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Exploration of the Impact of Gender-Affirming Care and Social Support on Executive Functioning and Mental Health in Gender-Diverse Autistic and Non-Autistic Adults

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ABSTRACT

Exploration of the Impact of Gender-Affirming Care and Social Support on Executive Functioning and Mental Health in Gender-Diverse Autistic and Non-Autistic Adults

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Between 4.8% and 26% of adults presenting to gender dysphoria clinics have an autism diagnosis. Both autistic people and gender-diverse people have higher rates of mental health conditions including anxiety and depression and more difficulties with executive functioning, all of which impact quality of life. Some work suggests that gender affirmation leads to better mental health outcomes, including better executive functioning, but this has not been studied directly in autistic adults who identify as gender-diverse or transgender. As such, we elected to explore the relationships among these variables at this intersection of gender diversity and autism. In a sample of 54 gender-diverse individuals, almost half of whom were autistic, we found that having planned, scheduled, or completed gender-affirming surgical procedures were associated with improved anxiety and depression symptoms, and with better executive functioning. We noticed that within this group there were high levels of anxiety, so much so that the anxiety appeared to be overwhelming our other analyses. In all of our analyses, increased anxiety was associated with worse executive functioning, and in many of our analyses, further steps in gender affirmation was associated with decreased anxiety. Findings suggest that clinicians can support gender-diverse people by helping them with their mental health, particularly with managing their anxiety.

Keywords: autism, gender diversity, transgender, executive functioning, mental health

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Autism

Autism is a neurodevelopmental difference that is characterized by differences in social communication style, strong interests, repetitive motor behaviors, and atypical sensory processing (American Psychiatric Association, 2022). Autistic people experience the world differently than neurotypical or allistic people do, which impacts the ways in which they interact with the people and the environments around them (Pellicano et al., 2022). The most recent observations by the Centers for Disease Control (CDC) estimate that 1 in 36 8-year-olds in the United States had been diagnosed with autism, or about 2.8% (Maenner, 2023). Current estimates from the CDC also indicate that around 2.21% of the adult population of the United States is autistic (Dietz et al., 2020). Despite these similar rates, much of the existing literature, current research, and current research funding has focused on autism in children, with issues of intersectionality in autism rarely being addressed (Howlin & Magiati, 2017).

Most of the existing literature in autism has focused on autistic children and only 3% of autism research funding went to support lifespan research in 2018 (U.S. Interagency Autism Coordinating Committee, 2018). Furthermore, the majority of autism-specific research funding, around 44%, has focused on biological aspects of autism, and another 20% has funded studies on genetic and environmental “risk factors” for autism (U.S. Interagency Autism Coordinating Committee, 2018). While the amount of funding for autism research has increased dramatically over the past few decades, the proportions of funding allocated to topics within the field has remained much the same as it was in 2009 when Singh and colleagues investigated trends in

autism research funding (Singh et al., 2009). This focus on etiology and biology of autism has continued in spite of many requests from autistic self-advocates for more research and focus on the quality of life and overall well-being of autistic people from their own perspectives (Milton & Bracher, 2013) as well as specifically on health care access and mental health support, co-occurring concerns, and stigma and discrimination (Pukki et al., 2022). A study of the perspectives of stakeholders by Pellicano and colleagues (2014) found that while all stakeholders (i.e., autistic adults, immediate family members of autistic people, practitioners, and researchers) valued basic research in autism, there were more immediate issues they would like autism research to focus on, such as social and emotional issues common in autistic people. The focus of both funding and research on autistic children and on the etiology of autism has left autistic adults across the lifespan vastly under researched, meaning that we know relatively little about the life experiences of autistic adults, the challenges they face, and what they need to feel supported.

This trend of focus on autism in children has been built on a legacy starting with Leo Kanner's focus on children in 1943 (Kanner, 1943). "Infantile autism" was first included in the third edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-III; American Psychiatric Association, 1980), and the infantilization of autism has continued through the years likely in part due to the focus on autism in children in media and by autism-related charitable organizations (Stevenson et al., 2011). Stevenson and colleagues (2011) found that the face of autism was portrayed as a child on 95% of autism charity webpages, in 91% of books and 68% of films and television programs about fictional autistic people, and in 79% of news stories about autistic people. This emphasis on autistic children has left autistic adults feeling unheard, unseen,

and frustrated by organizations that purport to support them (Des Roches Rosa, 2018; Hugett, 2023).

Autistic Adults and Life Outcomes

Autistic adults face many challenges in adulthood in meeting personal goals and in living lives that align with societal expectations. Many studies on adult outcomes in autistic people have focused on outcomes in terms of a reduction in autistic traits, educational attainment, independent living, finding and maintaining employment, and social development (Henninger & Taylor, 2013; Howlin et al., 2004; Howlin & Magiati, 2017; Levy & Perry, 2011; Shattuck et al., 2012).

In recent years there has been a movement led by autistic people to focus on outcomes surrounding quality of life rather than on those developed by neurotypical people. Pellicano and colleagues (2022), suggest that taking a *capabilities approach* and focusing on what components create a happy autistic life can help us to better understand current autistic adult outcomes and how best to support the autistic community.

One aspect of this capabilities approach is bodily integrity (i.e., "the ability to move freely from place to place; to be secure against violent assault; having opportunities for sexual satisfaction and for choice in matters of reproduction"). Bodily integrity is often jeopardized by the high levels of abuse and victimization experienced by autistic people (Brown-Lavoie et al., 2014; Griffiths et al., 2019). The risk for victimization is even higher in autistic adults who identify as queer or as gender diverse (Pecora et al., 2019; Reuben et al., 2021).

Another aspect of the capabilities approach, called bodily health (i.e., "being able to have good health, including reproductive health; to be adequately nourished; to have adequate shelter"), is more difficult for autistic people to achieve than neurotypical people. Autistic adults

face many barriers to receiving quality healthcare, such as lack of healthcare provider knowledge regarding autism, difficulties with patient-provider communication, anxiety about seeking healthcare, past negative experiences with healthcare providers, socio-economic challenges and access issues, sensory needs not being met in doctor's offices, and executive functioning and planning issues related to seeking and attaining healthcare (Bradshaw et al., 2019; Mason et al., 2019; Walsh et al., 2020).

Co-Occurring Mental Health Concerns and Autism

Autistic adults are also more likely than non-autistic adults to experience co-occurring mental health concerns. Croen and colleagues (2015) showed that when compared to a group of age- and sex-matched non-autistic participants, a sample of 1,507 autistic adults had higher rates of all major psychiatric disorders and all medical conditions. Joshi and colleagues (2013) found that in a sample of 63 autistic adults referred for psychiatric care, autistic participants had an average of three current clinical diagnoses, with the most common being attention-deficit hyperactivity disorder (ADHD), anxiety disorders, and major depressive disorder (MDD). A systematic review by Hollocks and colleagues (2019) examined 35 studies on the co-occurrence of anxiety and depression in autistic adults and found that the lifetime prevalence of anxiety in autistic adults was 42% and the lifetime prevalence of depression was 37%. Lugnegård and colleagues (2011) found that in a sample of 54 participants with an Asperger's syndrome diagnosis, 70% had experienced at least one episode of major depression, 50% had experienced multiple depressive episodes, and 50% had a co-occurring anxiety disorder (Lugnegård et al., 2011). Another study by Lugnegård and colleagues (2012) indicated that about half of a sample of 54 adults diagnosed with Asperger's syndrome also met diagnostic criteria for a personality disorder under the criteria within the fourth edition of the Diagnostic and Statistical Manual of

Mental Disorders (DSM-IV-TR; American Psychiatric Association, 2000), and all of these diagnoses fell within clusters A (i.e., paranoid, schizoid, and schizotypal personality disorders) and C (i.e., avoidant, dependent, and obsessive-compulsive personality disorders).

Autistic adults are also at higher risk for suicidal ideation and attempts to die by suicide, with 66% of a group of 367 adults with Asperger's syndrome experiencing suicidal ideation in their lifetime, and 35% reporting plans or attempts to die by suicide (Cassidy et al., 2014), and rates of suicidal ideation and behavior were significantly higher in those with co-occurring depression. Similar results were found by Paquette-Smith and colleagues (2014), with 35% of their sample of 50 autistic adults reporting having made an attempt to die by suicide.

While some of the co-occurrence of mental health concerns in autistic people, including suicidality, could be due to some biological factors, it is important to note that much of this co-occurrence is likely related to poor treatment of autistic people by neurotypical people and by society at-large. Autistic people are stigmatized and viewed negatively by peers and are often bullied and victimized because of their differences (Gibbs et al., 2022; Griffiths et al., 2019; Weiss & Fardella, 2018). Discrimination has a well-established connection with mental health disparities in people of color (Carter et al., 2017; Pieterse et al., 2012; Schmitt et al., 2014). The complex trauma of this type of repeated discrimination likely leads to the development of mental health concerns in autistic people in the same way that it does for other marginalized groups.

Autism and Victimization

Autistic children experience more frequent victimization than their neurotypical peers (Cappadocia et al., 2012; Forrest et al., 2020; Hwang et al., 2020; Zablotsky et al., 2014). In a group of 192 parents of autistic children, 77% reported that their child had been bullied within the last month, and 30% reported that their child was victimized two or more times per week

(Cappadocia et al., 2012). In a group of 1221 parents of autistic children, 63% reported that their child had been victimized at some point in their life, and those with higher levels of autistic traits were more likely to be bullied than those with fewer autistic traits (Zablotsky et al., 2014). In a group of 1057 autistic children, higher levels of autistic traits related to socialization and communication were associated with greater risk for being victimized (Forrest et al., 2020). In a study by Hwang and colleagues (2020), a group of 86 autistic children were significantly more likely to be victimized (39%) than the community children (4.6%).

Though there are fewer studies about bullying of autistic adults, current evidence suggests that autistic adults are also at greater risk for experiencing victimization than neurotypical adults (Gibbs et al., 2022; Griffiths et al., 2019; Weiss & Fardella, 2018). The study by Gibbs and colleagues (2022) compared 118 autistic adults to 110 non-autistic adults and found that autistic adults reported increased rates of violent victimization, including 75.4% reporting sexual harassment, 58.5% reporting stalking, 56.8% reporting sexual violence, and 58.5% reporting physical violence. On the other hand, the non-autistic adults reported lower rates of victimization, with 56.4% reporting sexual harassment, 27.3% reporting stalking, 28.2% reporting sexual violence, and 36.4% reporting physical violence (Gibbs et al., 2022). Weiss and Fardella (2018) found that among a group of 45 autistic adults who were age-matched with 42 non-autistic adults, the autistic adults were almost three times as likely as non-autistic adults to report teasing during adulthood and were over four times as likely to report being assaulted with a weapon during adulthood. In a study of overall vulnerability to negative life experiences, Griffiths and colleagues (2019) found that autistic adults were more likely to experience negative life events than neurotypical adults, and that higher levels of autistic traits were associated with more negative life events on the Vulnerability Experiences Quotient (VEQ; (Griffiths et al.,

2019), which measures negative life events across several domains, including education, employment, criminal justice, victimization, domestic abuse, and mental illness.

Autism Diagnostic Disparities

Autism diagnosis of those assigned female at birth tends to happen later than it does for those assigned male at birth (Giarelli et al., 2010) and currently there are about three or four times more males diagnosed than females (American Psychiatric Association, 2022; Loomes et al., 2017; Maenner, 2023). Females diagnosed with autism are also more likely to have higher levels of autistic traits, a co-occurring intellectual disability, and higher levels of behavioral symptoms (Dworzynski et al., 2012; Russell et al., 2010). These findings indicate that those assigned female at birth have to display higher levels of autistic traits in order to be seen as autistic by providers and to get an accurate diagnosis. Female-assigned autistic people are more likely to "mask" their autistic traits (Hull et al., 2017; Rynkiewicz et al., 2016; Tierney et al., 2016), which may make their difficulties less readily observable by assessors. In addition to concerns related to masking, autistic traits in female-assigned people are likely more difficult to capture with our current autism assessment tools because they were designed based on criteria written based on what autism looks like in young males. Some recent research has focused on trying to understand the differences in how autism presents in males and females due to the development of diagnostic criteria and assessment tools being based on the presentation of autism in young males (Gould & Ashton-Smith, 2011; Hiller et al., 2014; Kreiser & White, 2014; Mandy et al., 2012).

Black, Indigenous, and people of color (BIPOC) have also historically had lower diagnosis rates of autism than white people (Mandell et al., 2009; Yeargin-Allsopp et al., 2003), but recent data from the CDC suggest that among 8-year-olds in 2020, the rates of autism

diagnosis were higher among children of color, which may suggest improvements in identification of autistic children of color (Maenner, 2023). Autistic people of color are also more likely to receive a diagnosis later in life than white people (Burkett et al., 2015; CDC, 2016; Zeleke et al., 2019), and they are more likely to have a co-occurring intellectual disability (Mandell et al., 2009). This suggests that those BIPOC autistic children and adults with average or higher intellectual ability may be being missed diagnostically. Some research suggests that this diagnostic disparity could be due to a combination of factors, such as differences in cultural developmental norms, lower socio-economic status making medical and mental health care inaccessible, stigma around mental health diagnoses, and distrust of medical systems (Burkett et al., 2015; Ennis-Cole et al., 2013). Ennis-Cole and colleagues (2013) suggested that bias in medical providers' interpretation of behavior could also lead to inaccurate diagnoses, such as misdiagnosing a child of color with oppositional defiant disorder (ODD) rather than correctly diagnosing autism.

Overlap in the Autism and Gender-Diverse Communities

Gender-diverse and transgender communities also struggle with receiving accurate diagnoses, but evidence still suggests that there is a great deal of overlap among the autistic and gender-diverse communities (Glidden et al., 2016; Sala et al., 2020; van der Miesen et al., 2016; Warrier et al., 2020). Studies have shown that somewhere between 4.8% and 26% of adults presenting to gender dysphoria clinics have an official autism diagnosis (Cheung et al., 2018; Heylens et al., 2018). In a retrospective audit of 540 deidentified medical records in Australia, Cheung and colleagues found that around 4.8% of those who sought gender-affirming care had an autism diagnosis in their medical record, a distinctly higher proportion than the prevalence of autism in the general population of Australia, which is around 0.7%. Similarly, in a review of

532 medical charts in Belgium, Heylens and colleagues (2018) found that 6% of those who attended a gender clinic had a documented autism diagnosis in their chart, a rate six times higher than within the general population in Belgium. Heylens and colleagues (2018) also collected cross-sectional data from 75 patients at a gender clinic and found higher levels of autistic traits in the gender care seeking group than a comparison group, with 27% of gender clinic patients scoring above the cut-off of 60 on the Dutch version of the Social Responsiveness Scale – Adult Version (SRS-A; (Constantino & Gruber, 2012; Noens et al., 2012).

Other work has also shown a similar trend toward elevated autistic traits in those who are gender diverse or transgender (Jones et al., 2012; Pasterski et al., 2014; Skagerberg et al., 2015; van der Miesen et al., 2018; Warrier et al., 2020). Pasterski and colleagues (2014) found that 5.5% of a sample of 91 people seeking gender-affirming care in a London clinic scored above the threshold for potential diagnosis on the Autism Spectrum Quotient (AQ; Baron-Cohen et al., 2001). Skagerberg and colleagues (2015), found that of their sample of 166 parents of gender-diverse children and adolescents, 54.2% of parents indicated that their child was in the "mild," "moderate," or "severe" range on the Social Responsiveness Scale – Second Edition (SRS-2; Constantino & Gruber, 2012), indicating some degree of social differences that are typical of those with an autism diagnosis. In a sample of 3,245 participants, van der Miesen and colleagues (2018) compared children and adolescents with gender dysphoria to an autistic group and to a neurotypical group of children and adolescents. Using the Children's Social Behaviour Questionnaire (CSBQ; Hartman et al., 2006), they found that those with gender dysphoria had lower levels of autistic traits than those in the autistic group, but higher levels than those in the neurotypical group.

An online study by Kristensen and Broome (2015) found that 14% of a group of 875 people experiencing gender dysphoria had a formal autism diagnosis. A large online study of 641,860 participants across five datasets was conducted by Warrier and colleagues (2020). This study indicated significantly higher rates of autism diagnoses in transgender and gender-diverse participants than in cisgender participants. Notably, in Warrier's study, transgender and gender-diverse participants were also more likely than cisgender participants to suspect they had an undiagnosed autistic condition.

Some work also suggests that there are differences in autistic traits within the gender-diverse community on the basis of sex assigned at birth. Nobili and colleagues (2018) matched 656 transgender participants with 656 cisgender participants on the basis of sex assigned at birth and age, and found no statistically significant difference in autistic traits on the Autism Spectrum Quotient – Short Version (AQ-Short; Woodbury-Smith et al., 2005) in the overall group, with 33.2% of those in the cisgender group having scores above the cut-off, and 36.3% of those in the transgender group having scores above the cut-off. This lack of statistical difference held within those assigned male at birth as well, but, when they compared those assigned female at birth, 45% of the transgender group scored above the cut-off, compared to 30% of the cisgender group. This difference based on sex assigned at birth may further complicate our understanding of this overlap, especially considering the gender and sex differences in autism presentation and diagnostics.

Gender Diversity

Gender diversity is an overarching term that refers to those who hold gender identities or express their gender in ways that do not align with societal ideas about gender norms aligning with binary sex. The binary sex (i.e., male or female) assigned to an infant at the time of birth is

generally based on the appearance of external genitalia, while gender identity is a person's sense of their own gender. Intersex people are those who are born with chromosomal patterns (e.g., XXY rather than XX or XY), reproductive anatomy, or external genitalia that do not fit into the binary boxes of "male" or "female." Medical professionals, with permission from parents, sometimes perform non-necessary surgical procedures on intersex infants to change the appearance of reproductive anatomy or external genitalia to fit within the binary of "male" or "female" (Knight, 2017). It is estimated that between 8 and 20% intersex individuals also identify as transgender or gender diverse (Furtado et al., 2012), a higher rate than that of the general population.

Cisgender people are those whose gender identity aligns with their sex assigned at birth, while transgender and gender-diverse people are people whose gender does not always correspond to the sex they were assigned at birth (Egan & Perry, 2001). The actual population size of gender-diverse people has been difficult to ascertain because most official records, such as the United States Census, do not collect data on gender identity, but some more recent national surveys suggest that around 0.4-2.7% of the general population is estimated to be transgender or gender diverse (Collin et al., 2016; Conron et al., 2012; Deutsch, 2016; Meerwijk & Sevelius, 2017; Rider et al., 2018; Zucker, 2017).

Gender dysphoria is generally defined as having persistent distress due to an incongruence between sex assigned at birth and gender identity (American Psychiatric Association, 2022). Not all people who identify as gender diverse or transgender experience gender dysphoria. There is a wide range of experiences among the gender-diverse community in gender exploration and expression. The gender affirmation process can include many things in the realms of social transitioning (e.g., changing name, changing pronouns, changing dress and

grooming styles) and medical transitioning (e.g., gender-affirming hormones, gender-affirming surgical procedures). Many people who experience gender dysphoria seek out care at gender clinics to support them in their transition, particularly with medical transitioning aspects.

Gender Diversity and Health

Gender-diverse people are more likely than their cisgender peers to have co-occurring mental health concerns such as anxiety, depression, eating disorders, psychosis, and substance use disorders (Barr et al., 2021; Milano et al., 2019; Nuttbrock et al., 2014; Pinna et al., 2022; Reisner et al., 2016). Nuttbrock and colleagues (2014) found that in a sample of 230 transgender women, abuse by others related to gender identity was positively correlated with substance use, and this relationship was mediated by depressive symptoms. A report by Grant and colleagues (2010) indicated that 25% of the 6,450 transgender participants in their sample were using illicit substances and alcohol in order to cope with discrimination related to their gender identity. A study by de Vries and colleagues (2011) found that among a group of 105 adolescents with gender identity disorder (i.e. the name used for gender dysphoria in the DSM-IV; American Psychiatric Association, 2000) the prevalence of mood disorders was 12.4%, and the prevalence of anxiety disorders was 21%. Just over 1/3 of the gender-diverse respondents in a New Zealand-based study by Pitts and colleagues (2009) met criteria for a depressive disorder. A review by Milano and colleagues (2019) reported that gender-diverse folks were at higher risk for developing eating disorders and that this association could be due to body dissatisfaction and attempts to change the shape of the body to suit desired gender norms. A review of the literature on the overlap of psychosis and gender dysphoria indicated that the transgender community has higher rates of schizophrenia spectrum disorders (Barr et al., 2021).

Transgender people are also more likely to have suicidal thoughts and to attempt to die by suicide (Grossman & D'Augelli, 2007; Kessler et al., 2003; Testa et al., 2012). A study by Pitts and colleagues (2009) indicated that 25% of their sample reported that they had suicidal thoughts within the two weeks prior to when they were surveyed. Almost half of those in a sample of 55 transgender youth reported having suicidal thoughts and one quarter reported attempting to die by suicide (Grossman & D'Augelli, 2007). These rates have increased in recent studies, with 41% of respondents in the sample used by Grant and colleagues (2010) reporting that they had attempted suicide. A survey of 859 gender-diverse youth and young adults in Australia found that 79.7% of those surveyed had engaged in self-harm, 82.4% had suicidal thoughts, and 48.1% had attempted to due by suicide (Strauss et al., 2020).

Gender-diverse people have also been shown to have poorer physical health than cisgender folks (Grant et al., 2010; Rider et al., 2018) A review of health literature by Reisner and colleagues (2016) determined that transgender women are disproportionately affected by sexually transmitted infections (STIs). A global systematic review by Baral and colleagues (2013) indicated that HIV prevalence was 19.1% in a group of 11,066 transgender women from studies conducted around the world. Kcomt and colleagues (2020) found that 22% of transgender adults in their sample had avoided healthcare because they anticipated discrimination from a provider, and Grant and colleagues (2010) found that 28% of those in their sample had postponed needed medical care when they were sick. A survey of 2,168 transgender adolescents in the United States conducted by Rider and colleagues (2018) showed significantly poorer overall health and lower rates of preventive care checkup appointments.

This gap in health quality could be due to structural barriers faced by transgender people in accessing proper health care, such as discrimination and stigmatization by medical providers

and the medical system (Giblon & Bauer, 2017; Giffort & Underman, 2016; Kcomt, 2019; Roberts & Fantz, 2014; Safer et al., 2016; Winter et al., 2016). Lack of knowledge about transgender healthcare among providers, binary separation of healthcare facilities and services, difficulty accessing resources and information, pathologizing healthcare systems and providers, and direct discrimination from healthcare providers have been cited as concerns facing gender-diverse and transgender individuals in healthcare (Guss et al., 2019; Lefkowitz & Mannell, 2017; Snelgrove et al., 2012). A national transgender discrimination survey report on health and healthcare found that 19% of those in the sample had been refused care due to their gender identity, 28% had experienced verbal harassment in medical settings, and 2% had been victims of physical violence in doctor's offices (Grant et al., 2010). Grant and colleagues (2010) also found that half of those in the sample had to teach medical providers about transgender care.

Gender-Affirming Medical Care

Gender-affirming medical care, such as puberty blockers, gender-affirming hormones, and gender-affirming surgeries, has been shown to positively impact the mental health and overall quality of life of transgender people (Gorin-Lazard et al., 2012; Keo-Meier et al., 2015; Murad et al., 2010; Pavanello Decaro et al., 2021). Those who have received gender-affirming care tend to display lower rates of anxiety and depression, lower stress, and lower social distress (Colizzi et al., 2014; Colton Meier et al., 2011; Davis & Colton Meier, 2014; Gómez-Gil et al., 2012).

Gender Diversity and Victimization

Gender-diverse individuals are more likely to victimized, bullied, physically assaulted, and sexually assaulted than their cisgender peers (Griner et al., 2020; Martín-Castillo et al., 2020; Marx et al., 2021). Marx and colleagues (2021) found that among 610 transgender and gender-

nonconforming adolescents, 22% had been forced into sexual activity and 33% had been sexually harassed. They also found that 87% of the adolescents in their sample had experienced verbal harassment due to their gender expression, and 53% had experienced physical harassment for this reason. Griner and colleagues (2020) found that in a group of 82,538 college students, compared to binary males and females, the 204 transgender students reported significantly higher rates of all forms of violence measured, including emotional abuse by a partner (18.6%), physical abuse by a partner (10.3%), sexual abuse by a partner (10.8%), stalking (15.7%), sexual touch without consent (20.1%), attempted sexual penetration (14.2%), sexual penetration (11.8%), physical assault (13.2%), and verbal threats (39.2%).

Gender Minority Stress

The gender minority stress model (Hendricks & Testa, 2012) suggests that transgender and gender-diverse people face a range of stressors in day-to-day life that impact their quality of life and leads to the higher levels of mental distress and lower levels of physical wellbeing experienced by the transgender and gender-diverse community. Testa and colleagues (2015) describe distal stressors that transgender and gender-diverse people face, such as violence, rejection, discrimination (e.g., difficulty accessing legal documents due to differences in records with sex or name; being able to access safe restrooms in public), and nonaffirmation (i.e., when one's internal sense of gender identity is not affirmed by others). Nonaffirmation may occur if a transgender or gender-diverse person is referred to by incorrect pronouns or by a dead name (i.e., referring to someone by the name they were given at birth that they no longer use after transitioning), which may happen due to a stranger's interpretation of their gender expression, or intentionally by those who do not support their transition (Testa et al., 2015).

Hendricks and Testa (2012) also describe how distal stressors create a hostile and stressful environment, and how the anticipation of these stressors causes transgender and gender-diverse folks to develop a vigilance to protect themselves from anticipated harm and attempt to hide themselves and their identity from others to maintain this safety. They also describe a process through which prejudice from the external world is internalized, resulting in the proximal stressor of internalized transphobia, which has been associated with poorer mental and physical health, higher levels of stress, and higher rates of suicidal ideation and suicide attempts (Hendricks & Testa, 2012).

Gender Diversity, Autism, and Healthcare Equity

Both autistic and gender-diverse people experience healthcare discrimination and barriers to quality healthcare access. As many gender-diverse and transgender folks seek medical care as part of their gender affirmation process (e.g., gender-affirming hormones, gender-affirming surgical procedures), it is important that this specific type of healthcare and all other healthcare is accessible by gender-diverse and autistic people. This may be an intersection where the double burden of being both gender-diverse and autistic leads to poor outcomes.

Gender-diverse people face many health inequities and barriers in accessing both physical and mental healthcare (Lovejoy et al., 2023; Rider et al., 2018) and these inequities are worse for genderqueer and nonbinary trans people than for binary trans people. Queer autistic adults are less likely than others to seek healthcare, potentially due to negative experiences with providers and with the healthcare system as a whole (Hall et al., 2020). As such, gender-diverse and transgender autistic people, particularly those who are assigned female at birth, who hold a nonbinary trans identity, who come from a low-SES background, or who are people of color, are

likely to face many challenges navigating the autism diagnostic process and the gender affirmation process.

Executive Functioning

Executive functioning is a collection of cognitive processes that assist with the top-down control of thoughts and behaviors (Jones et al., 2012). It encompasses abilities related to guiding, directing, and managing cognitive, emotional, and behavioral functions. Executive functioning is related to adaptive functioning (Gilotty et al., 2002), which is the ability to perform daily tasks and to care for oneself. As such, executive functioning skills are important for navigating the world and doing things like keeping track of tasks, completing tasks, weighing options, making decisions, navigating the social world, and doing so efficiently. Being able to use executive functioning skills to navigate these tasks effectively leads to improved quality of life because it improves people's ability to build and maintain relationships and to maintain and care for their physical and mental health (M. de Vries & Geurts, 2015; Dijkhuis et al., 2017). It also supports people's ability to gain and keep employment (McGurk & Mueser, 2003; Tomaszewski et al., 2018), which allows for easier care of one's needs on a day-to-day basis from a financial perspective. Executive functioning difficulties are common in a variety of conditions (e.g., ADHD, depression, anxiety) and have been identified in both the autistic (St. John et al., 2021) and transgender communities (Strang et al., 2021).

Executive Functioning and Autism

It is difficult to speak about overall executive functioning in autistic people, as results from many studies have been inconsistent in demonstrating strengths and challenges in executive functioning for autistic people (St. John et al., 2021). The meta-analysis by St. John et al. (2021) regarding research in autism and executive functioning demonstrated that while there were many

inconsistencies, some studies showed that autistic adults struggle with cognitive flexibility, phonemic fluency, and working memory, and some studies showed that autistic adults demonstrated strengths in planning, decision-making, and semantic and nonverbal fluency. St. John and colleagues (2021) noted though that many of the studies included in their analysis involved structured executive functioning tasks that may not generalize to real life scenarios. Others studies suggest that cognitive flexibility strengths demonstrated in formal executive functioning tasks do not appear to align with autistic folks' preference for sameness in everyday life, which may limit their validity in the autistic population (Geurts et al., 2009). The overall literature on executive functioning and autism has resulted in fairly unclear findings, and these findings may be made even more unclear by co-occurring mental health concerns and stressors, including gender dysphoria and navigating the gender-affirming medical care system. One clear finding for autistic adults' executive functioning is that their performance is worsened by increased cognitive load (Bodner et al., 2019; Geurts & Vissers, 2012), which could disproportionately impact autistic transgender and gender-diverse individuals, as navigating being transgender or gender diverse is a burdensome cognitive task consistently co-occurring with other cognitive demands in everyday activities (Strang et al., 2021).

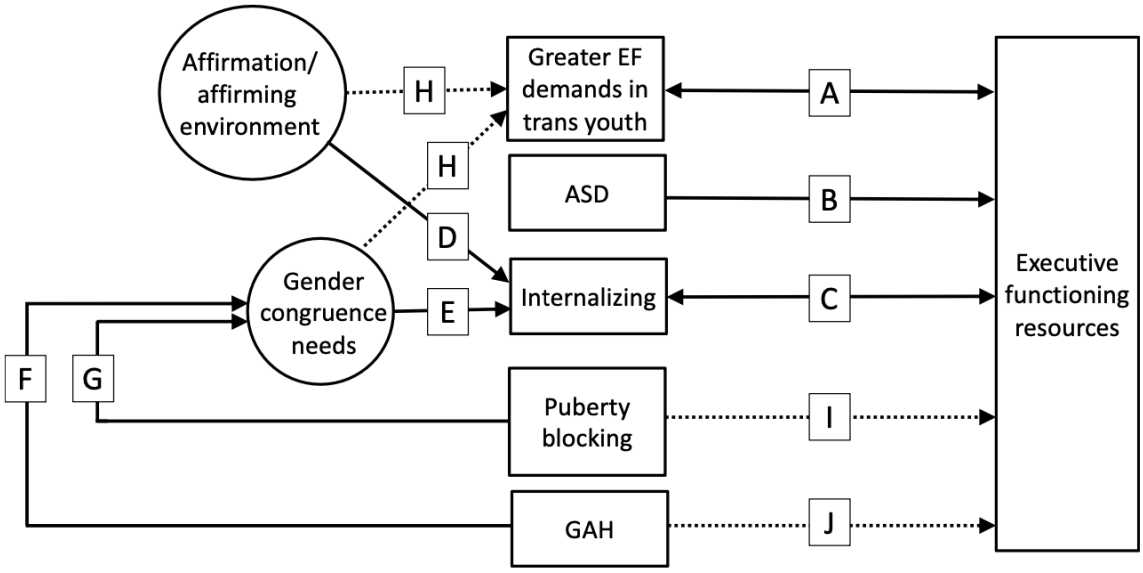
Executive Functioning and Gender Diversity

To understand executive functioning in gender-diverse and transgender people, Strang and colleagues (2021) created a model that outlines how executive functioning resources may be impacted by being transgender or gender diverse (See Figure 1). This model follows the gender minority stress model, and states that transgender and gender-diverse people have additional demands on their executive functioning capacities as a result of being transgender or gender diverse. It also suggests that factors such as having higher levels of autistic traits and

internalizing symptoms may overwhelm already taxed executive functioning capacities in gender-diverse people, because of the high degree of overlap between being transgender or gender-diverse and being autistic or having a co-occurring internalizing disorder such as depression or anxiety. Strang and his team stated in their model that affirming environments that help meet transgender and gender-diverse people's needs, and the use of gender-affirming care, may also impact executive functioning by reducing the demand for executive functioning capacities (Strang et al., 2021).

Figure 1

Strang and colleagues' model for executive functioning and gender diversity



Strang's study (2021) tested this model in a sample of 131 transgender youth between the ages of 11 and 21 and found that many of the youth in the study had executive functioning difficulties, and that those who were autistic or who had depression or anxiety had poorer executive functioning. They also found that those who had received gender-affirming hormones had fewer difficulties with executive functioning.

Rationale for the Present Study

Most studies regarding the gender-diverse population have focused their recruitment on gender dysphoria clinics, and not much is known about the general population of gender-diverse folks, not all of whom are dysphoric (Warrier et al., 2020). As such, we recruited online among the public, in order to try to learn about the experiences of those who may not be found in a gender clinic. It is important to note that those in gender dysphoria clinics likely represent a certain subset of gender-diverse people, and of gender-diverse people who are experiencing dysphoria, due to the level of distress related to gender that would lead to such a referral, and those who are able to access care at a gender clinic. Some people with gender dysphoria may not be able to access these clinics due to financial, geographical, familial, or other challenges (Warrier et al., 2020). The fact that other studies focus on gender dysphoria clinics could also explain some of the low rates of non-binary folks included in studies on gender diversity and autism, as some non-binary people may not seek services at a gender dysphoria clinic. The most recent US transgender survey from the National Center for Transgender Equality (NCTE) suggests that around 1/3 of gender-diverse people hold a nonbinary gender identity, while another 1/3 are transmasculine and the final 1/3 are transfeminine (James et al., 2016), but these more even rates are not being displayed in research on gender-diverse people. As such, we sought to recruit from a wide pool of gender-diverse people, rather than focusing our efforts on recruiting from gender dysphoria clinics, in hopes of obtaining a wider and more diverse sample, including more people who are nonbinary.

We also focused our attention on gender-diverse and transgender adults due to the fact that executive functioning continues to develop in adulthood (Diamond, 2002; Zelazo et al., 2004) and gender-diverse and transgender adults have the ability to take control of their social

and medical transition decisions as adults, which places a higher burden on their executive functioning capacities due to challenges with navigating the complex medical transition system. Transgender and gender-diverse adults also have more access to gender-affirming surgical procedures than transgender and gender-diverse children and adolescents. As such, it is important to investigate these concepts in adults. We also used self-report methods of data collection as we believe it is important to hear directly from the gender-diverse adult population about their experiences with gender affirmation, as well as their mental health and other experiences. Many prior studies have allowed for the perspective of some gender-diverse adolescents and their parents, but less focus has been placed on the experiences of gender-diverse adults. When we overlap this focus on pre-adulthood in the gender diversity literature with that of the autism literature, we see a similar lack of input from adult stakeholders. We hope that this study allows these voices to be heard so we can learn from the unique perspectives of this community.

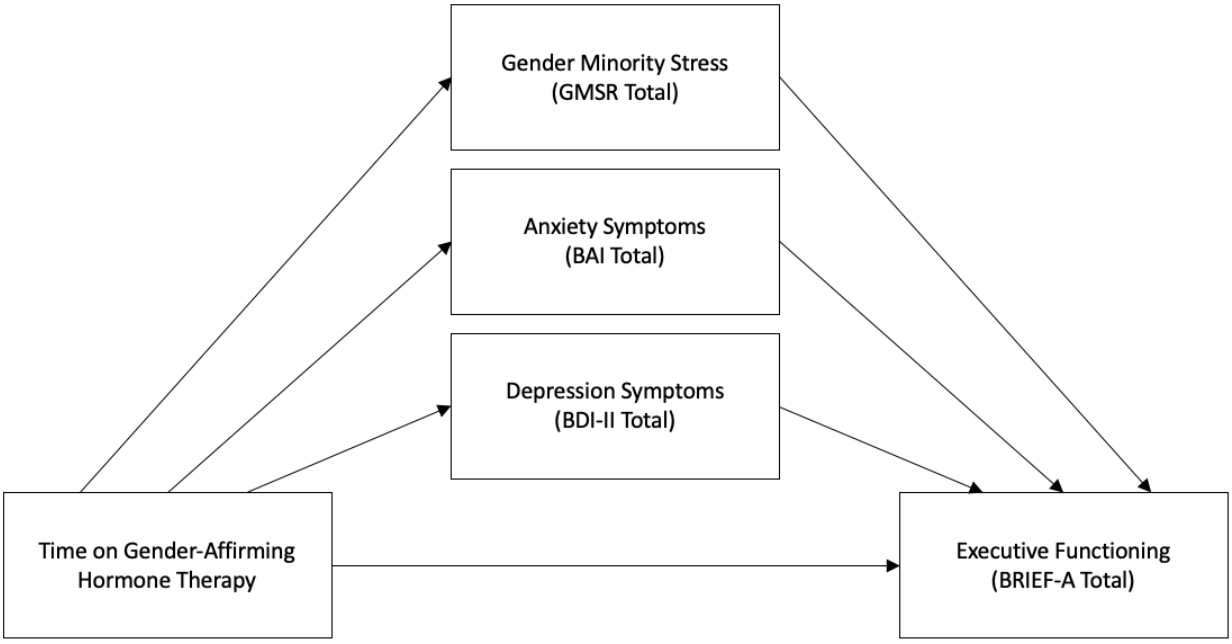
Hypotheses

1. We hypothesize that we will also find that gender-diverse people will have higher levels of anxiety, depression, and those with higher levels of gender minority stress will have more executive functioning difficulties.
2. Additionally, we hypothesize that higher levels of autistic traits will be associated with more executive functioning difficulties. These difficulties may be more apparent in a gender-diverse sample due to higher demands placed on autistic gender-diverse individuals in navigating the social and medical world.
3. Prior research has shown that gender-affirming care (particularly gender-affirming hormones) is associated with better executive functioning. We hypothesize that we will

see that longer amount of time on gender-affirming hormones is associated with better executive functioning. We hypothesize that this reduction in executive functioning challenges will occur through a pathway of lower levels of gender minority stress, anxiety, and depression (See Figure 2).

Figure 2

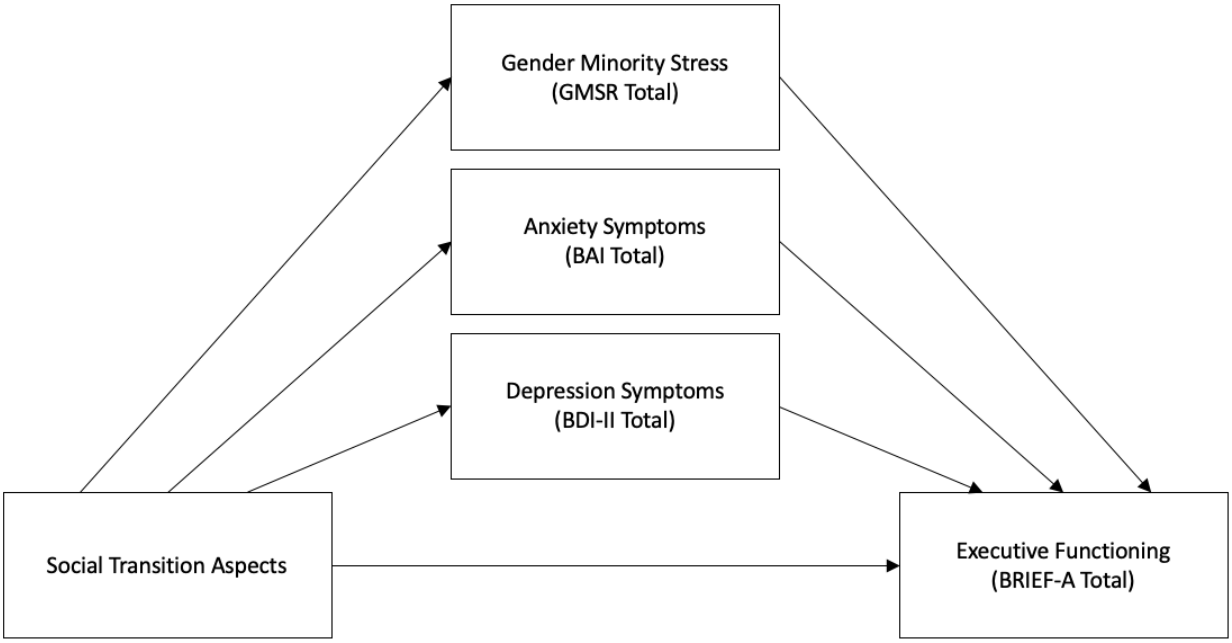
Mediation model for impact of gender-affirming hormone therapy on executive functioning



4. We also hypothesize that higher numbers of completed social transitioning aspects (coming out, name change, pronoun change, dress and presentation change, voice therapy) will be associated with better executive functioning, through the same pathways of lowering gender minority stress, anxiety, and depression (See Figure 3).

Figure 3

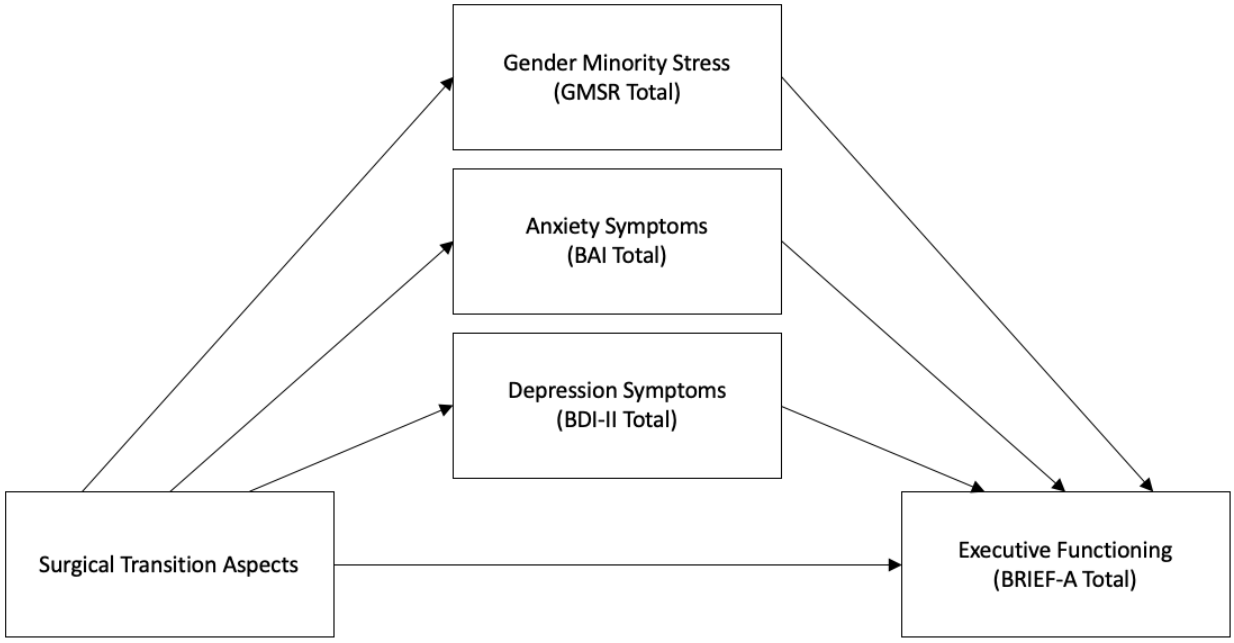
Mediation model for impact of social transition aspects on executive functioning



5. Likewise, we hypothesize that higher numbers of completed surgical transitioning aspects will be associated with better executive functioning, again through lowering gender minority stress, anxiety, and depression (See Figure 4).

Figure 4

Mediation model for impact of surgical transition aspects on executive functioning



Method

Procedure

This study was conducted online via a self-report Qualtrics survey including the measures listed below. Interested participants were asked to reach out to the research team via email, where they were provided with instructions for participation and a link to the survey. Participants were then asked to email the team after completing the survey in order to receive the link to the secondary survey for entry into a drawing for a $50 Amazon gift card. All participants completed the same measures, regardless of their recruitment origin or demographic factors.

Measures

Demographics

Survey participants completed a demographics questionnaire asking about sex assigned at birth, gender identity, sexual orientation, relationship status, race, ethnicity, education, work, socio-economic status, languages spoken, religion, disability status, and mental health diagnoses (see Appendix A).

Gender Affirmation History

Survey participants completed a questionnaire regarding social and medical transitioning. This questionnaire asked about social transition steps such as coming out, name and pronoun changes, gender expression changes via grooming and dress, and voice therapy. It also asked about medical transition steps such as puberty suppression, gender-affirming hormones, and gender-affirming surgical procedures (see Appendix B).

Gender Minority Stress

Survey participants completed the Gender Minority Stress and Resilience Measure (GMSR; Testa et al., 2015; See Appendix C). The GMSR is a standardized self-report measure of stress and resilience related to having a gender-diverse identity. It contains nine subscales about gender-related stress and resilience factors including: gender-related discrimination, gender-related rejection, gender-related victimization, non-affirmation of gender identity, internalized transphobia, pride, negative expectations for the future, nondisclosure, and community connectedness. The GMSR has been shown to have good criterion, convergent, and discriminant validity, as well as good reliability (Testa et al., 2015).

Executive Functioning

Survey participants completed the Behavior Rating Inventory of Executive Function – Adult Version (BRIEF-A; Roth et al., 2005; See Appendix D). The BRIEF-A is a standardized measure of the participants' perspective on their own executive functioning and self-regulation in their day-to-day life. We used the self-report version of this measure. The BRIEF-A contains nine clinical scales: inhibit, self-monitor, plan/organize, shift, initiate, task monitor, emotional control, working memory, and organization of materials. It also provides two broad indices of behavioral regulation and metacognition, as well as an overall summary score. The BRIEF-A has been shown to have high reliability, validity, and clinical utility across a large normative sample and across people with a range of conditions that impact executive functioning (Roth et al., 2005).

Autism Spectrum Quotient

Survey participants completed the Autism Spectrum Quotient (AQ; Baron-Cohen et al., 2001; See Appendix E), which is a standardized self-report measure of autistic traits. It contains five subscales, including: social skills, attention switching, attention to detail, communication, imagination. The test-retest reliability AQ has been found to be acceptable and the internal consistency for all domains have been shown to be moderate to high (Baron-Cohen et al., 2001). An examination found that the AQ can discriminate autistic traits in samples with high level of autism phenotype over controls with only two of the items scoring higher in the control sample (Woodbury-Smith et al., 2005). The AQ has been used in studying autistic adults (Maisel et al., 2016). The suggested cut-off score is 32 for a clinically significant level of autistic traits, but we measured autistic traits on the AQ in dimensional way, using it to indicate higher or lower levels of autistic traits.

Depression

Survey participants completed the Beck Depression Inventory – 2nd Edition (BDI-II; Beck et al., 1996; See Appendix F), which is a standardized self-report measure of depressive symptoms in the past two weeks. The BDI-II is a widely used indicator of depressive symptom severity aligned with the diagnostic criteria for depressive disorders in the DSM-IV (American Psychiatric Association, 2000). It includes questions related to feelings of sadness, pessimism, failure, loss of pleasure, suicidal thoughts, loss of interest, feelings of worthlessness, irritability, fatigue, and other related depressive symptoms. Its reliability has been shown to be in the excellent range and its internal consistency is considered adequate (Arbisi & Farmer, 2001).

Anxiety

Survey participants completed the Beck Anxiety Inventory (BAI; Beck et al., 1988; See Appendix G), which is a standardized self-report measure of anxiety symptoms over the past week. It includes questions related to both somatic (e.g., numbness and tingling, difficulty breathing, heart pounding or racing, shaky) and thought-related (e.g., unable to relax, terrified, nervous, fear of losing control) anxiety symptoms. The BAI is a widely used measure of anxiety symptom severity and its internal consistency and test-retest reliability are both rated as excellent (Dowd & Waller, 1998).

Participants

We recruited $N = 54$ participants who identified as transgender or gender-diverse via social media (i.e., Reddit, Twitter, Facebook, and Instagram), flyers posted in the community, word-of-mouth, contacting past participants from prior studies, and email newsletters from queer resource organizations in the Utah area. Participants were required to be age 18 or older, able to read English, and identify as gender diverse or transgender.

Demographics

Age, Race, Sex Assigned at birth, Gender Identity, Sexual Orientation, and Relationship Status. Ages of participants ranged from 18 to 56 (M = 26.97, SD = 6.95), with most participants in early adulthood. The majority of participants identified as white, and a significant minority identified as multiracial. Sightly more than half of our participants were assigned female at birth. Around one-third of our participants identified as male and another third identified as nonbinary. In terms of sexual orientation, around one-third of participants identified as bisexual, and the remaining two-thirds were fairly evenly split across other orientations. Around two-thirds of our participants were single, several were married or cohabitating with a partner, and. Many reported that they did not identify with any of the options provided for relationship status (See Table 1).

Table 1

Personal Demographics

Race	***N***	**%**
White	39	72
Black	3	6
Middle Eastern/North African	1	2
Multiracial	11	20
Sex Assigned at Birth	***N***	**%**
Female	32	60
Male	19	34
Intersex	2	4
Preferred not to disclose	1	2
Gender Identity	***N***	**%**
Female	18	33
Male	8	15
Nonbinary	20	37
Undisclosed or Uncertain/Exploring	8	15
Sexual Orientation	***N***	**%**
Straight/Heterosexual	5	9.3
Gay or Lesbian	11	20.4
Bisexual	17	31.5
Pansexual	4	7.4
Asexual	5	9.3
Queer	4	7.4
Uncertain/Exploring	4	7.4
Other	4	7.4
Relationship Status	***N***	**%**
Not in a relationship	34	63
Married	7	13
Cohabitating with a partner	7	13
Divorced	1	1.9
Other	5	9.3

Work Status, School Status, and Education Level. Regarding work status, around one-third of participants were not working, and there was variability among those who were working in terms of their weekly hours spent working. Around two-thirds of our participants reported that they were not currently enrolled in school. About half of participants had completed a bachelor's or higher level degree, while the majority of the other half had completed some college credits.

Income and Financial Situation. In terms of income, our participants were fairly spread out across income brackets, and most participants reported having enough money for necessities or having enough money for necessities and some luxuries (See Table 2).

Table 2

Economic and Educational Demographics

Work Status	***N***	**%**
Not working	21	39.8
Working 1-20 hours per week	13	24.1
Working 21-30 hours per week	3	5.6
Working 31-40 hours per week	12	22.2
Working over 40 hours per week	5	9.3
School Status	***N***	**%**
Not currently enrolled in school	33	61.1
Currently enrolled full-time	16	29.6
Currently enrolled part-time	5	9.3
Education Level	***N***	**%**
Did not finish high school	3	5.6
Obtained high school diploma or equivalent	4	7.4
Completed some college credits	15	27.8
Completed associate degree	6	11.1
Completed bachelor's degree	20	37
Completed master's degree	5	9.3
Completed doctorate degree	1	1.9
Income	***N***	**%**
$0-$15,000	13	24.1
$15,001-$25,000	5	9.3
$25,001-$35,000	4	7.4
$35,001-$50,000	12	22.2
$50,001-$75,000	6	11.1
$75,001-$100,000	4	7.4
$100,001-$200,000	6	11.1
Over $200,000	1	1.9
Undisclosed	3	5.5
Financial Situation	***N***	**%**
Routinely unable to purchase sufficient food	6	11.1
Occasionally unable to purchase sufficient food	7	13
Have enough for necessities	21	38.9
Have enough for necessities and some luxuries	20	37

Disability Status, Autism Diagnoses, Medical and Mental Health Diagnoses, and Suicidality. Regarding disability status, almost three-quarters of our participants disclosed that they have a disability, with most of those with disabilities identifying multiple disabilities. When asked about autism diagnoses, a little less than half of participants did not identify as autistic, and a little less than half identified as autistic, either through formal (29.6%) or self-diagnosis (14.8%), the remaining group reported that they were exploring an autism diagnosis or identity. When asked about other medical and mental health diagnoses, almost three-quarters of participants reported that they did not have any medical or mental health diagnoses. Those who did identify other diagnoses reported things like attention-deficit hyperactivity disorder (ADHD; 27.8%), eating disorders, depression, anxiety, post-traumatic stress disorder (PTSD), Ehlers-Danlos Syndrome (EDS), blood clotting disorders, and other autoimmune disorders. Due to high rates of suicidality in both the autistic and gender-diverse communities, we examined the 9th item on the BDI-II, which addresses suicidal ideation, and around two-thirds of participants responded that they do not have thoughts of killing themselves on this item, while around one-third reported that they have thoughts of suicide that they would not carry out, and a few others reported that they would like to kill themselves. No participants in this sample endorsed the option on this item that states, “I would kill myself if I had the chance” (See Table 3).

Table 3

Mental and Physical Health Demographics

Disability Status	***N***	**%**
Have a disability	39	72
Do not have a disability	15	28
Autism Diagnosis	***N***	**%**
Not autistic	22	40.7
Autistic	24	44.4
Formally diagnosed	16	29.6
Self-diagnosed	8	14.8
Exploring autism diagnosis/identity	8	14.8
Medical/Mental Health Diagnoses	***N***	**%**
Have other medical/mental health diagnoses	38	70.4
Do not have other medical/mental health diagnoses	12	22.2
Did not disclose	4	7.4
Suicidality	***N***	**%**
Do not have thoughts of dying by suicide	33	61.1
Have thoughts but would not act on them	18	33.3
Would like to die by suicide	3	5.6

Gender Affirmation and Gender-Affirming Medical Care History. In terms of gender affirmation and gender-affirming medical care, very few of participants had used puberty suppression medication, also known as puberty blockers. Just over half of our participants had used gender-affirming hormones. A small number of participants had completed at least one gender-affirming surgical procedure. Regarding social transitioning, the majority of participants had engaged in some form of social transition, and there was a considerable spread across the sample in terms of number of social transitioning aspects completed (See Table 4).

Table 4

Gender Affirmation Demographics

Puberty Suppression Medication	***N***	**%**
Have used puberty blockers	2	3.7
Have not used puberty blockers	52	96.3
Gender-Affirming Hormone Therapy	***N***	**%**
Have used gender-affirming hormones	28	52
Have not used gender-affirming hormones	26	48
Surgical Transition Aspects	***N***	**%**
Have had at least one gender-affirming surgical procedure	8	14
Have not had any gender-affirming surgical procedures	46	86
Social Transition Aspects	***N***	**%**
Have engaged in social transition	45	83.3
Two social transition aspects	2	3.7
Three social transition aspects	6	11.1
Four social transition aspects	4	7.4
Five social transition aspects	18	33.3
Six social transition aspects	10	18.5
Seven social transition aspects	5	9.3
Have not engaged in social transition	9	16.7

Power

Due to the exploratory nature of the analyses conducted within this paper, we did not conduct a formal power analysis. Due to the lack of research in this area currently, it is difficult to determine what sort of effect sizes would be estimated within this population. We attempted to recruit a sample similar in size to that of Strang and colleagues (Strang et al., 2021), since their research is similar in nature to our study. Unfortunately, due to difficulties with recruitment at this intersection of gender diversity and autism, we were unable to reach our recruitment goal. Our team faced many challenges with recruitment, potentially due to the current political climate surrounding transgender health care, mistrust of medical professionals and psychologists within this community, and the conservative religious institutions and communities from which we were attempting to recruit. Because of this difficulty with recruitment, our sample may be

smaller than necessary to detect the full nuance of the effects we are looking for within our analyses.

Results

Within our sample, the total score on the BRIEF-A ranged from 70 to 204, with an average score of 130.93 (*SD* = 31.69), indicating relatively high levels of executive functioning difficulties. The total score on the BDI-II ranged from 0 to 59, with an average score of 21.00 (*SD* = 14.10), indicating moderate levels of depression. Additionally, the total score on the BAI ranged from 0 to 61, with an average score of 20.11 (*SD* = 12.58), indicating moderate levels of anxiety. The total score on the AQ ranged from 12 to 45, with an average score of 29.28 (*SD* = 9.11), indicating significant levels of autistic traits. Finally, the total score on the GMSR ranged from 12 to 165, with an average score of 92.93 (*SD* = 30.92; See Table 5), indicating relatively high levels of gender minority stress.

Table 5

Descriptive Statistics for Measures

Measure	*M*	*SD*	Range
BRIEF-A	130.93	31.69	70-204
BDI-II	21.00	14.10	0-59
BAI	20.11	12.58	0-61
AQ	29.28	9.11	12-165

Hypothesis 1

We hypothesized that gender-diverse and transgender people with higher levels of anxiety, depression, and gender minority stress would have more executive functioning difficulties. To test this hypothesis, we conducted a regression with the total score on the BRIEF-A as the outcome variable, and included total scores on the BAI, BDI, and GMSR as predictors, and age as a control variable. The overall model was significant, $F[4] = 10.812$, $p < 0.001$, and both anxiety on the BAI ($t = 3.10$, $p = 0.003$) and depression BDI ($t = 2.05$, $p = 0.046$) contributed significantly to the model, while age ($t = 0.17$, $p = 0.866$) and gender minority stress on the GMSR ($t = 1.35$, $p = 0.185$) did not. These results indicate that higher levels of anxiety and depression are associated with higher scores on the BRIEF-A, which indicate more difficulty with executive functioning.

Hypothesis 2

We hypothesized that higher levels of autistic traits would be associated with more executive functioning difficulties. To test this hypothesis, we conducted a regression with the total score on the BRIEF-A as the outcome variable and included the total score on the AQ in the model, as well as age as a control variable. The overall model was not significant, but was approaching significance, $F[2] = 2.95$, $p = 0.061$, and the contribution of autistic traits on the AQ was significant ($t = 2.36$, $p = 0.022$), while age did not contribute significantly to this model ($t =$

-0.66, $p = 0.516$). While this overall model was not significant, as it was approaching significance, we report the predictors for the benefit of understanding for future researchers.

Hypothesis 3

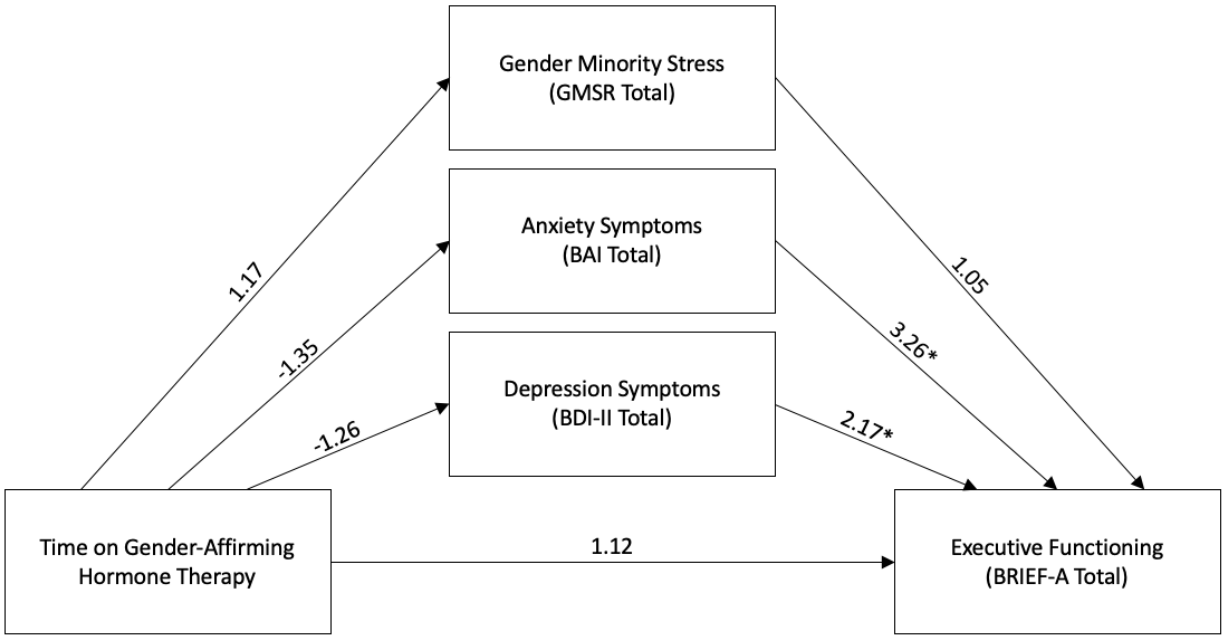
We hypothesized that a longer amount of time on gender-affirming hormones would be associated with better executive functioning. In order to test this hypothesis, we calculated a variable that indicated the number of days spent on gender-affirming hormones by each participant and added this variable to a regression model with the outcome variable of total score on the BRIEF-A. We did not include age as a control variable in this model because of its potential correlation with time spent on gender-affirming hormones. This model was not significant ($F[2] = 0.005$, $p = 0.946$), and the amount of time on gender-affirming hormones was not significant ($t = 0.07$, $p = 0.946$).

We also hypothesized that the reduction we expected to see in executive functioning difficulties for those who had spent more time on gender-affirming hormones would occur through a mediational pathway of lower levels of gender minority stress, anxiety, and depression. Though our regression analysis was not significant, O'Rourke and MacKinnon (2018) argue that one can and should test for mediation, even in the absence of significant effects, as the mediation may still be significant and provide useful information about the relationships among the variables. In order to test this hypothesis, we used the SPSS PROCESS macro model 4 utilizing 5,000 bootstraps, entering time on gender-affirming hormones as our predictor variable, total on the BRIEF-A as our outcome variable, and total on the BAI, total on the BDI-II, and total on the GMSR as our mediators. In this model, time spent on gender-affirming hormones did not have a significant relationship with executive functioning on the BRIEF-A ($t = 1.12$, $p = 0.268$), nor with the mediators of anxiety on the BAI ($t = -1.35$, $p = 0.183$), depression on the BDI-II ($t =$ -

1.26, $p = 0.214$), or gender minority stress on the GMSR ($t = 1.17$, $p = 0.246$). While gender minority stress on the GMSR also did not have a significant relationship with executive functioning on the BRIEF-A ($t = 1.05$, $p = 0.299$), both anxiety on the BAI ($t = 3.26$, $p = 0.002$) and depression on the BDI-II ($t = 2.17$, $p = 0.035$) did have a significant relationship with executive functioning on the BRIEF-A. The significant relationship between both anxiety and depression with executive functioning indicates that as depression and anxiety symptoms increase, so do executive functioning difficulties. The overall indirect effect of this model was not significant (*CI* [-0.0092, 0.0015]; See Figure 5).

Figure 5

Results of mediation between gender-affirming hormones and executive functioning



Hypothesis 4

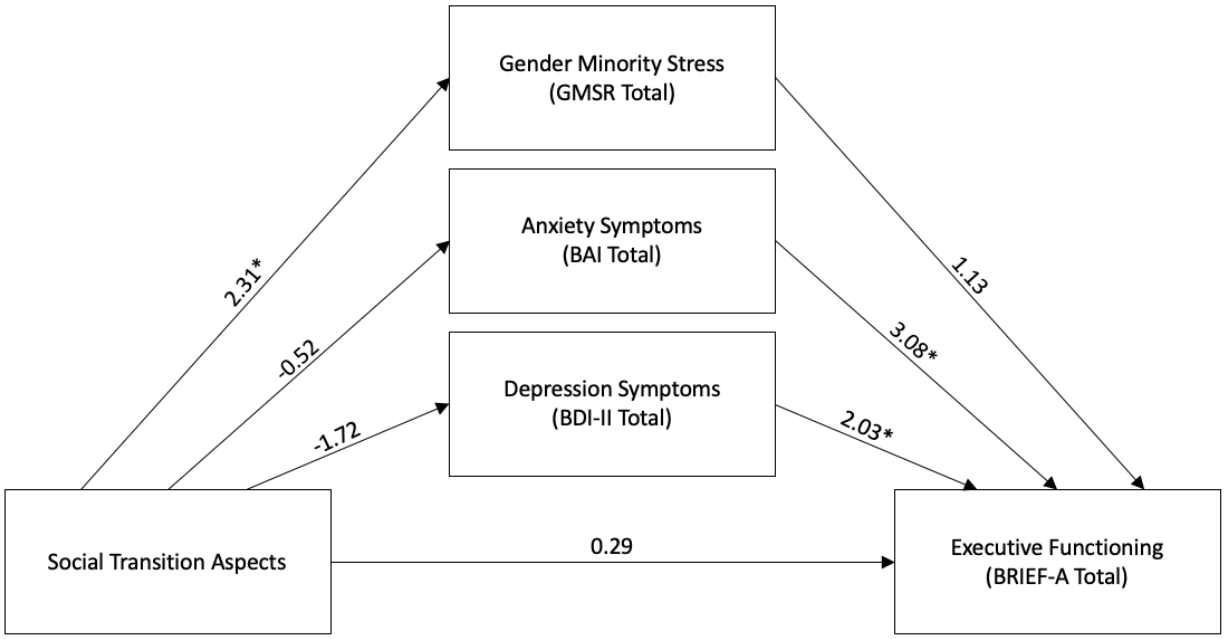
We hypothesized that higher numbers of completed social transitioning aspects (e.g., coming out, name change, pronoun change, dress and presentation change, voice therapy) would be associated with better executive functioning. In order to test this hypothesis, we calculated a variable that indicated the total number of social transitioning aspects completed by each participant and added this variable to a regression model with the outcome variable of total score on the BRIEF-A. Age was also included in this model as a control. This model was not significant ($F[2] = 0.157$, $p = 0.855$), and the number of social transitioning aspects was not significant ($t = -0.164$, $p = 0.870$), nor was age ($t = -0.54$, $p = 0.59$).

We also hypothesized that the reduction we expected to see in executive functioning difficulties for those who had completed more social transitioning aspects would occur through a

mediational pathway of lower levels of gender minority stress, anxiety, and depression. In order to test this hypothesis, we used the SPSS PROCESS macro model 4 utilizing 5,000 bootstraps, entering number of social transitioning aspects completed as our predictor variable, total on the BRIEF-A as our outcome variable, and total on the BAI, total on the BDI-II, and total on the GMSR as our mediators. In this model, number of social transitioning aspects did not have a significant relationship with executive functioning on the BRIEF-A ($t = 0.29$, $p = 0.775$), nor with the mediators of anxiety on the BAI ($t = -0.52$, $p = 0.607$) or depression on the BDI-II ($t = -1.72$, $p = 0.092$). Number of social transitioning aspects did have a significant relationship with the mediator of gender minority stress on the GMSR ($t = 2.31$, $p = 0.025$). The positive direction of this effect indicates that those who have completed more social transitioning aspects were experiencing more gender minority stress within this sample. While gender minority stress on the GMSR did not have a significant relationship with executive functioning on the BRIEF-A ($t = 1.13$, $p = 0.266$), both anxiety on the BAI ($t = 3.08$, $p = 0.003$) and depression on the BDI-II ($t = 2.03$, $p = 0.047$) did have a significant relationship with executive functioning on the BRIEF-A. The positive direction of these effects again indicates that as depression and anxiety symptoms increase, so do executive functioning difficulties. The overall indirect effect of this model was also not significant (*CI* [-5.0200, 3.0003]; See Figure 6).

Figure 6

Results of mediation between social transition aspects and executive functioning



Hypothesis 5

We hypothesized that higher numbers of completed gender-affirming surgical procedures would be associated with better executive functioning. Our sample had very little variability in this area, with a range of 0-2 total procedures completed, and only 14% of participants having completed any gender-affirming surgical procedures. As such, we attempted to better capture the variability in our sample by interpreting the qualitative information they provided regarding surgical procedures, as many were planning to undergo surgery, or had surgeries scheduled. In order to do so, we created an ordinal variable with the following options: 0 = no planning, 1 = working with provider on a plan to have procedure, 2 = procedure scheduled, 3 = one procedure completed, 4 = two procedures completed. We then added this variable to a regression model with total score on the BRIEF-A as the outcome variable, again including age as a control

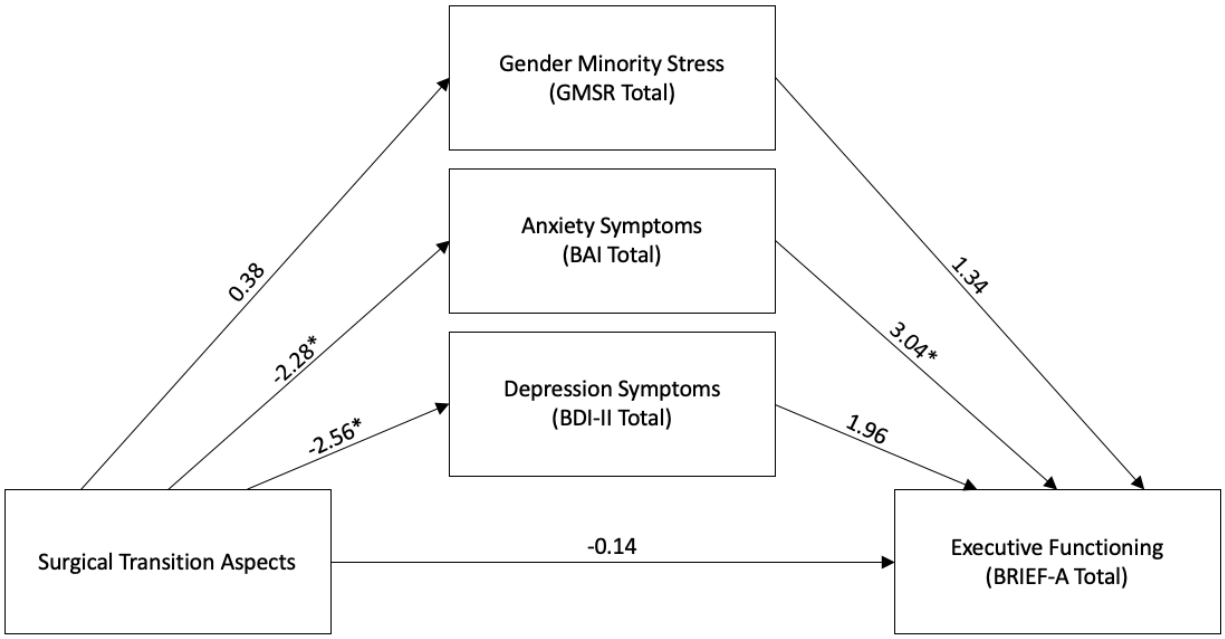
variable. This model was also not significant ($F[2] = 0.312$, $p = 0.734$) and the surgical procedure steps were not significantly contributing to the model ($t = -0.578$, $p = 0.566$), and age also did not significantly contribute to the model ($t = -0.512$, $p = 0.611$).

We also hypothesized that the reduction we expected to see in executive functioning difficulties for those who had completed more surgical procedure steps would occur through a mediational pathway of lower levels of gender minority stress, anxiety, and depression. In order to test this hypothesis, we used the SPSS PROCESS macro model 4 utilizing 5,000 bootstraps, entering our variable categorizing steps taken toward gender-affirming surgical procedures as our predictor variable, total on the BRIEF-A as our outcome variable, and total on the BAI, total on the BDI, and total on the GMSR as our mediators. In this model, surgical procedure steps did not have a significant relationship with executive functioning on the BRIEF-A ($t = -0.14$, $p = 0.890$), nor with the mediator of gender minority stress on the GMSR ($t = 0.38$, $p = 0.704$). Surgical transition aspects did have significant relationships with both of the other mediators, anxiety on the BAI ($t = -2.28$, $p = 0.027$) and depression on the BDI-II ($t = -2.56$, $p = 0.013$). The direction of this effect suggests that more surgical aspects led to lower anxiety and depression symptoms. While gender minority stress on the GMSR ($t = 1.34$, $p = 0.187$) and depression on the BDI-II ($t = 1.96$, $p = 0.055$) did not have a significant relationship with executive functioning on the BRIEF-A, anxiety on the BAI did have a significant relationship with executive functioning on the BRIEF-A ($t = 3.04$, $p = 0.004$). The direction of this effect indicates that as anxiety symptoms decrease, so do executive functioning difficulties. It is important to note that while depression was not significantly related to executive functioning within this model, this relationship was approaching significance, similarly to other models discussed above. This finding suggests that anxiety partially mediates the relationship between surgical procedure steps

and executive functioning on the BRIEF-A. The total effect of surgical procedure steps on executive functioning on the BRIEF-A is fairly small (β = -4.93, *CI* [-10.89, 1.05]), but much of it can be accounted for by the impact of anxiety on the BAI (β = -2.76, *CI* [-5.48, -0.33]) and depression on the BDI-II (β = -1.99, *CI* [-5.24, -0.16]). The overall indirect effect of this model was significant (*CI* [-9.1027, -0.2844]). In this model, 96% of the total effect of surgical steps on executive functioning can be accounted for by anxiety and depression (See Figure 7).

Figure 7

Results of mediation between surgical transition aspects and executive functioning



Correlations

In order to further understand the spread and relationships amongst our variables after our null findings, we ran a post-hoc exploratory correlation analysis (See Table 6). This analysis revealed significant correlations between gender minority stress on the GMSR and anxiety on the BAI, as well as with executive functioning challenges on the BRIEF-A. It also revealed a significant relationship between autistic traits on the AQ and executive functioning challenges on the BRIEF-A, which we did not see in prior analyses above. Additionally, it showed strong significant relationships between anxiety on the BAI and depressive symptoms on the BDI-II, as well as with executive functioning challenges on the BRIEF-A. Finally, it showed a strong correlational relationship between depressive symptoms on the BDI-II and executive functioning challenges on the BRIEF-A. These correlations suggest that anxiety and depression are strongly

connected within our sample, as is generally true in other research. They also confirm the findings from above that anxiety and depression are related to executive functioning challenges. They also show the relationship between gender minority stress and anxiety that could be impacting how are data are presenting in the prior analyses, wherein anxiety is accounting for a great deal of the variance, but anxiety and gender minority stress are related here, suggesting that decreasing anxiety or gender minority stress could be helpful in supporting this population. Overall, these relationships support the idea that executive functioning is related to all of these mental health factors, and that supporting folks with their mental health can help to support their executive functioning indirectly.

Table 6

Correlation Matrix for Measures

	GMSR	AQ	BAI	BDI-II	BRIEF-A
GMSR	1	.058	.275*	.260	.332*
AQ		1	.136	.227	.310*
BAI			1	.625**	.629**
BDI-II				1	.573**
BRIEF-A					1

Note. * = $p < .05$, ** = $p < .001$

Discussion

The overall goal of this paper was to investigate the impact of gender affirmation and social support on the mental health and executive functioning of gender-diverse autistic people. To the best of our knowledge, this is the first study to examine the relationships among these variables within an adult, gender-diverse, autistic sample.

Most interestingly, we found a significant relationship between executive functioning and gender-affirming surgical procedures, such that higher numbers of steps taken toward and actual completion of gender-affirming surgical procedures were associated with better executive functioning. As these data are correlational in nature, it is difficult to interpret a causal relationship between surgical procedures and executive functioning, and we believe it is important to note that those who have taken steps toward surgical affirmation procedures likely have high executive functioning abilities and support from others in order to reach that point in their affirmation process. This support could be coming from friends, family, and medical and mental health professionals. Those with this sort of support likely find it easier to navigate the affirmation process, and thus reap the benefits of access to needed gender-based care. While this is an intriguing finding and is worthy of comment and of future research, we urge caution in interpreting this finding, as the majority of our sample (86%), had not completed any surgical

procedures. In the broader literature, it has been reported that around 42-54% of transgender men, 28% of transgender women, and 9% of non-binary people, report having had a gender-affirming surgical procedure (Sineath et al., 2016). Within our sample, 50% of transgender men, 0% of transgender women, and 15% of our nonbinary participants had received a gender-affirming surgical procedure. While the percentage of transgender men in our group is around average and more of our nonbinary participants have had surgery than average, the fact that none of the transgender women in our sample have received any gender-affirming surgical procedures indicates that our sample differs from the general population in this way. Nonetheless, the mediation model suggests that further steps toward surgical procedures lead to improved executive functioning, with most of the effect occurring through decreases in anxiety and depression symptoms. The lack of impact of gender minority stress on this model may be due to the impact of anxiety and depression being so high, which may be overshadowing the impact of gender minority stress specifically.

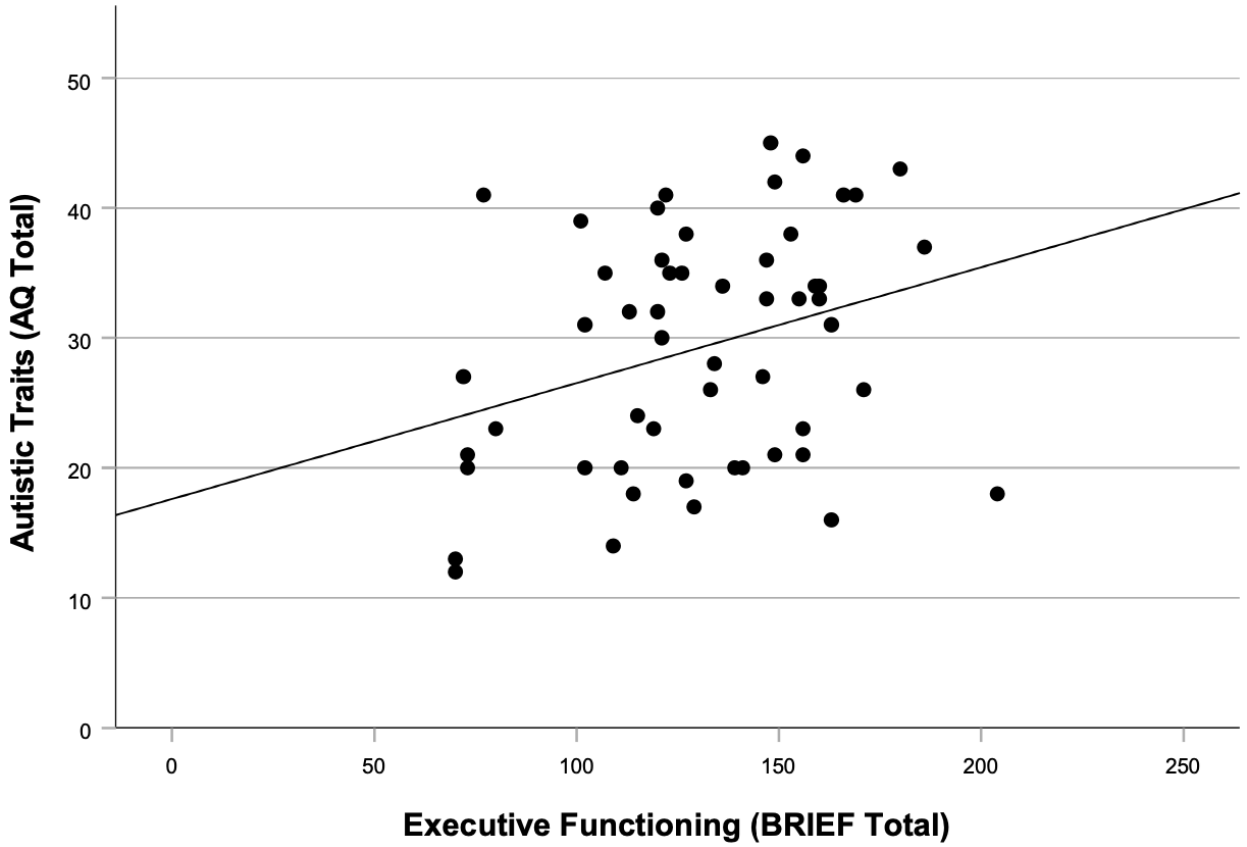
Additionally, we confirmed that lower levels of anxiety and depression were associated with lower levels of executive functioning concerns in this population. This suggests that supporting this population's mental health could help free up some executive functioning resources, which are desperately needed to navigate the complex social and medical process of gender affirmation. While this may sound like a relatively routine finding, it is especially important in this population due to the high amount of anxiety and depression found in both the autistic (Hollocks et al., 2019; Joshi et al., 2013) and gender-diverse communities (A. L. C. de Vries et al., 2011; Pitts et al., 2009), as well as the challenges faced by these groups in executive functioning (Bodner et al., 2019; St. John et al., 2021; Strang et al., 2021). As discussed earlier, the intersection of being both gender-diverse and autistic likely places a particular burden on

executive functioning (Strang et al., 2021), which could be alleviated through mental health supports.

On the other hand, we found that within this sample, autistic traits did not meaningfully impact executive functioning. This could be aligned with the complex findings in the literature relating autism and executive functioning. While some studies have shown that autistic adults struggle with some aspects of executive functioning (St. John et al., 2021), other work has demonstrated relative strengths in some areas of executive functioning as well (Geurts et al., 2009). One finding that has been well-established within the executive functioning literature is that higher cognitive load worsens executive functioning performance in autistic people (Bodner et al., 2019; Geurts & Vissers, 2012). Our hypothesis that autistic traits would impact executive functioning within this sample was based on this idea that increased cognitive load impacts executive functioning and that gender-diverse autistic people likely face a great deal of cognitive load in navigating the world as a gender-diverse person. However, our finding may instead confirm that autistic people have strengths in planning and decision-making (St. John et al., 2021). Many of the additional executive functioning demands placed on gender-diverse folks (Strang et al., 2021) appear to depend on these planning and decision-making skills. For example, gender-diverse people have additional executive functioning demands placed upon them regarding planning and organizing their gender-affirming medical care, deciding who is safe to come out to, and deciding how they would like to express their gender on a daily basis. A scatter plot of these data within our sample revealed a small relationship between autistic traits and executive functioning with a great deal of spread (See Figure 8), so it is difficult to make any strong inferences as to the meaning behind this data, due to inconsistencies within our sample in these areas. Our small sample size may also contribute to difficulty with interpretation here.

Figure 8

Scatter plot of autistic traits and overall executive functioning



Regarding the impact of gender affirmation on executive functioning, we examined the relationships among specific aspects of gender affirmation, mental health, gender minority stress, and executive functioning. While we found no significant effects for the impact of social transitioning or for gender-affirming hormone use, other prominent researchers, such as Strang and colleagues (2021), have found that those who had received gender-affirming hormones had fewer executive functioning difficulties. It is also important to note that though we did not find the support we expected for our hypotheses related to hormonal and social transitioning, we also did not find that these aspects of gender affirmation were harmful to our participants. We believe that this lack of a strong effect within our sample could be due to issues of sample size being too

small to detect our effect, rather than due to a true lack of effect in this area. Additionally, slightly less than half of those in our sample had not received any gender-affirming hormone therapy (48%), so we may not have the variability within our sample to detect an effect. As such, the skew we see with how many folks within our group had not taken any hormones may be impacting our results and potential interpretation. It is important to note that on average, around 62% of gender-diverse and transgender folks have received hormone therapy (Grant et al., 2010), a slightly higher rate than those in our sample (52%). A scatter plot of our sample's time on gender-affirming hormones and their executive functioning revealed that the majority of our sample had not used any gender-affirming hormones for very long (See Figure 9), making this finding especially difficult to interpret. These data are also difficult to interpret because though around half of our participants reported receiving gender-affirming hormone therapy, only around 29% reported the length of time they have been taking hormones, further skewing our data toward zero (See Figure 10). Additionally, an even smaller group of our participants (3.7%) had ever used puberty blockers. There are many reasons why our participants may have lower levels of hormone-related affirmation treatment, such as disinterest in hormonal treatment, time point in transition process being early, or difficulty accessing care due to the current political, legal, and social climate surrounding transgender rights. Our team believes that a larger sample with a broader range of hormone and puberty blocker use may have clarified this issue.

Figure 9

Scatter plot of time on gender-affirming hormones and overall executive functioning

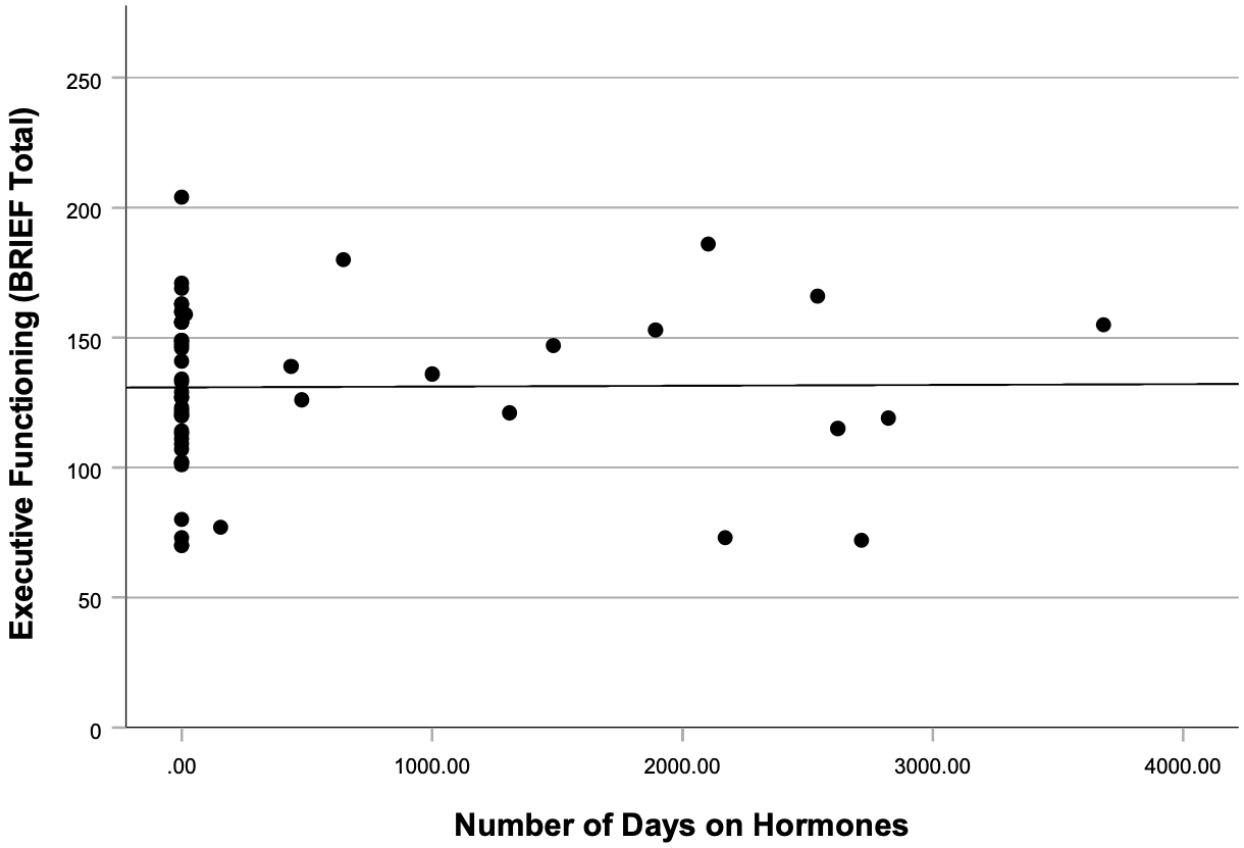
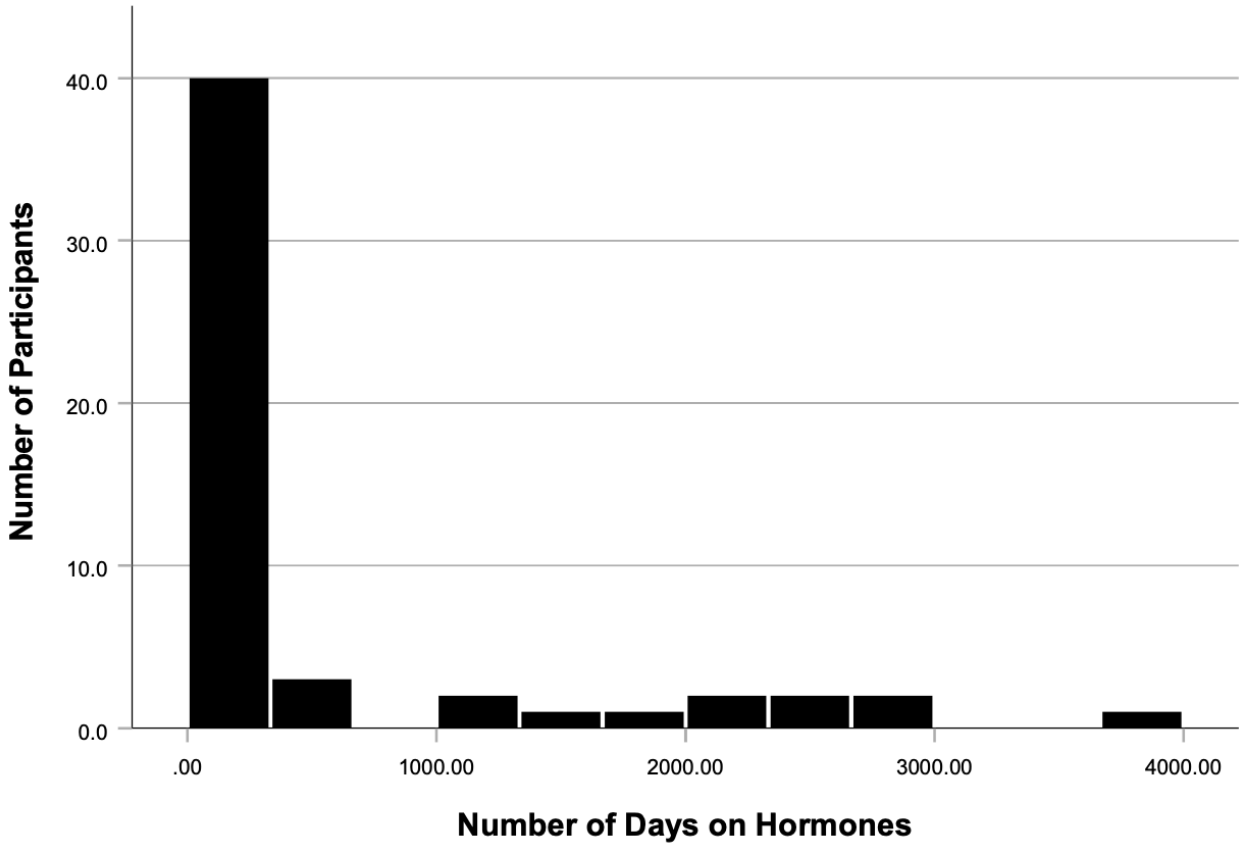


Figure 10

Bar graph of time on gender-affirming hormones



The lack of effect for social transition aspects could be explained by our small sample size or by the fact that many in our sample were quite young and were in the midst of early stages of their transitions. It could be that if we were to follow these young people into later stages of their transitions that they may see potential executive functioning benefits that could come later in their transitions after they have established how they would like to present and are presenting as such. At the moment that we caught them in our cross-sectional dataset, they may have been under a great deal of cognitive load and stress due to their early stages of transition. At this phase, they may be more likely to be distressed due to fears related to how people may respond to them being more visibly transgender early in their transition. They may also be

distressed by the sheer volume of decisions they need to make during their transition, as well as the planning and organizing of related tasks to achieve transition-related goals. It is important to note that while there is significant variability on our measures within our sample, overall, the scores skew toward moderate-to-high levels of distress, and as such, the overall variability is less than what we would like to see in our predictor variables.

Limitations and Future Directions

While our goal was to represent differing perspectives and experiences by recruiting an international online sample, as we were unable to recruit a large number of participants, differing individual experiences may be impacting our findings more heavily than anticipated. We recruited broadly with the goal of learning about a wide variety of experiences, but the international nature of our sample, combined with its small size, may make our findings less interpretable. Being transgender or gender diverse comes with vastly different experiences depending on where one lives due to the cultural perceptions of gender diversity. For example, in 2017, around 70% of people in Spain reported that they would like their country to do more to support and protect transgender people, while only 39% of people in Poland agreed with that statement (*Global Attitudes Toward Transgender People*, 2018). Even within the United States, being transgender in New York is a very different experience than being transgender in Florida due to differing legal protections among states regarding gender-affirming care and legal transitioning. The Human Rights Campaign reported that in April 2023, 29.5% of transgender youth in the United States live in states that have passed bans on gender-affirming care (*Attacks on Gender Affirming Care by State Map*, 2023).

With this in mind, it is also important to address that the timing of our study may also have impacted our sample's experiences and mental health. The recent increase in the United

States on anti-transgender legislation and rhetoric has likely caused a great deal of distress to our participants (Santhanam, 2023). They may have been feeling particularly distressed and afraid in our current political and social environment. While there is no way to eliminate confounds such as this, these data paint a picture of a very particular time in the history of transgender rights, particularly in the United States.

Other researchers should still be encouraged to recruit broadly, but to ensure that they have the power they need to detect the effects they are hoping to find. If we were to repeat this study, we would have spent more financial and temporal resources on recruitment, which was a particularly difficult aspect of conducting this study. A larger group of researchers could likely pool resources to conduct a study of these questions on a larger scale. Given more time, more funding, and better connections within the community outside of our state, we may have been able to recruit more effectively. Our experience has been that recruiting at the intersection of gender diversity and autism has been especially difficult, and this could also be partially attributed to increased fear among the gender-diverse community regarding safety in giving away personal information regarding a sensitive and private topic in their lives.

Conclusions

This study is the first of its kind to examine these questions in an adult, gender-diverse, autistic sample. It provides information to researchers and clinicians in this field about how executive functioning, gender minority stress, anxiety, and depression are related to one another in this population. This study provides support for the theory that anxiety and depression impact executive functioning in autistic people, just as they do in neurotypical people. It does not suggest that, within the gender-diverse population, autistic people struggle any more than neurotypical people with executive functioning overall. However, it is important for clinicians to

remember though that both gender-diverse and autistic people have a higher probability of being anxious and depressed, so the impact on executive functioning likely comes from those mental health concerns, rather than from autistic traits themselves within this population. This study also provides some support for the idea that gender-affirming surgical procedures are associated with better mental health and better executive functioning, but less can be said regarding other transitioning aspects (i.e., social and hormonal transitioning) based on these data. Further work is needed in this area to confirm this finding and to look into these questions with a larger sample that is powered to detect effects at these intersections.

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APPENDIX A

Demographics Questionnaire

1. In what month and year were you born? (please use MM/YYYY format)
2. What sex were you assigned at birth, on your original birth certificate?
    a. Male
    b. Female
    c. Intersex
    d. Not listed (please specify)
3. What is your current gender identity? How do you describe yourself?
    a. Male / Man or Trans Male / Man
    b. Female / Woman or Trans Female / Woman
    c. Gender-diverse (non-binary, genderfluid, genderqueer, gender non-conforming, bigender, agender, two-spirit)
    d. Not sure (exploring my gender identity)
    e. Not listed (please specify)
4. How strongly to you identify as male or female?
    a. Male
    b. Male-leaning
    c. Neutral (equally neither or both)
    d. Female-leaning
    e. Female
5. How would you describe your identity class?
    a. Male cisgender

   b. Male transgender
   c. Male-leaning cisgender
   d. Male-leaning transgender
   e. Neutral cisgender
   f. Neutral transgender
   g. Female-leaning cisgender
   h. Female-leaning transgender
   i. Female cisgender
   j. Female transgender

6. What are your pronouns?
   a. They/them
   b. He/him
   c. She/her
   d. Neopronouns (e.g., Xe / Xir / Xem, etc.)
   e. Other

7. What is your sexual orientation?
   a. Heterosexual / Straight
   b. Gay or Lesbian
   c. Bisexual
   d. Pansexual
   e. Asexual
   f. Queer
   g. Not sure (exploring my sexual orientation)

h. Not listed (please specify)

8. What is your relationship status?
    a. Single
    b. Married
    c. Civil union
    d. Cohabitating
    e. Separated
    f. Divorced
    g. Widowed
    h. Not listed (please specify)
9. Although the categories listed below may not represent your full identity or use the language you prefer, for the purpose of this survey, please indicate which group(s) below most accurately describes your racial identification? (You may select more than one option)
    a. Asian
    b. Black
    c. Latinx / Latine / Hispanic
    d. Middle Eastern / North African
    e. Pacific Islander / Native Hawaiian
    f. White
    g. Multiracial
    h. Not listed (please specify)

10. Multiracial people can identify in various ways. For example, some people identify with a specific racial heritage, and some identify as "multiracial." Please describe the race with which you primarily identify. Please also describe any other races that are part of your identity.
11. Are there any other words you would use to describe your race, ethnicity, or culture?
12. What languages do you currently speak?
13. How fluent are you currently in English?

    0 = not fluent at all, 5 = moderately fluent, 10 = completely fluent
14. What language is currently used in your home most of the time?
15. What is the highest grade in school, year in college, or post-college degree work have you completed?
    a. Did not finish high school (please enter highest grade completed)
    b. High school diploma, GED, or equivalent degree
    c. Some college credit (no degree completed)
    d. Technical / Trade / Vocational training
    e. Associate degree
    f. Bachelor's degree
    g. Master's degree
    h. Doctorate degree
16. Are you currently a student?
    a. Part-time student
    b. Full-time student
    c. Not a student

17. Are you currently involved in paid work?

    a. Not at all

    b. Working 1-20 hours per week

    c. Working 21-30 hours per week

    d. Working 31-40 hours per week

    e. Working over 40 hours per week

18. What is your current job title?

19. Currently, your total household income (all earners) is:

    a. $0-$15,000

    b. $15,001-$25,000

    c. $25,001-$35,000

    d. $35,001-$50,000

    e. $50,001-$75,000

    f. $75,001-$100,000

    g. $100,001-$200,000

    h. More than $200,000

20. What is the total number of people who rely on this income (including yourself)?

    a. 1

    b. 2

    c. 3

    d. 4

    e. 5

    f. 6

g. 7

h. 8

i. 9

j. 10+

21. Currently, how would you describe the financial situation of your family?

a. Routinely unable to purchase sufficient food or other necessities.

b. Occasionally unable to purchase sufficient food or other necessities.

c. Have enough money for necessities.

d. Have enough money for necessities and some luxuries.

22. With what religion or spiritual practice (if any) do you currently identify? (You may choose more than one option)

a. Christian – Catholic

b. Christian – Protestant (examples: Baptist, Episcopal, Methodist, Evangelical, Lutheran, Quaker, etc.)

c. Christian – LDS/Mormon

d. Christian – Other

e. Jewish

f. Muslim

g. Hindu

h. Buddhist

i. Spiritual but not religious

j. Agnostic

k. Atheist

l. Other (please specify)

23. Do you have a disability? (You may select more than one option)

a. No disability

b. Acquired / traumatic brain injury

c. Blind / low vision

d. Deaf / hard of hearing

e. Cognitive, developmental, or learning disability (please specify)

f. Chronic illness / medical condition (please specify)

g. Mental illness (please specify)

h. Physical / mobility concern that affects walking (please specify)

i. Physical / mobility concern that does not affect walking (please specify)

j. Speech / communication condition (please specify)

k. Other (please specify)

24. Do you have an autism spectrum condition diagnosis? (Examples: autism, autism spectrum disorder, autistic disorder, Asperger's, pervasive developmental disorder)

a. No

b. Yes, I have been formally diagnosed. (please specify diagnosed condition)

c. Yes, I am self-diagnosed.

d. I believe I may be autistic but am exploring and have not been diagnosed.

25. Do you have any other physical or mental health concerns that have not been discussed in previous questions?

a. No

b. Yes (please specify)

26. Think of the options below as a ladder representing where people stand in our society. At the top of the ladder are the people whose social class (income level, occupation, and education level) is the most ideal, accepted, and valued in our society. At the bottom of the ladder are the people whose social class is the least ideal, accepted, and valued in our society. The higher up you are on this ladder, the closer you are to the people at the very top and the lower you are, the closer you are to the bottom. Where would you put yourself on the ladder? Please select the option where you think you stand.

    10 – most ideal, valued, accepted social class

    9

    8

    7

    6

    5

    4

    3

    2

    1 – least ideal, valued, accepted social class

APPENDIX B

Gender Affirmation History Questionnaire

The following questions are related to social and medical transition steps that you may or may not have taken. We wish to note that we ask these questions for clarification and that we do not believe these questions are not indicative of your validity in your gender diverse identity.

1. Have you taken any steps to socially transition? (examples: coming out, changing name and pronouns, changing gender expression)
    a. No
    b. Yes
2. Which of the following steps have you taken? (You may select more than one option)
    a. Coming out to family / friends
    b. Changing name socially or legally
    c. Changing pronouns
    d. Changes in dress or grooming for gender expression
    e. Binding / packing / tucking / padding
    f. Changing participation in gendered activities (examples: living arrangements, sports, gendered clubs, etc.)
    g. Voice and communication or speech therapy to match vocal characteristics with gender identity
    h. Other (please specify)
3. When did you start the process of socially transitioning? (Please use MM/DD/YYYY format. If you are not certain, give your best guess).
4. Have you ever taken puberty suppression medication (puberty blockers)?

   a. No
   b. Yes

5. When did you start taking puberty blockers? (Please use MM/DD/YYYY format. If you are not certain, give your best guess.)
6. Are you currently taking puberty blockers?
   a. Yes
   b. No
7. When did you stop taking puberty blockers? (Please use MM/DD/YYYY format. If you are not certain, give your best guess.)
8. Have you ever taken gender-affirming hormones?
   a. No
   b. Yes
9. When did you start taking hormones? (Please use MM/DD/YYYY format. If you are not certain, give your best guess.)
10. Are you currently taking hormones?
    a. Yes
    b. No
11. When did you stop taking hormones? (Please use MM/DD/YYYY format. If you are not certain, give your best guess.)
12. Have you had any gender affirming surgical procedures?
    a. Yes
    b. No

13. Which of the following gender affirming surgical procedures have you had? (You may select more than one option)
    a. MtF breast / chest / top surgery: augmentation mammoplasty (implants/lipofilling)
    b. FtM breast / chest / top surgery: subcutaneous mastectomy/creation of a male chest
    c. MtF genital / bottom surgery: penectomy, orchiectomy, vaginoplasty, clitoroplasty, vulvoplasty
    d. FtM genital / bottom surgery: hysterectomy/salpingo-oophorectomy, urethral reconstruction, metoidioplasty, phalloplasty, vaginectomy, scrotoplasty, implantation of erection prosthesis, implantation of testicular prostheses
    e. MtF other surgery: facial feminization, liposuction/lipofilling, voice feminization surgery, thyroid cartilage reduction, gluteal augmentation, hair reconstruction
    f. FtM other surgery: voice masculinization surgery, liposuction/lipofilling, pectoral implants
    g. Other procedures (please specify)
14. When did you have your first gender affirming surgical procedure? (Please use MM/DD/YYYY format. If you are not certain, give your best guess.)
15. Is there anything else you would like us to know about your gender affirmation process?

APPENDIX C

Gender Minority Stress and Resilience Scale (GMSR)

Gender-related discrimination

Response options: Never; Yes, before age 18; Yes, after age 18; Yes, in the past year

1. I have had difficulty getting medical or mental health treatment (transition-related or other) because of my gender identity or expression.
2. Because of my gender identity or expression, I have had difficulty finding a bathroom to use when I am out in public.
3. I have experienced difficulty getting identity documents that match my gender identity.
4. I have had difficulty finding housing or staying in housing because of my gender identity or expression.
5. I have had difficulty finding employment or keeping employment or have been denied promotion because of my gender identity or expression.

Gender-related rejection

Response options: Never; Yes, before age 18; Yes, after age 18; Yes, in the past year

1. I have had difficulty finding a partner or have had a relationship end because of my gender identity or expression.
2. I have been rejected or made to feel unwelcome by a religious community because of my gender identity or expression.
3. I have been rejected or made to feel unwelcome in my ethnic/racial community because of my gender identity or expression.

4. I have been rejected or distanced from friends because of my gender identity or expression.
5. I have been rejected at school or work because of my gender identity or expression.
6. I have been rejected or distanced from family because of my gender identity or expression.

Gender-related victimization

Response options: Never; Yes, before age 18; Yes, after age 18; Yes, in the past year

1. I have been verbally harassed or teased because of my gender identity or expression. (For example, being called “it”)
2. I have been threatened with being outed or blackmailed because of my gender identity or expression.
3. I have had my personal property damaged because of my gender identity or expression.
4. I have been threatened with physical harm because of my gender identity or expression.
5. I have been pushed, shoved, hit, or had something thrown at me because of my gender identity or expression.
6. I have had sexual contact with someone against my will because of my gender identity or expression.

Non-affirmation of gender identity

Response options: 5-point scale from *strongly disagree* to *strongly agree*

1. I have to repeatedly explain my gender identity to people or correct the pronouns people use.

2. I have difficulty being perceived as my gender.
3. I have to work hard for people to see my gender accurately.
4. I have to be “hyper-masculine” or “hyper-feminine” in order for people to accept my gender.
5. People don’t respect my gender identity because of my appearance or body.
6. People don’t understand me because they don’t see my gender as I do.

Internalized transphobia

Response options: 5-point scale from *strongly disagree* to *strongly agree*

1. I resent my gender identity or expression.
2. My gender identity or expression makes me feel like a freak.
3. When I think of my gender identity or expression, I feel depressed.
4. When I think about my gender identity or expression, I feel unhappy.
5. Because of my gender identity or expression, I feel like an outcast.
6. I often ask myself: Why can’t my gender identity or expression just be normal?
7. I feel that my gender identity or expression is embarrassing.
8. I envy people who do not have a gender identity or expression like mine.

Pride

Response options: 5-point scale from *strongly disagree* to *strongly agree*

1. My gender identity or expression makes me feel special and unique.
2. It is okay for me to have people know that my gender identity is different from my sex assigned at birth.

3. I have no problem talking about my gender identity and gender history with almost anyone.
4. It is a gift that my gender identity is different from my sex assigned at birth.
5. I am like other people, but I am also special because my gender identity is different from my sex assigned at birth.
6. I am proud of be a person whose gender identity is different from my sex assigned at birth.
7. I am comfortable revealing to others that my gender identity is different from my sex assigned at birth.
8. I'd rather have people know everything and accept me with my gender identity and gender history.

Question to determine appropriate wording for items regarding negative expectations for the future and nondisclosure: Do you currently live in your affirmed gender all or most of the time? (Your affirmed gender is the one you see as accurate for yourself)

Response options: Yes, I live in my affirmed gender most or all of the time; No, I don't live in my affirmed gender most or all of the time.

If yes: use "history" in items below. If no: yes "identity" in items below

Negative expectations for the future

Response options: 5-point scale from *strongly disagree* to *strongly agree*

1. If I express my gender identity/history, others wouldn't accept me.
2. If I express my gender identity/history, employers would not hire me.

3. If I express my gender identity/history, people would think I am mentally ill or "crazy."
4. If I express my gender identity/history, people would think I am disgusting or sinful.
5. If I express my gender identity/history, most people would think less of me.
6. If I express my gender identity/history, most people would look down on me.
7. If I express my gender identity/history, I could be a victim of crime or violence.
8. If I express my gender identity/history, I could be arrested or harassed by police.
9. If I express my gender identity/history, I could be denied good medical care.

Nondisclosure

Response options: 5-point scale from *strongly disagree* to *strongly agree*

1. Because I don't want others to know my gender identity/history, I don't talk about certain experiences from my past or change parts of what I will tell people.
2. Because I don't want others to know my gender identity/history, I modify my way of speaking.
3. Because I don't want others to know my gender identity/history, I pay special attention to the way I dress or groom myself.
4. Because I don't want others to know my gender identity/history, I avoid exposing my body, such as wearing a bathing suit or nudity in public locker rooms.
5. Because I don't want others to know my gender identity/history, I change the way I walk, gesture, sit, or stand.

Community connectedness

Response options: 5-point scale from *strongly disagree* to *strongly agree*

1. I feel part of a community of people who share my gender identity.
2. I feel connected to other people who share my gender identity.
3. When interacting with members of the community that shares my gender identity, I feel like I belong.
4. I’m not like other people who share my gender identity.
5. I feel isolated and separate from other people who share my gender identity.

APPENDIX D

Behavior Rating Scale of Executive Functioning – Adult Version (BRIEF-A)

During the past month, how often has each of the following behaviors been a problem?

Response options: Never; Sometimes; Often

1. I have angry outbursts.
2. I make careless errors when completing tasks.
3. I am disorganized.
4. I have trouble concentrating on tasks (such as chores, reading, or work).
5. I tap my fingers or bounce my legs.
6. I need to be reminded to begin a task even when I am willing.
7. I have a messy closet.
8. I have trouble changing from one activity or task to another.
9. I get overwhelmed by large tasks.
10. I forget my name.
11. I have trouble with jobs or tasks that have more than one step.
12. I overreact emotionally.
13. I don’t notice when I cause others to feel bad or get mad until it is too late.
14. I have trouble getting ready for the day.
15. I have trouble prioritizing activities.
16. I have trouble sitting still.
17. I forget what I am doing in the middle of things.
18. I don’t check my work for mistakes.
19. I have emotional outbursts for little reason.

20. I lie around the house a lot.

21. I start tasks (such as cooking, projects) without the right materials.

22. I have trouble accepting different ways to solve problems with work, friends, or tasks.

23. I talk at the wrong time.

24. I misjudge how difficult or easy tasks will be.

25. I have problems getting started on my own.

26. I have trouble staying on the same topic when talking.

27. I get tired.

28. I react more emotionally to situations than my friends.

29. I have problems waiting my turn.

30. People say that I'm disorganized.

31. I lose things (such as keys, money, wallet, homework, etc.).

32. I have trouble thinking of a different way to solve a problem when stuck.

33. I overreact to small problems.

34. I don't plan ahead for future activities.

35. I have a short attention span.

36. I make inappropriate sexual comments.

37. When people seem upset with me, I don't understand why.

38. I have trouble counting to three.

39. I have unrealistic goals.

40. I leave the bathroom a mess.

41. I make careless mistakes.

42. I get emotionally upset easily.

43. I make decisions that get me into trouble (legally, financially, socially).
44. I am bothered by having to deal with changes.
45. I have difficulty getting excited about things.
46. I forget instructions easily.
47. I have good ideas but cannot get them on paper.
48. I make mistakes.
49. I have trouble getting started on tasks.
50. I say things without thinking.
51. My anger is intense but ends quickly.
52. I have trouble finishing tasks (such as chores, work).
53. I start things at the last minute (such as assignments, chores, tasks).
54. I have difficulty finishing a task on my own.
55. People say that I am easily distracted.
56. I have trouble remembering things, even for a few minutes (such as directions, phone numbers).
57. People say that I am too emotional.
58. I rush through things.
59. I get annoyed.
60. I leave my room or home a mess.
61. I get disturbed by unexpected changes in my daily routine.
62. I have trouble coming up with ideas for what to do with my free time.
63. I don’t plan ahead for tasks.
64. People say that I don’t think before acting.

65. I have trouble finding things in my room, closet, or desk.

66. I have problems organizing activities.

67. After having a problem, I don’t get over it easily.

68. I have trouble doing more than one thing at a time.

69. My mood changes frequently.

70. I don’t think about consequences before doing something.

71. I have trouble organizing work.

72. I get upset quickly or easily over little things.

73. I am impulsive.

74. I don’t pick up after myself.

75. I have problems completing my work.

APPENDIX E

Autism Spectrum Quotient – 50 Item Version (AQ)

Response options: Definitely agree, Slightly agree, Slightly disagree, Definitely disagree

1. I prefer to do things with others rather than on my own.
2. I prefer to do things the same way over and over again.
3. If I try to imagine something, I find it very easy to create a picture in my mind.
4. I frequently get so strongly absorbed in one thing that I lose sight of other things.
5. I often notice small sounds when others do not.
6. I usually notice car number plates or similar strings of information.
7. Other people frequently tell me that what I've said is impolite, even though I think it is polite.
8. When I am reading a story, I can easily imagine what the characters might look like.
9. I am fascinated by dates.
10. In a social group, I can easily keep track of several different people's conversations.
11. I find social situations easy.
12. I tend to notice details that others do not.
13. I would rather go to a library than to a party.
14. I find making up stories easy.
15. I find myself drawn more strongly to people than to things.
16. I tend to have very strong interests, which I get upset about if I can't pursue.
17. I enjoy social chitchat.
18. When I talk, it isn't always easy for others to get a word in edgewise.
19. I am fascinated by numbers.

20. When I'm reading a story, I find it difficult to work out the characters' intentions.
21. I don't particularly enjoy reading fiction.
22. I find it hard to make new friends.
23. I notice patterns in things all the time.
24. I would rather go to the theater than to a museum.
25. It does not upset me if my daily routine is disturbed.
26. I frequently find that I don't know how to keep a conversation going.
27. I find it easy to "read between the lines" when someone is talking to me.
28. I usually concentrate more on the whole picture, rather than on small details.
29. I am not very good at remembering phone numbers.
30. I don't usually notice small changes in a situation or a person's appearance.
31. I know how to tell if someone listening to me is getting bored.
32. I find it easy to do more than one thing at once.
33. When I talk on the phone, I'm not sure when it's my turn to speak.
34. I enjoy doing things spontaneously.
35. I enjoy doing things alone.
36. I find it easy to work out what someone is thinking or feeling just by looking at their face.
37. If there is an interruption, I can switch back to what I was doing very quickly.
38. I am good at social chitchat.
39. People often tell my that I keep going on and on about the same thing.
40. When I was young, I used to play games involving pretending with other children.
41. I like to collect information about categories of things (e.g., types of cars, birds, trains, plants).

42. I find it difficult to imagine what it would be like to be someone else.

43. I like to carefully plan any activities I participate in.

44. I enjoy social occasions.

45. I find it difficult to work out people's intentions.

46. New situations make me nervous.

47. I enjoy meeting new people.

48. I am a good diplomat.

49. I am not very good at remembering people's date of birth.

50. I find it very easy to play games with children that involve pretending.

APPENDIX F

Beck Depression Inventory – Second Edition (BDI-II)

This questionnaire consists of 21 groups of statements. Please read each group of statements carefully, and then pick out the one statement in each group that best describes the way you have been feeling during the past two weeks, including today. If several statements in the group seem to apply equally well, select the highest number for that group.

1. Sadness

   0 – I do not feel sad

   1 – I feel sad much of the time

   2 – I am sad all the time

   3 – I am so sad or unhappy that I can't stand it

2. Pessimism

   0 – I am not discouraged about my future

   1 – I feel more discouraged about my future than I used to be

   2 – I do not expect things to work out for me

   3 – I feel my future is hopeless and will only get worse

3. Past failure

   0 – I do not feel like a failure

   1 – I have failed more than I should have

   2 – As I look back, I see a lot of failures

   3 – I feel like I am a total failure as a person

4. Loss of pleasure

   0 – I get as much pleasure as I ever did from the things I enjoy

1 – I don't enjoy things as much as I used to

2 – I get very little pleasure from things I used to enjoy

3 – I can't get any pleasure from things I used to enjoy

5. Guilty feelings

   0 – I don't feel particularly guilty

   1 – I feel guilty over many things I have done or should have done

   2 – I feel quite guilty most of the time

   3 – I feel guilty all of the time

6. Punishment feelings

   0 – I don't feel I am being punished

   1 – I feel I may be punished

   2 – I expect to be punished

   3 – I feel I am being punished

7. Self-dislike

   0 – I feel the same about myself as ever

   1 – I have lost confidence in myself

   2 – I am disappointed in myself

   3 – I dislike myself

8. Self-criticalness

   0 – I don't criticize or blame myself more than usual

   1 – I am critical of myself than I used to be

   2 – I criticize myself for all of my faults

   3 – I blame myself for everything bad that happens

9. Suicidal thoughts or wishes

    0 – I don't have any thoughts of killing myself

    1 – I have thoughts of killing myself, but I would not carry them out

    2 – I would like to kill myself

    3 – I would kill myself if I had the chance

10. Crying

    0 – I don't cry any more than I used to

    1 – I cry more than I used to

    2 – I cry over every little thing

    3 – I feel like crying, but I can't

11. Agitation

    0 – I am no more restless or wound up than usual

    1 – I feel more restless or wound up than usual

    2 – I am so restless or agitated that it's hard to stay still

    3 – I am so restless or agitated that I have to keep moving or doing something

12. Loss of interest

    0 – I have not lost interest in other people or activities

    1 – I am less interested in other people or things than before

    2 – I have lost most of my interest in other people or things

    3 – It's hard to get interested in anything

13. Indecisiveness

    0 – I make decisions about as well as ever

    1 – I find it more difficult to make decisions than usual

2 – I have much greater difficulty making decisions than I used to

3 – I have trouble making any decisions

14. Worthlessness

0 – I do not feel I am worthless

1 – I don't consider myself as worthwhile and useful as I used to

2 – I feel more worthless as compared to other people

3 – I feel utterly worthless

15. Loss of energy

0 – I have as much energy as ever

1 – I have less energy than I used to have

2 – I don't have enough energy to do very much

3 – I don't have enough energy to do anything

16. Changes in sleeping pattern

0 – I have not experienced any change in my sleeping pattern

1a – I sleep somewhat more than usual

1b – I sleep somewhat less than usual

2a – I sleep a lot more than usual

2b – I sleep a lot less than usual

3a – I sleep most of the day

3b – I wake up 1-2 hours early and can't get back to sleep

17. Irritability

0 – I am no more irritable than usual

1 – I am more irritable than usual

2 – I am much more irritable than usual

3 – I am irritable all the time

18. Changes in appetite

0 – I have not experienced any change in my appetite

1a – My appetite is somewhat less than usual

1b – My appetite is somewhat greater than usual

2a – My appetite is much less than usual

2b – My appetite is much greater than usual

3a – I have no appetite at all

3b – I crave food all the time

19. Concentration difficulty

0 – I can concentrate as well as ever

1 – I can't concentrate as well as usual

2 – It's hard to keep my mind on anything for very long

3 – I find I can't concentrate on anything

20. Tiredness or fatigue

0 – I am no more tired or fatigued than usual

1 – I get more tired or fatigued more easily than usual

2 – I am too tired or fatigued to do a lot of things I used to do

3 – I am too tired or fatigued to do most things I used to do

21. Loss of interest in sex

0 – I have not noticed any recent change in my interest in sex

1 – I am less interested in sex than I used to be

2 – I am much less interested in sex now

3 – I have lost interest in sex completely

APPENDIX G

Beck Anxiety Inventory (BAI)

Indicate how much you have been bothered by that symptom during the past month, including today.

Response options: Not at all; Mildly, but it didn't bother me much; Moderately – it wasn't unpleasant at times; Severely – it bothered me a lot

1. Numbness or tingling
2. Feeling hot
3. Wobbliness in legs
4. Unable to relax
5. Fear of worst happening
6. Dizzy or lightheaded
7. Heart pounding/racing
8. Unsteady
9. Terrified or afraid
10. Nervous
11. Feeling of choking
12. Hands trembling
13. Shaky/unsteady
14. Fear of losing control
15. Difficulty breathing
16. Fear of dying
17. Scared

18. Indigestion
19. Faint/lightheaded
20. Face flushed
21. Hot/cold sweats