**UNIVERSITY OF PAVIA – IUSS SCHOOL FOR ADVANCED STUDIES PAVIA**

**Department of Brain and Behavioral Sciences (DBBS)**

**MSc in Psychology, Neuroscience and Human Sciences**

**"AN ILL-FITTED SWEATER THAT YOU JUST CAN'T SEEM TO GET OFF"**

# BEYOND LABELS: THE LIVED EXPERIENCE OF GENDER DYSPHORIA AND BODY PERCEPTION

Supervisor:

**Prof. GABRIELLA BOTTINI**

Co-Supervisor:

**Dr. VALERIA PEVIANI**

Master's thesis written by

**ELIO IREM ALPAY**

**Academic year**

**2023/2024**

# TABLE OF CONTENTS

**ABSTRACT**

**ACKNOWLEDGEMENTS**

**1. INTRODUCTION**

**1.1. Body Perception**

**1.1.1. Models Of Body Representation and The Taxonomy**

**1.1.1.1. Body Representations**

**1.1.1.2. Taxonomy**

**1.1.2. Sense Of Bodily Ownership**

**1.1.3. Neural Correlates of Body Representation**

**1.1.3.1. Neurological Basis of Body Perception**

**1.1.3.2. Multisensory Integration**

**1.1.3.3. Body-Related Illusions and Neuroimaging**

**1.1.4. Body *Mis*perception and Disturbances of Body Representation**

**1.2. Gender**

**1.2.1. Formation of Gender Identity**

**1.2.2. Differences in Sex Development**

**1.3. Gender Dysphoria and Body Perception**

**1.3.1. Transgenderism and Non-Binary**

**1.3.2. Diagnosing Gender Dysphoria**

**1.3.3. Behavioral Measures of Body Perception in Gender Dysphoria**

**1.3.4. Neuroscience of Perceived Self in Gender Dysphoria**

**2. RATIONALE, STUDY AIM, AND HYPOTHESES**

**3. RESEARCH METHODS**

**4. RESULTS**

**5. DISCUSSION AND CONCLUSION**

**REFERENCES**

**APPENDIX**

**Abstract**

Gender dysphoria (GD) is characterized by the incongruity between one's assigned and perceived gender identities, reflecting the complex interaction between self and the societal norms. The embodiment of GD adds a layer of complexity, as individuals strive to maintain a stable body image. This study investigates the bodily experience of GD sufferers through a comprehensive review of behavioral and neuroimaging studies and a qualitative analysis of firsthand resources from YouTube. By focusing on a narrowed population, transgender or gender non-conforming (e.g., non-binary) individuals, we aimed at identifying common patterns related to the body perception in GD. Previous behavioral and neuroimaging studies suggested that individuals with GD experience significant bodily discomfort impacting their body perception and mental health, potentially linked to unique neural circuitry in the body representation network. Our findings highlight repetitive themes of alienation from their physical bodies, particularly specific body parts, and expressed a desire to embody their perceived gender. This misalignment led to reports of depression, anxiety, and severe distress, leading in extreme cases to suicidal ideation. However, the study also identified positive experiences. Individuals described Gender Euphoria as a feeling of liberation and finally "becoming right", often after transitioning. This study also observed fluctuations in GD, specifically among non-binary individuals, potentially reflecting their fluid gender expression. These findings support a holistic understanding of GD, where self-identity is constructed through embodied experiences. A stable and integrated sense of self, body, and gender appears crucial for mental health and well-being.

*Keywords:* gender dysphoria, body perception, body image, transgenderism, non-binary, transition, gender fluidity.

**Acknowledgements**

I would like to acknowledge and give my warmest thanks to everyone who has helped and supported me throughout my thesis journey.

First and foremost, I would like to express my deepest gratitude to my advisors, Prof. Gabriella Bottini, Dr. Valeria Peviani, and Dr. Anna Giulia Curti for giving me their invaluable guidance and mentorship throughout this research. Their expertise, encouragement, understanding, and kindness, were crucial in shaping this study.

My personal journey with gender expression sparked my interest in this thesis topic. I couldn't have completed it without the support of my loved ones, who encouraged me to begin, persevere, and finally finish this work. I thank Tuba, Bilgesu. And Vince for their constant companionship and their acceptance of who I really am.

A heartfelt thank you to Vince for taking this roller coaster and sticking with me. Your presence made a small room in a foreign country into a *home* – a sense of belonging I wouldn't have found without you.

Special thanks to my family for their unwavering support and encouragement. I thank my brother, Kerem Batu, for being the rock of my life. My sister, Sinem, deserves a particular mention. As I have been their older sibling for their entire life, they have been my best friend and the best gift my parents gave to me. It never feels like we are not within the same borders because *wherever* we *go, you'll always be next to me*. The physical distance cannot be a measure of our sisterhood because no matter where life takes us, our hearts are one.

Finally, words cannot express the gratitude I have for the woman who would have given me the sun and the moon if she could. Indeed, she *did* give her days and nights and raised me into the person I am today. The strongest soul in my life – my mother. Canım annecim, burada sana hangi türlü teşekkür etsem yine az kalır. Sen hep benimle olduğun gibi, ben de hep seninleyim. Hadi, kahveyi koy da içelim.

İyi ki varsınız.

# 1. INTRODUCTION

The sense of *self* is not only a mindful experience but also significantly influenced by how we perceive ourselves in space and time. The alignment between one's perceived self and physical body may be crucial for human well-being. However, some individuals feel a strong discrepancy between their birth-assigned sex, which is determined by secondary sex characteristics and genitalia, and their deeply felt gender identity. This disconnect is known as Gender Dysphoria (GD) and is characterized by a strong and unyielding feeling of nonconformity between one's birth-assigned and perceived gender [Diagnostic Statistical Manual of Disorders (DSM-5-TR); APA, 2022]. Importantly, GD can be experienced during childhood or emerge later in life, and it must cause clinically significant distress or impairment in daily functioning to be diagnosed (APA, 2022).

Historically, the transgender experience was often understood through the lens of GD (reviewed in Ruzgar, 2019; Laub, 2019). However, the recent 11th edition of the International Statistical Classification of Diseases (ICD-11) has redefined "gender incongruence" under the chapter "Conditions related to sexual health" and is no longer reviewed as a mental disorder (World Health Organization, 2024). This change of categorization is to reduce stigmatization against transgender people and facilitate easier access to provided health care and insurance, such as gender-affirming procedures.

Understanding how individuals with GD experience their bodies is crucial for gaining a deeper understanding of body perception in GD. Here, we focus on how individuals with GD experience their bodies through the lens of body phenomenology. This approach emphasizes the lived experience of the body and how it shapes our sense of self. Our research aims to identify core themes within this experience, such as body perception, the emotional responses associated with GD, and the impact of life milestones (e.g., before and after transitioning) on body perception.

Within this aim, we employed a multifaceted approach. First, we conducted a comprehensive literature review encompassing various disciplines, including neuroscience, psychology, and medicine. To explore these themes, we employed a unique qualitative approach utilizing audio transcriptions from YouTube videos created by transgender and gender-nonconforming individuals. The selection of these videos was guided by predefined criteria to ensure a diverse and representative sample of experiences related to GD and body image (BI). Once collected, we meticulously analyzed the audio transcriptions using a manual and software-assisted qualitative approach (i.e., netnography; Kozinets, 2011). This

approach allowed us to explore the narratives and lived experiences expressed by individuals with GD, providing rich insights into their body perception and its connection to gender identity.

## 1.1. Body Perception

### 1.1.1. Models of Body Representation and the Taxonomy

#### 1.1.1.1. Body representation

In the study of body perception, a comprehensive understanding emerges from integrating insights across historical perspectives and contemporary theoretical frameworks. Fundamental to this exploration is the distinction between body schema and body image, deriving from seminal works such as those of Head and Holmes (1911; 1912) and further expounded by de Vignemont (2018; 2010). These concepts serve as foundational pillars for understanding how individuals perceive and interact with their bodies, encompassing both unconscious sensorimotor representations and conscious perceptual experiences.

In the neuroscience literature, the distinction between body schema and body image often delves into the roles of the dorsal and ventral pathways in processing visual information. The "what" and "where" systems proposed by Ungerleider and Mushkin (1982) have been one of the important works that are used repetitively in the literature (de Vignemont, 2010; Paillard, 1980, 1991). According to this model, the ventral stream, also known as the "what" pathway, is primarily responsible for identifying objects. In contrast, the dorsal stream, or "where" pathway, focuses on locating objects in space and guiding actions towards them. This dichotomy reflects the brain's ability to encode both the identity and spatial location of objects. Paillard's (1980) work further elaborates on these pathways by distinguishing between "the identified" and "the situated" bodies, clarifying the multifaceted nature of bodily representations (reviewed in de Vignemont, 2010). At its core, the body schema, as mentioned by Paillard (1991), serves as an unconscious sensorimotor representation that guides action and posture, illustrating the intricate interplay between neural pathways and body perception.

Similarly, Head and Holmes (1911; 1912) delineated body schema as comprising unconscious sensorimotor representations for action and posture, contrasting with the conscious perceptual experiences and beliefs summarized in the concept of body image. Gallagher (2005) expanded upon this conceptualization, introducing body schema as action-dependent and body image as the body percept or "body affect (i.e., interoceptive body)". Gallagher's study highlights the dynamic interplay between interoceptive bodily sensations, sensorimotor representations, and conscious body perception.

Later, the notion of consciousness in body perception was studied by Milner and Goodale (2008), who proposed a restrictive link between visual awareness and vision-for-perception, emphasizing the automatic nature of the dorsal pathway. However, as noted by Head and Holmes (1911; 1912), body schema operates at a subconscious level, while Gallagher (2005) suggests that individuals do not consciously attend to their limbs but rather to the external world.

Contrary to the assumption of complete unconsciousness, studies on motor imagery, which in one imagines one's body performing movements, yield different results. Accordingly, the enactive approach proposed by de Vignemont (2010) emphasizes the inseparability of perceptual experiences from bodily activities. This perspective challenges traditional notions of the strict division between conscious and unconscious processes. From this perspective, Schwoebel and Coslett (2005) conducted a study on motor imagery, in which stroke patients were asked to imagine or perform four hand movements of varying difficulty while researchers recorded their completion times. The individuals were consciously performing the action in their heads, accordingly, as reviewed in de Vignemont (2010). "Mental imagery of action" exhibits numerous similarities to physical actions on physiological, kinematic, and neural levels, including muscle activity, physical constraints and laws, and patterns of brain activity (Jeannerod, 2006). Schwoebel and Coslett (2005) demonstrate that the conscious access to body schema during mental simulations of movement, blurring the distinction between conscious and unconscious body representations (de Vignemont, 2010).

Overall, it is proposed that there exists a relatively intimate connection between the body schema and body image. As finalized by de Vignemont (2010):

> Most likely, the body schema and the body image(s) interact all the time. This is what we have already seen with neuropsychological disorders, which almost never affect only one type of body representations. (p. 209)

The concept of integrating sensorimotor representations within a Bayesian framework has been explored by de Vignemont (2018; 2010). Within this framework, a Bayesian model leverages prior knowledge to assess the likelihood of various outcomes given new information. As described by de Vignemont (2018), this model considers the existing knowledge about the body and its surroundings, alongside the sensory input currently being received. By synthesizing all available information, the model determines whether a specific

body part aligns with the mapping of the body or body representation. This theoretical approach offers a nuanced insight into how the brain constructs body representations, relying on both stored (i.e., top-down) and sensory (i.e., bottom-up) information about the body. It also considers the intrinsic uncertainty of sensory cues and the role of contextual factors, stressing the dynamic nature of body perception.

In conclusion, the distinction between body schema and body image underscores a fundamental aspect of body perception research. While body schema primarily governs unconscious sensorimotor representations guiding actions and postures, body image encapsulates conscious perceptual experiences and beliefs regarding one's bodily form. Despite their apparent dichotomy, these constructs are dynamically intertwined, exerting reciprocal influences on each other. This intricate relationship emphasizes the complexity inherent in body perception studies.

#### 1.1.1.2. Taxonomy

The exploration of bodily representations has been suggested to have originated from the complexity of bodily disorders, which can be neurological and psychiatric settings with a range of diverse symptoms affecting bodily awareness (de Vignemont, 2010). In their review, de Vignemont (2010) continued with historical perspectives on classifying these conditions, previously labeled as "disturbances in the body schema" or "disruptions in the body image". Further, de Vignemont (2010) proposed that these disorders are categorized based on clinical features, including deficits (e.g., somatosensory loss) and distortions (e.g., macrosomatognosia), and patients' varying levels of acknowledgment, ranging from unusual bodily experiences to altered beliefs.

Several authors (Dijkerman & de Haan, 2007; Schwoebel & Coslett, 2005; Gallagher, 2005; Paillard, 1999; Sirigu et al., 1991) have proposed employing the principle of double dissociation to classify these disorders, suggesting the existence of separate processing systems for body-related information. These are referred to as the dyadic and the triadic taxonomies. Later, Longo et al. (2010) proposed a new taxonomy.

1) The dyadic taxonomy: The body schema, rooted in sensorimotor representations derived from afferent (bottom-up) and efferent (top-down) information, coordinates movement and spatial awareness, aiding in motor control (Paillard, 1999; Rosetti, Rode & Boisson, 1995). While the former guides actions through sensorimotor

mechanisms, and the latter encompasses perceptual, conceptual, and emotional dimensions not directly involved in motor tasks (Gallagher, 2005). This dichotomy is central to the dyadic taxonomy, which posits a clear distinction between body schema and body image (Dijkerman & de Haan, 2007). Empirical evidence, such as the dissociations observed in deafferentation and numbsense, highlights disruptions in body schema and body image, respectively (Paillard, 1999).

2) The triadic taxonomy: In contrast, the triadic taxonomy builds upon the dyadic model while introducing a more nuanced perspective (Schwoebel & Coslett, 2005; Sirigu et al., 1991). Retaining the notion of body schema as sensorimotor representations, the triadic taxonomy diverges in its treatment of body image. The body image is further subdivided into two distinct representations: the body structural description and the body semantics. Meanwhile the former provides a visuospatial account of body parts and their relationships, the latter offers a conceptual and linguistic understanding of body functions and categorizations (Schwoebel & Coslett, 2005). Before all, Head and Holmes (1911) proposed two body representations, relying on (1) a dynamic representation of the position of the body in space and (2) mediating localization of somatic sensations on the body surface, called the postural schema and the superficial schema.

3) Longo and his colleagues (2019; 2010): Accepting the dichotomy between *somatoperception* (the construction of percepts and experiences of somatic objects and one's own body) and *somatorepresentation* (general semantic knowledge and communication), it becomes clear that maintaining dyadic representations of each body part along the tactile processing pathway would be inefficient, considering the body's bilateral symmetry (Tamè, Azañón, & Longo, 2019.) Thus, Longo et al. (2010) proposed three diverse bodily representations, based on Head and Holmes (1911): the superficial schema, the postural schema, and the body model. The superficial schema maps locations within primary somatotopic maps to the skin surface, allowing for precise localization of touch. The postural schema is a dynamic representation of body posture, incorporating both afferent proprioceptive signals and efferent motor commands to understand the position of body parts in space. The body model includes the metric properties of the body, such as size and shape. This model was later updated to incorporate the idea that touch is integrated

across both sides of the body before somatoperception occurs, ensuring a unified perceptual experience.

### 1.1.2. Sense of Bodily Ownership

The perception of our limbs as integral parts of ourselves occurs effortlessly, constituting what is known as the sense of body ownership or bodily self-consciousness. This innate feeling plays a pivotal role in human awareness, grounding us in our environment. It is a multisensory experience, transcending individual sensory inputs, and contributing significantly to our understanding of selfhood (Ehrsson, 2020). This is the sense of ownership, the subjective feeling of possession over our bodily attributes and mental states, as described by Gallagher (2000). Alongside, the sense of agency emerges, reflecting our ability to initiate and control actions (Moore & Fletcher, 2012).

The distinction between the body and the limb ownership underscores the complexity of the human perceptual experience. While body ownership represents the holistic identification with the entire body, limb ownership pertains to the specific sense of possession over individual body parts (Ehrsson, 2020). Neurological investigations (Feinberg et al., 2010; Bottini et al., 2002) have revealed the critical role of frontal and parietal brain regions in mediating these perceptions. Damage to these areas, as observed in conditions like asomatognosia and somatoparaphrenia, can disrupt the sense of ownership over limbs, leading to denial or misattribution of ownership (Vallar & Ronchi, 2009). Such findings suggest that the integration of visual and somatosensory inputs within non-primary areas of the brain is essential for generating the feeling of limb ownership (Ehrsson, 2020). In their review of studies examining the effects of brain lesions on the sense of ownership, Ehrsson (2020) highlights the challenge of definitively interpreting findings due to the widespread nature of the lesions, which often involve multiple brain regions and underlying white matter. Despite the challenges posed by several authors, the importance of understanding the impact on body perception has been observed widely.

The original rubber hand illusion (RHI) experiment, conducted by Botvinick and Cohen (1998), aimed to investigate the basis of body perception and the underlying mechanisms involved. In this study, participants were seated at a table with their one hand hidden from view and a rubber hand placed in front of them, aligned with the position of their real hand. The experimenters then stroked both the participant's hidden hand and the rubber hand simultaneously with paintbrushes, creating the illusion that the participant felt the touch

on the artificial hand as if it were their own. The results of the first RHI experiment (Botvinick & Cohen, 1998) revealed that, indeed, many participants experienced a compelling sense of ownership over the artificial hand.

In another RHI experiment conducted by Rohde et al. (2011), they concluded that the illusion primarily engaged proprioception and sensorimotor mechanisms associated with body schema, rather than higher-order visual pathways, suggesting a task dependency of the RHI. The authors further highlighted the role of perceptual judgments in canceling out the body image component of the illusion. Additionally, de Vignemont (2010) noted that the experimental conditions of the RHI primarily involve the body image because the illusion has been tested to be working only (1) when the strokes of the paintbrush or fingers are synchronized (2) when the positioning and the laterality of the hidden hand are in accordance with the fake one. Furthermore, studies have demonstrated that the RHI induces proprioceptive drift, or mislocalization of the hidden hand, and elicits stress responses when the artificial hand is inflicted pain (Armel & Ramachandran, 2003) or threatened by a sharp object (Ehrsson et al., 2007). This indirectly indicates that the rubber hand has been effectively incorporated into one's body representation (Braun et al., 2018).

The mechanisms underlying the sense of ownership over body parts and external objects have been subject to extensive research, with theories proposing different roles for multisensory integration and internal body representations. These approaches, often dichotomized as bottom-up and top-down, offer diverse perspectives in shaping the sense of ownership (Braun et al., 2018). Bottom-up explanations suggest that the sense of ownership relies heavily on integrating sensory inputs from multiple modalities, with less emphasis on internal body representations, while top-down theories propose a stronger role for internal body maps (Tsakiris, 2010).

Deriving from the bottom-up approach, the Bayesian perceptual learning theory by Armel and Ramachandran (2003) proposes the correlation between visual and tactile stimuli is crucial for inducing the RHI, with synchronous stimulation being both necessary and sufficient. This theory suggests that any object can be perceived as a part of one's body if visual and tactile inputs align spatiotemporally, as demonstrated by experimenters where participants felt ownership towards a table only when it was stroked synchronously with their hidden hand (Armel & Ramachandran, 2003). Similarly, Hohwy and Paton (2010) explored an alternative version of the RHI by aligning real and foreign hands in personal space, leading to reports of touch on the foreign arm even without tactile stimulation. Further,

unusual visuotactile stimuli induced supernatural touch sensations and felt touch on a cardboard box. However, there is limited evidence supporting ownership over non-hand objects in general (Ehrsson, 2020; Braun et al., 2018; Tsakiris & Haggard, 2005). This perspective suggests that while internally stable body representations exist, the sense of ownership primarily relies on Bayesian inference of sensory inputs, leading to situational adaptations of internal body maps.

On the other hand, the neurocognitive model of sense of ownership, Tsakiris's (2010) top-down approach, offers insights into how the perception of body ownership is understood from a different angle. According to this model, the sense of ownership over one's body is influenced by higher-level cognitive processes rather than solely by sensory input. The neurocognitive model suggests that mechanisms underlying the sense of ownership arise from the integration of various sensory inputs with "pre-existing internal body maps". These internal maps, which are formed based on past experiences and beliefs, are evaluated through three-level comparators to determine the congruence between sensory input and internal representations. Ehrsson (2020) further elaborates on this concept by outlining the principles of multisensory integration that govern body ownership. Derived from numerous RHI experiments (e.g., Kalckert & Ehrsson, 2017; Ward, Mensah & Junemann, 2015; Tsakiris & Haggard, 2005; Botvinick & Cohen, 1998), these principles serve as perceptual rules that govern how humans perceive their body ownership.

1) The temporal rule: The temporal principle of multisensory integration indicates that the sense of limb ownership hinges on the temporal synchrony of multisensory cues, with increased temporal delay diminishing the illusion's effect. Typically, asynchronous stimulation nullifies the illusion (Rohde et al., 2011; Botvinick & Cohen, 1998). A study by Petkova and Ehrsson (2009) showed that an irregular pattern of simultaneous strokes intensifies the illusion, rather than a regular pattern. Their results indicated that the temporal structure of the correlated signals influences the illusion beyond mere temporal coincidence.
2) The spatial rule: This rule encompasses factors such as the relative directions and locations of tactile and visual stimulation on the seen rubber hand and hidden real hand, as well as the relative orientations and distance between them. To elicit the illusion, both hands must be put in the same direction and/or angle. The sense of body ownership over this rule is concluded by Ehrsson (2020) as sharing the

multisensory processing within spatial coordinate systems centered around the body.

3) The tactile congruence rule: This principle highlights the importance of using similar tools to stroke both hands, with discrepancies (e.g., the rubber hand with a pencil, simultaneously the hidden real hand with a paintbrush) resulting in reduced illusion strength (Ward et al., 2015).

4) The humanoid shape rule: It underscores the necessity of hand-like objects to evoke significant limb ownership illusions, regardless of their material or color (Guterstam, Gentile & Ehrsson, 2013; Tsakiris et al., 2010; Tsakiris & Haggard, 2005). Indeed, the illusion works with wooden hands (Kalckert & Ehrsson, 2017), robotic hands (Rosén et al., 2009), pictures of real hands (Gentile et al., 2013), and hands varying in skin colors (Farmer, Tajadura-Jimenez & Tsakiris, 2012).

In conclusion, the fundamental temporal, spatial, and attributes of stimuli in the RHI support the idea that its nature is a genuine multisensory phenomenon, providing insights into the perception of body ownership (Ehrsson, 2020).

An alternate perspective on the sense of ownership is presented by Metzinger (2003) through the self-model theory of subjectivity. According to Metzinger's (2003) theory, a conscious self-representation must achieve transparency to be perceived as one's own, indicating that the phenomenal content of the representation is no longer jointly represented. This notion is illustrated in the Mirror-Box experiment pioneered by Ramachandran and Rogers-Ramachandran (1996), as elucidated by Metzinger (2003). In this experimental setup, the patient's intact limb is positioned in front of a mirror, aligning its reflection with the space where the amputated limb would have appeared. When patients perform required movements with their intact limb while observing the mirror reflection, a considerable number of individuals observe a notable increase in the vividness of their perception of the phantom limb (Ramachandran & Rogers-Ramachandran, 1996).

In Medina, Khurana, and Coslett's (2015) investigation centered around a Mirror-Box Illusion, the authors revealed a correlation between different facets of embodiment and the illusionary shift towards the visual reference. Specifically, illusory visual displacement positively correlated with sensations of deafference in asynchronous tapping conditions, whereas it exhibited a positive correlation with assessments of visual dominance and limb ownership in synchronous tapping conditions. As a result, participants temporarily overlook the fact that the image of their reflected limb is merely a representation, interpreting it as

genuine and consequently feeling a sense of ownership over it. These findings present evidence supporting distinct contributions of various embodiment aspects to the integration of multisensory information.

Metzinger (2003) also addresses clinical conditions in which patients may exhibit decreased or absent ownership over their thoughts, limbs (e.g., asomatognosia), or body (e.g., depersonalization) using this framework. The author suggests that in certain cases, individuals' self-representations remain *opaque* (i.e., not transparent), indicating that they still perceive the representational nature of these experiences. Consequently, these representations are no longer perceived as immediately present, but rather as distant and unfamiliar.

### 1.1.3. Neural Correlates of Body Representation

#### 1.1.3.1. Neurological Basis of Body Perception

To accomplish a process of uniformization over body phenomenology in GD, it could be useful to investigate underlying body representations and the possible disturbances in body perception.

Body perception is a fundamental aspect of human experience, encompassing the processes by which individuals perceive and interact with their own bodies and the external environment. Central to body perception is the integration of information from multiple sensory modalities, resulting in a coherent and unified representation of the body.

The neurological basis of body perception involves complex interactions between sensory systems and brain regions that are responsible for processing and integrating sensory information. Visual inputs regarding objects, processed by the inferior temporal (IT) cortex, are known to be conveyed to the prefrontal and medial temporal lobe structures (Ehrsson, 2020). Research on nonhuman primates, in this case with macaque monkeys, showed that neurons located in the IT cortex appeared to be activated selectively to the human- and monkey-shaped bodies and bodily parts (Kiani et al., 2007; Wachsmuth, Ora, & Perrett, 1994). Kiani et al. (2007) investigated cell activities across animate and inanimate images, and they concluded that nonhuman primates' perception distinguishes faces and bodies, as well as types of faces and bodies.

Functional Magnetic Resonance Imaging (fMRI) investigations in humans have compared reactions to images of bodies (headless to exclude face perception) and body parts

against control images (as reviewed in Peelen & Downing, 2007; Peelen et al., 2007). From this perspective, the authors have discovered that a specific region in the lateral occipitotemporal cortex exhibits robust and specific responses to static images of human bodies and bodily parts. Meanwhile, this region showed weaker responses to faces, objects, and object parts. Interestingly, they showed that this region shows lower responses in non-human animals compared to humans, particularly mammals, indicating a partial activation by objects sharing a similar body structure to humans (Downing et al., 2006). Based on these findings and more, this region has been identified as the extrastriate body area (EBA), situated bilaterally in the posterior inferior temporal sulcus or middle temporal gyrus (Downing et al., 2001).

At the forefront of the neural network involved in body perception and processing sensory information related to the body, is the somatosensory cortex. The somatosensory cortex is in the parietal lobe**,** which receives and processes tactile sensations from the body's surface. Research by Penfield and Rasmussen (1950) coined the topographical organization of the somatosensory cortex through experiments involving electrical stimulation in patients with epilepsy. They revealed distinct motor and sensory "homunculi" in the precentral (of the frontal lobe; M1) and postcentral (of the parietal lobe; S1) gyri, respectively. Earlier research has suggested that the primary somatosensory cortex (S1) exclusively processes tactile sensations from the body's opposite side, leaving the task of integrating bilateral touch to areas beyond S1, particularly the secondary somatosensory cortex (S2) (as reviewed in Tamè et al., 2019). However, Tamè et al. (2015) revealed that S1 is engaged in bilateral tactile representation much earlier in the sensory processing sequence than previously thought. This early involvement of S1 is likely mediated by transcallosal pathways that interconnect S1 regions across both hemispheres, facilitating this processing (Tamè et al., 2012).

Building upon the somatosensory cortex's foundational role, studies have illuminated the contributions of additional brain regions to body perception. The posterior parietal cortex (PPC), for instance, integrates sensory inputs from various modalities to construct representations of body position, movement, and spatial relationships. Recent investigations by Medendorp and Heed (2019) have provided valuable insights into the PPC's involvement in spatial processing and sensorimotor integration, emphasizing its significance in body awareness. Further, the authors suggested that in the PPC, sensory and motor functions are integrated in a unified manner rather than treating them separately. According to this framework, a rostral-to-caudal gradient within the PPC is implicated in state estimation, with

lesions leading to increased reliance on visual feedback and subsequent adjustments in motor execution. Conversely, a medial-to-lateral gradient is associated more with action execution rather than visual planning, suggesting that the PPC serves as a central hub for body-environment decision-making processes, integrating prospective sensory data to inform adaptive motor responses.

Furthermore, the insular cortex assumes a pivotal role in integrating sensory, emotional, and interoceptive (i.e., the perception and awareness of internal bodily sensations) signals relevant to the body (Craig, 2009). Braun and his colleagues (2018) have highlighted the insula's significance in processing bodily sensations and visceral states. Later, research indicates that activity in the right insula is linked to various functions such as feelings of embodiment (Farrer & Frith, 2002), subjective experience of body ownership (Vogeley et al., 2004), and self-recognition (Fink et al., 2003). Dysfunction or alterations in insular activity have been associated with disturbances in body perception, such as somatoparaphrenia and depersonalization (Medford et al., 2016; Baier & Karnath, 2008).

In addition to these cortical regions, the temporal parietal junction (TPJ) emerges as a critical node in the body perception network. The brain distinguishes between the body and external objects by monitoring sensory input attribution. Situated at the convergence of the temporal and parietal lobes, the TPJ integrates visual, proprioceptive, and vestibular inputs to maintain a cohesive sense of bodily self and distinguish between self-generated and externally generated sensory experiences (Vallar & Ronchi, 2009). Another study by Tsakiris and his colleagues investigated how the right TPJ processes multisensory events related to body perception, disrupting the rTPJ with transcranial magnetic stimulation (TMS) blurred the line between body-related and external stimuli. It was concluded by the authors that the rTPJ maintains a coherent sense of the body, differently from the body's surroundings (Tsakiris, Costantini & Haggard, 2008).

Resting-state functional magnetic resonance imaging (rs-fMRI) provides insights into the intrinsic functional organization of the brain by measuring temporal correlations of fluctuations in the blood-oxygen-level-dependent (BOLD) signal, reflecting synchronous neuronal activity (Beckmann et al., 2005; Fox et al., 2005; Biswal et al., 1995). Notably, networks demonstrating high intrinsic connectivity during rest often coincide with those activated during specific tasks, with task performance correlating with intrinsic resting-state connectivity (Cole et al., 2014).

The default mode network (DMN) is an intrinsic connectivity network implicated in mind-wandering and self-referential thinking (Northoff & Panksepp, 2008). The DMN is predominantly composed of the PCC, medial prefrontal cortex, and lateral parietal cortices (Raichle et al., 2001). The salience network (SN), which includes the fronto-insular and anterior cingulate cortices (ACC), is believed to be involved in the perception of one's own body by processing internal physiological states (Craig, 2002) and stimuli that are socially and emotionally relevant (Uddin, 2015).

#### 1.1.3.2. Multisensory Integration

Multisensory integration in body perception refers to the combination of various sources of information, or *sensory modalities.* The modalities include vision, audition, olfaction, gustation, somatosensation, proprioception, and vestibular sensation. The integration of sensory modalities is fundamental for developing, updating, and maintaining body perception, enabling a meaningful interpretation of one's perception.

Research on nonhuman primates has shed light on the intricate workings of multisensory integration. Specifically, studies involving macaque monkeys have highlighted the involvement of various brain regions, including the premotor cortex and the cortices of the intraparietal sulcus and inferior parietal cortex (as reviewed in Ehrsson, 2020), in responding to visual, tactile, and proprioceptive stimulation (Graziano et al., 2004). With their cells possessing receptive field (RF) properties, nonhuman primates have become integral to neuroscience investigations. These studies have revealed increased activation in the ventral premotor cortex when visual stimuli are presented within the peripersonal space of nonhuman primates, a phenomenon attributed to the natural overlap of visual and tactile receptive fields in these cells (Rizzolatti et al., 1981). Further, researchers have observed that multisensory cells in the premotor cortex encode peripersonal space in a body part-centered coordinate system, as evidenced by the neurons' RFs being anchored to the arm. This was demonstrated by the visual RFs of the multisensory neurons moving along with the arm when it was in motion (Graziano, Yap & Gross, 1994). Additionally, it was discovered that multisensory neurons from the frontal and parietal areas that signal visual and auditory RFs are confined to the space surrounding the monkey's body, including areas such as VIP, parietal lobes, the putamen (Graziano & Gross, 1993), and the secondary somatosensory cortex, as well as the ventral premotor cortex (Schlack et al., 2005).

Research in humans yields comparable results. The premotor cortex and intraparietal cortex have been observed to be responding to visual and tactile stimulation in relation to specific body parts (Ehrsson, Spence & Passingham, 2004) and to visual stimulation near the hand in peripersonal space (Brozzoli et al., 2011). Due to the observed strong activation of multisensory areas in the presence of visual and/or tactile stimulation (Gentile et al., 2013; Gentile, Petkova & Ehrsson, 2011), the ventral premotor cortex, intraparietal cortex, inferior parietal cortex, and cerebellum have been described to be the stimuli integration center from upper limbs (as reviewed in Ehrsson, 2020).

Neural pathways connecting these brain regions facilitate the transmission and processing of sensory information, contributing to the formation of a coherent body representation. Multiple sensory modalities and neural plasticity further shape body perception by allowing for the refinement and adaptation of neural circuits in response to sensory experiences and environmental demands.

Perceiving one's own body cannot be attributed to one single sensory modality (e.g., vision, somatosensation, proprioception, vestibular sensation, etc.) but it is multisensory. Understanding the multisensory integration and neurological basis of body perception is essential for elucidating how individuals perceive, experience, and interact with their bodies. Although it is not limited to a complex network of neural pathways and brain regions, unique experiences, beliefs, and knowledge related to the body form the meaning of what body schema, body image, and body concepts are. The concept of body perception, with implications for various domains such as neuroscience, psychology, and clinical practice, might be a central point also in the research of understanding GD thoroughly.

#### 1.1.3.3. Body-Related Illusions and Neuroimaging

Neuroimaging investigations often utilize the RHI, a paradigm developed by Ehrsson, Spence, and Passingham (2004), which allows participants to undergo fMRI while experiencing RHI conditions adjusted to the classical setup. Additionally, beyond fMRI, other techniques such as positron emission tomography (PET), electroencephalography (EEG), and lesion mapping have been used.

EEG studies by Rao and Kayser (2017) have suggested a crucial role of the premotor cortex (PMC) and intraparietal sulcus (IPS) over hand-ownership, supported by findings of frontocentral and parietal electrode involvement. In addition, two investigations conducted by

Kanayama, Sato, and Ohira (2007; 2009) consistently found a clear connection between the strength of the RHI experience and the synchronization of brain activity in the lower gamma frequency range, suggesting the involvement of the parietal cortex.

In fMRI and PET studies, various brain regions have been linked to experimentally induced sense of ownership and/or hand-centered coordinate systems (Braun et al., 2018). These include the bilateral PMC (Gentile, Guterstam, Brozzoli, & Ehrsson, 2013; Petkova et al., 2011; Brozzoli et al., 2012; Ehrsson et al., 2004), IPS subregions (Gentile et al., 2013; Brozzoli et al., 2012; Petkova & Ehrsson, 2008; Ehrsson, Spence & Passingham., 2004), extrastriate body area (EBA) (Limanowski, Lutti, & Blankenburg, 2014), putamen (Petkova et al., 2011), and insula (Limanowski et al., 2014; Tsakiris et al, 2007). Braun et al. (2018) suggested that multimodal neurons within the PMC and IPS, which integrate visual and somatosensory information, are responsible for representing an individual's bodily space. The insula's involvement in bodily ownership has been linked to its function in emotional self-awareness and integrating internal bodily sensations (Craig, 2009). The relevance of the right posterior insula in bodily self-awareness is underscored by the co-occurrence of awareness of movement and limb ownership, as evidenced by voxelwise lesion-behavior mapping in stroke patients (Baier & Karnath, 2008).

The multisensory nature of bodily ownership underscores that it cannot be solely attributed to a single sensory modality but instead arises from the integration of diverse sensory inputs. In his work, Ehrsson (2020) sought to demonstrate that certain principles of multisensory integration, such as spatial congruence, play pivotal roles in elucidating the mechanisms underlying the sense of ownership. Neuroimaging studies have consistently linked the perception of limb ownership to the activation of various multisensory areas in the frontal and parietal lobes (Grivaz, Blanke, & Serino, 2017; Limanowski & Blankenburg, 2016; Guterstam et al., 2013; Gentile, Guterstam et al., 2013; Downing et al., 2001). For instance, initial fMRI investigations (Ehrsson et al., 2004) revealed heightened activity in PMC and IPS during conditions of visuotactile synchrony, particularly evident in the RHI paradigm.

The innate sense of ownership appears to be associated with the activation of specific brain regions, including the bilateral ventral PMC, bilateral intraparietal cortex, bilateral inferior parietal cortex (supramarginal gyrus), and the right cerebellum (Gentile et al., 2013). Notably, the intensity of hand disownership correlates with a reduction in fMRI signal within these regions, indicating their involvement in the illusion. The authors noted that the

increased BOLD activity in the left ventral PMC and right IPS was not contingent on the illusion but rather considered indicative of ownership of the actual hand. Moreover, EBA and lateral occipital cortices (LOCS) contribute to the visual processing of the body, with cross-modal interactions facilitating visual self-recognition of the hand (Driver & Noesselt, 2008; Downing et al., 2001). Further, Driver and Noesselt (2008) explained these cross-modal interactions by top-down adjustments from PPC regions, potentially enhancing visual self-recognition. Additionally, the lateral cerebellar hemispheres are involved in integrating proprioceptive, tactile, and visual inputs, particularly when exposed to consistent multisensory stimulation of the rightward upper limb (Gentile et al., 2011).

Full-Body Ownership Illusion is parallel to the RHI and demonstrates the importance of temporal and spatial congruency in eliciting a sense of ownership (Ehrsson, 2020; Petkova & Ehrsson, 2008). The original illusion by Petkova and Ehrsson (2008) was induced by equipping participants with head-mounted displays (HDMs) linked to cameras positioned on a mannequin's head. This setup allowed participants to see a three-dimensional (3D) video feed of the mannequin's body as if it were their own. By synchronously touching to the corresponding sites on the mannequin's abdomen and the participant's own, participants felt a strong sense of ownership over the mannequin's body. The illusion was further confirmed through participant reports and physiological responses (Skin Conductance Responses or SCRs), demonstrating a convincing embodiment of the mannequin's body as their own (Petkova & Ehrsson, 2008).

The results of the study revealed how the sense of ownership and multisensory integration interact, clarifying key elements that affect the full-body ownership illusion's induction and intensity. Firstly, temporal synchrony of tactile stimulation emerges as a pivotal determinant, with asynchronous stroking leading to a diminished illusion (Petkova & Ehrsson, 2008), the same as the RHI (e.g., Botvinick & Cohen, 1998). Secondly, the authors explained that the spatial congruence between the perceived body and the participant's own body further amplifies the illusion, while deviations in orientation or distance attenuate its effect. Notably, the presence of a humanoid shape is also essential, as substituting it with a large block of wood abolishes the illusion (Ehrsson, 2020; Petkova et al., 2011).

Neuroimaging findings revealed by Petkova and Ehrsson (2008) increased activity in key brain regions during the illusion, including the ventral premotor cortex, intraparietal cortex, lateral occipital cortex, lateral cerebellar hemisphere, and putamen. Particularly, the heightened activation observed in the ventral premotor cortex was correlated with a stronger

illusion (Petkova & Ehrsson, 2008). Further, the authors described the multisensory nature of body ownership, emphasizing the integration of visual, tactile, and proprioceptive cues, alongside predicted sensory feedback during active movements. Such integration, especially when aligned from a first-person perspective, engenders a profound sense of ownership over one's entire body, even extending to perceiving interactions such as shaking hands with one's real body (Petkova & Ehrsson, 2008).

Deriving from the Full-Body Illusion, one may suggest that disruptions in their multisensory integration particularly concern the sense of bodily ownership, and vice versa. Given that GD is not classified as a neurological or psychiatric condition, one might question that while multisensory integration remains largely intact in individuals with GD, then, where does the discomfort arise from? The following section will delve into the disturbances in body perception or the potential misperceptions of bodily ownership, forwarding us later to the formation of the gendered self and the exploration of gender-expansive identities.

### 1.1.4. Body *Mis*perception and Disturbances of Body Representation

Above, the experimentation with multisensory bodily signals in experimental settings involving healthy individuals led to defining conceptual models of body representations. These manipulations have the potential to evoke changes in bodily self-awareness, including changes in self-identification, spatial orientation, and the individual's subjective viewpoint (as reviewed in Ehrsson, 2020). Models of body representation however have been also informed by alterations of body perception such as a sense of detachment or alienation from their bodies, that can result from various neurological and psychiatric conditions (de Vignemont, 2018).

The feeling of bodily presence (de Vignemont, 2018) extends beyond touch; it entails a deep awareness of one's body. The example from the author's book simply follows:

> When something brushes our knee, not only do we feel a tactile sensation, we also become suddenly aware of the presence of our knee as being located in egocentric space, as a body part that we can reach and grasp. (de Vignemont, 2018, p. 44).

This feeling of bodily presence is closely intertwined with the concept of ownership (de Vignemont, 2018), as evidenced in studies on phenomena like phantom limb sensations (Ramachandran & Hirstein, 1998; Melzack, 1990) and depersonalization experiences (as

reviewed in Dell, 2011; Sierra, 2009). Moreover, individuals may encounter a disconnect between their sense of presence and ownership (Blanke & Arzy, 2005), acknowledging the body's presence without associating with themselves.

One manifestation of bodily disownership is *segmental exclusion syndrome,* where individuals exhibit reduced limb usage even after apparent recovery from traumatic or infectious afflictions (de Vignemont, 2018). Accordingly, this condition, due to prolonged immobilization, can persist, as observed in cases involving wearing casts for broken limbs. Moreover, *peripheral sensory or motor loss*, as seen in spinal cord injuries or acute sensory neuropathy, leads to drastic experiences of bodily disownership (Case et al., 2020). Individuals may perceive their bodies as "holes" or feel alienated, describing sensations like "twisted legs" or "toes turned down" (Conomy, 1973). Further, neuroscientific investigations have uncovered cortical reorganization post-spinal cord injuries, accompanied by corporeal illusions and altered body ownership, particularly linked to neuropathic pain (Scandola et al., 2017; Ding, Kastin & Pan, 2005; Moore et al., 2000). Additionally, *peripheral deafferentation* disrupts sensory input, resulting in a loss of proprioception and tactile sensation below the neck (de Vignemont, 2010). Individuals may compensate for this lack of sensory feedback by relying on visual cues, leading to a sense of disconnection from their bodies and contributing to a distorted body image (Gallagher & Cole, 1995).

Another indication of body misperception is *personal neglect*, typically stemming from right hemispheric brain lesions, which involves a lack of awareness or attention toward one bodily part or the half of the body, most commonly the left side (Committeri et al., 2007; Rusconi et al., 2002). Patients may exhibit behaviors such as neglecting to comb, shave, or dress the left side of their body. Despite these noticeable behavioral signs, patients usually remain unaware of their deficits (Case et al., 2020). Unlike *somatoparaphrenia*, where individuals experience an unusual sense of disownership towards their specific body part(s) and perceive it as belonging to someone else (Gerstmann, 1942), individuals with personal neglect recognize that the neglected body parts belong to them when prompted, even though their behavior suggests otherwise (Rusconi et al., 2002).

Lesion studies have identified the right inferior parietal cortex, including the supramarginal and postcentral gyri, as key areas involved in personal neglect (Committeri et al., 2007). Similarly, somatoparaphrenia typically arises from a lesion or an epileptic seizure in the right parietal lobe (Vallar & Ronchi, 2009; Bottini et al., 2002). The authors also reported that damage to the underlying white matter suggests that personal neglect might

result from a disconnection between regions responsible for proprioceptive and somatosensory processing and those involved in more abstract body representations. Recent research on the inattention factor in personal neglect by Bertagnoli et al. (2022) suggested that personal neglect involves more than spatial attention or body representation disorders, as its associated network differs from those of other body representation disorders. For instance, the network for disturbed sensations of body ownership, such as asomatognosia and somatoparaphrenia, involves a fronto-insular-parietal network (Moro et al., 2023). In contrast, somatoparaphrenia, which is sometimes identified with intense emotional responses and feelings of hostility towards the disowned limb (i.e., misoplegia), typically arises from lesions that contribute to the development of this delusional perception (Vallar & Ronchi, 2009). Furthermore, Bottini et al. (2002) associated the experiences of disownership with the involvement of brain areas such as the insular cortex or subcortical regions, including basal ganglia.

Certain medical conditions involve disorders related to other aspects of body representation, such as body image. Examples could be *Anorexia Nervosa* (AN), in which individuals often exhibit profound dissatisfaction with their body size, and *Body Dysmorphic Disorder* (BDD), which is characterized by an overwhelming preoccupation with perceived physical defects that either not seen or slightly seen by the others (APA, 2022). Both AN and BDD share overlapping but distinct symptoms of body image misperception. While both involve dissatisfaction with body size and appearance, the underlying mechanisms likely diverge. In AN, dissatisfaction with body image often outweighs visual distortions. This suggests a complex interplay between cognitive factors (attitudes) and perceive their bodies (Cash & Deagle, 1997). Studies using upright and inverted body pictures found that individuals with AN struggle with recognizing bodies as a whole (configural processing) and focusing more on details over their bodies (Urgesi et al., 2014). Additionally, they showed distortions in judging body boundaries, similar to patients with right parietal lobe damage, suggesting altered processing in the right hemisphere (Nico et al., 2010). On the other hand, BDD revolves around a distorted self-image leading to compulsive behaviors, such as repetitive grooming and intense distress over perceived flaws that may be barely noticeable to others (Philips et al., 2008). Furthermore, while most studies have not found deficits in primary tactile perception in AN (as reviewed by Case et al., 2020), they do reveal distortions in how the body is perceived and represented. Individuals with AN tend to overestimate distances between points applied to the arm and abdomen, suggesting an enlarged secondary

tactile perception, which correlates with body dissatisfaction and indicates a link between tactile body maps and attitudinal aspects of body image (Keizer et al., 2012). Furthermore, they might misjudge their ability to fit through spaces, indicating altered sensorimotor and spatial orientation representations of the body or, disruptions in body schema (Guardia et al., 2010).

Neuroimaging studies suggest disruptions in neural networks related to cognitive control, visual interpretation, and emotional processing in BDD and AN [as reviewed in Case et al. (2020) and Hong, Nezgovorova & Hollander (2018)]. In AN, difficulties in retrieving body image representations from brain regions such as the precuneus and PPC may contribute to body size estimation problems (Mohr et al., 2010). Studies focusing on introspective abilities found evidence of increased activation in right hemisphere sensorimotor regions during body image comparison tasks, including hyperactivation of the insula and reduced activity in ACC (Mohr et al., 2010). Further, fMRI studies showed increased activity in left lateral-temporal-parietal cortices in BDD patients when viewing low-resolution images, suggesting a shift toward holistic information processing (Feusner et al., 2010). Additionally, they showed increased functional connectivity within brain networks involved in processing faces when viewing low-resolution images (Moody et al., 2015). In contrast, control subjects showed similar activation patterns in the right hemisphere but only activated the left hemisphere for detailed processing of high-resolution images (Feusner et al., 2010). Both AN and BDD patients exhibit similar patterns of increased connectivity between specific brain regions related to face processing and body representation but with reduced activity in the insula. This suggests shared underlying neural mechanisms as well as distinct processing patterns in these disorders.

While not directly related to body image concerns like AN and BDD, *Body Integrity Dysphoria* (BID) shares some similarities. Individuals with BID experience a profound sense of discomfort and a desire to amputate a healthy limb, feeling it does not belong to their body, leading to harmful consequences such as self-injury, with onset typically occurring by early adolescence and not better explained by other mental disorders or medical conditions (ICD-11, 2024). This intense drive for alteration suggested a mismatch between their perceived body image and their actual anatomical structure (First, 2005; Ramachandran & McGeoch, 2007). Individuals with BID often experience a sense of relief and a feeling of completeness after undergoing amputation, which contrasts sharply with the intense sense of incompleteness they feel before the procedure (de Vignemont, 2018).

The distress, sourced from one's own body associated with BID, is hypothesized to stem from a discrepancy between the intact somatosensory information and a distorted body image (McGeoch et al., 2011). Research using neuroimaging techniques has shown reduced functional connectivity between the primary sensorimotor cortex, associated with the limb desired for amputation, and other brain regions in individuals with BID (Saetta et al., 2020). This included the right superior parietal lobule (rSPL), which is believed to be involved in processing body size and shape (Saetta et al., 2020). Furthermore, these studies have identified atrophy in the left premotor cortex, a region crucial for integrating multisensory information about the limbs (van Dijk et al., 2013), and the rSPL (Saetta et al., 2020). Interestingly, the severity of atrophy in these regions has been linked to the intensity of the desire for amputation and the extent to which individuals engage in behaviors that simulate being an amputee (e.g., using wheelchairs or crutches) (Saetta et al., 2020). Unlike BDD, those with BID do not necessarily view the affected limb as malformed or unattractive. Instead, they experience a sense of bodily disownership, feeling the limb does not belong to their body (Noll & Kasten, 2014). This distinction suggests that BID is rooted in a sense of bodily disownership, rather than a distorted perception of physical appearance.

Finally, this section concludes by examining the feeling of idling away from one's body, manifested in two distinct experiences: *Out-of-Body Experiences* (OBEs) and *Depersonalization Disorder* (DPD).

OBEs involve a perceived separation of consciousness from the physical body, often with an observer perspective from a distance or elevated viewpoint (Case et al., 2020). OBEs are characterized by three key phenomenological aspects: disembodiment, or the self-existing outside of the physical body; extracorporeal egocentric perspective or viewing the world from a detached and elevated vantage point; autoscopy or perceiving one's own body from this elevated position (Blanke & Arzy, 2005). DPD, on the other hand, features persistent and recurrent episodes of feeling detached from one's body or mental processes. Individuals with DPD often describe feeling like an outside observer of themselves and may experience distorted bodily sensations or a sense of disownership from their bodies, leading to a profound sense of misperception (de Vignemont, 2018).

Neuroscientific research has offered valuable insights into the biological basis of DPD. In their literature review, Sierra and David (2011) showed that individuals with DPD exhibited increased activity in the prefrontal cortex alongside reduced activity in the insula and limbic-related areas when presented with aversive or emotionally arousing stimuli. An

fMRI study by Philips et al. (2001) revealed a dampened psychophysiological response to emotional stimuli in DPD patients. This reduced response manifested as altered patterns of brain activity, particularly in areas crucial for processing emotions. For example, the reduced activity observed in the insula is known for interoceptive awareness (recognizing bodily signals) and generating emotional states. This diminished activity in the insula correlated with the emotional numbing experienced by people with DPD. Conversely, Philips et al. (2001) concluded the increased insula activity in patients whose DPD symptoms improved could be a potential target. Furthermore, a specific region within the right ventrolateral prefrontal cortex was identified as playing a key role in the top-down suppression of emotional responses (Phillps et al., 2001).

Similar to DPD, Blanke and Arzy (2005) proposed that OBEs might arise from disruptions in sensory information processing related to the body. This could lead to a distorted sense of personal space and a feeling of detachment from the physicality. Additionally, dysfunction in the vestibular system, responsible for balance and spatial orientation, might contribute to a disconnect between one's internal sense of space and the external visual environment. Blanke and Arzy (2005) suggested that these combined disruptions might be crucial for OBEs to occur and may stem from sudden cerebral dysfunction in the TPJ, involved in integrating various sensory inputs. These experiences highlight the complex nature of the experience of embodiment. OBEs might be temporary phenomena caused by disruptions in sensory processing (Blanke & Arzy, 2005), while DPD is a more chronic condition potentially linked to altered brain activity in areas related to emotional processing (Sierra & David, 2011). Both conditions suggest that the feeling of owning and inhabiting our bodies transcends a simple understanding of physical boundaries (de Vignemont, 2018) that cannot be exclusively linked to one single modality (Ehrsson, 2020).

A strong desire to feel a sense of wholeness with one's own body is a fundamental human need. Brain regions associated with body perception, particularly the ones involved in processing somatosensory information and spatial awareness, likely play a crucial role in this feeling of bodily presence (de Vignemont, 2018). These regions contribute to how we perceive and interact with the world around us, including our own bodies. Further, disruptions in this area can lead to feelings of bodily alienation or disownership, characterized by a dislike or detachment from one's own body.

The natural human desire for connection extends not only to our environment but also to a sense of internal unity. Gender identity expression can be seen as one way we achieve this connectedness within ourselves. For some individuals, a disconnect exists between their internal sense of gender and their assigned sex at birth, also known as GD. The next chapter will explore the development of gender identity in detail. the role of genetics, hormones, and environmental influences, and how these factors can contribute to transgenderism and GD.

## 1.2. Gender

In recent decades, the field of Gender Studies has emerged as a multidisciplinary endeavor aimed at understanding the complexities of gender identity, expression, and experience. From early childhood socialization to the development of gender identity, from the neurological underpinnings of gender representation to the diverse experiences of transgender and non-binary individuals, Gender Studies encompasses a wide array of topics that intersect with psychology, neuroscience, sociology, and cultural studies. This chapter seeks to explore the multifaceted nature of gender, examining key concepts and research findings that shed light on the formation, representation, and lived experiences of gender. By delving into these areas, we aim to deepen our understanding of how gender shapes individuals' identities, behaviors, and perceptions, and to contribute to ongoing discussions concerning GD, the marginalization of transgender and non-binary individuals, and the impacts on their overall well-being.

### 1.2.1. Formation of Gender Identity

Theoretical perspectives on gender identity development often integrate biological, psychological, and social viewpoints, contributing to a richer understanding of its complexities across a broad spectrum. Further, sex hormones during prenatal development influence brain differentiation, directing it towards male or female characteristics (Phoenix et al., 1959). Animal studies, particularly with testosterone, demonstrate their impact not only on genital but also brain sexual differentiation and subsequent behavior (McCharty, de Vries & Forger, 2009). Human studies corroborate these findings, highlighting the challenge of studying similar trends (Hines, 2009).

A brief historical examination of the formation of gender identity highlights its inherently subjective and individually unique nature. This exploration underscores that gender identity has never conformed to a rigid, one-size-fits-all model, but rather reflects a diverse and personal spectrum of experiences and understandings. Firstly, for instance, Freud's theory of personality development attributed variability in gender identity to "abnormal" early childhood psychosexual experiences during the phallic stage (Freud, 1905). Or, similarly, Money proposed the concept that core gender identity could be molded during a critical period in early childhood by raising a child as male or female, marking the beginning of recognizing the role of social factors in gender identity development (Money,

Hampson & Hampson, 1955). One of the most famous cases that has been pinpointed by Gender Studies could be the study of John/Joan.

The case of John/Joan from Money's studies stands as an illustration of the complexities surrounding gender identity development. In the 1960s and 1970s, beliefs in trends suggested that a child was in a blank state at birth, with societal conventions dictating subsequent gender direction (as reviewed in de Vries et al., 2014; Money, Hampson & Hampson, 1955). John/Joan, initially identified as a male named David Reimer, became the subject of an experiment following a surgical mishap during infancy that resulted in the loss of his penis. Guided by Money's theory that gender identity was malleable during a critical period of early childhood (as reviewed in de Vries et al., 2014), David was raised as a girl, receiving hormonal treatment (i.e., estrogen intake) and psychological counseling to facilitate feminization. However, despite concerted efforts to align David's gender identity with his assigned female sex, he never identified as female. His eventual detransition to male identity at the age of 14 (Diamond & Sigmundson, 1997), underscored the enduring influence of intrinsic gender identity over externally imposed gender roles (Meyer-Bahlburg, 2005). Tragically, David's life was marked by years of psychological distress, financial instability, and ultimately, his suicide in 2004 (de Vries et al., 2014). Later, instead of social environment and learning, the focus of early gender programming redirected to enzymatic disorders or cloacal exstrophy (Swaab, Garcia-Falgueras, 2009).

Building upon these notions, Kohlberg's (1966) theory of gender constancy, which is achieved around ages 6-7, posits that children understand that gender remains constant across different situations. Earlier research by Slaby & Frey (1975) identified stages such as gender labeling (identifying one's own and others' gender), gender stability (understanding that gender is stable over time), and gender consistency (recognizing that gender does not change with alterations in appearance or activities and is linked to genitalia). Most children develop a gender identity that aligns with their sex assigned at birth (de Vries et al., 2014). The acquisition of basic gender information correlates with increased engagement with gender-stereotyped toys (Zosuls et al., 2009). Before achieving gender constancy, children already possess knowledge of gender stereotypes and behaviors. They tend to remember gender-consistent information better, and this rigidity in thinking about sex-typed traits and behavior decreases after age 7 (Signorella, Bigler, & Liben, 1993). Therefore, Kohlberg's cognitive theory of gender identity formation suggested that children develop gender identity as they cognitively understand gender differences and their lifelong consequences (Kohlberg, 1966).

Cognitive psychology further shaped this discourse with the introduction of *gender schema theory*, positing that children develop a network of gender-related information that influences their behaviors (Bem, 1981).

Psychosocial theories argued that sex-segregated peer networks reinforced stereotypical gender behaviors, further emphasizing the influence of social environments on gender identity (Maccoby & Jacklin, 1987). Social cognitive psychology highlights environmental influences on gender development, with modeling being a significant means of transmitting values and behaviors. Children often choose same-gender models (Bussey & Bandura, 1999). Between preschool and puberty, children predominantly spend time with same-sex peers and siblings, which influences their social development and friendships (Maccoby, 1998). The family environment significantly impacts gender attitudes, with traditional families fostering more traditional gender roles, whereas less traditional families encourage nontraditional gender attributes (Crouter, Whiteman, McHale, & Osgood, 2007).

Meanwhile, brain studies revealed structural differences between males and females in brain anatomy and function, later attributed to cognitive functioning differences (Gur et al., 1999). Specifically, studies on transgender individuals identified brain areas consistent with their identified gender, emphasizing the neurological basis of gender identity (Zhou, Hoffman, Gooren & Swaab, 1995).

These studies provide comprehensive insights into the psychological and social dimensions of gender development. However, they often rely on binary frameworks and stereotypical behaviors, potentially overlooking the experiences of transgender and gender non-conforming individuals. Recognizing the importance of these factors, we extend our understanding to include gender-expansive or gender non-conforming development among the indicated individuals.

### 1.2.2. Differences in Sex Development

The exact causes of gender identity remain under investigation, but research suggests a complex interplay between genetic and prenatal hormonal factors. Studies examining the 2D:4D finger ratio and otoacoustic emissions (OAEs) in transgender individuals hint at a potential link between prenatal testosterone exposure and later gender identity (Fusar-Poli et al., 2021; Ristori et al., 2020). Additionally, twin studies have demonstrated a higher concordance rate for monozygotic twins compared to dizygotic twins with GD, suggesting a

possible genetic component (Heylens et al., 2012). Furthermore, the existence of families with multiple transgender individuals lends further credence to the role of genetics (Green, 2000).

Prenatal hormonal influences on gender development are further illustrated by examining specific medical conditions. Individuals with 5-alpha-reductase-2 deficiency or 17-beta-hydroxysteroid dehydrogenase-3 deficiency, for instance, are genetically XY but raised female due to their androgen insensitivity. However, puberty, with its surge in testosterone production, can sometimes lead these individuals to transition to a male identity (de Vries, Dorelejiers & Cohen-Kettenis, 2007). Conversely, Congenital Adrenal Hyperplasia (CAH) exposes the fetus to high androgen levels, potentially masculinizing genitalia in females. While raised as females, some CAH individuals may exhibit more masculine behaviors and preferences (Berenbaum, 1999; Berenbaum & Snyder, 1995). However, gender identity remains variable, with most identifying as heterosexual and some as bisexual or homosexual (Hines, Brook & Conway, 2004). Interestingly, Complete Androgen Insensitivity Syndrome (CAIS) presents a unique case. Individuals with CAIS are XY but lack androgen receptors, resulting in female genitalia and upbringing. Despite normal male testosterone levels, they develop a female gender identity due to their insensitivity. However, partial androgen sensitivity can lead to GD and transitioning (Mazur, 2005). These examples highlight the complex interplay between genetics and prenatal hormones, where hormonal exposure doesn't necessarily dictate gender identity. Ultimately, a combination of genetic and environmental factors likely contributes to the development of this multifaceted aspect of human identity.

### 1.3. Gender Dysphoria and Body Perception

#### 1.3.1. Transgenderism and non-binary

In this section, the complex landscape of transgenderism and non-binary identities is explored by the diverse terminology (see Table 1) used to describe these experiences. To provide clarity and enhance understanding, we have compiled a comprehensive table of terminology commonly employed in discussions surrounding transgender and non-binary identities. Through this exploration, our objective is to uncover the complex array of gender identities, illuminating the various ways individuals navigate and express their gender.

**Table 1.**

**Some common terms in Queer Studies.**

| Terminology | Definition |
|---|---|
| *Binding and Binders* | Binding refers to the practice of compressing one's chest to create a flatter appearance, typically employed by individuals who wish to minimize the visibility of their breasts. Binders are specialized undergarments or garments designed for this purpose, constructed with materials that provide compression while ensuring comfort and safety. |
| *Cisgender Person* | Denoting an individual whose gender identity aligns with their sex assigned at birth, thereby lacking the gender incongruence characteristic of transgender persons. |
| *Gender* | The array of attitudes, affectations, and behaviors associated with the expression of one's biological sex, alongside the sociological understanding of gender as the construction and organization of meanings relating to sexual differences. |
| *Gender Affirming* | Affirming procedures encompass a spectrum of interventions facilitating the authentic expression and embodiment of a transgender individual's gender identity.<br>Such interventions span medical modalities including hormone therapy and surgical interventions, as well as non-medical aspects like binding, dress code, haircut, chosen name, and more. |
| *Gender Identity* | The subjective apprehension of oneself as either man, woman, a blend of both, neither, or transcending conventional delineations of man or woman, which may encompass identifications with non-binary or third gender designations. |
| *Gender Expression* | The external manifestations of one's gender identity, encompassing appearance, dress, comportment, and interests, often subject to the influence of societal gender norms and stereotypes. |
| *Genderqueer* | Individuals whose gender identity or expression diverges from the traditional binary classification of gender as strictly man or woman, male or female. It involves those who identify with multiple genders (bigender, pangender), non-binary genders, or those who identify as having no gender at all (agender, genderless). |
| *Gender Non-Conforming* | Individuals whose gender expression or identity does not align with societal expectations or norms associated with their assigned sex at birth. They may present themselves in ways that defy traditional gender roles or may identify with a gender identity other than the one typically associated with sex. |
| *Gender Stereotypes* | Notions within a culture or era regarding the distinct traits and behaviors attributed to men and women, often dictating what characteristics they should possess. Departure from these societal expectations can lead to rejection and hostility, particularly affecting transgender individuals. |
| *Gender Incongruence* | A significant and enduring misalignment between an individual's perceived gender and their assigned biological sex. It is important to note that merely exhibiting gender variant behavior or preferences does not warrant diagnosis within the group. |
| *Gender Dysphoria* | The distress or unease arising from the incongruity between an individual's gender identity and the sex they were assigned at birth, including associated gender roles and physical attributes. Gender dysphoria is not universally experienced by all individuals whose gender identity diverges from societal norms at various points throughout their lives. |
| *Gender Transition* | Gender transitioning involves aligning one's attributes and expressions with their gender identity, which may include social changes like altering appearance and legal documentation. It can also encompass physical alterations through medical interventions to align physical characteristics with gender identity, facilitating social integration. Individuals undergoing physical transitioning are commonly referred to as transsexuals. |

**Table 1.**

**Some common terms in Queer Studies.**

| | |
|---|---|
| *Intersex* | Intersex individuals display variations in biological sex components like chromosomes, hormones, gonads, and/or genitals, termed as a "disorder of sexual development". Despite apparent anomalies in newborn's sex characteristics, they are often assigned either male or female sexes at birth. However, when this assignment does not match subsequent gender identity, intersex individuals may transition to the trangender category. |
| *Neo-pronouns* | A set of gender-neutral pronouns that are newly created or less commonly used in mainstream language. They are often chosen by individuals who do not feel accurately represented by traditional pronouns like "he/him" or "she/her". Examples of neo pronouns include "ze/zir", "xe/xem", and "ey/em". |
| *Non-Binary* | Individuals whose gender identity does not exclusively align with the categories of male or female. Non-binary individuals may identify with a combination of both genders, fluctuate between genders, or identify with a gender outside of the male/female binary altogether. |
| *Packing and Packers* | Packing involves wearing prosthetic devices called packers to create a bulge in the genital area, commonly used by transgender men or non-binary individuals for a more masculine appearance and to alleviate gender dysphoria. |
| *Passing* | The ability of a transgender or gender non-conforming individual to be perceived as, or "pass" as, a member of their identified gender by others, often in social or public settings. This can involve aspects such as appearance, mannerisms, voice, and behavior aligning with societal expectations or stereotypes associated with the gender they identify with. |
| *Sex Assigned at Birth* | The designation of an individual's sex at or shortly after their birth. This assignment may align with the individual's subsequent gender identity as they mature, although it is not always congruent. In medical and sociological discourse, this concept is frequently termed "natal sex" or "biological sex." While for the majority of individuals, their gender identity and expression are in harmony with their sex assigned at birth, transgender individuals experience a misalignment between their gender identity or expression and the sex assigned to them at birth. |
| *Sexual Orientation* | Sexual orientation pertains to an individual's romantic or sexual attraction to others and is distinct from gender identity. It includes whom one is emotionally and/or sexually attracted to and is not the same as gender identity. |
| *Social Transitioning* | The process by which a transgender or gender non-conforming individual begins to publicly present themselves and live in accordance with their gender identity, rather than the gender they were assigned at birth. This can involve changes in outward appearance, such as clothing, hairstyle, and mannerisms, as well as adopting a name and pronouns that align with their gender identity. |
| *Transgender Person* | Transgender individuals encounter a level of discordance between their gender identity and assigned sex at birth. Similarly, certain intersex individuals, along with individuals perceived as cross-dressers by others, also undergo gender incongruence and the associated dysphoria. |
| *Transgender Man* | An individual who was assigned female at birth but identifies as a man or employs similar designations such as "trans man" or "man of transgender experience". |
| *Transgender Woman* | An individual who was assigned male at birth but identifies as a woman or utilizes equivalent labels like "trans woman" or "woman of transgender experience". |
| *Transphobia* | Prejudice, discrimination, or hostility directed towards transgender or gender non-conforming individuals. It encompasses negative attitudes, beliefs, and behaviors that marginalize, exclude, or harm individuals whose gender identity or expression does not conform to traditional societal norms or expectations. Transphobia can manifest in various forms, including verbal abuse, physical abuse, denial of rights and opportunities, social exclusion, and institutional discrimination. It perpetuates stigma, inequality, and systematic barriers that impact the well-being and safety of transgender and gender non-conforming individuals. |

Note: Adapted from "Language and Terminology in Transgender Health" by G. Knudson, 2020, *Gender Confirmation Surgery,* 41-46. Copyright 2020 by the Springer Nature.

### 1.3.2. Diagnosing Gender Dysphoria

GD reflects a sustained disconnect between a person's inherent sense of self as a particular gender and the sex they were assigned at birth. This disconnect can lead to significant emotional distress and hinder their ability to function effectively in various aspects of life (APA, 2022). Older theories suggested that GD might result from psychological disturbances or anxious temperaments interacting with parental factors (Zucker & Bradley, 1995; Coates & Person, 1985). High rates of separation anxiety (Zucker, Bradley, & Lowry Sullivan, 1996) and internalizing behaviors have been observed in children with GD, though the causal relationship remains unclear (Wallien et al., 2007; Cohen-Kettenis et al., 2003).

**Table 2.**

**Diagnostic Criteria of Gender Dysphoria**

| Diagnostic criteria | Adolescents and Adults | Children |
|---|---|---|
| | A marked incongruence between one's experienced/expressed gender and primary and/or secondary sex characteristics (or in young adolescents, the anticipated secondary sex characteristics). | A strong desire to be of the other gender or an insistence that one is the other gender (or some alternative gender different from one's assigned gender). |
| | A strong desire to be rid of one's primary and/or secondary sex characteristics because of a marked incongruence with one's experience/expressed gender (or in young adolescents, a desire to prevent the development of the anticipated secondary sex characteristics). | In boys (assigned gender), a strong preference for cross-dressing or simulating female attire; in girls (assigned gender), a strong preference for wearing only typical masculine clothing and a strong resistance to the wearing of typical feminine clothing. |
| | A strong desire for the primary and/or secondary sex characteristics of the other gender. | A strong preference for cross-gender roles in make-believe play or fantasy play. |
| | A strong desire to be of the other gender (or some alternative gender different from one's assigned gender) | A strong preference for the toys, games, or activities stereotypically used or engaged in by the other gender. |
| | A strong desire to be treated as the other gender (or some alternative gender different from one's assigned gender). | A strong preference for playmates of the other gender. |
| | A strong conviction that one has the typical feelings and reactions of the other gender (or some alternative gender different from one's assigned gender). | In boys (assigned gender), a strong rejection of typically masculine toys, games, and activities of rough-and-tumble play; or in girls (assigned gender), a strong rejection of typically feminine toys, games, and activities. |
| | | A strong dislike of one's sexual anatomy. |
| | | A strong desire for the physical sex characteristics that match one's experienced gender. |
| Associated Distress/ Impairment | The condition must be associated with clinically significant distress or impairment of social, occupational, or other important areas of functioning. | The condition must be associated with clinically significant distress or impairment in social, occupational, or other important areas of functioning. |

*Note*: Adapted from "What is Gender Dysphoria?", by J. Turban, 2022 (https://www.psychiatry.org/patients-families/gender-dysphoria/what-is-gender-dysphoria). Copyright 2024 American Psychiatric Association.

Social factors play a crucial role in gender identity development. Historically, theories posited that gender identity largely followed the gender of rearing, with early gender assignment leading to congruent gender identities (Money et al., 1955). However, current understanding emphasizes a complex interplay of genetic, environmental, social, and biological factors in shaping individual gender identities (de Vries et al., 2014; Lenroot & Giedd, 2011). Given the limitations of past research focusing primarily on binary gender frameworks, it is essential to expand our understanding to include transgender and non-binary experiences.

Further, boys showing female interests and behaviors and girls preferring male toys and playmates might express a desire to be the other gender early on (Cohen-Kettenis, 2005; Cohen-Kettenis & Pfäfflin, 2003). In children with GD, who insist they are the other gender, it was reported that they tend to seek gender affirming procedures during adolescence compared to those who state they desire to be the other gender (Steensma et al., 2013a). However, a longitudinal study with Dutch children, with both sexes compared, found that childhood gender-expansive behavior was more predictive of same-sex sexual orientation in adulthood rather than later GD (Steensma et al., 2013b). While it may be hypothesized that gender-expansive attitudes and displayed behaviors in children might indicate unexplored traits, such expressions resist a singular attribution to phenomena like transgenderism or sexual orientation. Rather, these manifestations appear to be inherently subjective, reflecting the individual's unique identity.

In clinical studies, children with GD showed a similar sequence of gender development stages (labeling, stability, constancy) as controls but reached these stages later (Zucker et al., 1999). Accordingly, children referred to based on gender binary displayed more same-sex play if their gender consistency aligned with societal norms, compared to those whose gender expression diverged from these norms. This suggested that the acquisition of gender labeling is a prerequisite for developing gender-stereotyped behavior (Ruble, Martin & Berenbaum, 2006).

Most studies on gender typical development focus on universal trends and average milestones, often overlooking the range of experiences within populations (as reviewed by de Vries et al., 2014). This approach can mistakenly label children who do not meet certain developmental benchmarks as not fitting. For example, cognitive theories of gender might classify children with GD as having a "developmental lag" in achieving gender constancy (Zucker et al., 1999). Other theories incorporate concepts like satisfaction with gender

identity and the understanding of societal pressures to conform to stereotypes (Egan & Perry, 2001). The reliance on outdated theories fails to acknowledge the evolving understanding of GD and its complex interplay with numerous factors, including personal experiences. Similarly, gender identity can change over time, as seen in individuals who undergo medical gender affirming procedures (e.g., sex reassignment surgery, mastectomy, and so on) or identify with a gender different from their natal sex.

Initially described by Fisk (1974) as a distressing condition, GD has long been associated with significant emotional turmoil and difficulty coping with one's assigned sex. Davy and Toze (2018) highlight the distressing nature of GD, advocating for the necessity of transitioning to alleviate this distress. This emphasis on distress remains prominent in contemporary conceptualizations, as evidenced by the DSM-5's criteria linking GD diagnosis with clinically significant distress or impairment in various areas of functioning (APA, 2022). Particularly central to this distress are concerns surrounding the body, including primary and secondary sex characteristics (APA, 2022), such as genitals, body hair, and breasts. The experience of distress is often compounded by feelings of body dissatisfaction, driven by a desire for the primary or secondary sex characteristics of the other gender (Feusner et al., 2016). Nieder et al. (2011) noted that GD may manifest itself before puberty or during/after puberty, indicating variability in the age onset of this condition. This variability underscores the diverse experiences individuals may have with their gender identity and the timing at which they begin to experience distress or discomfort with their assigned sex at birth. Overall, this dissatisfaction with one's body and appearance has prompted some authors to conceptualize GD as a body image disorder rather than solely a mental health disorder (Money, 1994).

The reliance on outdated theories fails to acknowledge the evolving understanding of GD and its complex interplay with a range of factors, including personal experiences. Many prepubertal children with GD see these feelings revoked after puberty, while for others, GD persists and may only be resolved through medical gender affirming procedures (Steensma et al., 2013a; Cohen-Kettenis & van Goozen, 1997). The persistence of GD in some individuals also suggests that attempting to develop universal theories to explain such subjective experiences may not be fruitful. Thus, the understanding of gender identity encompasses an individual's intrinsic perception of their gender, including a spectrum beyond traditional binary categorizations. As Tate, Youssef, and Bettergarcia (2014) elucidate, gender identity reflects a deeply subjective sense of being female, male, both, or neither. While historically

entrenched in the binary framework, contemporary discourse acknowledges the diverse landscape of gender identities, including non-binary expressions (Galupo, Pulice-Farrow & Pehl, 2021; Galupo, Pulice-Farrow & Ramirez, 2017).

### Differential Diagnosis

Distinguishing GD from other conditions with overlapping presentations requires careful evaluation. While some conditions may share features of distress related to bodily appearance, key distinctions exist. Firstly, individuals with BDD have a preoccupation with perceived flaws in their appearance, often seeking alterations like surgery to address these concerns. In contrast, GD stems from a mismatch between a person's internal sense of gender identity and their assigned sex at birth, with a strong desire to be of another gender (APA, 2022). Later, individuals with BID experience a desire to amputate a healthy limb to feel complete. Unlike GD, where the goal is to change the body to align with the perceived gender identity, BID does not involve a wish to change gender (APA, 2022). Considering the high prevalence of autism spectrum disorder, differentiating the prior from the latter, and vice versa can be challenging (Kallitsounaki & Williams, 2023). However, the concrete and rigid thinking patterns around gender roles, or difficulties with social relationships characteristic of ASD, may help distinguish it from the persistent desire to be another gender and the associated distress experienced in GD (APA, 2022). Finally, individuals with schizophrenia may exhibit transient and fragmented experiences related to gender. These experiences can manifest as bizarre delusions, such as the belief of having undergone castration at birth, which Meijer et al. (2017) refer to as "gender-themed delusions."

### Comorbidity

Research suggests a significant mental health burden for individuals with GD. The distress caused by the mismatch between their perceived and actual bodies can manifest as comorbid conditions. Studies by Garg and Elshimy (2023) reported high rates of substance use disorders among individuals with GD compared to the general population. Additionally, APA (2022) highlights higher rates of depression, anxiety, and disruptive behaviors in the affected population. This increased vulnerability to mental health concerns could be linked to social stigma and the challenges associated with expressing a gender-expansive identity. Furthermore, research suggests a higher prevalence of autism spectrum disorder among

individuals with GD (APA, 2022). Experiences of harassment or violence can further exacerbate these challenges, potentially leading to post-traumatic stress disorder (PTSD). Madeddu et al. (2019) found that personality disorders, particularly those within Cluster B (characterized by dramatic, erratic, or unpredictable emotions and behaviors), were comorbid in over half of their sample with GD.

### Suicidality

The rates of suicidality and suicide attempts for transgender individuals are alarmingly high, ranging from 30% to 80% (APA, 2022). Accordingly, risk factors include past maltreatment, gender-based violence, depression, substance abuse, and younger age. Adolescents and adults with GD are at increased risk for suicidal thoughts and attempts (Mak et al., 2020), especially before receiving gender-affirming treatment and legal recognition of their gender identity (APA, 2022). Research by Garcia-Vega et al. (2018) suggested a substantial prevalence of suicidal ideation and attempts, with no significant difference between transgender men and women.

### Body Image Scales

Body Image (BI) in GD research extends beyond physical appearance. It encompasses how individuals perceive, think, and feel about their bodies (Cash & Pruzinsky, 2002). Studies identified a link between GD and BI, with BI being a complex mix of personal assessments, convictions, emotional responses, and actions about one's physicality (Cash, 2004).

To study the emotions of the transgender community about their physical appearance, Lindgren and Pauly (1975) developed the Body Image Scale for Transsexuals (BIS) to assess body satisfaction in the transgender community. Their findings revealed varying degrees of dissatisfaction between pre-treatment female-to-male (FtM) and male-to-female (MtF) transgender individuals, with pre-treatment FtMs exhibiting lower levels of discontent. Furthermore, studies suggested that hormonal therapy and genital surgery can improve body satisfaction, regarding genitals, facial hair, and breasts (Kuiper & Cohen-Kettenis, 1988; Fleming et al., 1982). In post-operative transgender individuals, Kraemer et al. (2007) reported that MtFs reported feeling less insecure and more attractive or confident compared to both pre-operative MtFs and cisgender controls. Similarly, FtM individuals experienced enhanced satisfaction with phalloplasty (i.e., genital surgery) (Kraemer et al., 2007).

Modern scales like the Evaluation of the Own Body Questionnaire (FBeK), the European Network for the Investigation of Gender Incongruence (ENIGI), and the Hamburg Body Drawing Scale highlighted disparities in body satisfaction between individuals with GD and control groups (Becker et al., 2016). Furthermore, physicians employ reliable instruments such as the Utrecht Gender Dysphoria Scale (UGDS) (Steensma et al., 2013c) and the Gender Identity/Gender Dysphoria Questionnaire for Adolescents and Adults (GIDYQ-AA) (Deogracias et al., 2007) to assess GD. The UGDS emphasizes core aspects like bodily discomfort, gender identity, and gender role expression, while the GIDYQ-AA explores a broader range encompassing subjective feelings, physical symptoms, social interactions, and legal/societal challenges (Schneider et al., 2016). While the UGDS is valuable, its earlier versions used gendered language, limiting its use for non-binary individuals (McGuire et al., 2020). The revised UGDS-GS, developed by McGuire et al. (2020), addresses this by creating a more inclusive scale for the gender spectrum. The UGDS-GS assesses dissatisfaction with gender identity and expression over time, while also considering comfort with affirmed gender identity.

### 1.3.3. Behavioral Measures of Body Perception in Gender Dysphoria

GD can manifest in observable behaviors. The research explored how individuals with GD interact with their bodies in relation to their gender identity. Some research suggested the core of individuals' dissatisfaction with genitalia and body hair for MtFs and breasts and hips for FtMs (Becker et al., 2016; Fisher et al., 2014).

Body dysphoria, coupled with body-related avoidance strategies such as behaviors to avoid confronting their bodies, like looking away from mirrors or wearing loose clothing, are hallmark manifestations of GD (Coleman et al., 2012; Cohen-Kettenis & Pfafflin, 2010). These behaviors stem from a deep feeling of mismatch between one's inner identity and the physical attributes of their body. This disconnection often causes distress, impacting daily functioning and promoting efforts to manage dysphoria, such as avoidance from interacting with one's own body and/or engaging in extreme measures to conform to their affirmed gender.

Dissatisfaction with physical sex characteristics extends beyond genitalia in GD, as highlighted by van de Grift et al. (2016a). Their study, utilizing BIS, found that transgender women (MtFs) experience concerns not only with genitals and breasts but also with non-genital features like facial hair and posture. Similarly, transgender men (FtMs) grapple with

dissatisfaction regarding breasts and genitals, along with concerns about hip shape and body hair (van de Grift et al., 2016a). Likewise, analogous patterns were observed in pre-operative individuals with GD, with MtFs primarily expressing dissatisfaction with genitals and body hair, while FtMs exhibited heightened dissatisfaction with their breasts and hips (Becker et al., 2016; Fisher et al., 2014). These unsatisfactory feelings with gender-atypical characteristics were concluded by the authors as intensifying during social interactions, where traits like facial hair or breast size may inadvertently signal one's assigned sex at birth, potentially hindering their ability to "pass" as their affirmed gender (van de Grift et al., 2016a). Furthermore, societal expectations of masculinity and femininity can exacerbate feelings of body incongruence for transgender individuals (Rabito-Alcòn & Rodrìgues Molina, 2015; Johnson, 2007).

Within the search for an understanding of GD, Feusner et al. (2016) conducted research with FtM individuals, investigating their bodily perception of morphed body pictures ranging from their assigned sex at birth to their desired gender identity. Their findings showed that participants identified more strongly with pictures closer to their desired gender, compared to cisgender male and female controls. This suggested a potential disconnect between the internal sense of self and external appearance for FTM individuals (Feusner et al., 2016). Interestingly, when participants had more time for observation and response, BI ratings for pictures congruent with their perceived self were higher (Feusner et al., 2016). Accordingly, the authors suggested that conscious thoughts and emotional experiences may influence body identification, particularly in gender dysphoric individuals who often experience feelings of insecurity and unattractiveness due to concerns about BI (Kraemer et al., 2008). Furthermore, in the study conducted by Feuser et al. (2016), it was found that several FtM participants expressed feelings of disgust when confronted with their unaltered images or when these pictures were adjusted to reflect their assigned sex at birth. Intriguingly, this reaction was absent among the control group (Feusner et al., 2016). These findings suggested that body perception in FtM individuals is influenced by both internal self-concept and external factors. They may engage in "top-down processing," relying on conscious thought to reconcile their internal identity with their physical appearance (Feusner et al., 2016).

Further, in the investigation surrounding overall bodily discomfort, Pulice-Farrow, Cusack and Galupo (2020) analyzed to understand how individuals experience dysphoria. The study, utilizing a non-clinical sample of transgender individuals, aimed to directly assess

how dysphoria manifests regarding body image and appearance. Participants' responses revealed a departure from prevailing conceptualizations of GD, as they discussed both their body-related disconnection and manifestations of distress by an open-ended prompt (Pulice-Farrow et al., 2020). Their findings highlighted two primary insights: firstly, that GD experiences were influenced by interpersonal interactions and the broader social environment; and secondly, that direct inquiries into GD reveal nuanced conceptualizations that extend beyond traditional clinical definitions. Although the phenomena of GD have been understood within a series of diagnostic criteria, the pathways transgender and/or gender non-conforming individuals follow to be more aligned with their gender identity do not seem to be linear or fixed (Galupo et al., 2020). Rather, the authors described their journey as asynchronous or dynamic (Galupo et al., 2020). This approach was also concluded accordingly: GD might arise from environmental situations surrounding the individual or it might change over time. It was also noted by Pulice-Farrow et al. (2020) that, out of the traditional boundaries of gender identity, the felt dysphoria was not a protest for their natal sex or a wish to become the "other" gender. In the study, individuals expressed this situation as more of an imbalance between societal traditional gender views, or masculinity and femininity, underscoring the lack of representation of the non-binary population.

Moreover, the repercussions of body dissatisfaction extend beyond emotional distress, with transgender individuals facing elevated risks of adverse mental health outcomes, including suicidal ideation and self-harm (Peterson et al., 2017). This highlights the intricate interplay between body dissatisfaction and GD, with one exacerbating the other (Peterson et al., 2017). However, research suggests that the intensity of these feelings of dissatisfaction may be mitigated through various medical transition steps, such as the administration of cross-gender hormones or undergoing gender affirmation surgeries (van de Grift et al., 2016a; Bandini et al., 2013). These interventions aim to align an individual's physical characteristics with their gender identity, potentially alleviating distress and improving overall well-being.

Gender affirming interventions encompass a spectrum of approaches aimed at aligning an individual's physical appearance and social identity with their experienced gender. It is known that transgender people who wish to undergo physical transition to align with another gender typically report feeling more authentic and having a more positive perception of their bodies following gender affirming surgeries (Kraemer et al., 2008). However, these interventions extend beyond medical procedures to include various aspects of

self-expression and psychological support. For instance, speech therapy, epilation, and facial feminization surgery are among the medical interventions available to transgender individuals seeking gender affirmation (Ainsworth & Spiegel, 2010). However, it is important to recognize that gender affirmation is not solely reliant on medical interventions; transgender individuals often utilize clothing, makeup, and other forms of self-expression to enhance their gender expression. While these methods can bolster feelings of self-efficacy, they may also inadvertently contribute to body image concerns, such as the development of eating disorders (Milano et al., 2020). Consequently, psychological counseling plays a crucial role in supporting individuals through the gender affirmation process by fostering self-acceptance and coping strategies (Ainsworth & Spiegel, 2010).

Social transitioning represents a significant aspect of the gender affirmation journey, emphasizing the alignment of an individual's social presentation with their gender identity. Research by van de Grift et al. (2016a) underscores the importance of social perception and "passing" - the ability to be perceived as one's affirmed gender - in influencing body satisfaction among transgender individuals. The study highlighted that a positive social transition, coupled with the ability to "pass," correlates with higher levels of body satisfaction. Additionally, the positive impact of gender confirming medical interventions on body satisfaction, as indicated by Jones et al. (2016), further emphasizes the significance of successful transitioning. The ability to navigate social interactions in alignment with one's gender identity not only contributes to improved psychological well-being but also reinforces a sense of authenticity and self-acceptance within the transgender community.

### 1.3.4. Neuroscience of Perceived Self in Gender Dysphoria

Traditionally, the neurobiology of GD has been linked to sex-atypical cerebral differentiation during fetal development (Swaab, 2007). Recent studies have uncovered a nuanced pattern of cortical thickness and white matter tracts among individuals with GD, revealing divergent neural structures distinct from the cisgender population (Guillamon, Junque, & Gòmez-Gil, 2016).

Resting-state fMRI studies (Nota et al., 2017; Feusner et al., 2016; Manzouri et al., 2015) have investigated the functional connectivity among various brain regions implicated in bodily perception and self-referential thinking. These studies, focusing on brain regions such as the medial prefrontal cortex, anterior insula, TPJ, and precuneus, as well as cerebral

networks including the visual network, sensorimotor networks, DMN, and SN, suggested alterations in functional connectivity patterns specific to GD.

Transgender individuals, both subject groups (Lin et al., 2014), exhibited functional connectivity differences compared to cisgender individuals. The authors concluded the associations between observed connectivity alterations and the subjective experience of incongruence between gender identity and sex assigned at birth. Also, Nota et al. (2017) conducted studies involving cisgender and transgender prepubertal children and adolescents, revealing distinct patterns of network organization. The findings of Nota et al. (2017) resulted in transgender adolescents showing functional connectivity patterns that were more similar to their experienced gender rather than their sex assigned at birth, specifically within the sensorimotor networks. Notably, no significant group differences in functional connectivity were observed among prepubertal children, suggesting that these differences in brain connectivity emerge with age and during puberty (Nota et al., 2017).

Manzouri et al. (2017) investigated the gray and white matter volumes in MtF and FtM individuals, revealing similarities and differences compared to both male and female cisgender controls. The cortical thickness examinations suggested a “female” pattern in MtF, deriving from the finding that MtF showed a thicker cortex than male controls in the parietal and occipital lobes (Manzouri et al., 2017). Meanwhile, FtM displayed no cortical differences from either male or female controls, as stated by Luders et al. (2012). Manzouri et al. (2017) observed greater gray matter volume in the occipitoparietal junctions and the inferior frontal gyrus of MtF compared to controls, with observed smaller thalamus and putamen volumes (Savic & Arver, 2011), suggesting alterations in sexually dimorphic brain structures. Interestingly, testosterone treatment in FtM resulted in increased cortical thickness, contrary to the anticipated masculinization effect (Zubiaurre-Elorza et al., 2013). These findings supported the hypothesis that GD might involve distinct neural signatures in networks related to bodily representation, particularly in structures associated with own-body perception (Savic & Arver, 2011).

Previous studies noted thicker cortex areas in MtF compared to male controls, indicating neuroanatomical differences potentially related to gender identity (Zubiaurre-Elorza et al., 2013). Zubiaurre-Elorza et al (2013) identified significant distinctions primarily along the midline, particularly in the orbitofrontal, insular, and occipital cortex, whereas Luders et al. (2012) observed disparities in both the pre and postcentral gyri. Analysis conducted by Savic and Arver (2011) on GM volume in MtF individuals revealed no

significant differences in several regions compared to controls of the same sex assigned at birth. However, discrepancies were noted in the GM volume of the right inferior frontal cortex, TPJ, thalamus, and putamen when compared to both control groups (Savic & Arver, 2011).

On the other hand, the FtM group of the study (Manzouri et al., 2017) exhibited cortical thickness differences in regions such as the pACC and parietal lobules, along with weaker functional connections between the pACC and other brain regions (i.e., the precuneus, the thalamus, and the insula), compared to controls. The results were explained as a diminished linkage between networks involved in body perception and sense of ownership in FtM individuals, impacting their emotional reactions to bodily self. The authors also observed a lack of functional connectivity from the amygdala to certain brain regions, such as the precuneus and TPJ, EBA, and the fusiform cortex. This alignment with reported emotional detachment and aversion towards one's own body could suggest a coping mechanism that separates emotional responses from bodily self (Manzouri et al., 2017).

Additionally, Feusner et al. (2016) revealed that individuals diagnosed with GD, particularly those transitioning from FtM, exhibited reduced connectivity within the DMN. Specifically, the authors noted that in regions such as the precuneus, PCC, and ACC. Their study also demonstrated that when FtM participants viewed images where their body was morphed to align with their gender identity, their self-rating correlated with the connectivity in the anterior segment of the DMN, associated with self-referential processing (Feusner et al., 2016). This observation of distinct network patterns in FtM individuals, compared to both male and female controls, suggests that their neural connectivity profiles deviate from the typical continuum observed between heterosexual males and females.

Lin et al. (2014) revealed that transgender participants exhibit heightened functional expression of the bilateral postcentral gyrus and superior parietal lobule, integral components of the body representation circuitry, compared to cisgender individuals. These regions display a unique connectivity pattern with brain regions associated with sensorimotor processing, potentially reflecting the long-standing dysphoric experience with their physical bodies among transgender individuals (Lin et al., 2014). These findings were supported by structural changes (i.e., gray matter volume in the pre/postcentral gyrus and the thalamus) observed in MtF transgender individuals in brain regions involved in body perception. These convergent results suggest a neurological basis for the dysphoria experienced by transgender individuals.

The study also found increased activation in brain regions associated with visual processing and face recognition such as LOCs, in transgender participants (Lin et al., 2014). Moreover, transgender individuals exhibited more connections between the postcentral gyrus, superior parietal lobe, and brain regions responsible for visual and auditory processing compared to cisgender individuals. This expanded network integration of visual and auditory cues (e.g., voice and physical appearance) suggested a role in shaping body image and gender identification for transgender individuals.

Regarding the insula, an essential component for body awareness, no significant changes were observed in the insula or ACC of transgender individuals (Lin et al., 2014). However, connectivity between the right insula and bilateral postcentral gyrus showed a negative correlation with the self-identified gender during the experiment. Reduced connectivity between the insula and postcentral gyrus was associated with an enhanced ability of transgender individuals to intentionally dissociate their emotional responses from their perceived bodily state, potentially influencing their gender identification (Lin et al., 2014). Conversely, the insula detects salient stimuli and errors (Harsay et al., 2012; Taylor, Seminowicz, & Davis, 2009), with the right insula particularly involved in driving the salience network following the detection of incongruence errors (Ham et al., 2013). Lin et al. (2014) concluded that individuals may perceive incongruent bodily sensations as less significant or important, explained by the reduced connectivity between the insula and postcentral gyrus and measured "self-ness score" of their gender identity.

In a study of MEG, Case et al. (2017) delved into somatosensory processing, particularly focusing on FtM individuals and their response to tactile sensation in the chest. They found that FtM individuals exhibit less activation of the supramarginal gyrus and secondary somatosensory cortex (S2) along with increased activation of the temporal lobe in response to the stimulation. This was concluded within a reduced integration and heightened anxiety and alarm towards sensation from gender incongruent body parts. Moreover, the study revealed increased white matter fractional anisotropy in these regions among FtM individuals, indicating potential underlying differences in white matter associated with altered sensory processing (Case et al., 2017).

In addition to altered sensory perception, FtM individuals experience reduced ownership of their breasts despite sensations arising from them (Case et al., 2017). The aversion towards the body parts was defined by the authors as "rapid and automatic at the sensory level". The discrepancy may stem from the mismatch between their unwanted

external body parts (i.e., breasts) and their internal body maps (i.e., no breasts), as explained by Case and her colleagues (2017) with the neurocognitive model (Tsakiris, 2010). According to Case et al. (2017), cultural and personal experiences likely influence differences in body representation. Higher-level differences in gender identification could lead to an acquired aversion to sex-specific body parts, potentially modifying the representation of those body parts over time (Giummarra et al., 2011). Deriving from there, Case et al. (2017) explained their findings of heightened peri-amygdala response observed in FtM participants may reflect their dislike of the female-identified body part.

Furthermore, Lin et al. (2014) found decreased functional connectivity in the lateral prefrontal cortex in transgender individuals compared to cisgender individuals. Negative correlations exist between self-reported stress levels and both the overall connectivity and centrality of the left dorsolateral prefrontal cortex (dlPFC) (Cisler et al., 2013). In major depression, individuals with higher apathy levels exhibit reduced functional connectivity between the ACC and the dlPFC or vlPFC compared to non-apathetic individuals (Alexopoulos et al., 2013). Additionally, the lateral PFC plays a crucial role in integrating various sensory inputs and regulating emotional responses (Ochsner & Gross, 2005). Lin et al. (2014) speculated that the decreased connectivity in areas attributed to emotion regulation and the network processing of multiple sensory inputs could imply a disengagement or suppression of cognitive processing of the emotional self as a strategy to cope with gender-sex incongruence.

# 2. RATIONALE, STUDY AIMS, AND HYPOTHESES

## 2.1. Rationale and Aims

The perception of the human body has been a focal point of scholarly inquiry throughout history. This pursuit of understanding has led to significant advancements in the study of body representation, including approaches to conceptualizing terminology (e.g., body schema vs. body image), and behavioral and neurocognitive models. Yet, research is not halted at neuroscience; it has been widely studied in various areas, such as psychology, sociology, philosophy medicine, and gender studies. However, the complexity of human nature often poses challenges to achieving comprehensive insights. Gender expression, a fundamental aspect of human identity, exemplifies such complexity. Historically, deviations from binary gender expressions have been met with resistance and stigma, stemming from a fear of being "different". This societal bias has contributed to a relative paucity of research in this area. However, one may suggest that it has also highlighted the need for more focused and inclusive studies, ultimately supporting the development of research that addresses these gaps. With the evolution of societal norms and increased acceptance of diverse gender identities, there is now a growing recognition of the need to study gender identity without prejudice. Contemporary research is increasingly focused on understanding the intricate ways in which individuals perceive and experience their bodies, particularly in the context of GD.

GD is a complex condition characterized by a misalignment between an individual's gender identity and their assigned sex at birth (APA, 2022). This misalignment has been noted to be crucial for the overall well-being of individuals, affecting them in various areas of life. While there is also a growing body of research examining various aspects of GD, there remains a significant gap in understanding how individuals with this condition construct their body phenomenology – the subjective experience and perception of their own bodies. Understanding the construction of body phenomenology in GD is essential for providing more effective support and interventions for individuals experiencing this condition. By elucidating the subjective experiences and factors behind body perception, this study may contribute to future quantitative studies on body perception and representation in GD.

Thus, this research aims to explore the experience of the body in GD by taking a phenomenological perspective. Qualitative investigations serve as a valuable addition to quantitative research by offering detailed firsthand narratives that provide descriptions of a phenomenon (McLeod, 2013). Additionally, examining personal experiences through phenomenological analysis allows for the identification of individual cognitive processes

expansively (Solowski, 2000). Therefore, incorporating an extensive literature review on behavioral observations and neural correlates, alongside autobiographical content addressing body perception in GD, is beneficial. Through the analysis of autobiographical videos on platforms like YouTube, we have the unique opportunity to explore these bodily experiences firsthand. The overarching aims of the present research are threefold: firstly, to uncover the common patterns and themes regarding body perception among individuals with GD; secondly, to describe the nature and scope of emotional distress associated with body perception in GD; thirdly, to investigate potential differences in body perception across different periods, such as before and after transitioning, pre-puberty and during or after puberty, and fluctuations in a lifespan, as in individuals identifying as genderfluid. To achieve these objectives, a qualitative research design will be employed by analyzing coded audio transcripts (i.e., content analysis). The results will be presented through a combination of direct quotes and descriptions within the paper, exploring potential themes and differences in body perception across individuals, such as those who have transitioned compared to those who have not.

To sum up, the study of the lived experience among individuals with GD through a qualitative lens and combining it with qualitative research methods, such as analyzing autobiographical content (i.e., audio transcriptions of YouTube videos), allows for in-depth exploration. By immersing ourselves in these firsthand accounts, we aim to capture the multifaceted experiences of GD, shedding light on the emotional complexities and challenges surrounding body perception and self-identity. The main aim is thus to unveil the underlying patterns embedded within these narratives, offering unique insights into the realities of GD sufferers and the journey of transitioning.

Accordingly, the present study investigates the following questions:

1. What are the common patterns and themes, regarding the body phenomenology in GD, as revealed through analysis of autobiographical content (i.e., YouTube videos)?

Analyzing visual content directly from transgender and gender non-conforming individuals provides a unique perspective on shared experiences. Despite variations in GD manifestations, patterns and themes extracted from these videos can offer valuable insights for individuals navigating similar changes. Utilizing text analysis tools may facilitate data extraction, allowing for a comprehensive exploration of body perception themes portrayed in autobiographical videos.

2. How are experiences GD expressed in autobiographical videos?

By delving into autobiographical content, we seek to capture the diverse phenomenology of GD, including expressions of negative affect and discomfort toward one's own body. Utilizing existing data from YouTube provides a rich source of autobiographical information, offering insights into the lived experiences of gender incongruent individuals. This exploration aims to quantify the frequency of discomfort expressions and identify patterns related to GD.

3. How do individuals with GD describe their body perception and relationship with their own physicality (before and after transitioning)?

Gender-affirming procedures likely play a significant role in reshaping individuals' body perception. Therefore, analyzing autobiographical narratives from individuals with GD can provide valuable insights about milestones in GD. By comparing narratives of who have and have not undergone surgery, and the milestones through life (e.g., puberty, gender fluidity) we aim to uncover the impact of gender-affirming surgery and potential differences in body experiences on GD.

### 2.2. Hypotheses

The following hypotheses aim to address key questions regarding GD, body perception, and autobiographical expression. By analyzing firsthand spoken videos and visual content shared by individuals with GD, this study seeks to uncover patterns and themes related to the sense of bodily ownership and experiences of gender incongruence. Additionally, the study aims to examine the impact of gender-affirming procedures on individuals' body perception and relationship with their physical body.

1) Hypothesis 1: Analysis of the content from transgender and gender non-conforming (i.e., non-binary) individuals will unveil common patterns and themes associated with body perception and experiences of gender incongruence. This hypothesis proposes that an examination of the content shared by transgender and non-binary individuals will reveal recurring motifs and narratives concerning body image, gender identity, and the experience of living with feelings of gender incongruence.
2) Hypothesis 2: Autobiographical videos shared by individuals with GD will detect negative affect and discomfort toward their bodies. This hypothesis posits that GD sufferers will often articulate feelings of distress or dissatisfaction regarding their physical appearance and gender identity in their autobiographical narratives.

3) Hypothesis 3: Individuals who have undergone gender-affirming surgery will report differences in their body experiences compared to individuals who have not undergone such surgery. These intensity changes in GD will be reflected in their autobiographical narratives, with a predicted trend of greater body satisfaction and reduced dysphoria among those who transitioned surgically.

## 3. RESEARCH METHODS

This study employed a qualitative research design, specifically a phenomenological approach, to explore the lived experiences of individuals with GD. Phenomenology aims to understand the subjective experiences and meanings individuals attribute to certain phenomena, in this case, the feeling of being in a "wrong body", and the experiences associated with it. This approach aligns well with our goal of gaining a deeper understanding of the body perception in relation to GD.

### Data Collection

For the collection of data, in the search for the cultural narratives of body perception within the transgender community on YouTube, we adopted a netnographic approach (as reviewed in Brajkovic, 2011; Kozinets, 2011) a form of online ethnography. As described by Kozinets (2011), netnography is a distinct form of ethnography tailored to the specific requirements of the modern world (Brajkovic, 2011). It allows a non-participatory observational approach aimed at exploring the cultural narratives of a specific group. While studies like Snelson's (2015) investigation of school-related vlogging and Genita's (2024) examination of intercultural marriages utilized YouTube videos with content analysis, our focus is on capturing the essence of the lived experience of GD in relation to body perception. Preference is thus given to English-spoken videos to ensure the universality of language comprehension. Due to the nature of this research, our approach provides raw and informative insights, enabling us to learn directly from individuals within such social platforms (i.e., YouTube) in a manner that is both authentic and contextually rich.

Following established netnographic principles, the data collection process involved:

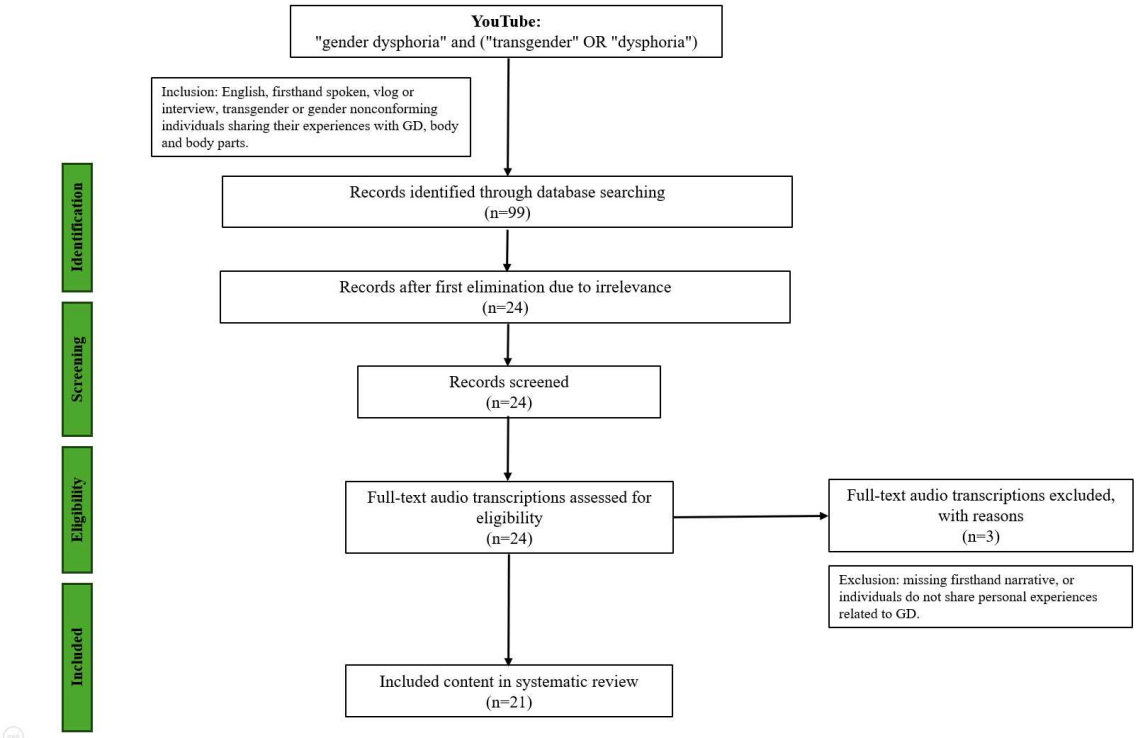
- Research Planning: Defining research goals and data collection strategies.
- Gaining Cultural Entrée: Familiarizing with the online transgender community and its language, like *binding* or *packing* (see Table 1).
- Data Collection:
    - Keyword Selection: Utilizing keywords like "gender dysphoria", "transgender", and "dysphoria" in Google Advanced Search to identify relevant YouTube videos [i.e., ("gender dysphoria" OR transgender OR dysphoria)].

- Inclusion/Exclusion Criteria: Selection of videos featuring individuals openly discussing their GD experiences and autobiographical insights related to their bodies. Excluding irrelevant content like music videos or news reports.
- Sample Selection: Reviewing video titles, descriptions, and initial content for relevance.

- Data Extraction: Generating audio transcriptions from selected videos and reviewing them for accuracy and completeness.

**Figure 1.**

**Pipeline of screening process**




## Sample Characteristics

Following the established inclusion/exclusion criteria, we conducted a two-phase screening process to identify relevant YouTube videos. This involved reviewing titles, descriptions, and initial content of the videos. In the initial phase, 99 videos were reviewed, with 75 excluded for not meeting the criteria (e.g., music video, religious content). A second screening of the remaining videos based on verbal content resulted in the exclusion of 3 additional videos

(e.g., missing first-person narrative, irrelevant content). This rigorous screening process yielded a final sample of 21 YouTube videos. These videos featured a total of 26 individuals with GD, representing a diverse range of experiences.

**Table 4.**

**Characteristics of sample**

| Video number | Subject | Upload date | Direction of transition |
|---|---|---|---|
| 1 | D1 | 10/04/2018 | MtF |
| 2 | D2 | 12/11/2018 | MtF |
| 3 | D3 | 11/04/2022 | Non-binary |
| 4 | D4 | 14/11/2023 | MtF |
| 5 | D6 | 13/06/2023 | FtM |
| 6 | D7 | 18/06/2023 | MtF |
| 7 | D8 | 18/06/2023 | FtM |
| 8 | D10 | 22/03/2022 | MtF |
| 9 | D11 | 22/03/2022 | FtM |
| 10 | D12 | 04/01/2022 | MtF |
| 11 | D13 | 13/07/2020 | FtM |
| 12 | D14 | 04/01/2019 | FtM |
| 13 | D15 | 02/07/2023 | MtF |
| 14 | D16 | 13/07/2023 | FtM |
| 15 | D17 | 28/06/2023 | MtF |
| 16 | D18 | 28/06/2023 | MtF |
| 17 | D19 | 04/07/2018 | FtM |
| 18 | D20 | 20/11/2012 | MtF |
| 19 | D21 | 24/04/2019 | FtM |
| 20 | D22 | 24/04/2019 | MtF |
| 21 | D23 | 26/08/2023 | MtF |
| 22 | D24 | 22/06/2023 | Non-binary |
| 23 | D25 | 31/05/2023 | FtM |
| 24 | D26 | 30/06/2021 | Non-binary |
| 25 | D27 | 29/04/2023 | MtF |
| 26 | D28 | 29/04/2023 | MtF |

The sample breakdown included 14 individuals who identified as MtF, 9 who identified as FtM, and 3 who identified as non-binary. They were from the following countries: United States (n=19), United Kingdom (n=3), New Zealand (n=2), Australia (n=1), and Germany (n=1). Participants represented various stages of transitioning, encompassing

legal, social, and medical procedures. The participants' ages ranged from 8 to 42 years old (M = 21.7, SD = 12.4), with age data missing for 11 individuals.

**Data Analysis**

This study employed a pre-established coding scheme developed based on existing literature on body phenomenology and the lived experience of GD. This scheme categorized data based on predefined categories relevant to the research questions (see Table 5). To analyze the audio transcripts, we embraced a content coding approach based on the diagnostic criteria for GD (see Table 2; APA, 2022) and informed by previous research (Pulice-Farrow et al., 2020; Mirabella et al., 2020). The transcribed data was analyzed using NVivo Software (QSR International, 2014) to identify repetitive patterns among these categories. This analysis aimed to shed light on how individuals with GD narrate their body-related experiences through YouTube narratives.

The study adhered to ethical guidelines for online research, ensuring anonymity. We also considered fair use exceptions for utilizing copyrighted material on YouTube, such as quotations. In the European Union, fair use exceptions may apply to works used for "quotation, criticism, review, caricature, parody, and pastiche" (Google, 2024).

## 4. RESULTS

This qualitative analysis employed content analysis to explore the lived experiences of GD in a sample of individuals who identify as transgender or gender non-conforming. We analyzed audio transcriptions of YouTube videos. The predefined codes were grouped into three core categories: *BODY, AFFECT,* and *TRANSITION.* This paper focuses on presenting the qualitative findings related to how participants described their experiences of body dysphoria primarily, and the associated emotional consequences. Sub-categories are illustrated with time-specific quotes directly attributed to documented individuals with GD.

**Table 5.**

**Categories and sub-categories of Body Perception and Gender Dysphoria**

| Core category | Sub-category | % of sample |
|---|---|---|
| Body perception | | 38% |
| | Descriptions of GD | |
| | Expressed discomfort or negative affect toward gender-specified body part(s) | |
| | Expressed discomfort or negative affect toward gender non-specified body part(s) | |
| | Desire to be in the correct body | |
| Affect and distress | | 33% |
| | Emotional responses in distress of GD | |
| | Avoidance behavior | |
| | Self-harm, suicidal ideation and suicide | |
| Transition | | 29% |
| | Existence of GD in pre-puberty | |
| | Existence of GD in during or after puberty | |
| | Pre-transitioning | |
| | Post-transitioning and *Gender Euphoria* | |
| | *Gender Fluidity* | |

### Body Perception

Body perception was the first predefined category most frequently reported in the analysis. This discomfort manifested in four various ways: *descriptions of GD, discomfort towards gender-specified body part(s), discomfort towards gender non-specified body part(s),* and *the desire to be in the correct body.*

***Descriptions of GD***

Participants described a pervasive sense of discomfort with their bodies, often characterized by feelings of "wrongness", "incompleteness", or "detachment" from their physical selves:

> I never knew about what transgender was. I just knew, I was in the wrong body (D28, 2023, 01:24).

One individual described experiencing these feelings as a constant weight throughout his life:

> I was born female and grew up for many many years as a woman. I married, I had children, and I wasn't unhappy. But I was never whole, I never felt complete… but it took many many years to discover who I actually am (D13, 2020, 00:26).

Another individual described a general unease with their bodies, using metaphors to convey the feeling of inhabiting the "wrong" body:

> A lot of people don't understand what dysphoria feels like and I understand that sometimes it's difficult to see a situation from another's perspective. In other words, dysphoria feels like wearing your right shoe on your left foot, and your left shoe on your right foot, but never taking them off. So, it's uncomfortable and you can't be your true self (D19, 2018, 00:24).

> Imagine you're wearing an itchy ill-fitted sweater that you just can't seem to get off. Yeah, that's exactly what it's like (D3, 2022, 00:05).

Another individual described transitioning as a way of moving away from the confines of masculinity:

> For me, I was transitioning basically during my college years. And I was dipping my toe in the water, then a little bit deeper, and a little bit deeper. It wasn't about learning how to be female; it was more about forgetting about this artificiality of maleness that had been imposed upon me (D20, 2012, 01:33).

Even for individuals who identify outside the gender binary, overall discomfort may still stem from GD. However, for some non-binary individuals, this distress may manifest more as social dysphoria, rather than body dysphoria:

> Social dysphoria is what hits hard for me and is what gets me dysphoric the most. Knowing that other people will never see me as my gender is heartbreaking and really does get to me, especially as a trans binary person. Because people really don't think that NBs [non-binary people] are real (D3, 2022, 02:38).

***Expressed Discomfort or Negative Affect toward Gender-Specified Body Part(s)***

Several individuals reported experiencing discomfort with specific body parts typically associated with their assigned sex at birth. These feelings of dysphoria could motivate coping strategies, such as chest binding for individuals assigned female at birth who desire a flatter chest (see Table 1). One participant described the distress caused by the incongruence between their gender identity and their physical body when asked about the importance of medical intervention:

> It's the part that I hate the most. It's my genitalia. It's the most masculine part of me and it just makes me sick sometimes (D18, 2023, 06:52).

The discomfort some individuals felt toward their sex-assigned anatomy was initially a source of confusion. They may not have been able to digest this feeling until they learned about GD:

> I responded to my own body, so I assumed for many many years that not liking breasts and not being comfortable with having a period, not liking touch, a whole heap of things were going on for me… I assumed those things were because of my autism… I was 61 years old before I had my confirmed diagnostic assessment that that said, "You are, in fact, living with Gender Dysphoria" (D13, 2020, 02:11; 08:09).

***Expressed Discomfort or Negative Affect toward Gender Non-Specified Body Part(s)***

However, some participants also discussed a broader range of body features as contributing to their sense of gender incongruence. These features, such as head and hand size or height, may not be as readily modifiable as primary sex characteristics. Nevertheless, participants

acknowledged that societal expectations often associate these features with the binary categories of masculine and feminine.

> A couple examples for AFAB [assigned female at birth] people are getting dysphoria around your chest and hips, getting dysphoria around your hair. A lot of AFAB people get dysphoria around their height. I know personally for me, sometimes, I can get dysphoria around my head size and my hands as well. Because I feel like they are fairly feminine, and it makes me dysphoric (D3, 2022, 01:19).

In addition, this participant described coping mechanisms they developed to manage the discomfort associated with their height:

> Even if it's just a small thing that makes you really *euphoric* [emphasis added]. I know wearing my DOCs [type of footwear with thick soles] makes me euphoric because I'm like, "Yes! I'm wearing boots. Masculinity!" It's those kinds of things that can really help you feel better in your own skin, even if it's something small that you're wearing, being around people who respect your pronouns and your name (D3, 2022, 05:08).

***Desire to Be in the Correct Body***

Consistent with the diagnostic criteria for GD, a strong desire to be of their identified gender was a prominent sub-category in our sample. Many individuals reported experiencing these feelings from early childhood. This realization often manifested through behaviors that challenged societal expectations of the gender binary:

> I was four, but throughout my childhood, I remember that I was always with books, movies, anything that I would and could kind of put myself into… It was always the female character (D1, 2018, 01:55).

Another individual recounted experiencing this desire from the age of nine, a feeling that has persisted throughout her life:

> I know exactly when: I was four. And I was watching Barbie and the Pink Shoes. And I was like "I want to be a ballet dancer". And then, when I started doing ballet, that's when I was like "I want to be a girl" (D12, 2022, 00:03).

**Affect and Distress**

Building upon the theme of body dysphoria, our analysis focused on a second core category: the emotional consequences of these experiences. The audio transcriptions extracted from YouTube revealed that the discomfort associated with GD often were translated into negative emotions or distress. Some individuals described a range of negative emotional responses, including *emotional responses in distress of GD, avoidance behavior, self-harm, suicidal thoughts, and suicide.*

***Emotional Responses in Distress of GD***

Many individuals described experiencing a range of negative emotions associated with their GD, including feelings of depression, anxiety, and emotional breakdowns:

> We went into 'Best and Less', Mum was going to the boy's aisle when I started crying. And begging her to go to the girl's aisle. And she walked a little bit further to the boy's aisle and I had a really, really bad breakdown (D12, 01:28).

Additionally, some individuals reported that their GD could be a source of confusion, both consciously and unconsciously:

> I had buried that little girl inside of me for so long that when I started kind of exploring my sexuality. I was attracted to men but the only way that I could rationalize that was "Okay. I'm a man, so I must be gay" … I met my husband four years ago and we've been married for three years. We have a beautiful home here, in Germany. We have two dogs, two cats, and for all intents and purposes. I should be the happiest person in the world, but I was still depressed, and I could not figure out what is wrong with me. Why can't I be happy? And, so, that's when I started to seek professional help… (D1, 2018, 03:19).

***Avoidance Behavior***

Our analysis identified self-limiting behaviors as a coping mechanism for some individuals experiencing GD. These behaviors aimed to minimize distress associated with their bodies. Examples included avoiding mirrors, reflections, or seeing specific body parts. One child with GD in our dataset exhibited avoidance behaviors when asked about bath time:

> I mostly ignore what I've got down there. [When having baths and things] I try not to think about [it] (D10, 2022, 36:22).

The observed avoidance behaviors also extended to social interactions and intimacy. For example, participants reported that the intensity of their discomfort with their GD and bodies led them to withdraw from social situations:

> Dating is really hard because at a certain point you have to tell your partner that you're transgender or was transgender. And some boys, in my case, they don't seem to like. They think it's bad then they don't want to see me anymore. I've had that like a couple of times, so at a certain point I just stopped dating. Because there was like a trigger for me to get depressed (D21, 2019, 04:58).

Our analysis also revealed avoidance behaviors among some individuals who struggled to accept their transgender identity. One participant, for example, described their experience with GD and the coping mechanism of adhering rigidly to their assigned sex at birth, reinforcing the binary:

> I would consider what happened over the next coming years, me taking it to the extreme. This is me, competing in Miss Ohio USA at 19 years old and this was the ultimate attempt at seeing if I could sustain myself by the external praise and affirmation from my femininity when internally I definitely felt a sense of masculinity… I used this to really hide and press down any internal sense of who I really was (D14, 2019, 02:15).

***Self-harm, Suicidal Ideation, and Suicide***

The results suggested a link between body dysphoria and self-harm behaviors, including non-suicidal self-injury, suicidal ideation, and suicide attempts. This association underscored the severity of GD, as it can contribute to increased vulnerability to depression and suicidal thoughts within the transgender population:

> I transitioned to be happy, to be true to myself. It was a very difficult time. I was just stuck in this depression, and I struggled with suicidal thoughts (D23, 2023, 06:27).

Interestingly, some data suggested that suicidal thoughts could occur even after starting a gender transition. The lengthy process of physical changes, which can take years, may be linked to a decrease in mental health for some individuals:

> Unfortunately, in 41 percent of transgender people, including myself, have attempted suicide. And it wasn't at the beginning of my transition. It wasn't when I was considering coming out. It was four years, or more, into my transition that I hit a brick wall. Because I realized, as I said in another, surgery wasn't gonna give me this alignment that I felt with more than just my body. And I had to, then, deal with and cope all of the things that I had been pushing down and snoozing for that amount of time (D14, 2019, 10:02).

**Transition**

Our literature review identified the fluidity of GD over time as a significant theme. This final category encompasses the dynamic nature of GD, as evidenced by variations in its presentation across five sub-categories: *pre-puberty, during or after puberty, pre-transitioning, post-transitioning (including the possibility of Gender Euphoria),* and *Gender Fluidity.*

***Existence of GD in Pre-Puberty***

Consistent with research findings, our data suggested that GD can manifest in early childhood. Focusing on children under 10 years old (before the typical onset of puberty, defined as ages 10-12; APA, 2018), our analysis revealed that individuals expressed their early childhood experiences through behaviors:

> When I was little, like three years old, or something, I used to dress up as a girl because it felt really normal to me. Till people started telling me that I had to dress up to my gender I was born into, a boy. And I kept doing it in secret until it couldn't be a secret anymore. I find it hard to explain how it feels to be like this because I was really born like this… I don't have a choice, I just feel female and there is nothing in me that once thought that I was male (D21, 2019, 03:12).

As they progressed through puberty, the anticipation of physical changes incongruent with their gender identity led to heightened distress.

### *Existence of GD in During or After Puberty*

As participants transitioned into adolescence and puberty, the development of secondary sex characteristics (e.g., breasts, voice deepening) corresponded with a rise in self-reported GD and body dysphoria:

> When my, you know, body started to change and clothes sat on me differently and all of that was just the beginning of really sort of, you know, disconnecting from myself and feeling a degree of discomfort that was very erosive and damaging (D25, 2023, 00:05).

One participant described the development of secondary sex characteristics as a constant betrayal, a physical manifestation of their struggle to be seen as their true gender:

> I always would kind of teeter on that line between a boy or a girl. But, then, when you hit puberty that kind of all changes and, then, became much more difficult… I remember as my body was changing, going through puberty, hating everything that I saw and it just… I was disgusted with what was happening because I couldn't be this little girl that I had tried so hard to be as a child (D1, 2018, 02:21).

### *Pre-transitioning*

Our analysis revealed that discomfort associated with GD and body dysphoria was most prevalent among participants prior to transitioning. The physical features incongruent with their gender identity emerged as a core source of their GD:

> It's, you know, being assigned a gender at birth based on your genitalia, and that not being the reality of who you are. Then, the sort of incongruence and disconnect with that, [it] just continues to chip away at you (D25, 01:13).

One individual described how an external observer, a parent, articulated their sense of incompleteness and unfulfillment pre-transitioning:

> I think my mom actually puts it really well in the book. She said that before I transitioned, I just wasn't all there. Like, we never, she never had all of me. I was never fully present. And I couldn't quite share my feelings. I couldn't quite be a full member of the family (D20, 2012, 01:09).

The inability to articulate their feelings sometimes leads individuals to experience confusion about their gender identity. Finding appropriate terminology to describe their experiences provided some relief from the discomfort:

> I mean, I remember watching this YouTuber (i.e., content creator on YouTube) in a video [that] she was talking about how she was trans and something that she was doing. I was like "Oh my God". A huge weight lifted off my shoulder because I was finally had clarity on the way I felt (D17, 2023, 00:35).

Some participants also described an earlier misidentification with same-sex attraction as a coping mechanism to manage their discomfort and confusion. This strategy involved coming out as gay men or lesbian women before ultimately recognizing their GD and transitioning:

> I thought that I'm attracted to women, I am a woman, therefore I must be lesbian. And I must be a butch lesbian. Eventually, I came to understand that that term was in fact tying me, keeping me tied, to a gender identity as female that wasn't mine (D13, 2020, 04:16).

***Post-Transitioning and Gender Euphoria***

Our research suggested that alleviating GD was a primary motivator for many participants' desires to achieve physical characteristics that aligned with their gender identity. The closer they felt to their authentic selves, the greater their resilience or tolerance towards GD became. For example, one individual described experiencing fluctuations in the intensity of their GD over time:

> I've worked so hard to become the woman that I was supposed to be just from hormones. I got these nice legs, my facial features changed, I'm soft… I am who I'm supposed to be and I'm happy… I feel like I'm happy with the way I look and everything. But, still, obviously I'm a human being. So, still, some days I'm like, you know… I'm a little ugly today but I feel like for the most part, I'm happy with how I look (D28, 19:00).

The expression of GD among non-binary individuals may take a distinct form compared to binary transgender experiences:

> The biggest thing that helped me with my Gender Dysphoria is realizing that my gender, no matter what anyone else perceives me. As that realization was so powerful because no matter what anyone else sees me as I know that they're looking at a non-binary person. Because I know that I am non-binary and that makes me so happy that this is a non-binary body no matter what it looks like right now (D3, 06:37).

The concept of experiencing completeness, happiness, and excitement associated with the free expression of gender identity is referred to as *Gender Euphoria*. In essence, *gender euphoria* describes the positive emotional state achieved by transgender and gender non-conforming individuals when their internal sense of gender identity aligns with their outward presentation and physical embodiment. Several participants in our study discussed this phenomenon:

> … and, you know, the first time they get your pronoun correct, not because they were being kind to you because it's how they saw you in the world. It's just you feel elated in that moment (D15, 03:57).

> I remember the first time I was fully dressed in boy's clothes, like, as an adult, out. It was like super liberating for me. I was like "Oh my God, this feels so amazing (D16, 03:33).

> I felt like I had just climbed out of a wet suit that I had been wearing my entire life that, all of a sudden, that I had nerve endings, a million more nerve endings than I had. It just, the world felt different. You know, something happened to my body chemistry where it was wrong, and then, all of a sudden, it just clicked, and it became right (D20, 01:33).

***Gender Fluidity***

Interestingly, GD can manifest in dynamically throughout a transgender or gender non-conforming person's life. For some individuals, GD may fluctuate in intensity, even persisting despite attempts to diminish it:

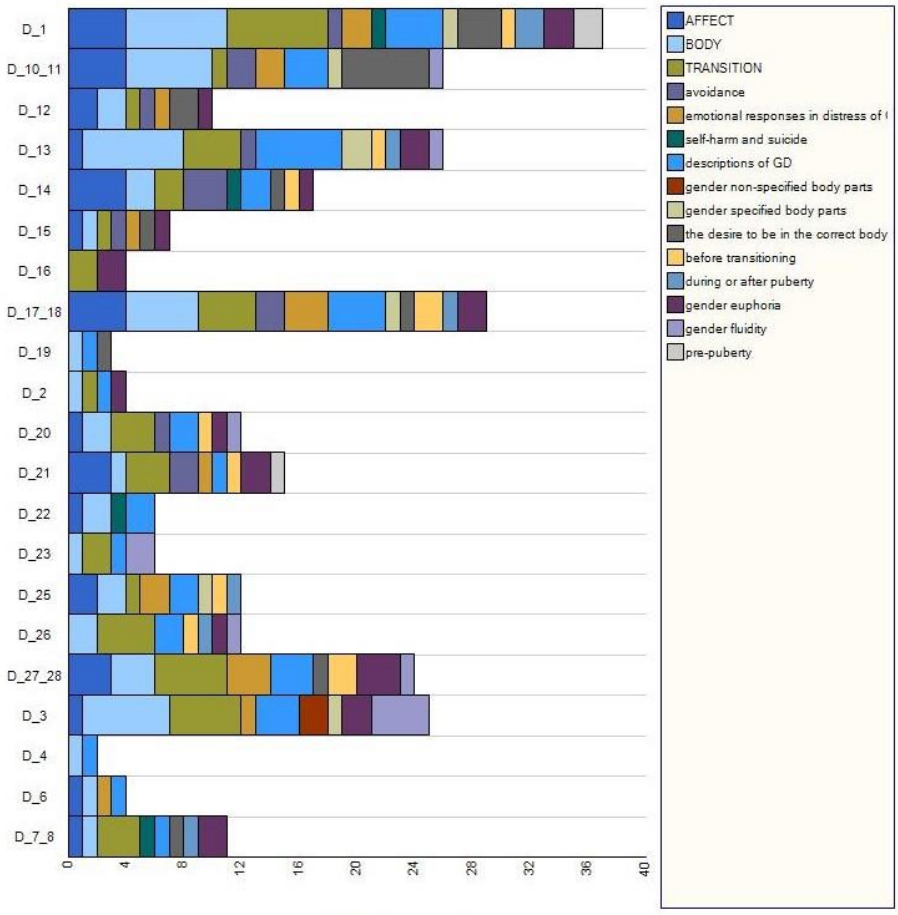
> A lot of times people ask me when I first knew. Like, when did I first start thinking about gender issues, and when did I know, when did things change. And, for me, it's really a hard question to answer. Because I don't ever remember that not being an issue (D20, 00:00).

One individual shared their experience with fluctuations of GD, accompanied by the arose confusion in terms of diagnostic criteria, indicating the underrepresented non-binary population:

> It took me a while to call myself non-binary/trans because my dysphoria is pretty fluid, in the way it presents itself. And there are times where I thought that I was faking being non-binary or trans because so much emphasis is put on Gender Dysphoria to be trans. And I don't have it every day, or I don't have it to the intensity that I thought I should have it in order to call myself a real trans person (D3, 03:51).

**Figure 2.**

**Bar chart of category impact on subjects**




*Note:* The weight of defined common patterns and themes of GD experience and body perception calculated according to each individual report.

**Thematic Interplay**

> I just felt like an imposter. I felt like an imposter in my own skin, and I got really good at hiding how I felt, what is that discomfort feeling, like… I was completely detached from what I was seeing and who I was, who I actually am inside. So, for me, I'm just trying to make my outsides mirror who I really feel like I am on the inside (D17, 2023, 00:03).

The three themes we predefined (body perception and GD, related experienced distress, and persistence or changes over time) were thoroughly studied among individuals with GD. However, the lived experience, as exemplified by the quotes above, often integrates these categories into a cohesive narrative, experienced together. For example, someone might feel like their body does not match who they are, which can lead to both physical and emotional distress. In Figure 2, we present the interplay of categories and sub-categories derived from GD experience and body perception. This figure was generated using Nvivo (Lumivero, 2014) and plotted with a Matrix Coding Query based on coding reference counts. The bars represent the weight of defined common patterns and themes of GD experience and body perception for each individual. As shown, there is a clear trend suggesting the inevitability of combined themes in the essence of the lived experience of GD in relation to body perception.

# 5. DISCUSSION AND CONCLUSION

> "Body image has come to mean not only the way one perceives his own body but also the way he feels about his perceptions" (Pauly & Lindgren, 1977, p. 133)

This qualitative study employed a phenomenological approach to explore the lived experience of body perception among individuals with GD. Through the analysis of autobiographical content shared in YouTube videos, the research aimed to uncover recurring patterns, emotional expressions, and the impact of transitioning on body perception in GD.

The first hypothesis, predicting the identification of repetitive patterns and themes regarding body perception among transgender and gender non-conforming individuals, was validated through observations. In this study, participants frequently expressed feelings of alienation from their physical bodies, aligning with prior research that positions body perception as central to GD, characterized by feelings of wrongness, incompleteness, and shifting away from the physical sense of self. This is in line with the research conducted by Feusner et al. (2016), who found that transgender participants were more drawn to morphed pictures closer to their perceived selves, indicating a conscious decision-making process rather than reflexive perceptual recognition when identifying with their gender identity. Van de Grift et al. (2016b) additionally highlighted that body attributes difficult to conceal typically garnered the highest dissatisfaction compared to the other sex.

Moreover, when detailing the mismatched body parts, participants commonly cited gender-related parts (e.g., genitalia, secondary sex characteristics) as origins of their body dysphoria. Prior research noted dissatisfaction with primary sex characteristics, with MtFs focusing more on genitalia and body hair and FtMs on breasts and hips (Becker et al., 2016; Fisher et al., 2014). However, some concerns extended to non-gender-specified body parts like the head or hand scales. According to van de Grift et al. (2016a), the discomfort arose not only from primary sex characteristics but also secondary ones, such as facial hair and posture for MtFs and hip contours and body hair for FtMs.

Additionally, the desire to embody another gender was a prevalent theme. Fisher et al. (2014) stated that being transgender often centers on a profound desire to attain the primary and secondary sex characteristics of a gender different from one's assigned sex. Our study suggests that that may not be the case for all individuals of the gender-expansive population. Some participants, specifically non-binary individuals, expressed a sense of incongruence that differed from the stereotypical experience of transgender individuals. Indeed, van de

Grift et al. (2016a) noted that not all transgender gender non-conforming individuals experience this discomfort or seek medical interventions, indicating that social gender perceptions significantly influence overall body perception, potentially affecting their ability to "pass". This was evidenced by our study as the reported content includes avoidance from social situations in order not to feel, or diminish the negative affect, of their experienced GD, explained in the next section.

Kraemer et al. (2008) suggested that conscious thoughts and emotional experiences significantly influence body identification, especially for those feeling insecure and unattractive due to body image concerns. Our findings corroborate this, as descriptions of depression, anxiety, and severe distress (e.g., breakdowns) resulting from the misalignment of gender identity and physical body systematically emerged. This dissatisfaction often aligned more closely with social dysphoria than body dysphoria, suggesting that negative affects might also stem from social interactions. Pulice-Farrow et al. (2020) found that GD experiences are heavily influenced by interpersonal interactions and the broader social environment, highlighting the dynamic nature of GD. In an attempt to cope, individuals in our study reported avoidance behaviors, such as avoiding certain body parts and distancing themselves from social life. These behaviors, including avoiding mirrors and reflections or wearing loose clothing, were also observed (Coleman et al., 2012; Cohen-Kettenis & Pfafflin, 2010). One illustrative case from our sample involved an individual who sought to accept their physicality through validation and approval from those who perceived them as a woman. These behaviors are supported by research that identifies them as coping strategies employed to manage distress and mitigate daily dysfunction. Such strategies include avoiding interaction with one's own body and taking extreme measures to conform to one's affirmed gender (Coleman et al., 2012; Cohen-Kettenis & Pfaffin, 2010).

In extreme cases, some participants in our study indicated engaging in non-suicidal self-injury, experiencing suicidal ideation, and attempting suicide as coping mechanisms for GD. It is not surprising that this group exhibits higher rates of suicidality given the pervasive stigmatization and discrimination they face. This aligns with research showing elevated suicidality rates among transgender individuals, especially FTM individuals compared to MTF individuals (Peterson et al., 2017). Suicide attempts were reported by our sample as unfortunate events they hoped to avoid in the future, often linked to the pre-transition phase. A substantial body of research has established a heightened risk of suicide among transgender individuals (Mak et al., 2020). Notably, this risk appears to be consistent across various

transgender subgroups, with no significant differences identified (Peterson et al., 2017). On a more positive note, newer generations tend to embrace individuality, including gender expression, with greater openness. According to Farokhi et al. (2024), although the interpretations of transphobia, and related abuse, were relatively consistent across generations, older transgender individuals reported facing more violence and feeling less empowered to resist family abuse.

Our findings align with previous research demonstrating that medical transition steps, such as hormone therapy and gender-affirming surgeries, can alleviate negative feelings associated with GD and improve overall well-being (Bandini et al., 2013; van de Grift et al., 2016a). Additionally, the study supports the notion that GD can manifest at various ages. Individuals across a wide age range reported experiencing GD, suggesting it is not limited to a specific developmental stage. This aligns with Nieder et al. (2011) who found that FtM individuals often reported earlier onset of GD (pre-puberty) compared to MtF individuals. The later emergence of GD in some MtF participants was concluded to be due to later discovery or potentially influenced by societal factors or the perception of having "more to lose" by expressing true gender (Nieder et al., 2011). While limitations in participant demographics of our study prevent definitive conclusions about the permanence or impermanence of GD, our findings emphasize the potential influence of social environments. We observed that participants who had more social support, particularly family or friendships with other transgender and gender-nonconforming individuals, may have influenced their experience of dysphoria. Indeed, research by Steensma et al. (2013a) suggested that the way families manage GD can impact an individual's cognition of gender representation. This finding indicates the importance of considering the social context surrounding transgender and gender non-conforming individuals, as the intensity of GD experiences may be influenced by these external factors over time.

Following the discussion of age onset, in the current study, the medical procedures were claimed to elevate the discomfort towards the body as it supports gender expression, aligning the perception with the physicality of one's body. Many participants described positive experiences following their transition, contrasting with the negative emotional responses typically reported. The negative affect seems to be elevated according to the previous research, indicating that medical interventions can significantly reduce dissatisfaction and enhance self-concept or else they remain dissatisfied and unhappy with their fixed gender identity (Pauly & Lindgren, 1977). This study's findings are further

supported by evidence demonstrating that transgender individuals who pursue medical interventions to match their identified gender report increased feelings of authenticity and a more positive body image (Kraemer et al. 2008). Additionally, social transitioning, or "passing," correlates with high levels of body satisfaction, underscoring the positive impact of gender-conforming medical interventions on body perception (van de Grift et al., 2016a; Jones et al., 2016).

A concept that was expressed in our study is Gender Euphoria, described by individuals as “elated”, “liberating”, and “becoming right”. Ashley and Ells (2018) defined it as “a distinct enjoyment or satisfaction” arising from the alignment, while it was also described as resilience (Lambrou et al., 2020). Further, Beischel, Gauvin, and Anders (2022) suggested that euphoria and dysphoria have a complicated relationship, where their participants expressed them as opposites, or experiencing dysphoria more chronically and euphoria less intense than the prior. The conceptualization of gender euphoria highlights the complex relationship between euphoria and dysphoria, marking the lived experience unique to the individual. Therefore, it is important to acknowledge the individual variations in how euphoria and dysphoria manifest, as a single definition might not fully capture everyone's reality (Beischel et al., 2022). The current study further highlights the difficulty in establishing universal terminology within the transgender and gender non-conforming community as experiences vary depending on the individual.

The study also noted that the fluctuations in GD experiences were more pronounced among non-binary individuals, reflecting their fluid gender expression. Non-binary participants reported changes in GD more acutely than transgender individuals, suggesting that traditional measures of GD may not fully capture their experiences (Galupo, Pulice-Farrow & Pehl, 2021). This highlights the need for nuanced approaches to understanding GD across diverse gender identities. Furthermore, the elevation of negative affect happened in our sample population after legal, medical, or social transitioning. Conversely, research by Byne et al. (2018) and Chen et al. (2016) suggested not all transgender and gender non-conforming individuals experience GD. Furthermore, the desire to fully transition to a binary gender identity may not resonate with everyone, particularly within non-binary identities (Galupo et al., 2021). Our sample from the non-binary population described a way to cope with their GD as there is no “non-binary body” or there is no standard body form (appearance) for a non-binary person. The distinct experiences of non-binary individuals with

gender may be a reason why traditional measures of GD resonate less with them compared to transgender individuals (Galupo & Pulice-Farrow, 2020).

In conclusion, our study's findings emphasize the significance of medical and social interventions in alleviating GD and improving body perception. Our study highlights the thematic interplay between various phenomena of GD, for instance, changes in perception of body parts related to gender in the journey of transitioning and Gender Euphoria. These interactions are clearly illustrated in Figure 2, which defines the dynamic interconnection between the lived experience of GD and body perception. This reinforces the notion that these experiences cannot be neatly categorized. This holistic perspective aligns with the understanding that individuals construct their self-identity through their embodied experiences. A stable sense of self, body, and a perception that integrates all these elements appears crucial for well-being and mental health.

**Limitations**

This study acknowledges certain limitations. Relying on YouTube content creators may introduce bias, as they might be more likely to share experiences at the extremes of the GD spectrum. Relatedly, the sample does not fully represent the entire transgender and gender non-conforming population. Also, social media research inherently lacks the standardization and control of a traditional experiment. The researchers cannot control for factors that might influence the content creators' narratives, potentially affecting the validity of the data. Finally, the sample may not fully represent the diversity of the transgender and gender non-conforming community. Factors such as age, ethnicity, socioeconomic status, and access to technology could influence who creates content on YouTube.

**Future Implementation**

Despite these limitations, this study offers valuable insights into body perception among individuals experiencing GD. Future research can build upon this work by addressing these limitations by using a more diverse sample that is more representative of the transgender and gender non-conforming community. Developing or utilizing standardized measures to assess body phenomenology would allow for more objective comparisons across studies and populations. Employing a mixed-methods approach that combines quantitative data (surveys) with qualitative data (in-depth interviews or focus groups) can provide richer and more nuanced insights. In particular, semi-structured interviews, with their open-ended nature, can

be very effective in promoting diversity and inclusivity by allowing participants to express their experiences in their own words, potentially revealing unique perspectives.

Future research can delve deeper into the neural mechanisms underlying body perception in GD. Body-related illusions offer promising avenues to explore how the body and embodiment are experienced. To understand how individuals with GD integrate sensorimotor and tactile cues for body perception, for instance, spatiotemporal analysis (e.g., RHI) and Full-Body Ownership Illusion paradigms can provide a further understanding of this complex process. By employing these paradigms, researchers can gain a more comprehensive understanding of how individuals with GD perceive their bodies not just in a static sense, but also in movement and interaction with the environment. Furthermore, these approaches can shed light on how the perception of body ownership might be disrupted in GD and how it might be influenced by therapeutic interventions and, with longitudinal studies, gender affirming interventions. By utilizing these diverse methodologies, future research can significantly advance our understanding of body perception in GD and its relationship to gender identity.

## Conclusion

This study contributes to a growing body of research on body perception in GD. By analyzing narratives shared on YouTube, we revealed the profound impact GD has on body image. Our findings emphasize the importance of addressing body dysphoria in therapy and supporting individuals in achieving bodily congruence. This research lays the groundwork for future studies exploring diverse gender identities. Future research is needed to develop more sensitive and inclusive measurements for the full spectrum of body perception in individuals with GD, experiences beyond the traditional binary to encompass the diversity of identities (i.e. non-binary), and the relationship between body perception and authentic self-expression. By delving deeper into these areas, future research can contribute to a more comprehensive understanding of body perception in GD and support the development of more effective interventions for individuals experiencing this condition.

## REFERENCES


Ainsworth, T. A., & Spiegel, J. H. (2010). Quality of life of individuals with and without facial feminization surgery or gender reassignment surgery. *Quality of life research : an international journal of quality of life aspects of treatment, care and rehabilitation*, *19*(7), 1019–1024. https://doi.org/10.1007/s11136-010-9668-7

Alexopoulos, G. S., Hoptman, M. J., Yuen, G., Kanellopoulos, D., Seirup, J. K., Lim, K. O., & Gunning, F. M. (2013). Functional connectivity in apathy of late-life depression: a preliminary study. *Journal of affective disorders*, *149*(1-3), 398–405. https://doi.org/10.1016/j.jad.2012.11.023

American Psychiatric Association. (2022). Diagnostic and statistical manual of mental disorders (5thed., text rev.). https://doi.org/10.1176/appi.books.9780890425787

Armel, K. C., & Ramachandran, V. S. (2003). Projecting sensations to external objects: evidence from skin conductance response. Proceedings. Biological sciences, 270(1523), 1499–1506. https://doi.org/10.1098/rspb.2003.2364

Ashley, F., & Ells, C. (2018). In favor of covering ethically important cosmetic surgeries: Facial feminization surgery for transgender people. The American Journal of Bioethics, 18(12), 23–25. doi:10.1080/15265161.2018.1531162

Baier, B., & Karnath, H. O. (2008). Tight link between our sense of limb ownership and self-awareness of actions. Stroke, 39(2), 486–488. https://doi.org/10.1161/STROKEAHA.107.495606

Bandini, E., Fisher, A. D., Castellini, G., Lo Sauro, C., Lelli, L., Meriggiola, M. C., Casale, H., Benni, L., Ferruccio, N., Faravelli, C., Dettore, D., Maggi, M., & Ricca, V. (2013). Gender identity disorder and eating disorders: similarities and differences in terms of body uneasiness. *The journal of sexual medicine*, *10*(4), 1012–1023. https://doi.org/10.1111/jsm.12062

Becker, I., Nieder, T. O., Cerwenka, S., Briken, P., Kreukels, B. P., Cohen-Kettenis, P. T., Cuypere, G., Haraldsen, I. R., & Richter-Appelt, H. (2016). Body Image in Young Gender Dysphoric Adults: A European Multi-Center Study. *Archives of sexual behavior*, *45*(3), 559–574. https://doi.org/10.1007/s10508-015-0527-z

Beckmann, C. F., DeLuca, M., Devlin, J. T., & Smith, S. M. (2005). Investigations into resting-state connectivity using independent component analysis. Philosophical transactions of the Royal Society of London. Series B, Biological sciences, 360(1457), 1001–1013. https://doi.org/10.1098/rstb.2005.1634

Beischel, W. J., Gauvin, S. E. M., & van Anders, S. M. (2022). "A little shiny gender breakthrough": Community understandings of gender euphoria. *International Journal of Transgender Health, 23*(3), 274–294.

Bem, S. L. (1981). Gender schema theory: A cognitive account of sex typing. *Psychological Review, 88*(4), 354–364. https://doi.org/10.1037/0033-295X.88.4.354

Berenbaum S. A. (1999). Effects of early androgens on sex-typed activities and interests in adolescents with congenital adrenal hyperplasia. *Hormones and behavior*, *35*(1), 102–110. https://doi.org/10.1006/hbeh.1998.1503

Berenbaum, S. A., & Snyder, E. (1995). Early hormonal influences on childhood sex-typed activity and playmate preferences: Implications for the development of sexual orientation. *Developmental Psychology, 31*(1), 31–42. https://doi.org/10.1037/0012-1649.31.1.31

Bertagnoli, S., Pacella, V., Rossato, E., Jenkinson, P. M., Fotopoulou, A., Scandola, M., & Moro, V. (2022). Disconnections in personal neglect. *Brain structure & function*, *227*(9), 3161–3171. https://doi.org/10.1007/s00429-022-02511-z

Biswal, B., Yetkin, F. Z., Haughton, V. M., & Hyde, J. S. (1995). Functional connectivity in the motor cortex of resting human brain using echo-planar MRI. Magnetic resonance in medicine, 34(4), 537–541. https://doi.org/10.1002/mrm.1910340409

Blanke, O., & Arzy, S. (2005). The out-of-body experience: disturbed self-processing at the temporo-parietal junction. *The Neuroscientist : a review journal bringing neurobiology, neurology and psychiatry*, *11*(1), 16–24. https://doi.org/10.1177/1073858404270885

Bottini, G., Bisiach, E., Sterzi, R., & Vallar, G. (2002). Feeling touches in someone else's hand. Neuroreport, 13(2), 249–252. https://doi.org/10.1097/00001756-200202110-00015

Botvinick, M., & Cohen, J. (1998). Rubber hands "feel" touch that eyes see. Nature, 391(6669), 756. https://doi.org/10.1038/35784

Brajkovic, E. (2011). [Review of the book *Netnography: doing ethnographic research online* by R. V. Kozinets]. *Social Antropology 19*(1) p. 121-122. https://doi.org/10.1111/j.1469-8676.2010.00142_11.x

Braun, N., Debener, S., Spychala, N., Bongartz, E., Soros, P., Muller, H. H. O., & Philipsen, A. (2018). The Senses of Agency and Ownership: A Review. Frontiers in Psychology, 9, 535. https://doi.org/10.3389/fpsyg.2018.00535

Brozzoli, C., Gentile, G., Petkova, V. I., & Ehrsson, H. H. (2011). fMRI adaptation reveals a cortical mechanism for the coding of space near the hand. The Journal of Neuroscience, 31(24), 9023–9031. https://doi.org/10.1523/JNEUROSCI.1172-11/ .2011

Brozzoli, C., Makin, T. R., Cardinali, L., Holmes, N. P., & Farnè, A. (2012). Peripersonal Space: A Multisensory Interface for Body–Object Interactions. In M. M. Murray (Eds.) et. al., The Neural Bases of Multisensory Processes. CRC Press/Taylor & Francis.

Bussey, K., & Bandura, A. (1999). Social cognitive theory of gender development and differentiation. *Psychological Review, 106*(4), 676–713. https://doi.org/10.1037/0033-295X.106.4.676

Byne, W., Karasic, D. H., Coleman, E., Eyler, A. E., Kidd, J. D., Meyer-Bahlburg, H. F. L., Pleak, R. R., & Pula, J. (2018). Assessment and Treatment of Gender Dysphoria and Gender Variant Patients: A Primer for Psychiatrists. *The American journal of psychiatry*, *175*(10), 1046. https://doi.org/10.1176/appi.ajp.2018.1751002

Case, L. K., Brang, D., Landazuri, R., Viswanathan, P., & Ramachandran, V. S. (2017). Altered White Matter and Sensory Response to Bodily Sensation in Female-to-Male Transgender Individuals. *Archives of sexual behavior*, *46*(5), 1223–1237. https://doi.org/10.1007/s10508-016-0850-z

Case, L. K., Solcà, M., Blanke, O., & Faivre, N. (2020). Disorders of body representation. Elsevier eBooks, 401–422. https://doi.org/10.1016/b978-0-12-812492-5.00018-8

Cash T. F. (2004). Body image: past, present, and future. Body image, 1(1), 1–5. https://doi.org/10.1016/S1740-1445(03)00011-1

Cash, T. F., & Deagle, E. A., 3rd (1997). The nature and extent of body-image disturbances in anorexia nervosa and bulimia nervosa: a meta-analysis. *The International journal of eating disorders*, *22*(2), 107–125.

Cash, T.F., & Pruzinsky, T. (2002). Body Image: A Handbook of Theory, Research, and Clinical Practice.

Chen, D., Hidalgo, M. A., Leibowitz, S., Leininger, J., Simons, L., Finlayson, C., & Garofalo, R. (2016). Multidisciplinary Care for Gender-Diverse Youth: A Narrative Review and Unique Model of Gender-Affirming Care. *Transgender health*, *1*(1), 117–123. https://doi.org/10.1089/trgh.2016.0009

Cisler, J. M., James, G. A., Tripathi, S., Mletzko, T., Heim, C., Hu, X. P., Mayberg, H. S., Nemeroff, C. B., & Kilts, C. D. (2013). Differential functional connectivity within an emotion regulation neural network

among individuals resilient and susceptible to the depressogenic effects of early life stress. *Psychological medicine*, *43*(3), 507–518. https://doi.org/10.1017/S0033291712001390

Coates, S., & Person, E. S. (1985). Extreme boyhood femininity: Isolated behavior or pervasive disorder? *Journal of the American Academy of Child Psychiatry, 24*(6), 702–709. https://doi.org/10.1016/S0002-7138(10)60113-6

Cohen-Kettenis, P. T. (2005). Gender identity disorder in DSM? Journal of the American Academy of Child & Adolescent Psychiatry, 44(4), 409-410.

Cohen-Kettenis, P. T., & Pfäfflin, F. (2010). The DSM diagnostic criteria for gender identity disorder in adolescents and adults. *Archives of sexual behavior*, *39*(2), 499–513. https://doi.org/10.1007/s10508-009-9562-y

Cohen-Kettenis, P. T., & van Goozen, S. H. (1997). Sex reassignment of adolescent transsexuals: a follow-up study. *Journal of the American Academy of Child and Adolescent Psychiatry*, *36*(2), 263–271. https://doi.org/10.1097/00004583-199702000-00017

Cohen-Kettenis, P. T., Owen, A., Kaijser, V. G., Bradley, S. J., & Zucker, K. J. (2003). Demographic characteristics, social competence, and behavior problems in children with gender identity disorder: a cross-national, cross-clinic comparative analysis. *Journal of abnormal child psychology*, *31*(1), 41–53. https://doi.org/10.1023/a:1021769215342

Cohen-Kettenis, P.T. & Pfafflin, F. (2003). *Transgenderism and intersexuality in childhood and adolescence* (46). Thousand Oaks, CA: SAGE Publications.

Cohen-Kettenis, P.T. (2005). Gender identity disorders. In C. Gillberg, R. Harrington, & H.-C. Steinhausen (Eds.), *A clinician's handbook of child and adolescent psychiatry* (pp. 695–725). Cambridge: Cambridge University Press.

Cole, M. W., Bassett, D. S., Power, J. D., Braver, T. S., & Petersen, S. E. (2014). Intrinsic and task-evoked network architectures of the human brain. Neuron, 83(1), 238–251. https://doi.org/10.1016/j.neuron.2014.05.014

Coleman, E., Bockting, W., Botzer, M., Cohen-Kettenis, P., DeCuypere, G., Feldman, J., … Zucker, K. (2012). Standards of Care for the Health of Transsexual, Transgender, and Gender-Nonconforming People, Version 7. *International Journal of Transgenderism*, *13*(4), 165–232. https://doi.org/10.1080/15532739.2011.700873

Committeri, G., Pitzalis, S., Galati, G., Patria, F., Pelle, G., Sabatini, U., Castriota-Scanderbeg, A., Piccardi, L., Guariglia, C., & Pizzamiglio, L. (2007). Neural bases of personal and extrapersonal neglect in humans. *Brain : a journal of neurology*, *130*(Pt 2), 431–441. https://doi.org/10.1093/brain/awl265

Conomy J. P. (1973). Disorders of body image after spinal cord injury. *Neurology*, *23*(8), 842–850. https://doi.org/10.1212/wnl.23.8.842

Craig A. D. (2002). How do you feel? Interoception: the sense of the physiological condition of the body. Nature reviews. Neuroscience, 3(8), 655–666. https://doi.org/10.1038/nrn894

Craig A. D. (2009). How do you feel--now? The anterior insula and human awareness. Nature reviews. Neuroscience, 10(1), 59–70. https://doi.org/10.1038/nrn2555

Crouter, A. C., Whiteman, S. D., McHale, S. M., & Osgood, D. W. (2007). Development of Gender Attitude Traditionality Across Middle Childhood and Adolescence. *Child Development, 78*(3), 911–926. https://doi.org/10.1111/j.1467-8624.2007.01040.x

Davy, Z., & Toze, M. (2018). What Is Gender Dysphoria? A Critical Systematic Narrative Review. *Transgender health*, *3*(1), 159–169. https://doi.org/10.1089/trgh.2018.0014

de Vignemont F. (2010). Body schema and body image--pros and cons. Neuropsychologia, 48(3), 669–680. https://doi.org/10.1016/j.neuropsychologia.2009.09.022

de Vignemont, F. (2018). Mind the body. Oxford: Oxford University Press.

de Vries, A. L. C., Kreukels, B. P. C., Steensma, T. D., & McGuire, J. K. (2014). Gender identity development: A biopsychosocial perspective. In B. P. C. Kreukels, T. D. Steensma, & A. L. C. de Vries (Eds.), *Gender dysphoria and disorders of sex development: Progress in care and knowledge* (pp. 53–80). Springer Science + Business Media. https://doi.org/10.1007/978-1-4614-7441-8_3

de Vries, A. L., Doreleijers, T. A., & Cohen-Kettenis, P. T. (2007). Disorders of sex development and gender identity outcome in adolescence and adulthood: understanding gender identity development and its clinical implications. *Pediatric endocrinology reviews : PER*, *4*(4), 343–351.

Dell, P. (2011). Depersonalization: A New Look at a Neglected Syndrome, by M. Sierra. Journal of trauma & dissociation : the official journal of the International Society for the Study of Dissociation (ISSD). 12. 401-3. 10.1080/15299732.2011.573763.

Deogracias, J. J., Johnson, L. L., Meyer-Bahlburg, H. F. L., Kessler, S. J., Schober, J. M., & Zucker, K. J. (2007). The gender identity/gender dysphoria questionnaire for adolescents and adults. *Journal of Sex Research, 44*(4), 370–379. https://doi.org/10.1080/00224490701586730

Diamond, M., & Sigmundson, H. K. (1997). Sex reassignment at birth. Long-term review and clinical implications. *Archives of pediatrics & adolescent medicine*, *151*(3), 298–304. https://doi.org/10.1001/archpedi.1997.02170400084015

Dijkerman, H.C. & de Haan, E.H. (2007). Somatosensory processes subserving perception and action. *The Behavioral and Brain Sciences, 30,* 189-201.

Ding, Y., Kastin, A. J., & Pan, W. (2005). Neural plasticity after spinal cord injury. *Current pharmaceutical design*, *11*(11), 1441–1450. https://doi.org/10.2174/1381612053507855

Downing, P. E., Chan, A. W., Peelen, M. V., Dodds, C. M., & Kanwisher, N. (2006). Domain specificity in visual cortex. Cerebral cortex (New York, N.Y. : 1991), 16(10), 1453–1461. https://doi.org/10.1093/cercor/bhj086

Downing, P. E., Jiang, Y., Shuman, M., & Kanwisher, N. (2001). A cortical area selective for visual processing of the human body. Science (New York, N.Y.), 293(5539), 2470–2473. https://doi.org/10.1126/science.1063414

Driver, J., & Noesselt, T. (2008). Multisensory interplay reveals crossmodal influences on 'sensory-specific' brain regions, neural responses, and judgments. Neuron, 57(1), 11–23. https://doi.org/10.1016/j.neuron.2007.12.013

Egan, S. K., & Perry, D. G. (2001). Gender identity: A multidimensional analysis with implications for psychosocial adjustment. *Developmental Psychology, 37*(4), 451–463. https://doi.org/10.1037/0012-1649.37.4.451

Ehrsson, H. H., Spence, C., & Passingham, R. E. (2004). That's my hand! Activity in premotor cortex reflects feeling of ownership of a limb. Science (New York, N.Y.), 305(5685), 875–877. https://doi.org/10.1126/science.1097011

Ehrsson, H. H., Wiech, K., Weiskopf, N., Dolan, R. J., & Passingham, R. E. (2007). Threatening a rubber hand that you feel is yours elicits a cortical anxiety response. Proceedings of the National Academy of Sciences of the United States of America, 104(23), 9828–9833. https://doi.org/10.1073/pnas.0610011104

Ehrsson, H.H. (2020). Multisensory Processes In Body Ownership. In Sathian K., Ramachandran, V.S. (Eds.) *Multisensory Perception: From Laboratory to Clinic.* Elsevier, 179-200.

Farmer, H., Tajadura-Jiménez, A., & Tsakiris, M. (2012). Beyond the colour of my skin: How skin colour affects the sense of body-ownership. Consciousness and Cognition: An International Journal, 21(3), 1242–1256. https://doi.org/10.1016/j.concog.2012.04.011

Farokhi, Y., Mendoza, V., Ben Hagai, E., Sanders, E., Antin, T., & Ortega, P. (2024). Trans across generations: Shifts in narratives of gender, transphobic violence, and community support. *Sex Roles: A Journal of Research.* Advance online publication. https://doi.org/10.1007/s11199-024-01476-z

Farrer, C., & Frith, C. D. (2002). Experiencing oneself vs another person as being the cause of an action: the neural correlates of the experience of agency. NeuroImage, 15(3), 596–603. https://doi.org/10.1006/nimg.2001.1009

Feinberg, T. E., Venneri, A., Simone, A. M., Fan, Y., & Northoff, G. (2010). The neuroanatomy of asomatognosia and somatoparaphrenia. Journal of neurology, neurosurgery, and psychiatry, 81(3), 276–281. https://doi.org/10.1136/jnnp.2009.188946

Feusner, J. D., Dervisic, J., Kosidou, K., Dhejne, C., Bookheimer, S., & Savic, I. (2016). Female-to-male transsexual individuals demonstrate different own body identification. *Archives of Sexual Behavior, 45*(3), 525–536. https://doi.org/10.1007/s10508-015-0596-z

Feusner, J. D., Moody, T., Hembacher, E., Townsend, J., McKinley, M., Moller, H., & Bookheimer, S. (2010). Abnormalities of visual processing and frontostriatal systems in body dysmorphic disorder. *Archives of general psychiatry*, *67*(2), 197–205. https://doi.org/10.1001/archgenpsychiatry.2009.190

Fink, G. R., Marshall, J. C., Weiss, P. H., Stephan, T., Grefkes, C., Shah, N. J., Zilles, K., & Dieterich, M. (2003). Performing allocentric visuospatial judgments with induced distortion of the egocentric reference frame: an fMRI study with clinical implications. NeuroImage, 20(3), 1505–1517. https://doi.org/10.1016/j.neuroimage.2003.07.006

First M. B. (2005). Desire for amputation of a limb: paraphilia, psychosis, or a new type of identity disorder. *Psychological medicine*, *35*(6), 919–928. https://doi.org/10.1017/s0033291704003320

Fisher, A. D., Ristori, J., Bandini, E., Giordano, S., Mosconi, M., Jannini, E. A., Greggio, N. A., Godano, A., Manieri, C., Meriggiola, C., Ricca, V., Italian GnRH analogs study ONIG group, Dettore, D., & Maggi, M. (2014). Medical treatment in gender dysphoric adolescents endorsed by SIAMS-SIE-SIEDP-ONIG. *Journal of endocrinological investigation*, *37*(7), 675–687. https://doi.org/10.1007/s40618-014-0077-6

Fisk N. M. (1974). Editorial: Gender dysphoria syndrome--the conceptualization that liberalizes indications for total gender reorientation and implies a broadly based multi-dimensional rehabilitative regimen. *The Western journal of medicine*, *120*(5), 386–391.

Fleming, M. Z., MacGowan, B. R., Robinson, L., Spitz, J., & Salt, P. (1982). The body image of the postoperative female-to-male transsexual. *Journal of consulting and clinical psychology*, *50*(3), 461–462. https://doi.org/10.1037//0022-006x.50.3.461

Fox, M. D., Snyder, A. Z., Vincent, J. L., Corbetta, M., Van Essen, D. C., & Raichle, M. E. (2005). The human brain is intrinsically organized into dynamic, anticorrelated functional networks. Proceedings of the National Academy of Sciences of the United States of America, 102(27), 9673–9678. https://doi.org/10.1073/pnas.0504136102

Freud, S. (1905). *Three essays on the theory of sexuality*. https://ci.nii.ac.jp/naid/10024579215

Fusar-Poli, L., Rodolico, A., Sturiale, S., Carotenuto, B., Natale, A., Arillotta, D., Siafis, S., Signorelli, M. S., & Aguglia, E. (2021). Second-to-Fourth Digit Ratio (2D:4D) in Psychiatric Disorders: A Systematic

Review of Case-control Studies. *Clinical psychopharmacology and neuroscience : the official scientific journal of the Korean College of Neuropsychopharmacology*, *19*(1), 26–45. https://doi.org/10.9758/cpn.2021.19.1.26

Gallagher, S. (2005). How the body shapes the mind. New York: Oxford University Press.

Gallagher, Shaun & Cole, Jonathan. (1995). Gallagher, S. and Cole, J. 1995. Body schema and body image in a deafferented subject. Journal of Mind and Behavior. 16. 369-390.

Gallagher, Shaun. (2000). Gallagher, S. 2000. Philosophical conceptions of the self: implications for cognitive science. *Trends in Cognitive Sciences, 4,* 14-21.

Galupo, M. P., & Pulice-Farrow, L. (2020). Subjective ratings of gender dysphoria scales by transgender individuals. *Archives of Sexual Behavior, 49*(2), 479–488. https://doi.org/10.1007/s10508-019-01556-2

Galupo, M. P., Pulice-Farrow, L., & Lindley, L. (2020). "Every time I get gendered male, I feel a pain in my chest": Understanding the social context for gender dysphoria. *Stigma and Health, 5*(2), 199–208. https://doi.org/10.1037/sah0000189

Galupo, M. P., Pulice-Farrow, L., & Pehl, E. (2021). "There Is Nothing to Do About It": Nonbinary Individuals' Experience of Gender Dysphoria. *Transgender health*, *6*(2), 101–110. https://doi.org/10.1089/trgh.2020.0041

Galupo, M. P., Pulice-Farrow, L., & Ramirez, J. L. (2017). "Like a constantly flowing river": Gender identity flexibility among nonbinary transgender individuals. In J. D. Sinnott (Ed.), *Identity flexibility during adulthood: Perspectives in adult development* (pp. 163–177). Springer International Publishing/Springer Nature. https://doi.org/10.1007/978-3-319-55658-1_10

García-Vega, E., Camero, A., Fernández, M., & Villaverde, A. (2018). Suicidal ideation and suicide attempts in persons with gender dysphoria. Psicothema, 30(3), 283–288. https://doi.org/10.7334/psicothema2017.438

Garg G, Elshimy G, Marwaha R. Gender Dysphoria. [Updated 2023 Jul 11]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2024 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK532313/

Genita, V.Y., (2024), Analysis of Youtube Content of Mixed-Marriage Women Living Overseas From The Perspective of Anxiety/Uncertainty Management, PERSPEKTIF, 13 (2); 530-539

Gentile, G., Guterstam, A., Brozzoli, C., & Ehrsson, H. H. (2013). Disintegration of multisensory signals from the real hand reduces default limb self-attribution: an fMRI study. The Journal of Neuroscience: the official journal of the Society for Neuroscience, 33(33), 13350–13366. https://doi.org/10.1523/JNEUROSCI.1363-13.2013

Gentile, G., Petkova, V. I., & Ehrsson, H. H. (2011). Integration of visual and tactile signals from the hand in the human brain: an FMRI study. Journal of neurophysiology, 105(2), 910–922. https://doi.org/10.1152/jn.00840.2010

Gerstmann, J. (1942). Problem of imperception of disease and of impaired body territories with organic lesions. Relation to body scheme and its disorders. *Archives of Neurology & Psychiatry, 48,* 890–913. https://doi.org/10.1001/archneurpsyc.1942.02290120042003

Giummarra, M. J., Bradshaw, J. L., Nicholls, M. E., Hilti, L. M., & Brugger, P. (2011). Body integrity identity disorder: deranged body processing, right fronto-parietal dysfunction, and phenomenological experience of body incongruity. *Neuropsychology review*, *21*(4), 320–333. https://doi.org/10.1007/s11065-011-9184-8

Google. (2024). *Fair Use on Youtube.* https://support.google.com/youtube/answer/9783148?hl=en

Graziano, M. S., & Gross, C. G. (1993). A bimodal map of space: somatosensory receptive fields in the macaque putamen with corresponding visual receptive fields. Experimental brain research, 97(1), 96–109. https://doi.org/10.1007/BF00228820

Graziano, M. S., Yap, G. S., & Gross, C. G. (1994). Coding of visual space by premotor neurons. Science (New York, N.Y.), 266(5187), 1054–1057. https://doi.org/10.1126/science.7973661

Graziano, M.S., Gross, C.G., Taylor, C.S., Moore, T. (2004). A system of multimodal areas in the primate brain. In Charles Spence & Jon Driver (eds.), Crossmodal Space and Crossmodal Attention. Oxford University Press.

Green, R. Family Cooccurrence of "Gender Dysphoria": Ten Sibling or Parent–Child Pairs. *Arch Sex Behav* 29, 499–507 (2000). https://doi.org/10.1023/A:1001947920872

Grivaz, P., Blanke, O., & Serino, A. (2017). Common and distinct brain regions processing multisensory bodily signals for peripersonal space and body ownership. NeuroImage, 147, 602–618. https://doi.org/10.1016/j.neuroimage.2016.12.052

Guardia, D., Lafargue, G., Thomas, P., Dodin, V., Cottencin, O., & Luyat, M. (2010). Anticipation of body-scaled action is modified in anorexia nervosa. *Neuropsychologia*, *48*(13), 3961–3966. https://doi.org/10.1016/j.neuropsychologia.2010.09.004

Guillamon, A., Junque, C., & Gómez-Gil, E. (2016). A Review of the Status of Brain Structure Research in Transsexualism. *Archives of sexual behavior*, *45*(7), 1615–1648. https://doi.org/10.1007/s10508-016-0768-5

Gur, R. C., Turetsky, B. I., Matsui, M., Yan, M., Bilker, W., Hughett, P., & Gur, R. E. (1999). Sex differences in brain gray and white matter in healthy young adults: correlations with cognitive performance. The Journal of neuroscience : the official journal of the Society for Neuroscience, 19(10), 4065–4072. https://doi.org/10.1523/JNEUROSCI.19-10-04065.1999

Guterstam, A., Gentile, G., & Ehrsson, H. H. (2013). The invisible hand illusion: multisensory integration leads to the embodiment of a discrete volume of empty space. Journal of cognitive neuroscience, 25(7), 1078–1099. https://doi.org/10.1162/jocn_a_00393

Ham, T., Leff, A., de Boissezon, X., Joffe, A., & Sharp, D. J. (2013). Cognitive control and the salience network: an investigation of error processing and effective connectivity. *The Journal of neuroscience : the official journal of the Society for Neuroscience*, *33*(16), 7091–7098. https://doi.org/10.1523/JNEUROSCI.4692-12.2013

Harsay, H. A., Spaan, M., Wijnen, J. G., & Ridderinkhof, K. R. (2012). Error awareness and salience processing in the oddball task: shared neural mechanisms. *Frontiers in human neuroscience*, *6*, 246. https://doi.org/10.3389/fnhum.2012.00246

Head, H., Holmes, G. (1911-1912). Sensory Disturbances From Cerebral Lesions, Brain, 34(2-3), 102–254, https://doi.org/10.1093/brain/34.2-3.102

Heylens, G., De Cuypere, G., Zucker, K. J., Schelfaut, C., Elaut, E., Vanden Bossche, H., De Baere, E., & T'Sjoen, G. (2012). Gender identity disorder in twins: a review of the case report literature. *The journal of sexual medicine*, *9*(3), 751–757. https://doi.org/10.1111/j.1743-6109.2011.02567.x

Hines, M. (2009). Gonadal hormones and sexual differentiation of human brain and behavior. In D. W. Pfaff, A. P. Arnold, A. M. Etgen, S. E. Fahrbach, & R. T. Rubin (Eds.), *Hormones, brain and behavior* (2nd ed., pp. 1869–1909). Elsevier Academic Press. https://doi.org/10.1016/B978-008088783-8.00059-0

Hines, M., Brook, C., & Conway, G. S. (2004). Androgen and psychosexual development: core gender identity, sexual orientation and recalled childhood gender role behavior in women and men with congenital

adrenal hyperplasia (CAH). *Journal of sex research*, *41*(1), 75–81. https://doi.org/10.1080/00224490409552215

Hohwy, J., & Paton, B. (2010). Explaining away the body: experiences of supernaturally caused touch and touch on non-hand objects within the rubber hand illusion. PloS one, 5(2), e9416. https://doi.org/10.1371/journal.pone.0009416

Hong, K., Nezgovorova, V., & Hollander, E. (2018). New perspectives in the treatment of body dysmorphic disorder. *F1000Research*, *7*, 361. https://doi.org/10.12688/f1000research.13700.1

International Classification of Diseases, Eleventh Revision (ICD-11), World Health Organization (WHO) 2024-01 https://icd.who.int/browse11

Jeannerod, M. (2006). Motor cognition: What actions tell the self. Oxford University Press. https://doi.org/10.1093/acprof:oso/9780198569657.001.0001

Johnson, K. (2007). Transsexualism: Diagnostic dilemmas, transgender politics and the future of transgender care. In V. Clarke & E. Peel (Eds.), *Out in psychology: Lesbian, gay, bisexual, trans and queer perspectives* (pp. 445–464). John Wiley & Sons Ltd. https://doi.org/10.1002/9780470713099.ch21

Jones, B. A., Haycraft, E., Murjan, S., & Arcelus, J. (2016). Body dissatisfaction and disordered eating in trans people: A systematic review of the literature. *International review of psychiatry (Abingdon, England)*, *28*(1), 81–94. https://doi.org/10.3109/09540261.2015.1089217

Kalckert, A., & Ehrsson, H. H. (2017). The Onset Time of the Ownership Sensation in the Moving Rubber Hand Illusion. Frontiers in psychology, 8, 344. https://doi.org/10.3389/fpsyg.2017.00344

Kallitsounaki, A., & Williams, D. M. (2023). Autism Spectrum Disorder and Gender Dysphoria/Incongruence. A systematic Literature Review and Meta-Analysis. *Journal of autism and developmental disorders*, *53*(8), 3103–3117. https://doi.org/10.1007/s10803-022-05517-y

Kanayama, N., Sato, A., & Ohira, H. (2007). Crossmodal effect with rubber hand illusion and gamma-band activity. Psychophysiology, 44(3), 392–402. https://doi.org/10.1111/j.1469-8986.2007.00511.x

Kanayama, N., Sato, A., & Ohira, H. (2009). The role of gamma band oscillations and synchrony on rubber hand illusion and crossmodal integration. Brain and Cognition, 69(1), 19–29. https://doi.org/10.1016/j.bandc.2008.05.001

Kasten, Erich & Noll, Sarah. (2014). Body Integrity Identity Disorder (BIID): How Satisfied are Successful Wannabes. Psychology and Behavioral Sciences. 3. 222-232. 10.11648/j.pbs.20140306.17.

Keizer, A., Smeets, M. A., Dijkerman, H. C., van Elburg, A., & Postma, A. (2012). Aberrant somatosensory perception in Anorexia Nervosa. *Psychiatry research*, *200*(2-3), 530–537. https://doi.org/10.1016/j.psychres.2012.05.001

Kiani, R., Esteky, H., Mirpour, K., & Tanaka, K. (2007). Object category structure in response patterns of neuronal population in monkey inferior temporal cortex. Journal of neurophysiology, 97(6), 4296–4309. https://doi.org/10.1152/jn.00024.2007

Knudson, Gail. (2020). Language and Terminology in Transgender Health. 10.1007/978-3-030-29093-1_4.

Kohlberg, L. (1966). A cognitive-developmental analysis of children's sex-role concepts and attitudes. In E. E. Maccoby (Ed.), *The development of sex differences* (pp. 82–173). Stanford, CA: Stanford University Press.

Kozinets, R. (2010). Netnography: Doing Ethnographic Research Online.

Kraemer, B., Delsignore, A., Schnyder, U., & Hepp, U. (2008). Body image and transsexualism. *Psychopathology*, *41*(2), 96–100. https://doi.org/10.1159/000111554

Kuiper, A & Cohen-Kettenis, Peggy. (1998). Gender Role Reversal among Postoperative Transsexuals. International Journal of Transgenderism. 23.

Lambrou, N. H., Cochran, K. M., Everhart, S., Flatt, J. D., Zuelsdorff, M., O'Hara, J. B., Weinhardt, L., Flowers Benton, S., & Gleason, C. E. (2020). Learning from Transmasculine Experiences with Health Care: Tangible Inlets for Reducing Health Disparities Through Patient-Provider Relationships. *Transgender health*, *5*(1), 18–32. https://doi.org/10.1089/trgh.2019.0054

Lenroot, R. K., & Giedd, J. N. (2011). Annual Research Review: Developmental considerations of gene by environment interactions. *Journal of child psychology and psychiatry, and allied disciplines*, *52*(4), 429–441. https://doi.org/10.1111/j.1469-7610.2011.02381.x

Limanowski, J., & Blankenburg, F. (2016). Integration of visual and proprioceptive limb position information in human posterior parietal, premotor, and extrastriate cortex. The Journal of Neuroscience, 36(9), 2582–2589. https://doi.org/10.1523/JNEUROSCI.3987-15.2016

Limanowski, J., Lutti, A., & Blankenburg, F. (2014). The extrastriate body area is involved in illusory limb ownership. NeuroImage, 86, 514–524. https://doi.org/10.1016/j.neuroimage.2013.10.035

Lin, C. S., Ku, H. L., Chao, H. T., Tu, P. C., Li, C. T., Cheng, C. M., Su, T. P., Lee, Y. C., & Hsieh, J. C. (2014). Neural network of body representation differs between transsexuals and cissexuals. *PloS one*, *9*(1), e85914. https://doi.org/10.1371/journal.pone.0085914

Lindgren, T. W., & Pauly, I. B. (1975). A body image scale for evaluating transsexuals. *Archives of sexual behavior*, *4*(6), 639–656. https://doi.org/10.1007/BF01544272

Longo, M. R., Azañón, E., & Haggard, P. (2010). More than skin deep: body representation beyond primary somatosensory cortex. Neuropsychologia, 48(3), 655–668. https://doi.org/10.1016/j.neuropsychologia.2009.08.022

Luders, E., Sánchez, F. J., Tosun, D., Shattuck, D. W., Gaser, C., Vilain, E., & Toga, A. W. (2012). Increased Cortical Thickness in Male-to-Female Transsexualism. *Journal of behavioral and brain science*, *2*(3), 357–362. https://doi.org/10.4236/jbbs.2012.23040

Lumivero (2014) *NVivo* (Version 10) www.lumivero.com

Maccoby, E. E. (1998). *The two sexes: Growing up apart, coming together.* Belknap Press/Harvard University Press.

Maccoby, E. E., & Jacklin, C. N. (1987). Gender segregation in childhood. In H. W. Reese (Ed.), *Advances in child development and behavior,* Vol. 20, pp. 239–287). Academic Press. https://doi.org/10.1016/S0065-2407(08)60404-8

Madeddu, F., Prunas, A., & Hartmann, D. (2009). Prevalence of Axis II disorders in a sample of clients undertaking psychiatric evaluation for sex reassignment surgery. *The Psychiatric quarterly*, *80*(4), 261–267. https://doi.org/10.1007/s11126-009-9114-6

Mak, J., Shires, D. A., Zhang, Q., Prieto, L. R., Ahmedani, B. K., Kattari, L., Becerra-Culqui, T. A., Bradlyn, A., Flanders, W. D., Getahun, D., Giammattei, S. V., Hunkeler, E. M., Lash, T. L., Nash, R., Quinn, V. P., Robinson, B., Roblin, D., Silverberg, M. J., Slovis, J., Tangpricha, V., … Goodman, M. (2020). Suicide Attempts Among a Cohort of Transgender and Gender Diverse People. American journal of preventive medicine, 59(4), 570–577. https://doi.org/10.1016/j.amepre.2020.03.026

Manzouri, A., Kosidou, K., & Savic, I. (2017). Anatomical and Functional Findings in Female-to-Male Transsexuals: Testing a New Hypothesis. *Cerebral cortex (New York, N.Y. : 1991)*, *27*(2), 998–1010. https://doi.org/10.1093/cercor/bhv278

Mazur T. (2005). Gender dysphoria and gender change in androgen insensitivity or micropenis. *Archives of sexual behavior*, *34*(4), 411–421. https://doi.org/10.1007/s10508-005-4341-x

McCarthy, M. M., de Vries, G. J., & Forger, N. G. (2009). Sexual differentiation of the brain: Mode, mechanisms, and meaning. In D. W. Pfaff, A. P. Arnold, A. M. Etgen, S. E. Fahrbach, & R. T. Rubin (Eds.), *Hormones, brain and behavior* (2nd ed., pp. 1707–1744). Elsevier Academic Press. https://doi.org/10.1016/B978-008088783-8.00054-1

McGeoch, P. D., Brang, D., Song, T., Lee, R. R., Huang, M., & Ramachandran, V. S. (2011). Xenomelia: a new right parietal lobe syndrome. *Journal of neurology, neurosurgery, and psychiatry*, *82*(12), 1314–1319. https://doi.org/10.1136/jnnp-2011-300224

McGuire, J. K., Berg, D., Catalpa, J. M., Morrow, Q. J., Fish, J. N., Nic Rider, G., Steensma, T., Cohen-Kettenis, P. T., & Spencer, K. (2020). Utrecht Gender Dysphoria Scale - Gender Spectrum (UGDS-GS): Construct validity among transgender, nonbinary, and LGBQ samples. *International journal of transgender health*, *21*(2), 194–208. https://doi.org/10.1080/26895269.2020.1723460

McLeod, J. (2013). Increasing the rigor of case study evidence in therapy research. *Pragmatic Case Studies in Psychotherapy, 9*(4), 382–402. https://doi.org/10.14713/pcsp.v9i4.1832

Medendorp, W. P., & Heed, T. (2019). State estimation in posterior parietal cortex: Distinct poles of environmental and bodily states. Progress in neurobiology, 183, 101691. https://doi.org/10.1016/j.pneurobio.2019.101691

Medford, N., Sierra, M., Stringaris, A., Giampietro, V., Brammer, M. J., & David, A. S. (2016). Emotional Experience and Awareness of Self: Functional MRI Studies of Depersonalization Disorder. Frontiers in psychology, 7, 432. https://doi.org/10.3389/fpsyg.2016.00432

Medina, J., Khurana, P., & Coslett, H. B. (2015). The influence of embodiment on multisensory integration using the mirror box illusion. Consciousness and cognition, 37, 71–82. https://doi.org/10.1016/j.concog.2015.08.011

Meijer, J. H., Eeckhout, G. M., van Vlerken, R. H., & de Vries, A. L. (2017). Gender Dysphoria and Co-Existing Psychosis: Review and Four Case Examples of Successful Gender Affirmative Treatment. *LGBT health*, *4*(2), 106–114. https://doi.org/10.1089/lgbt.2016.0133

Melzack, R. (1990). Phantom limbs and the concept of a neuromatrix. Trends in neurosciences, 13(3), 88–92. https://doi.org/10.1016/0166-2236(90)90179-e

Metzinger, T. (2003). Being no one: The self-model theory of subjectivity. MIT Press.

Meyer-Bahlburg H. F. (2005). Gender identity outcome in female-raised 46,XY persons with penile agenesis, cloacal exstrophy of the bladder, or penile ablation. *Archives of sexual behavior*, *34*(4), 423–438. https://doi.org/10.1007/s10508-005-4342-9

Milano, W., Ambrosio, P., Carizzone, F., De Biasio, V., Foggia, G., & Capasso, A. (2020). Gender Dysphoria, Eating Disorders and Body Image: An Overview. *Endocrine, metabolic & immune disorders drug targets*, *20*(4), 518–524. https://doi.org/10.2174/1871530319666191015193120

Milner, A.D., Goodale, M.A. (2008). Two visual systems reviewed. *Neuropsychologia, 46,* 774-785.

Mirabella, M., Giovanardi, G., Fortunato, A., Senofonte, G., Lombardo, F., Lingiardi, V., & Speranza, A. M. (2020). The Body I Live in. Perceptions and Meanings of Body Dissatisfaction in Young Transgender Adults: A Qualitative Study. *Journal of clinical medicine*, *9*(11), 3733. https://doi.org/10.3390/jcm9113733

Mohr, H. M., Zimmermann, J., Röder, C., Lenz, C., Overbeck, G., & Grabhorn, R. (2010). Separating two components of body image in anorexia nervosa using fMRI. *Psychological medicine*, *40*(9), 1519–1529. https://doi.org/10.1017/S0033291709991826

Money, J. (1994). The concept of gender identity disorder in childhood and adolescence after 39 years. *Journal of Sex & Marital Therapy, 20*(3), 163–177. https://doi.org/10.1080/00926239408403428

Money, J., Hampson, J. G., & Hampson, J. L. (1955). Hermaphroditism: recommendations concerning assignment of sex, change of sex and psychologic management. *Bulletin of the Johns Hopkins Hospital*, *97*(4), 284–300.

Moody, T. D., Sasaki, M. A., Bohon, C., Strober, M. A., Bookheimer, S. Y., Sheen, C. L., & Feusner, J. D. (2015). Functional connectivity for face processing in individuals with body dysmorphic disorder and anorexia nervosa. *Psychological medicine*, *45*(16), 3491–3503. https://doi.org/10.1017/S0033291715001397

Moore, C. I., Stern, C. E., Dunbar, C., Kostyk, S. K., Gehi, A., & Corkin, S. (2000). Referred phantom sensations and cortical reorganization after spinal cord injury in humans. *Proceedings of the National Academy of Sciences of the United States of America*, *97*(26), 14703–14708. https://doi.org/10.1073/pnas.250348997

Moore, J. W., & Fletcher, P. C. (2012). Sense of agency in health and disease: a review of cue integration approaches. Consciousness and cognition, 21(1), 59–68. https://doi.org/10.1016/j.concog.2011.08.010

Moro, V., Pacella, V., Scandola, M., Besharati, S., Rossato, E., Jenkinson, P. M., & Fotopoulou, A. (2023). A fronto-insular-parietal network for the sense of body ownership. *Cerebral cortex (New York, N.Y. : 1991)*, *33*(3), 512–522. https://doi.org/10.1093/cercor/bhac081

Nico, D., Daprati, E., Nighoghossian, N., Carrier, E., Duhamel, J. R., & Sirigu, A. (2010). The role of the right parietal lobe in anorexia nervosa. *Psychological medicine*, *40*(9), 1531–1539. https://doi.org/10.1017/S0033291709991851

Nieder, T. O., Herff, M., Cerwenka, S., Preuss, W. F., Cohen-Kettenis, P. T., De Cuypere, G., Haraldsen, I. R., & Richter-Appelt, H. (2011). Age of onset and sexual orientation in transsexual males and females. *The journal of sexual medicine*, *8*(3), 783–791. https://doi.org/10.1111/j.1743-6109.2010.02142.x

Northoff, G., & Panksepp, J. (2008). The trans-species concept of self and the subcortical-cortical midline system. Trends in cognitive sciences, 12(7), 259–264. https://doi.org/10.1016/j.tics.2008.04.007

Nota, N. M., Kreukels, B. P. C., den Heijer, M., Veltman, D. J., Cohen-Kettenis, P. T., Burke, S. M., & Bakker, J. (2017). Brain functional connectivity patterns in children and adolescents with gender dysphoria: Sex-atypical or not?. *Psychoneuroendocrinology*, *86*, 187–195. https://doi.org/10.1016/j.psyneuen.2017.09.014

Ochsner, K. N., & Gross, J. J. (2005). The cognitive control of emotion. *Trends in cognitive sciences*, *9*(5), 242–249. https://doi.org/10.1016/j.tics.2005.03.010

Paillard, J. (1980). Le corps situé et le corps identifié. Une approche psychophysiologique de la notion de schéma corporel. *Revue Medicale de la Suisse Romande, 100,* 129-141.

Paillard, J. (1991). Motor and representational framing of space. In J. Paillard (Ed.), Brain and space (pp. 163–182). Oxford University Press.

Paillard, J. (1999). Body schema and body image: A double dissociation in deafferented patients. In G.N. Gantchev, S. Mori, J. Massion (Eds.), *Motor Control, Today and Tomorrow,* 197-214.

Pauly, I. B., & Lindgren, T. W. (1976-1977). Body image and gender identity. *Journal of Homosexuality, 2*(2), 133–142. https://doi.org/10.1300/J082v02n02_04

Peelen, M. V., & Downing, P. E. (2007). The neural basis of visual body perception. Nature reviews. Neuroscience, 8(8), 636–648. https://doi.org/10.1038/nrn2195

Peelen, M. V., Atkinson, A. P., Andersson, F., & Vuilleumier, P. (2007). Emotional modulation of body-selective visual areas. Social cognitive and affective neuroscience, 2(4), 274–283. https://doi.org/10.1093/scan/nsm023

Penfield, W., & Rasmussen, T. (1950). The cerebral cortex of man; a clinical study of localization of function. Macmillan.

Peterson, C. M., Matthews, A., Copps-Smith, E., & Conard, L. A. (2017). Suicidality, Self-Harm, and Body Dissatisfaction in Transgender Adolescents and Emerging Adults with Gender Dysphoria. *Suicide & life-threatening behavior*, *47*(4), 475–482. https://doi.org/10.1111/sltb.12289

Petkova, V. I., & Ehrsson, H. H. (2008). If I were you: perceptual illusion of body swapping. PloS one, 3(12), e3832. https://doi.org/10.1371/journal.pone.0003832

Petkova, V. I., & Ehrsson, H. H. (2009). When right feels left: referral of touch and ownership between the hands. PloS one, 4(9), e6933. https://doi.org/10.1371/journal.pone.0006933

Petkova, V. I., Björnsdotter, M., Gentile, G., Jonsson, T., Li, T. Q., & Ehrsson, H. H. (2011). From part- to whole-body ownership in the multisensory brain. Current biology : CB, 21(13), 1118–1122. https://doi.org/10.1016/j.cub.2011.05.022

Phillips, Katharine & Didie, Elizabeth & Feusner, Jamie & Wilhelm, Sabine. (2008). Body Dysmorphic Disorder: Treating an Underrecognized Disorder. The American journal of psychiatry. 165. 1111-8. 10.1176/appi.ajp.2008.08040500.

Phillips, M. L., Medford, N., Senior, C., Bullmore, E. T., Suckling, J., Brammer, M. J., Andrew, C., Sierra, M., Williams, S. C., & David, A. S. (2001). Depersonalization disorder: thinking without feeling. *Psychiatry research*, *108*(3), 145–160. https://doi.org/10.1016/s0925-4927(01)00119-6

Phoenix, C.H., Goy, R.W., Gerall, A.A., & Young, W.C. (1959). Organizing action of prenatally administered testosterone propionate on the tissues mediating mating behavior in the female guinea pig. *Endocrinology*, *65*, 369–382. https://doi.org/10.1210/endo-65-3-369

Pulice-Farrow, L., Cusack, C. E., & Galupo, M. P. (2020). "Certain parts of my body don't belong to me": Trans individuals' descriptions of body-specific gender dysphoria. *Sexuality Research & Social Policy: A Journal of the NSRC, 17*(4), 654–667. https://doi.org/10.1007/s13178-019-00423-y

Rabito Alcón, M. F., & Rodríguez Molina, J. M. (2015). Body image in persons with gender dysphoria. *Medwave*, *15*(4), e6138. https://doi.org/10.5867/medwave.2015.04.6138

Raichle, M. E., MacLeod, A. M., Snyder, A. Z., Powers, W. J., Gusnard, D. A., & Shulman, G. L. (2001). A default mode of brain function. Proceedings of the National Academy of Sciences of the United States of America, 98(2), 676–682. https://doi.org/10.1073/pnas.98.2.676

Ramachandran, V. S., & Hirstein, W. (1998). The perception of phantom limbs. The D. O. Hebb lecture. Brain : a journal of neurology, 121 ( Pt 9), 1603–1630. https://doi.org/10.1093/brain/121.9.1603

Ramachandran, V. S., & McGeoch, P. (2007). Can vestibular caloric stimulation be used to treat apotemnophilia?. *Medical hypotheses*, *69*(2), 250–252. https://doi.org/10.1016/j.mehy.2006.12.013

Ramachandran, V. S., & Rogers-Ramachandran, D. (1996). Synaesthesia in phantom limbs induced with mirrors. Proceedings. Biological sciences, 263(1369), 377–386. https://doi.org/10.1098/rspb.1996.0058

Rao, I. S., & Kayser, C. (2017). Neurophysiological Correlates of the Rubber Hand Illusion in Late Evoked and Alpha/Beta Band Activity. Frontiers in human neuroscience, 11, 377. https://doi.org/10.3389/fnhum.2017.00377

Ristori, J., Cocchetti, C., Romani, A., Mazzoli, F., Vignozzi, L., Maggi, M., & Fisher, A. D. (2020). Brain Sex Differences Related to Gender Identity Development: Genes or Hormones?. *International journal of molecular sciences*, *21*(6), 2123. https://doi.org/10.3390/ijms21062123

Rizzolatti, G., Scandolara, C., Matelli, M., & Gentilucci, M. (1981). Afferent properties of periarcuate neurons in macaque monkeys. I. Somatosensory responses. Behavioural brain research, 2(2), 125–146. https://doi.org/10.1016/0166-4328(81)90052-8

Rohde, M., Di Luca, M., & Ernst, M. O. (2011). The Rubber Hand Illusion: feeling of ownership and proprioceptive drift do not go hand in hand. PloS one, 6(6), e21659. https://doi.org/10.1371/journal.pone.0021659

Rosén, B., Ehrsson, H. H., Antfolk, C., Cipriani, C., Sebelius, F., & Lundborg, G. (2009). Referral of sensation to an advanced humanoid robotic hand prosthesis. Scandinavian journal of plastic and reconstructive surgery and hand surgery, 43(5), 260–266. https://doi.org/10.3109/02844310903113107

Ruble, D. N., Martin, C. L., & Berenbaum, S. A. (2006). Gender Development. In N. Eisenberg, W. Damon, & R. M. Lerner (Eds.), *Handbook of child psychology: Social, emotional, and personality development* (6th ed., pp. 858–932). John Wiley & Sons, Inc.

Rusconi, M. L., Maravita, A., Bottini, G., & Vallar, G. (2002). Is the intact side really intact? Perseverative responses in patients with unilateral neglect: A productive manifestation. *Neuropsychologia, 40*(6), 594–604. https://doi.org/10.1016/S0028-3932(01)00160-9

Ruzgar N. M. (2020). Second Lives, Second Changes: A Surgeon's Stories of Transformation. *The Yale Journal of Biology and Medicine*, *93*(1), 225.

Saetta, G., Hänggi, J., Gandola, M., Zapparoli, L., Salvato, G., Berlingeri, M., Sberna, M., Paulesu, E., Bottini, G., & Brugger, P. (2021). Neural Correlates of Body Integrity Dysphoria. *Current biology : CB*, *31*(16), 3702. https://doi.org/10.1016/j.cub.2021.07.037

Savic, I., & Arver, S. (2011). Sex dimorphism of the brain in male-to-female transsexuals. *Cerebral cortex (New York, N.Y. : 1991)*, *21*(11), 2525–2533. https://doi.org/10.1093/cercor/bhr032

Scandola, M., Aglioti, S. M., Avesani, R., Bertagnoni, G., Marangoni, A., & Moro, V. (2017). Corporeal illusions in chronic spinal cord injuries. *Consciousness and cognition*, *49*, 278–290. https://doi.org/10.1016/j.concog.2017.01.010

Schlack, A., Sterbing-D'Angelo, S. J., Hartung, K., Hoffmann, K. P., & Bremmer, F. (2005). Multisensory space representations in the macaque ventral intraparietal area. The Journal of neuroscience : the official journal of the Society for Neuroscience, 25(18), 4616–4625. https://doi.org/10.1523/JNEUROSCI.0455-05.2005

Schneider, C., Cerwenka, S., Nieder, T. O., Briken, P., Cohen-Kettenis, P. T., De Cuypere, G., Haraldsen, I. R., Kreukels, B. P., & Richter-Appelt, H. (2016). Measuring Gender Dysphoria: A Multicenter Examination and Comparison of the Utrecht Gender Dysphoria Scale and the Gender Identity/Gender Dysphoria Questionnaire for Adolescents and Adults. *Archives of sexual behavior*, *45*(3), 551–558. https://doi.org/10.1007/s10508-016-0702-x

Schwoebel, J., Coslett, H.B. (2005). Evidence for multiple, distinct representations of the human body. *Journal of Cognitive Neuroscience, 17,* 543-553.

Second Lives, Second Changes: A Surgeon's Stories of Transformation. 2019. ECW Press: Toronto, Ontario. ISBN: (Hardcover) 978-1770414679.

Sierra, M., & David, A. S. (2011). Depersonalization: A selective impairment of self-awareness. *Consciousness and Cognition: An International Journal, 20*(1), 99–108. https://doi.org/10.1016/j.concog.2010.10.018

Sierra-Siegert, M. (2009). Depersonalization: A New Look at a Neglected Syndrome. Depersonalization: A New Look at a Neglected Syndrome. 1-174. 10.1017/CBO9780511730023

Signorella, M. L., Bigler, R. S., & Liben, L. S. (1993). Developmental differences in children's gender schemata about others: A meta-analytic review. *Developmental Review, 13*(2), 147–183. https://doi.org/10.1006/drev.1993.1007

Sirigu, A., Grafman, J., Bressler, K., & Sunderland, T. (1991). Multiple representations contribute to body knowledge processing. Evidence from a case of autotopagnosia. *Brain, 114,* 629-642.

Snelson, C. (2015). Vlogging about school on YouTube: An exploratory study. New Media & Society, 17(3), 321-339. https://doi.org/10.1177/1461444813504271

Sokolowski, R. (1999). *Introduction to Phenomenology*. Cambridge: Cambridge University Press. https://doi.org/10.1017/CBO9780511809118

Steensma, T. D., Kreukels, B. P. C., Jürgensen, M., Thyen, U., de Vries, A. L. C., & Cohen-Kettenis, P. T. (2013c). 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.

Steensma, T. D., McGuire, J. K., Kreukels, B. P., Beekman, A. J., & Cohen-Kettenis, P. T. (2013a). Factors associated with desistence and persistence of childhood gender dysphoria: a quantitative follow-up study. *Journal of the American Academy of Child and Adolescent Psychiatry*, *52*(6), 582–590. https://doi.org/10.1016/j.jaac.2013.03.016

Steensma, T. D., van der Ende, J., Verhulst, F. C., & Cohen-Kettenis, P. T. (2013b). Gender variance in childhood and sexual orientation in adulthood: a prospective study. *The journal of sexual medicine*, *10*(11), 2723–2733. https://doi.org/10.1111/j.1743-6109.2012.02701.x

Swaab D. F. (2007). Sexual differentiation of the brain and behavior. *Best practice & research. Clinical endocrinology & metabolism*, *21*(3), 431–444. https://doi.org/10.1016/j.beem.2007.04.003

Swaab, D. F., & Garcia-Falgueras, A. (2009). Sexual differentiation of the human brain in relation to gender identity and sexual orientation. *Functional neurology*, *24*(1), 17–28.

Tamè, L., Azañón, E., Longo, M.R. (2019) A Conceptual Model Of Tactile Processing Across Body Features Of Size, Shape, Side, And Spatial Location. Front. Psychol. 10:291. doi:10.3389/fpsyg.2019.00291

Tamè, L., Pavani, F., Papadelis, C., Farnè, A., & Braun, C. (2015). Early integration of bilateral touch in the primary somatosensory cortex. Human brain mapping, 36(4), 1506–1523. https://doi.org/10.1002/hbm.22719

Tate, C. C., Youssef, C. P., & Bettergarcia, J. N. (2014). Integrating the study of transgender spectrum and cisgender experiences of self-categorization from a personality perspective. *Review of General Psychology, 18*(4), 302–312. https://doi.org/10.1037/gpr0000019

Taylor, K. S., Seminowicz, D. A., & Davis, K. D. (2009). Two systems of resting state connectivity between the insula and cingulate cortex. *Human brain mapping*, *30*(9), 2731–2745. https://doi.org/10.1002/hbm.20705

Tsakiris M. (2010). My body in the brain: a neurocognitive model of body-ownership. Neuropsychologia, 48(3), 703–712. https://doi.org/10.1016/j.neuropsychologia.2009.09.034

Tsakiris, M., & Haggard, P. (2005). The Rubber Hand Illusion Revisited: Visuotactile Integration and Self-Attribution. Journal of Experimental Psychology: Human Perception and Performance, 31(1), 80–91. https://doi.org/10.1037/0096-1523.31.1.80

Tsakiris, M., Carpenter, L., James, D., & Fotopoulou, A. (2010). Hands only illusion: multisensory integration elicits sense of ownership for body parts but not for non-corporeal objects. Experimental brain research, 204(3), 343–352. https://doi.org/10.1007/s00221-009-2039-3

Tsakiris, M., Costantini, M., & Haggard, P. (2008). The role of the right temporo-parietal junction in maintaining a coherent sense of one's body. Neuropsychologia, 46(12), 3014–3018. https://doi.org/10.1016/j.neuropsychologia.2008.06.004

Tsakiris, M., Hesse, M. D., Boy, C., Haggard, P., & Fink, G. R. (2007). Neural signatures of body ownership: a sensory network for bodily self-consciousness. Cerebral cortex (New York, N.Y. : 1991), 17(10), 2235–2244. https://doi.org/10.1093/cercor/bhl131

Turban, J. (2022, August). *What is Gender Dysphoria?.* American Psychiatric Association. https://psychiatry.org/patients-families/gender-dysphoria/what-is-gender-dysphoria

Uddin L. Q. (2015). Salience processing and insular cortical function and dysfunction. Nature reviews. Neuroscience, 16(1), 55–61. https://doi.org/10.1038/nrn3857

Ungerleider, L. G., & Mishkin, M. (1982). Two cortical visual systems. In D. J. Ingle, M. A. Goodale, & R. J. W. Mansfield (Eds.), Analysis of visual behavior (pp. 549-586). Cambridge: MIT Press.

Urgesi, C., Fornasari, L., Canalaz, F., Perini, L., Cremaschi, S., Faleschini, L., Thyrion, E. Z., Zuliani, M., Balestrieri, M., Fabbro, F., & Brambilla, P. (2014). Impaired configural body processing in anorexia nervosa: evidence from the body inversion effect. *British journal of psychology (London, England : 1953)*, *105*(4), 486–508. https://doi.org/10.1111/bjop.12057

Vallar, G., & Ronchi, R. (2009). Somatoparaphrenia: a body delusion. A review of the neuropsychological literature. Experimental brain research, 192(3), 533–551. https://doi.org/10.1007/s00221-008-1562-y

van de Grift, T. C., Cohen-Kettenis, P. T., Elaut, E., De Cuypere, G., Richter-Appelt, H., Haraldsen, I. R., & Kreukels, B. P. (2016a). A network analysis of body satisfaction of people with gender dysphoria. *Body image*, *17*, 184–190. https://doi.org/10.1016/j.bodyim.2016.04.002

van de Grift, T. C., Cohen-Kettenis, P. T., Steensma, T. D., De Cuypere, G., Richter-Appelt, H., Haraldsen, I. R., Dikmans, R. E., Cerwenka, S. C., & Kreukels, B. P. (2016b). Body Satisfaction and Physical Appearance in Gender Dysphoria. *Archives of sexual behavior*, *45*(3), 575–585. https://doi.org/10.1007/s10508-015-0614-1

van Dijk, M. T., van Wingen, G. A., van Lammeren, A., Blom, R. M., de Kwaasteniet, B. P., Scholte, H. S., & Denys, D. (2013). Neural basis of limb ownership in individuals with body integrity identity disorder. *PloS one*, *8*(8), e72212. https://doi.org/10.1371/journal.pone.0072212

Vogeley, K., May, M., Ritzl, A., Falkai, P., Zilles, K., & Fink, G. R. (2004). Neural correlates of first-person perspective as one constituent of human self-consciousness. Journal of cognitive neuroscience, 16(5), 817–827. https://doi.org/10.1162/089892904970799

Wachsmuth, E., Oram, M. W., & Perrett, D. I. (1994). Recognition of objects and their component parts: responses of single units in the temporal cortex of the macaque. Cerebral cortex (New York, N.Y. : 1991), 4(5), 509–522. https://doi.org/10.1093/cercor/4.5.509

Wallien, M. S., & Cohen-Kettenis, P. T. (2008). Psychosexual outcome of gender-dysphoric children. *Journal of the American Academy of Child and Adolescent Psychiatry*, *47*(12), 1413–1423. https://doi.org/10.1097/CHI.0b013e31818956b9

Ward, J., Mensah, A., & Jünemann, K. (2015). The rubber hand illusion depends on the tactile congruency of the observed and felt touch. Journal of Experimental Psychology: Human Perception and Performance, 41(5), 1203–1208. https://doi.org/10.1037/xhp0000088

Zhou, J. N., Hofman, M. A., Gooren, L. J., & Swaab, D. F. (1995). A sex difference in the human brain and its relation to transsexuality. *Nature*, *378*(6552), 68–70. https://doi.org/10.1038/378068a0

Zosuls, K. M., Ruble, D. N., Tamis-Lemonda, C. S., Shrout, P. E., Bornstein, M. H., & Greulich, F. K. (2009). The acquisition of gender labels in infancy: implications for gender-typed play. *Developmental psychology*, *45*(3), 688–701. https://doi.org/10.1037/a0014053

Zubiaurre-Elorza, L., Junque, C., Gómez-Gil, E., Segovia, S., Carrillo, B., Rametti, G., & Guillamon, A. (2013). Cortical thickness in untreated transsexuals. *Cerebral cortex (New York, N.Y. : 1991)*, *23*(12), 2855–2862. https://doi.org/10.1093/cercor/bhs267

Zucker, K. J., & Bradley, S. J. (1995). *Gender identity disorder and psychosexual problems in children and adolescents.* Guilford Press.

Zucker, K. J., Bradley, S. J., & Lowry Sullivan, C. B. (1996). Traits of separation anxiety in boys with gender identity disorder. *Journal of the American Academy of Child and Adolescent Psychiatry*, *35*(6), 791–798. https://doi.org/10.1097/00004583-199606000-00019

Zucker, K. J., Bradley, S. J., Kuksis, M., Pecore, K., Birkenfeld-Adams, A., Doering, R. W., Mitchell, J. N., & Wild, J. (1999). Gender constancy judgments in children with gender identity disorder: evidence for a developmental lag. *Archives of sexual behavior*, *28*(6), 475–502. https://doi.org/10.1023/a:1018713115866

Zucker, Kenneth & Meyer-Bahlburg, Heino & Kessler, Suzanne & Schober, Justine. (2020). Gender Identity/Gender Dysphoria Questionnaire for Adolescents and Adults.

# APPENDIX

## YouTube Videos Used in the Study

D1. (2018, April 10). Life with Gender Dysphoria | Sunny Miller | TEDxEBS [Video]. YouTube. https://www.youtube.com/watch?v=M9YICZZeJNs&ab_channel=TEDxTalks

D2. (2018, November, 12). You Don't Need Dysphoria to Be Trans [Video]. YouTube. https://www.youtube.com/watch/UC7LgV9duHc

D3. (2022, April 11). What is Gender Dysphoria? [Video]. YouTube. https://www.youtube.com/watch/k0eXHdPhjU0

D4. (2023, November 14). What does being transgender mean anyway? | Jay Simmons | TEDxSt Albans [Video]. YouTube. https://www.youtube.com/watch/26E9Eeyipto

D6. (2023, June 13). Families with transgender children struggle to navigate wave of anti-trans politics [Video]. YouTube. https://www.youtube.com/watch/7gGQxP-KTFM

D7. (2023, June 18). Transgender youth and the fight over medical care [Video]. YouTube. https://www.youtube.com/watch?v=CZkRgMKFg-4

D8. (2023, June 18). Transgender youth and the fight over medical care [Video]. YouTube. https://www.youtube.com/watch?v=CZkRgMKFg-4

D10. (2022, March 22). The 8 Year Old With Body Dysphoria | Kids On The Edge | FULL DOCUMENTARY | Origin [Video]. YouTube. https://youtu.be/6ZpjgGI0V28

D11. (2022, March 22). The 8 Year Old With Body Dysphoria | Kids On The Edge | FULL DOCUMENTARY | Origin [Video]. YouTube. https://youtu.be/6ZpjgGI0V28

D12. (2022, January 4). How nine-year-old Ellie is embracing her transgender identity | ABC | Australia [Video]. YouTube. https://youtu.be/LzUQPb0HhtA

D13. (2020, July 13). Gender Dysphoria as an Autistic person [Video]. YouTube. https://youtu.be/jTDF3oHsxI8

D14. (2019, January 4). A Lifesaving Shift in the Transgender Conversation | Ashton Colby | TEDxColumbus [Video]. YouTube. https://youtu.be/b_DrQmCj7pI

D15. (2023, July 2). Virginia's first openly transgender delegate Danica Roem shares her advice for transgender youth [Video]. YouTube. https://youtu.be/De9rCiefJpU

D16. (2023, July 13). The other side of social media: Transgender visibility online [Video]. YouTube. https://youtu.be/_MH0o47Lhp0

D17. (2023, June 28). Being transgender in New Zealand | Paddy Gower Has Issues [Video]. YouTube. https://youtu.be/sJ1JVGb9_DQ

D18. (2023, June 28). Being transgender in New Zealand | Paddy Gower Has Issues [Video]. YouTube. https://youtu.be/sJ1JVGb9_DQ

D19. (2018, July 4). Gender Dysphoria. [Video]. YouTube. https://youtu.be/wiU4WZiyHA4

D20. (2012, November 20). On being transgender: Kim Reed of FAR FROM THE TREE by Andrew Solomon [Video]. YouTube. https://youtu.be/mxGhLif9w4s

D21. (2019, April 24). Understanding transition [Video]. YouTube. https://youtu.be/-B62IbbwYMU

D22. (2019, April 24). Understanding transition [Video]. YouTube. https://youtu.be/-B62IbbwYMU

D23. (2023, August 26). The human experience behind being a transgender athlete | Outside the Lines [Video]. YouTube. https://youtu.be/vjEmbpO27o4

D24. (2023, June 22). Family shares their journey with their transgender child [Video]. YouTube. https://youtu.be/b4PawaZKOhc

D25. (2023, May 31). Elliot Page opens up about gender dysphoria in ABC News Pride special | GMA [Video]. YouTube. https://youtu.be/CxrWu2LcRNY

D26. (2021, June 30). How families can support transgender and nonbinary terms [Video]. YouTube. https://youtu.be/Rr9XMDjJ4zM

D27. (2023, April 29). Transgender women share their transition journey on The Nightcap [Video]. YouTube. https://youtu.be/hBtsaOAG1Yk

D28. (2023, April 29). Transgender women share their transition journey on The Nightcap [Video]. YouTube. https://youtu.be/hBtsaOAG1Yk