still had to prove myself, how you already believed in me while I had nothing to show yet. Five years ago, when I was anxiously trying to figure out what to do professionally, you told me: do not make any decisions out of fear, but base them on your passions and the things you want in life. This was exactly what I needed to hear at the time, and I have been keeping it in mind ever since, and even passing it on to other people who need to hear it. Thank you for sharing your incredible scientific expertise with me, for knowing where to put the bar (as high as possible, but never out of sight), for the honest conversations and advice, for your integrity, but mostly for your mentorship. You have been my mentor since I was a Master student, and I hope you will remain to be so even now that our paths are about to diverge. **Guy**, they say you should never meet your heroes. In that sense, I could have been setting myself up for disappointment by asking a scientist with one of the most impressive track records when it comes to transgender health to supervise my projects. Things turned out differently: today I admire you even more, and I am even more grateful that you agreed to be involved. I honestly do not know how you keep all the professional

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