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The Impact of Interruptions in Gender-Affirming Medical Care during COVID-19 on Anxiety and Depression among Trans and Non-binary People in Canada: A Longitudinal Study

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Abstract

Background. Transgender and non-binary (TGNB) populations experience disproportionally high levels of anxiety and depression; it is imperative we investigate how the COVID-19 pandemic may have impacted the mental health of TGNB communities.

Methods. Among a Canadian sample of TGNB persons aged ≥15 years, we used multiple linear regression to examine whether interruptions in gender-affirming care were associated with anxiety and depression, and whether that effect was modified by pre-pandemic mental health.

Results. Anxiety and depression levels were high both pre-pandemic and during the pandemic. Approximately a quarter of TGNB persons experienced interruptions in hormonal care. After adjusting for confounders, there was no association between interruptions in gender-affirming care and anxiety. However, interruptions in hormonal care was associated with increased depressive symptoms during the pandemic, and this effect was modified by pre-pandemic depression.

Conclusion. Interruptions in hormonal care may have increased depressive symptoms in an already highly-depressed group of TGNB persons.

Keywords

Coronavirus, COVID-19, transgender, non-binary, mental health, gender-affirming medical care, anxiety, depression, Canada, longitudinal

Summary for Lay Audience

The World Health Organization (WHO) declared the coronavirus disease (COVID-19) a global health pandemic on March 11th, 2020. Since then, there have been major social, health and economic changes. The shut down of "non-essential" businesses contributed to increased unemployment rates, school closures forced students and teachers to adapt to a virtual learning environment, and disruptions in health-care systems resulted in an increase in unmet health care needs. Evidently, the COVID-19 pandemic has resulted in an increasing number of disruptions to daily life for individuals globally. This has raised concerns about whether these changes have contributed to increased mental health challenges; especially for marginalized populations, such as the transgender and non-binary (TGNB) community. Given that TGNB Canadians have previously experienced inequities in health care access and socioeconomic disadvantages, COVID-19-related disruptions may disproportionally affect this population.

Gender dysphoria is the feeling of distress that some TGNB persons experience due to their gender identity differing from their sex assigned at birth. Gender-affirming care is a medical intervention that can help alleviate this distress. This type of healthcare is available in Canada and it includes treatments such as, puberty blockers, hormone therapy and surgeries. Importantly, there have been documented benefits and improvements in mental health, including anxiety and depression, after receiving gender-affirming care.

This thesis used data from Trans PULSE Canada; a study that collected data on the health and well-being of Canadian TGNB persons aged ≥14 years pre-pandemic (2019) and one year later, during the pandemic (2020). In this study, we found that TGNB persons were experiencing high levels of anxiety and depression symptoms both pre-pandemic and during the pandemic. Pandemic anxiety severity was not different from pre-pandemic levels; however, depression symptoms during the pandemic were higher compared to pre-pandemic. We also found that interruptions in gender-affirming care was not linked to anxiety levels during the pandemic. In contrast, interruptions in gender-affirming care, specifically interruptions in hormonal care, played a role in increased depression during the pandemic, wherein interruptions in hormonal care played a greater role on pandemic depression for those who were less depressed pre-pandemic.

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Chapter 1

1 Introduction

This chapter will explain the rationale and study objectives for this thesis.

1.1 Overview of study rationale

The World Health Organization (WHO) declared the coronavirus disease (COVID-19) a global health pandemic on March 11th, 2020 (WHO, 2020b). Within a short period of time, COVID-19 has had detrimental health effects on millions of individuals, notably among older adults and those with pre-existing medical conditions. As morbidity and mortality rates continue to be monitored globally, broader impacts of COVID-19 have also been recognized, such as disruptions in healthcare systems, social gatherings and events, and economic strain (Haleem et al., 2020). At the beginning of the pandemic, many countries opted to shut down "non-essential" businesses; consequently, unemployment rates increased significantly. In Canada alone, the economic shutdown resulted in the unemployment rate increasing more than two-fold from 5.6% in February to 13.7% in May of 2020 (Statistics Canada, 2020a). School closures forced students to learn from home via an online format, and stay-at-home orders along with social gathering limits were implemented to slow down the spread of the virus, resulting in individuals social distancing from peers and even close family members. Moreover, due to the potential influx of COVID-19 patients in hospitals and scarce medical resource availability, non-urgent medical care were put on hold or delayed for many individuals, resulting in an increase in unmet health care needs (Canadian Agency for Drugs and Technologies in Health, 2020). These additional, indirect burdens of the COVID-19 disease have affected the lives of individuals in other ways, alongside physical health (Dubey et al., 2020).

As SARS-CoV-2 is a novel viral strand that has not been previously identified (WHO, 2020b), it has resulted in an abundance of research being conducted on the development of a treatment for infected patients, in addition with how to best advise the public on strategies to prevent the spread of infection (Banerjee & Nair, 2020; Sirotich &

Hausmann, 2021). Given the race to vaccinate populations and the focus on mitigating the spread of the virus, there has been limited research efforts on how the COVID-19 pandemic has impacted minority populations. In particular, sexual and gender minority populations (SGM) are underrepresented (Phillips et al., 2020; Sirotich & Hausmann, 2021). The impact of the virus itself is largely unknown among the transgender and non-binary (TGNB) population due to the lack of inclusion of sexual orientation and gender identity in surveillance data (Phillips et al., 2020). Efforts to mitigate the impacts of COVID-19, including health care interruptions and socioeconomic disruptions are being experienced across Canada (Chen-See, 2020; Statistics Canada, 2020b). However, these disruptions may be particularly severe for TGNB Canadians given pre-existing inequities in health care access and socioeconomic disadvantages (Bauer & Scheim, 2015). In the U.S., it was reported that 13.1% of the lesbian, gay, bisexual and transgender (LGBT) adult population experienced food insecurity due to the pandemic, compared to 7.2% of adults who were not LGBT (File & Marshall, 2021). The U.S. Census Bureau Survey data also revealed that LGBT persons experienced greater economic struggles than their non-LGBT counterparts. Therefore, there is evidence to suggest that inequities are being further magnified by the COVID-19 pandemic.

There has also been an increase in unmet health care needs due to the delay in non-urgent medical care. These delays have also affected TGNB persons due to the postponement of in-person consultation and surgeries. As a result, there may be an increased difficulty accessing hormone therapy and/or gender-affirming surgeries during the pandemic (Wang et al., 2020). Even prior to the pandemic, many TGNB persons seeking gender-affirming medical care have had to overcome obstacles to schedule their appointments and surgical procedures, including financial, legal and geographic barriers (Roberts et al., 2020). The usual wait times that are experienced can be even further exacerbated due to the pandemic. Moreover, previous research has demonstrated that TGNB communities already experience increased health and mental health concerns compared to the general and lesbian, gay, and bisexual (LGB) populations (Grant et al., 2011; Su et al., 2016), which becomes increasingly concerning with the impacts of COVID-19. Given that gender-affirming care has repeatedly demonstrated improvements in mental health outcomes in TGNB persons (Baker et al., 2021; Passos et al., 2020; Wernick et al., 2019;

White Hughto & Reisner, 2016), it is imperative we investigate whether difficulties in accessing gender-affirming care during the pandemic have impacted the mental health of this population.

In general, there is limited research on the effects of delays to gender-affirming care due to COVID-19 on TGNB peoples' mental health. The majority of the current literature consists of perspectives, commentaries and opinion pieces on sex and gender equity issues, with few primary and secondary studies that have investigated the effects of the COVID-19 pandemic on TGNB peoples' mental health. In Canada, no major health survey has captured the experiences of lesbian, gay, bisexual, transgender, queer (or sometimes questioning), and two-spirited (LGBTQ2+) Canadians during the pandemic (Prokopenko & Kevins, 2020). Therefore, it is evident that there is a gap in the current literature on the impact of pandemic-related delays in gender-affirming care on TGNB mental health in Canada. Fortunately, the Trans PULSE Canada study is a community-based survey that has collected data on TGNB health and well-being both pre-pandemic and during the pandemic. This provides a unique opportunity to conduct a longitudinal study that can fill the current gap in literature and shed light on some of the impacts that the COVID-19 pandemic has had on TGNB individuals in Canada.

1.2 Thesis objectives

The purpose of this thesis is to determine the impact of interruptions in gender-affirming medical care during COVID-19 on anxiety and depression levels among TGNB persons in Canada. The following objectives will be addressed:

1. Identify the characteristics of TGNB persons in Canada at the time of the COVID-19 pandemic, as well as the characteristics of TGNB individuals experiencing interruptions in gender-affirming medical care during the pandemic.

2. Describe interruptions in gender-affirming medical care during the COVID-19 pandemic in Canada.

3. Identify if there are differences in anxiety and depression levels among TGNB individuals from pre-pandemic to pandemic periods.

4. Examine if there is a relationship between interruptions in gender-affirming medical care and pandemic anxiety levels.

    a. Model 1— interruptions in gender-affirming medical care as a predictor of pandemic anxiety, adjusting for pre-pandemic anxiety.

    b. Model 2— interruptions in gender-affirming medical care as a predictor of pandemic anxiety, assessing for an interaction between interruptions in care and pre-pandemic anxiety levels and adjusting for other potential confounders.

    c. Model 3— interruptions in gender-affirming medical care as a predictor of pandemic anxiety, adjusting for pre-pandemic anxiety and other potential confounders.

5. Examine if there is a relationship between interruptions in gender-affirming medical care and pandemic depression levels.

    a. Model 1— interruptions in gender-affirming medical care as a predictor of pandemic depression, adjusting for pre-pandemic depression.

    b. Model 2— interruptions in gender-affirming medical care as a predictor of pandemic depression, assessing for an interaction between interruptions in care and pre-pandemic depression levels and adjusting for other potential confounders.

    c. Model 3— interruptions in gender-affirming medical care as a predictor of pandemic depression, adjusting for pre-pandemic depression and other potential confounders.

Chapter 2

2 Literature Review

The following chapter will provide an overview of TGNB mental health pre-pandemic and the role of gender affirmation (social, legal and medical) in mental health with a specific focus on gender-affirming medical care. It will also briefly review the literature that is available on the global impact of COVID-19 and how changes related to the pandemic may play a role in the lives of TGNB people. Finally, this review will discuss the current available research on TGNB mental health during the COVID-19 pandemic, as well as the implications of interruptions in gender-affirming medical care on TGNB mental health.

2.1 TGNB mental health pre-pandemic

Sex assigned at birth is the assignment of male or female to an infant based on the appearance of the genitalia at birth. Gender differs from biological sex in the sense that it is used to describe the socially constructed and accepted roles, behaviours, expressions and identities of individuals, which can change over time (Canadian Institutes of Health Research, 2020). One's gender identity may be the same or different from their sex assigned at birth. Cisgender denotes persons whose gender identity is congruent with their biological sex. In contrast, transgender is an umbrella term used to describe individuals whose gender identity does not align with their sex assigned at birth (GLAAD Media Reference Guide, 2016). This includes persons who identify as women, men, non-binary, genderqueer, cross-dresser, transexual, along with other gender identities. Individuals whose gender identity does not simply fit into the two categories, man or woman, may identify themselves as non-binary or genderqueer (GLAAD Media Reference Guide, 2016).

Prior to the onset of the current pandemic, TGNB adults and adolescents were already experiencing disproportionally high levels of anxiety, depression, and suicidal thoughts (Becerra-Culqui et al., 2018; Kattari et al., 2020). Multiple studies have reported depression prevalence rates ranging from 50% to 67% (Clements-Nolle et al., 2006; Kim

et al., 2006; Nuttbrock et al., 2010). In comparison, in the Canadian general population, the prevalence of depression is 4.7% (Pearson et al., 2013). This highlights the importance of attending to the mental health needs of this population. Canadian studies using clinical samples have reported that TGNB persons may be experiencing high levels of anxiety and depression. A recent retrospective chart review of TGNB persons referred to a transgender clinic in Kingston, Ontario reported that almost two thirds of the clinical sample was diagnosed with an anxiety disorder in their lifetime and just over half of the sample was diagnosed with mood disorders (She et al., 2020). Another Canadian clinical study of TGNB youth in Vancouver reported that 24% and 35% of their sample had an anxiety disorder and mood disorder, respectively (Khatchadourian et al., 2014).

Other countries, such as the U.K. and U.S, have also reported a high prevalence of anxiety, depression, suicide and self-harm in clinical samples of TGNB persons. A U.S. retrospective cohort study that used electronic medical records of transgender youth matched with cisgender counterparts revealed mental health disparities between the two populations (Reisner et al., 2015). This study revealed that transgender youth had a greater risk of being diagnosed with anxiety (RR: 3.27; 95% CI: 1.80, 5.95) and depression (RR: 3.95; 95% CI: 2.60, 5.99), compared to their matched cisgender peers. A study in the UK investigated levels of depression among a large clinical sample of TGNB persons who had been referred to a national transgender health service (Witcomb et al., 2018). Among TGNB persons who were not currently on hormone therapy, the risk of a possible depressive disorder or probable depressive disorder was four times higher in TGNB persons compared to the general UK population (Witcomb et al., 2018). However, it is important to note that clinical samples might not provide the most accurate representation of mental health for TGNB persons in the community. Clinical samples might overrepresent the proportion of TGNB persons experiencing mental health challenges since mental health or inability to cope would likely lead these individuals to make the decision to clinically address their gender dysphoria.

Heightened mental health challenges have also been reported in non-clinical samples of TGNB Canadians. The Trans PULSE Project, a community-based research project, reported that approximately 61.2% of transfeminine individuals experienced symptoms

that could be classified as having clinical depression (Rotondi, Bauer, Travers, et al., 2011). The Trans PULSE Project also reported that the prevalence of depression was similar for transmasculine individuals, with about two-thirds reporting symptoms that are consistent with a clinical depression diagnosis (Rotondi, Bauer, Scanlon, et al., 2011). Moreover, rates of suicidal ideation and attempts were high in transgender Ontarians where 35.1% reported suicidal ideation and 11.2% attempted suicide in the past year (Bauer et al., 2015). Similarly, the Canadian Trans Youth Health Survey revealed a heightened prevalence of mental health challenges in youth and young adults across Canada (Veale, Peter, Travers, et al., 2017). Among TGNB youth aged 14-18, almost 75% reported non-suicidal self-injury in the past year, about 35% reported a suicide attempt in the past year and 45% reported extreme stress. Among TGNB young adults aged 19-25, over half of the respondents reported non-suicidal self-injury in the past year, close to 75% reported having ever seriously considered suicide and 71% reported feeling depressed in the past year (Veale, Peter, Travers, et al., 2017). One Canadian study noted significant mental health disparities when comparing the mental health of TGNB persons to the general population in Canada that were matched on age. Among those aged 19 to 25 years, greater psychological distress was reported for TGNB individuals when compared to a general population of young adults from the Canadian Community Health Survey (Veale, Watson, Peter, et al., 2017). Moreover, compared to the general population of youth, there was also a significantly greater proportion of TGNB individuals who reported a major depressive episode in the past year (71.1% vs. 7.8%), suicidal ideation in their lifetime (74.4% vs 15.4%), and suicide attempts in their lifetime (37.8% vs. 3.4%). When comparing gender identities, self-harm was reported more often in non-binary and transmasculine individuals, with non-binary persons reporting worse levels of mental health overall (Veale, Watson, Peter, et al., 2017). Suicide and self-harm may be fatal and/or harmful consequences of anxiety and depression in the TGNB community. As previously discussed, the prevalence of depression is much higher in the TGNB population compared to the general population in Canada. The same trend seems to follow for anxiety disorders. Jaffray (2020) reported that Canadian TGNB persons were more likely to be diagnosed with an anxiety disorder than Canadian cisgender persons (57.0% vs. 13.1%). This demonstrates that TGNB persons in Canada are likely

experiencing a disproportionally high level of pre-pandemic mental health challenges compared to other Canadian populations.

Several community-based studies in other countries have also found similar mental health trends in their TGNB communities. An online survey that was conducted in Australia and New Zealand investigated the health and well-being of TGNB communities (Pitts et al., 2009). The study revealed that 36.2% of TGNB persons had depressive symptoms that were indicative of a current major depressive disorder. The prevalence of depression found in this sample of TGNB individuals was also much higher relative to the general Australian population where 6.2% of Australians experienced an affective disorder in a 12-month period (Australian Bureau of Statistics, 2007). Another study used a national community sample to investigate the mental health and well-being of TGNB youth aged 14 to 25 across Australia (Smith et al., 2014). This study reported that 45% and 47% of the participants reported an anxiety and depression diagnosis, respectively. A community-based study with TGNB participants from the UK and Ireland reported similar mental health challenges (McNeil et al., 2012). This study revealed that 63% of their sample had suicidal ideation in the past year and 11% had attempted suicide in the past year. Anxiety and depression levels were also concerning with 55% and 38% reporting having had/currently having a depression and anxiety diagnosis, respectively (McNeil et al., 2012). The 2015 U.S. Transgender Survey reported that 39% of TGNB persons experienced psychological distress compared to 5% of the general U.S. population (James et al., 2016). Therefore, a heightened prevalence of mental health challenges has been noted in TGNB populations with significant differences relative to the general population. This raises concerns about whether the COVID-19 pandemic is further exacerbating anxiety and depressive symptomology in TGNB individuals

2.2 Gender affirmation and its role in mental health: social, legal and medical

Gender affirmation is the social acceptance and recognition of an individuals' gender identity, role, and/or expression (Sevelius, 2013). A TGNB person's transition may have social, legal and/or medical aspects in which some or all can contribute to an individuals' gender affirming process. Social gender affirmation might include things like "coming

out", the correct use of preferred names and pronouns, social support from friends, family and/or strangers, and dressing in clothing that expresses one's gender identity (Glynn et al., 2016). Previous research has shown that social gender affirmation has an impact on the health and well-being of TGNB persons. A U.S. study examined the association between gender affirmation and psychological well-being and determined that transgender women with family support had lower levels of depression and higher self-esteem (Glynn et al., 2016). These findings remain consistent among other studies where there have been positive mental health outcomes and lower levels of anxiety and depression found in transgender persons who have social support (Ryan et al., 2010; Murdock & Bolch, 2005). In contrast, TGNB individuals who were experiencing high levels of family rejection exhibited more depressive symptoms, suicidal ideation and attempts, and substance misuse (Yadegarfard et al., 2014; Klein & Golub, 2016). Furthermore, the use of preferred names and pronouns can have many positive implications on TGNB mental health. A U.S. study of 129 transgender and gender diverse youth reported that those who had the ability to use their preferred names had lower levels of depression and suicidal behaviours (Russell et al., 2018). Using correct preferred names and pronouns allows TGNB persons to feel supported in their felt gender while also decreasing stress levels; ultimately resulting in better mental health outcomes (Brown et al., 2020).

Legal gender affirmation refers to making changes to legal documentation (e.g., birth certificate, passport, driver's license) to reflect an individual's current gender identity. Some TGNB persons continue to face difficulties when seeking legal documentation changes. For example, in the U.S., some states require medical documentation from a doctor/psychiatrist as well a history of gender-affirming medical care (e.g., use of hormones and/or surgery) to receive approval for a name change (Restar et al., 2020). In Ontario, when requesting a change in sex designation on birth certificates, medical documentation from a physician or psychologist is required to support the application (Service Ontario, 2021). However, gender-affirming surgeries are not required to apply for gender marker or name changes on legal documents across Canada. This demonstrates that countries and/or regions may have different existing policies when it comes to legal gender affirmation.

It is important for TGNB persons to have access to gender congruent identity documents as it may impede their daily lives in multiple aspects, including their ability to travel, seek employment opportunities, and access social and healthcare services (Malta et al., 2020). If access is restricted, it may result in TGNB individuals living in social isolation or even avoiding necessary medical care, which could ultimately result in basic human rights being unintentionally revoked from this already marginalized population. Moreover, previous literature has demonstrated that legal gender affirmation has significant implications on mental health among TGNB individuals. A Canadian community-based research study revealed that among transgender Ontarians aged 16 and over, having at least one identity document corresponding to current gender identity was associated with a reduction in past year suicide ideation and attempts (Bauer et al., 2015). A recent study based in the U.S. also revealed that compared to those who did not undergo legal gender marker and name changes, those who did reported lower levels of depression, anxiety and psychiatric distress (Restar et al., 2020). Similarly, a cross-sectional study conducted in the U.S. reported that compared to those who did not have ID's congruent with their gender, psychological distress and suicidal ideation and planning was lower among those who did have all their ID's congruent with their gender (Scheim et al., 2020). This demonstrates that legal gender affirmation may play a significant role in TGNB mental health and further emphasizes the importance for policy makers to reduce barriers and ease access to legal document changes for TGNB persons.

Some TGNB persons may experience distress and/or discomfort due to the discordance between their gender identity and sex assigned at birth—this is known as gender dysphoria (American Psychiatric Association, 2013). Studies have suggested that both adolescent and adults experiencing gender dysphoria are increasingly seeking support and care at gender identity clinics in both Europe and North America (de Vries et al., 2015; Aitken et al., 2015). Fortunately, treatments are available to TGNB persons who are experiencing discomfort or distress.

Gender-affirming medical care is one such treatment that may alleviate symptoms through aligning one's gender identity with their physical appearance. This can be attained through using puberty blockers, hormone therapy, and/or surgery. Puberty

blockers are sometimes prescribed for adolescents who are experiencing gender dysphoria in order to suppress the production of estrogen and testosterone, and ultimately delay changes to the body that occur during the pubescent years (World Professional Association for Transgender Health [WPATH], 2012). Research has demonstrated that the effects of puberty blockers are reversible and safe to administer in children. Hormone therapy is used to feminize or masculinize an individuals' body who is experiencing gender dysphoria and is considered a partially reversible treatment (WPATH, 2012). Gender-affirming surgeries, such as "top", "bottom", and facial surgeries are irreversible procedures that are medically necessary for some TGNB persons. In general, not all TGNB persons seek gender-affirming medical treatment; some individuals may live as their felt gender without any procedures, while others may need one or more gender-affirming procedures. However, it is important to note that if left untreated, gender dysphoria can lead to other mental health complications, including anxiety, depression and self-harm behaviours.

Access to gender-affirming medical care is essential for TGNB persons and can have a major impact on their psychosocial well-being. In fact, there has been an increasing trend in the number of referrals to gender identity clinics (Fielding & Bass, 2018; Handler et al., 2019). A study in the U.K. reported that at a gender clinic located in Oxfordshire, referrals had doubled in the past 6 years; there were 59 referrals in 2011-2013 and this number increased to 103 referrals from 2014-2016 (Fielding & Bass, 2018). Moreover, the mean age of TGNB persons referred to the clinic was significantly lower in more recent years (2013-2016) compared to the first three years of the study (2011-2013). A study in the U.S. also reported a significant increase in referrals between 2015 and 2018 where there were 56 referrals in 2015 compared to 194 in 2017 (Handler et al., 2019). These findings remain consistent across Canada, where pediatric patient referrals have increased exponentially from 2004 to 2016, with about a 10-fold increase from 2012-2016 (Lawson et al., 2017). Therefore, an increase in demand has been noted in several countries which may result in increased wait-times to receive needed gender-affirming care.

It has already been reported that in British Columbia, TGNB individuals waited 150 days or less between their referral and surgery assessment appointment, while TGNB persons from other provinces/territories in Canada waited 180 days. Upon completion of this appointment, there was another waiting period between surgery approval and the surgery date which was eight months or less in Canada (Frohard-Dourlent et al., 2017). Long wait-times were previously reported for hormone therapy as well. In Alberta, some TGNB individuals have to wait up to six months to find a general practitioner that will refer them to a psychiatrist, in which psychiatric wait-lists can then be even longer. There is also another three to four month waiting period after to have an appointment with an endocrinologist in order to receive a prescription (Rendell-Watson, 2017).

Several studies have noted the benefits and improvements in mental health outcomes upon receiving gender-affirming care (Almazan & Keuroghlian, 2021; Baker et al., 2021; Wernick et al., 2019; White Hughto & Reisner, 2016; Passos et al., 2020). A recently published systematic review investigated the effects of hormone therapy on mental health outcomes and quality of life among TGNB people of all ages (Baker et al., 2021). The review concluded that there is evidence to suggest that hormone therapy may improve quality of life, anxiety symptoms, and depressive symptoms among TGNB persons, with no studies reporting negative psychological outcomes due to hormone therapy. This finding was consistent across gender identities and age (Baker et al., 2021). Another systematic review by Wernick et al. (2019) found that gender-affirming surgeries provided improvements in psychological outcomes as well.

Furthermore, a study conducted in the Netherlands concluded that hormone therapy and gender reassignment surgery significantly reduced gender dysphoria symptoms and improved psychological outcomes (including anxiety and depression) in young adults over time (de Vries et al., 2014). Importantly, it was reported that after gender-affirming surgery, the wellbeing of TGNB persons in this study was similar or in some cases, even better than that of the general population within the same age range (de Vries et al., 2014). A study conducted in the U.S. examined the relationship between gender-affirming surgeries and mental health outcomes in a large sample of TGNB adults (Almazan & Keuroghlian, 2021). The results suggested that having had one or more

gender-affirming surgeries was associated with reduced psychological distress in the past month, as well as lower past year suicidal ideation. A Canadian study by Bauer et al. (2015) determined that among transgender persons who reported a need to receive gender-affirming care, those who completed a medical transition (such as hormone therapy and/or surgical procedures) had reduced suicidal ideation. A community sample from the UK and Ireland also reported that suicidal ideation and attempts were reduced after receiving gender-affirming care with 70% of TGNB persons reporting they were more satisfied with their lives post transition (McNeil et al., 2012). Moreover, a prospective cohort study conducted in Italy reported that hormone therapy was associated with better mental health, in which both anxiety and depression was reduced for those who were using hormone therapy (Colizzi et al., 2014). Therefore, several studies in various countries have determined that there is a relationship between gender-affirming care and improved mental health, including anxiety and depression, in TGNB persons who require this form of care.

2.3 COVID-19 pandemic impact

On December 31st, the WHO was notified of cases of pneumonia with an unknown cause discovered in Wuhan City, China (WHO, 2020b). The number of new cases continued to increase rapidly and COVID-19 began spreading to various countries in a very short period of time. On March 11th 2020, the WHO declared COVID-19 a global pandemic. In the early months of the pandemic, government policy responses were very similar world-wide (Hale et al., 2021). Most countries established various emergency measures to mitigate and reduce the spread of COVID-19. It is important to note how quickly governments had adopted these new policies. Hale et al. (2021) revealed that in early March, extreme lockdown measures had not been implemented in the majority of countries worldwide. However, by the beginning of April, the policy response of almost every single country changed drastically; lockdown orders and new measures to curb the spread of COVID-19 were quickly adapted globally. These measures resulted in changes to day-to-day functioning for almost all individuals and led to disruptions world-wide, including travel restrictions, increased contact tracing and quarantine requirements, increased investment in medical equipment for healthcare facilities, reduced or cancelled

healthcare services, workplace/business and school closures, bans on social gatherings/events (e.g., weddings, concerts, sporting events), increased financial support for those who may have lost their source of income and overall detrimental economic impacts. In the next few months of the pandemic, these policies were eventually lifted or eased in some countries however, in some instances, they had been reimposed; especially when a resurgence of cases was of concern.

The closure of businesses and workplaces, including restaurants, fitness facilities and retail stores, resulted in a financial loss for both business owners and their employees. To mitigate the impact of these changes, some countries offered these businesses and their employees financial aid. Specifically, in Canada, the Canada Emergency Response Benefit (CERB) provided $2000 monthly to individuals who were directly impacted by the COVID-19 pandemic. As the pandemic progressed, other forms of financial support were provided to businesses and individuals who were directly impacted by the policies that were imposed throughout 2020 and 2021 (Government of Canada, 2021). Support for individuals and families included the Employment Insurance Program, Canada Recovery Benefit, Canada Recovery Sickness Benefit, among others. The Canadian Government also waived interest fees for students who had received federal loans. Additionally, school closures resulted in students and teachers having to quickly adapt to learning and teaching in an online format. Remote learning introduced other concerns and challenges including, family violence and safety, food insecurity, availability of devices and internet for children learning from home, and potential income impacts for parents who had to reduce their work hours to support homeschooling (Statistics Canada, 2021b).

The COVID-19 pandemic also had an impact on the delivery of healthcare services. Some health services that were previously provided in person were recommended to be moved to an online format to mitigate the spread of the virus, such as follow-up visits with physicians and psychological treatments, including support groups (WHO, 2020a). Additionally, due to the potential influx of patients presenting to emergency departments with COVID-19, there was an increased fear of hospital overcrowding. As a result, elective procedures and surgeries had largely been cancelled (WHO, 2020a). “Essential” health services were still being provided during this time in which the WHO identified

priority categories and/or populations; this included but was not limited to immunizations for communicable diseases, reproductive health services, services for vulnerable populations (e.g., children and older adults), medications and services for the management of chronic diseases, and acute health emergencies that require immediate attention. Over a year into the pandemic, it was reported that 90% of countries were still experiencing at least one interruption in essential healthcare services, which indicated no major changes since the beginning of the pandemic (WHO, 2021).

The Canadian healthcare system also endured changes due to the COVID-19 pandemic (Canadian Institute for Health Information [CIHI], 2020). For example, emergency department visits, hospital care and physician services were largely affected. In particular, there was a tremendous number of surgery cancellations reported which directly impacted Canadians. From March to June 2020, there were approximately 335 000 fewer surgeries performed in Canada in comparison to the previous year (CIHI, 2020). Those who required medically urgent surgeries were likely to receive them as planned however, there was a reduction in surgeries that were deemed less urgent. Compared to the same time period in 2019, the first few months of the pandemic in 2020 resulted in a decrease in surgeries; this included 21% fewer knee and hip replacements, a 53% reduction in hernia repairs, 29% fewer retina repairs and 17% lower fracture repairs (CIHI, 2020). There was also a disruption in cancer care in which there was a 20% reduction in cancer surgeries performed during the first wave of the pandemic compared to the same time frame in 2019. Moreover, Chen-See (2020) reported that approximately 50% of those receiving cancer care had their appointments cancelled or rescheduled due to COVID-19 in Canada.

Disruptions in healthcare services likely impacted TGNB persons in Canada with regards to gender-affirming care. It was reported that gender-affirming surgeries were cancelled during the first wave of the pandemic (Provincial Health Services Authority [PHSA], 2020). By June of 2020, some elective surgeries had recommenced in hospitals and this varied by province/territory (CIHI, 2020). Similarly, some gender-affirming surgeries were resumed during this time as well (PHSA, 2020). It is important to note that prior to the pandemic, there were already long wait-times for gender-affirming surgeries

(Frohard-Dourlent et al., 2017). As a result, the COVID-19 pandemic will only exacerbate the pre-existing wait-times and impact future surgeries. A recent brief report by the Trans PULSE Canada study noted that TGNB persons in Canada also experienced interruptions in their hormonal care due to the COVID-19 pandemic (Trans PULSE Canada COVID Cohort Working Group on behalf of the Trans PULSE Canada Team, 2020). Therefore, the postponement of non-urgent healthcare services likely had an impact on the availability of gender-affirming care for TGNB persons in Canada.

Similar to other emergency and crisis events, it is inevitable that there will be psychological consequences due to the increased distress experienced from the COVID-19 pandemic (WHO, 2019). Each individual may be impacted differently during a state of emergency. In particular, the WHO (2019) reported that during humanitarian crises, including epidemics, it is common to see anxiety and depression levels increase over two-fold. Vulnerable populations who already experience severe mental disorders can be disproportionally affected during and after emergency events; emphasizing the importance of providing access to care for these individuals.

In Canada, there have already been increased concerns for the mental health of Canadians amidst the pandemic. A report by the Canadian Mental Health Association (CMHA) revealed that during the first wave of the pandemic, 38% of Canadians said that their mental health worsened due to COVID-19 with 46% feeling anxious and worried (CMHA, 2020a). Moreover, people who identified as LGBTQ2+ were more likely to report a decline in mental health during this time period. Another study by CMHA that took place during the second wave of the pandemic revealed that Canadians were still experiencing heightened mental health challenges in certain subpopulations (CMHA, 2020b). Specifically, LGBTQ2+ individuals were experiencing increased mental health challenges in comparison to the first wave of the pandemic (CMHA, 2020b). There are several reasons why COVID-19 may be contributing to rising mental health issues in Canadians. Some of these mental health challenges may be attributed to the uncertainty about this novel virus, including an increased concern for one’s health, as well as the health of other family members or loved ones, while other challenges may be attributed to the policy changes. For example, due to mandated industry closures, some may be

experiencing unemployment or income loss, school closures may result in the loss of a safe and supportive environment for some students, and stay-at-home orders may result in increased social isolation and domestic violence (CMHA, 2020c).

2.4 Current available research: COVID-19 impact on TGNB mental health, social support, service disruptions and gender-affirming medical care

2.4.1 COVID-19 impact on TGNB mental health

The current literature has shown that TGNB youth have generally been experiencing heightened mental health problems in relation to the COVID-19 pandemic (Hawke et al., 2021; Jones et al., 2021). In particular, increased anxiety and depression levels have most often been reported. A Canadian study with a sample of 622 youth (29 identified as TGNB and 593 identified as a man/boy or woman/girl) reported that TGNB youth had significantly higher scores for mental health issues during COVID-19 compared to their cisgender counterparts (OR=2.64, p-value=0.001) (Hawke et al., 2021). In the U.K., 161 TGNB youth participated in an online survey where they could describe their personal experiences during COVID-19 via open-response questions (Jones et al., 2021). The qualitative portion of the survey revealed that several youths had reported that their anxiety and depression symptoms were exacerbated during the beginning of the pandemic. However, there were also a small sample of youth that noted that their mental health symptoms had improved due to the pandemic, most notably due to having more free time to work on their mental health as well as having reduced social anxiety (Jones et al., 2021).

TGNB adults have also been experiencing deteriorating mental health amidst the pandemic. A global cross-sectional survey of TGNB adults (n=849) reported that approximately 46% and 51% of their sample screened positive for anxiety and depression, respectively (Restar et al., 2021). The U.S. PRIDE longitudinal study also discovered depression and anxiety changes among SGM persons during the onset of the COVID-19 pandemic (Flentje et al., 2020). For the 2288 participants included in the study, depression symptoms increased by a Patient Health Questionnaire-9 (PHQ-9)

score of 1.21 (t=11.35, p value <0.001) from pre- to post-pandemic. Anxiety symptoms also increased by a General Anxiety Disorder-7 (GAD-7) score of 3.11 (t=27.95, p<0.001) from pre- to post-pandemic. Interestingly, those who were not experiencing symptoms consistent with generalized anxiety and depression pre-pandemic were the individuals who were experiencing these increased anxiety and depression symptoms post-pandemic (Flentje et al., 2020). Another U.S. study reported that compared to pre-pandemic anxiety and depression levels, a greater proportion of TGNB individuals met the threshold for clinically significant symptoms of anxiety and depression during the pandemic (Kidd et al., 2021). Importantly, a recent study on LGBTQ+ adults in the U.K. has shown that TGNB individuals reported higher depression scores than their cisgender, lesbian and gay counterparts during the pandemic (Kneale & Bécares, 2021). Therefore, there is evidence to suggest that TGNB persons are experiencing mental health complications amidst the pandemic—further emphasizing the importance of including TGNB persons in COVID-19-related research efforts.

2.4.2 COVID-19 impact on social support and mental health services for TGNB people

Studies have reported that TGNB persons are experiencing a lack of social support during the pandemic (Hawke et al., 2021; Jones et al., 2021). A Canadian study by Hawke et al. (2021) determined that TGNB youth are experiencing a lack of support from family members during the pandemic, however this trend was not reported when examining levels of support from friends or significant others. The authors concluded that this may be as a result of living in unsupportive environments due to stay-at-home orders that have been implemented (Hawke et al., 2021). Similarly, another study in the U.K. reported that youth had lost sources of support and had challenges accessing support due to social distancing guidelines (Jones at al., 2021). TGNB adults are also experiencing disruptions regarding the social support they usually have available. The predominately European, TransCareCOVID-19 study reported that of participants who were members of a support group, 69.2% had limited access to them due to COVID-19 (Koehler et al., 2020).

The COVID-19 pandemic has also resulted in several service disruptions due to stay-at-home orders. For the TGNB population, mental health service disruptions as well as

reduced access to community support groups have been reported. Among TGNB Canadian youth, approximately 70% reported a COVID-19-related disruption in mental health or substance use service compared to 26% of cisgender youth (Hawke et al., 2021). Moreover, a greater proportion of TGNB youth reported that their needs were not met for mental health and substance use services compared to cisgender youth (63% vs. 28%). Although telehealth has become widely adapted in the COVID-19 era, it is important to note that telehealth mental health services may not be ideal for TGNB persons as they might experience social anxiety (e.g., in relation to their voice) which prevents them from using online mental health interventions (Jones et al., 2021).

A cross-sectional global study of 964 TGNB adults reported that among gender-affirming resources that they were using, mental health services was the most frequently disrupted resource (Jarrett et al., 2021). Some TGNB persons rely on other services for informal mental health support, for which it has been reported that there is also reduced access to specific LGBTQ+ and TGNB supportive organizations due to the pandemic (Kidd et al., 2021). A U.S. longitudinal cohort study of TGNB adults showed that over half of their study sample had reduced access to LGBTQ+/TGNB supportive organizations due to the pandemic. Moreover, this reduced access was linked to higher psychological distress after controlling for pre-pandemic mental health levels (Kidd et al., 2021). Therefore, a decrease in social support and additional service disruptions (in particular, mental health services) may have a detrimental effect on TGNB people's mental health.

2.4.3 COVID-19 and interruptions in gender-affirming medical care

Due to the COVID-19 pandemic, some TGNB persons have been experiencing delays and/or reduced access to gender-affirming medical care (Kidd et al., 2021). A study in the U.K. reported that the majority of TGNB youth were worried about the COVID-19 pandemic impact on their transition process as many had difficulties accessing gender-affirming medical care (Jones et al., 2021). Some of these youths also reported feeling social anxiety due to their inability to access gender-affirming medical care; in particular, gender-affirming surgical procedures had been cancelled with no new rescheduled date (Jones at al., 2021). A predominantly European, cross-sectional study of TGNB adults revealed that among those who received or were planning to receive gender-affirming

care, approximately 60% were concerned that future transgender health care would be difficult to access due to the ongoing pandemic (Koehler et al., 2020). Moreover, about half of the respondents who had already received some type of gender-affirming care had experienced difficulties in accessing transgender healthcare services due to the pandemic. For example, 21.8% reported that their access to hormones was currently restricted, with another 15.6% and 19.5% reporting that their surgery was cancelled/postponed or that they expect that it will be cancelled/postponed, respectively (Koehler et al., 2020). A U.S. study also reported that 11.1% of TGNB participants in their study experienced a surgery cancellation and 32.7% reported an interruption in hormonal care (Kidd et al., 2021). A cross-sectional, global study of TGNB adults (n=849) determined that among the participants who were receiving gender-affirming care prior to the pandemic, 33.2% and 31.1% experienced a reduction in hormone treatments and surgical after-care, respectively (Restar et al., 2021). This same study also found that interruptions in gender-affirming care partially mediated the relationship between the impact of socioeconomic loss and poor mental health outcomes during the pandemic.

2.4.4 Interruptions in gender-affirming medical care and mental health

Before data had become available, commentaries and opinion pieces had expressed concerns about the potential negative effects of delays in gender-affirming care due to COVID-19 on TGNB mental health (Herman & O'Neill, 2020; Wang et al., 2020; van der Miesen et al., 2020; Pearce et al., 2020). Due to the postponement of in-person consultations and surgeries, TGNB persons could have difficulties in accessing hormone therapy and/or gender-affirming surgeries (Wang et al., 2020), wherein a lack of access to this care could result in increased suicidal ideation and attempts (Herman & O'Neill, 2020). Moreover, TGNB persons often have already overcome many barriers to schedule their surgical procedures, including financial, legal and geographic obstacles (Roberts et al., 2020). For example, in Germany, just the application process for top surgeries can take anywhere from two to six months (Eickers, 2020). There are also limited surgeons who specialize in these procedures which increases wait-times and can affect the mental health of this population.

Currently, there are a few studies that have investigated the association between delays in gender-affirming medical care and mental health (Zwickl et al., 2021; Jarrett et al., 2021; Kidd et al., 2021). A cross-sectional study of TGNB persons in Australia showed that those who experienced cancellations in gender-affirming surgeries were more likely to have thoughts of self-harm or suicide (Zwickl et al., 2021). A global, cross-sectional study discovered a relationship between screening positive for depression and anxiety and reduced access to gender-affirming resources (e.g., hormone therapy, surgery after-care, mental health services, cosmetic supplies, body modifiers) due to the COVID-19 pandemic (Jarrett et al., 2021). When examining the relationship between gender-affirming care and suicidal ideation, the authors found a similar trend—among the individuals who had rare or no suicidal ideation during the onset of the pandemic, those who had experienced a loss of access to at least one gender-affirming resource reported greater suicidal ideation (Jarrett et al., 2021). In contrast, a U.S. longitudinal cohort study of TGNB individuals aged 16 or older did not find a significant relationship between interruptions in gender-affirming care and greater psychological distress (Kidd et al., 2021). Initially, while controlling for gender identity and age, interruptions in gender-affirming care due to the pandemic was associated with greater psychological distress. However, after the investigators adjusted for pre-pandemic mental health, this relationship was no longer significant (Kidd et al., 2021).

2.5 Potential implications of COVID-19 disruptions on TGNB people and their mental health

With the potential of disruptions in hormonal prescriptions amidst the pandemic, an increasing number of TGNB persons may search for alternative methods to acquire hormones in order to prevent unwanted changes to secondary sex characteristics. Online forums are frequently being used in the TGNB community for individuals seeking advice for obtaining hormones as they begin to run short on supply (Edenfield, 2021). It is important to note that online forums may provide advice that are not written by physicians with medical expertise. Therefore, the medical advice provided could lead to an increasing number of individuals exhibiting risky behaviours to acquire hormones, which could be very dangerous and detrimental to their health. Van der Miesen et al.

(2020) concluded that there will likely be an even greater delay for individuals seeking gender-affirming care in the future due to the reduced capacity of healthcare systems and cancellations of previous procedures. Given the relationship between gender-affirming care and mental health, this may result in heightened mental health complications in the TGNB population.

Not only can the pandemic impact gender-affirming care, but it can also contribute to an increased difficulty in accessing needed health care among this population. Prior to the pandemic, TGNB persons were already experiencing barriers when seeking health care, including a deficiency of knowledgeable healthcare professionals in transgender health and long wait times to see transgender-friendly providers (Wang et al., 2020; Carman et al., 2020). This may be even more exacerbated due to social distancing measures (Carman et al., 2020). Moreover, some TGNB persons have previously encountered discrimination or discomfort when seeking care which may explain why some delay seeking care or experience a lower quality of care (Pearce et al., 2020; Herman and O'Neill, 2020). Delayed care and treatment results in a greater risk of developing serious and life-threatening consequences of COVID-19. Additionally, TGNB persons may have appointments with psychiatrists and/or therapists postponed or moved to an online format (Eickers, 2020). This could lead to a decreased frequency and/or lower standards of available mental health services for TGNB persons, especially if there is a lack of quality in the telehealth being offered (van der Miesen et al., 2020). Given that TGNB persons were already experiencing a greater level of mental health complications than the general population, these difficulties in accessing needed health care can be detrimental to their mental well-being.

The closure of businesses, office spaces and schools has resulted in an increased number of individuals working and studying from home, including TGNB persons. The ability to work from home has resulted in positive experiences for some TGNB individuals, while others have experienced increased distress due to this change in environment. Some TGNB persons might enjoy working from home because they are able to use their bathroom at home, rather than having to decide whether they can use the bathroom that reflects their gender identity at their current workplace (Konnoth, 2020). In contrast,

some may have negative experiences working from home. For example, since in-person conversations can no longer take place, phone calls may be used more frequently to communicate. As a result, TGNB persons may get misgendered on telephone calls because the individual on the other line can only listen to their voice and cannot see their physical appearance (Konnoth, 2020).

School closures can also have a negative impact on TGNB youth who must go home to families that are unsupportive of their gender. This is especially harmful for youth who have peer support at school and frequently use the mental health programs offered (Salerno et al., 2020). Additionally, some businesses have opted to completely close due to the economic strain caused by the pandemic, resulting in job losses and an increase in unemployment. The 2015 U.S. Transgender Survey revealed that the unemployment rate for transgender persons was already three times higher compared to the general U.S. population (James et al., 2016). Transgender respondents were also more likely to live in poverty compared to the U.S. population (29% vs. 12%). Given that lower socioeconomic status has been previously associated with a higher prevalence of health risks (Stronks et al., 1998), TGNB persons may be at a greater risk of both the short and long-term implications of the COVID-19 pandemic. Aside from unemployment and income affecting both financial stability and physical health, it also may result in increased mental health issues for TGNB persons who rely on employment insurance to cover their gender-affirming medical care (van der Miesen et al., 2020).

Stay-at-home orders and social isolation may be detrimental for TGNB individuals, specifically for those who have unsupportive families or are at a greater risk for partner violence (Herman & O'Neill, 2020). One study discusses how social distancing can have negative implications on the mental health of SGM populations (Phillips et al., 2020). For example, factors contributing to minority stress can become more prevalent during the pandemic, including poor social support. A supportive network can include people outside of one's household, such as friends, teachers, co-workers, and community groups and organizations. With the ongoing pandemic, TGNB persons may be experiencing even greater levels of social exclusion due to separation from supportive individuals who are not living in their household and reduced availability of safe spaces (Carman et al., 2020;

van der Miesen et al., 2020). It is important to note that TGNB persons may not solely rely on medical professionals for mental health services; local community centres and organizations can also provide mental health support for these individuals (Eickers, 2020). However, many of these organizations were not able to operate due to COVID-19 measures. Therefore, this can result in a decrease in social support and acceptance for TGNB persons who do not have a solid support system at home. Eickers (2020) also noted that social isolation, which may result from a combination of both difficulties accessing TGNB specific health care and reduced social support, can have a negative impact on the mental well-being of transgender individuals; especially for those who were already suffering from mental health complications pre-pandemic.

Furthermore, social distancing guidelines can have an indirect effect on substance abuse as individuals may turn to alcohol and/or drugs as a coping strategy since there are less supportive resources available during these unprecedented times (Carman et al., 2020). There is some evidence to suggest that alcohol and drug abuse is more prevalent in LGBTQ+ populations compared to the broader population (Ritter et al., 2012; Roxburgh et al., 2016). In particular, substance abuse among transgender persons has been previously linked to increased stigma and social exclusion (Scheim et al., 2017). A Canadian study reported that approximately 12% of the transgender population in Ontario used at least one high-risk drug in the past year, in which transgender persons were also more likely to use both cocaine and amphetamine compared to the non-transgender population (Scheim et al., 2017). Given that social exclusion has previously been linked to drug use, this could potentially result in increased substance abuse during the pandemic and additional physical and mental health complications for this population.

Overall, there is very limited research that has examined the relationship between interruptions in gender-affirming care due to COVID-19 and mental health. The majority of the existing literature consists of cross-sectional studies and opinion pieces which make it impossible to determine causation. Moreover, a recent longitudinal study reported contradicting results with regards to this association when compared to the other cross-sectional studies, demonstrating a further need to assess this relationship with longitudinal data. Many of these studies were also conducted outside of Canada which

reduces the generalizability to the Canadian population. Importantly, some researchers who have investigated this relationship have called for future research with longitudinal data to better understand the relationship between interruptions in gender-affirming care due to COVID-19 and mental health (Restar et al., 2021). Given the limited longitudinal research that is available and the lack of research that has included the TGNB Canadian population, this current study has the unique opportunity to longitudinally examine the impact of interruptions in gender-affirming care due to COVID-19 on anxiety and depression among TGNB people in Canada.

Chapter 3

3 Methods

This chapter will provide an overview of the study sample, the variables included in the analysis and how they were measured, along with statistical analyses that were performed.

3.1 Study sample

Trans PULSE Canada was a national community-based survey funded by the Canadian Institutes of Health Research (CIHR) that focused on the health and well-being of transgender and non-binary people in Canada. In particular, the Trans PULSE Canada study seeks to describe and compare health outcomes and access to healthcare among transgender and non-binary people across different provinces/territories, as well as gathering additional information on nine priority population groups (individuals with disabilities, Indigenous persons, sex workers, non-binary individuals, racialized persons, those living in a rural location, immigrants and newcomers, youth and older adults). To be eligible to participate, individuals had to be over the age of 14, reside in Canada, and identify as a gender other than what they were assigned at birth. To recruit participants in the study, the majority of the promotion took place through social media (e.g., Trans PULSE Canada website, Facebook, Twitter) and community organizations. There were also eleven peer research associates (PRA) hired across Canada who promoted the questionnaire locally and were available to collect data in person via tablets.

The Trans PULSE Canada study was originally designed as a multi-mode national cross-sectional survey. However, given the situation with COVID-19 in 2020, the research team decided to create a new COVID-19 related survey which would capture how the pandemic had impacted the lives of TGNB persons in Canada—this new study was called the Trans PULSE COVID Cohort. As a result, this thesis is a longitudinal study using both the 2019 and 2020 datasets. To be eligible to participate in the 2020 survey, individuals had to have participated in the Trans PULSE Canada survey in 2019 and they had to be currently living in Canada. To recruit participants, an invitation was sent to

those individuals who had provided contact information and consent for recontact in the 2019 survey. Each participant was recontacted via phone, email or mail depending on the information provided on the previous survey.

For the Trans PULSE Canada survey in 2019, data were collected for ten weeks in the summer of 2019. Participants could complete the questionnaire online, in paper or over the phone in either English or French. There was also the option to complete the questionnaire via phone with a language interpreter. Two versions were available for participants—a longer questionnaire and a short form. The full-length questionnaire focused on many aspects of health and well-being, including questions on gender-affirming care, experiences with health services, physical and mental health status, social support, gender positivity and distress, and identity documents. Participants were able to save and exit the online questionnaire at any time if they were unable to complete it in one sitting, as well as schedule multiple sessions if the questionnaire was being completed via phone or in-person with a PRA. The short-form questionnaire was available to those who were unable or were not willing to complete the longer version of the questionnaire and it included questions on demographics, along with one key question from each major section in the full-length questionnaire. At the end of the questionnaire, participants were given the opportunity to provide contact information if they were willing to be recontacted for potential future studies. However, this was not a requirement to participate in the study. For those who provided contact information, the contact information and questionnaire answers were stored separately. Additionally, there was no honorarium for completion of the questionnaire.

All data were stored on REDCap servers at Western University. REDCap is a highly secured web application used for surveys and databases. Research Ethics Board (REB) study approval was obtained from the Unity Health Toronto Research Ethics Board at St. Michael's Hospital, the Human Research Ethics Board at University of Victoria, Non-Medical Research Ethics Board at Western University, and the Research Ethics Board of Wilfrid Laurier University. Given that youth were also able to participate in the study, it is important to note that parental/guardian consent was waived for youth under the age of

18 in order to protect the safety of transgender and non-binary youth who may have not disclosed their gender identity to their parents or others.

For the Trans PULSE COVID Cohort, data were collected for approximately four weeks in the fall of 2020. Eligible participants were able to complete the questionnaire online or in paper format. If there were any issues with accessing the questionnaire due to communication difficulties (e.g., if they had used translators for the 2019 questionnaire), those individuals were directed to contact the project coordinator or principal investigators who would aid in providing appropriate accessibility. The Trans PULSE COVID questionnaire included sections on sociodemographics, healthcare access (primary, emergency, gender-affirming care etc.), physical and mental health status, COVID-19 testing and care, as well as access to community and social support. Some questions used standardized study instruments, while others were adapted from the TransCare COVID-19 questionnaire and Statistics Canada population questionnaires. Participants were able to pause the online and paper questionnaires and restart at a later time if needed. At the end of the questionnaire, they were also able to update the contact information that was provided in the 2019 questionnaire. A $20 gift card honorarium was given to participants upon completion (President's Choice, Amazon.ca, Tim Horton's or Indigo).

All data were securely stored on REDCap servers at Western University and REB study approval was obtained from the Institutional Review Board at Drexel University, the Non-Medical Research Ethics Board at Western University, the Human Research Ethics Board at University of Victoria and the Research Ethics Board at Wilfrid Laurier University. Lastly, in contrast to the sharing protocol for the Trans PULSE Canada data which only allowed de-identified data to be accessible to the team's Data Analysis Working Group, anonymized data from the COVID cohort will be made available to the public.

There were a total of 3524 questionnaires completed in 2019. Observations were deleted if they were (1) identified as non-participants (e.g., team members entering the online questionnaire for testing), (2) those who logged in but did not start the questionnaire, (3)

bots and trolls or (4) duplicate entries. As a result, the following observations were deleted: 8 questionnaires as they were non-participant entries, 527 due to incompletion of multiple key early demographic questions (age, ethnoracial identity, person of colour, immigration, sex assigned at birth, gender identity category), 2 due to trolls and 114 were duplicate entries. This resulted in a final sample size of 2873 in 2019. Of the total 2873 final study participants, there were 2870 that were completed online or in paper, 0 by telephone, and 3 were administered by PRAs (all in English). Of the participants who completed the questionnaire in 2019, there were 1184 who had provided consent for recontact however, the contact information was invalid for some individuals. Therefore, of those who had valid information and were contacted for the Trans PULSE COVID Cohort, there were a total of 826 survey respondents. Observations were removed if consent was not provided on the questionnaire. All questionnaires were completed online. This resulted in a final sample size of 820 for the 2020 data collection period.

This thesis is a longitudinal study using both the 2019 pre-pandemic and 2020 pandemic datasets in order to assess the impact of interruptions in gender-affirming care during COVID-19 on changes in anxiety and depression among Trans PULSE Canada participants. Individuals were included in the study if (1) they completed both the 2019 full questionnaire and 2020 COVID questionnaire, (2) at the time of the 2019 survey, were aged 14 or older, lived in Canada and identified as a gender other than what they were assigned at birth (general criteria from the 2019 survey), and (3) at the time of the 2019 survey, they either had completed, were in process, or were planning to receive gender-affirming care. Those who were not planning to receive gender-affirming medical treatment or were not sure whether they would seek gender-affirming medical treatment in 2019 were excluded. As a result, there were 611 survey respondents included in the final analytic sample for this study.

3.2 Directed acyclic graphs

Directed acyclic graphs (DAGs) offer a visual representation of the causal relationships between dependent and independent variables while also providing the association of these variables with other covariates. In particular, DAGs can be used to determine whether other covariates might confound the relationship between the exposure and

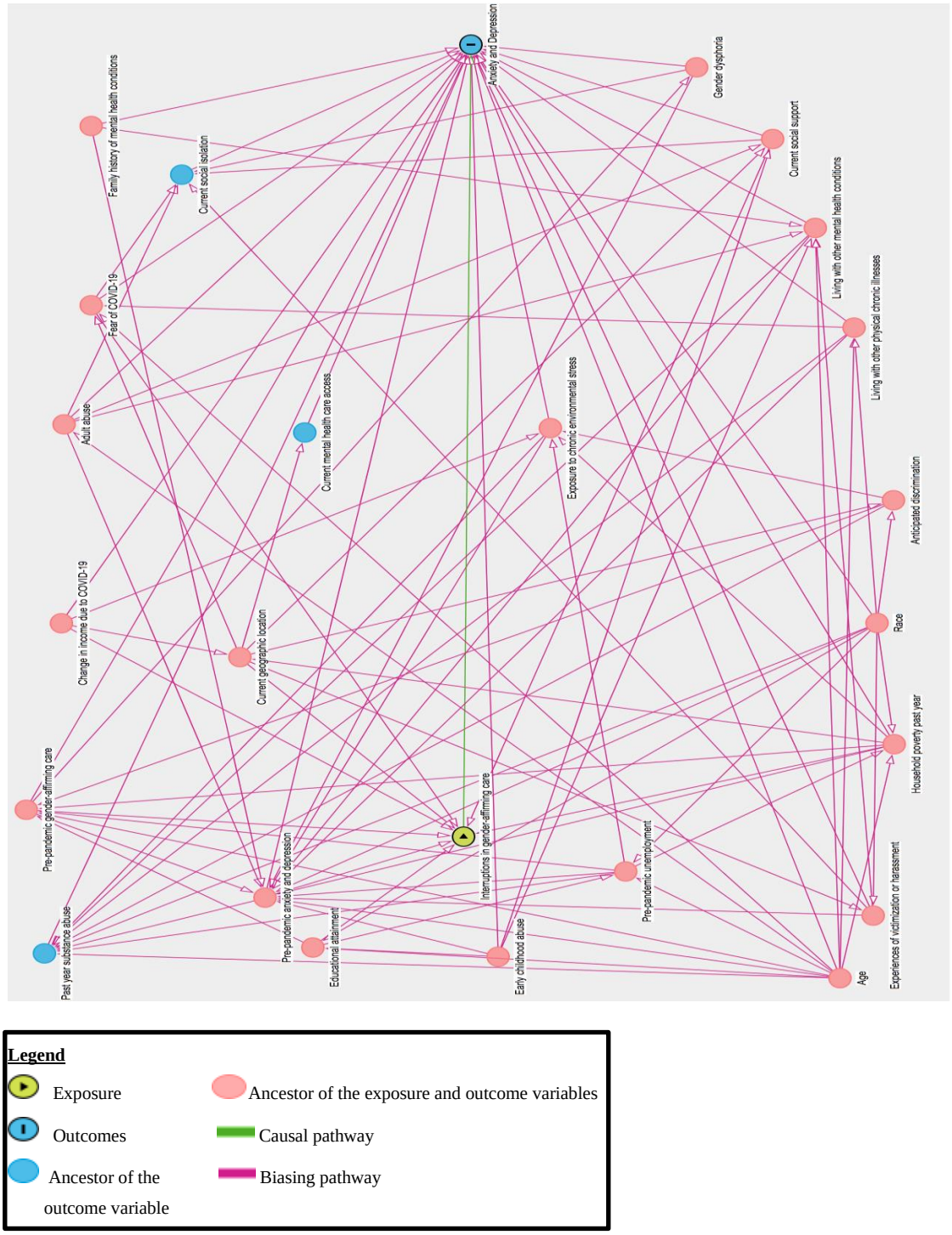
outcome. A variable is a confounder if it has the ability to distort the true relationship between an independent and dependent variable by playing a causal role in the outcome of interest and having an association with the exposure. By using DAGs, one can determine minimally sufficient adjustment sets— the minimum set of confounder variables one needs to adjust for to measure a causal relationship without the risk of confounding bias (Foraita et al., 2014).

For some research questions, the construction of a DAG can become very complex; this in turn has resulted in the production of the online web application known as DAGitty (Textor et al., 2016). This application allows the user to easily draw DAGs to determine minimum sufficient adjustment sets for their research question of interest. To determine what variables might be relevant to include in the DAG, one can use previous research found in the literature, a priori knowledge, along with other information such as theories or expert opinions (Foraita et al., 2014). For this thesis, DAGitty was used to determine a minimum sufficient set of confounders to adjust for in order to measure an unbiased association between interruptions in gender-affirming care and the outcomes, anxiety and depression (Figure 1). For our DAG, we decided to include both outcomes, anxiety and depression, in order to determine a common minimum sufficient adjustment set that could work for both models. Previous literature was used to determine other risk factors that may play a causal role in anxiety and depression. Given the limited research available on this topic, a priori knowledge was also used to determine relevant variables to include in the DAG. Both measured and unmeasured variables that were relevant in assessing the relationship between interruptions in care and anxiety and depression were included in the DAG by the user. DAGitty also allows users to force adjustment for specific covariates that they would like to be included in every adjustment set (Textor, 2011). For this thesis, the specific covariates that we wanted to include (pre-pandemic anxiety and depression) were already included in the eight possible minimal sufficient adjustment sets that DAGitty had created; therefore, we did not need to force adjustment. To select our final adjustment set from the eight options that DAGitty provided, we prioritized a set that did not include unmeasured variables, had a smaller number of covariates to adjust for and variables with minimal missing data (Austin et al., 2019). As a result, the minimum sufficient adjustment set included the following variables: change

in income due to COVID-19, current geographic location (province/territory), current social support, educational attainment, fear of COVID-19 (COVID-19 related health concerns), household poverty past year (low-income household), pre-pandemic anxiety and depression and pre-pandemic gender-affirming care status (2019).

Figure 1

Directed acyclic graph (DAG) of the relationship between interruptions in gender-affirming care and anxiety and depression



3.3 Study measures

3.3.1 Exposure variables

Interruptions in gender-affirming care. Three variables from the Trans PULSE COVID Cohort questionnaire were used to create a composite variable on interruptions in gender-affirming care. The first focused on interruptions in taking hormones: “Since March 12, 2020, have you had interruptions in taking hormones?”. The potential response options were “Yes” or “No”. This question was only asked to those participants who take hormones. The second focused on inability to get a new prescription for hormones: “Since March 12, 2020, have you been unable to get a new prescription or referral for hormones?”. There were three response options: “Yes,” “No,” and “I haven’t needed this during this time”. Both of these items were developed by the Trans PULSE Canada Team. The final variable focused on surgery interruptions: “Have you had a surgery appointment canceled or postponed due to the current COVID-19 outbreak?”. Possible responses were “Yes,” “No,” and “Not yet, but I expect it will”. This was only asked to participants who had a gender-affirming surgery booked before March 12, 2020. This questionnaire item was adapted from the TransCare COVID-19 project (TransCare Hamburg, 2020) — an international, online survey that focused on how transgender persons have been affected by COVID-19 in terms of physical health, mental health and transgender health care.

For the composite variable, participants were categorized into four groups: (1) interruptions in taking hormones, (2) surgical interruptions, (3) interruptions in taking hormones and surgical interruptions, and (4) no interruptions in gender-affirming care. Those who had interruptions in taking hormones and those who were unable to get a new prescription or referral for hormones were grouped together as having “interruptions in taking hormones”. Those who answered “Yes” or “No” to the items were categorized into the appropriate interruption group. Additionally, those who had responded “Not yet, but I expect it will” for surgical interruptions or “I haven’t needed this during this time” for inability to get a new prescription for hormones were categorized as not having an interruption.

3.3.2 Outcome variables

Anxiety. The Overall Anxiety Severity and Impairment Scale (OASIS) was used to measure self-reported pandemic anxiety levels. Developed by Norman et al. (2006), the OASIS is a continuous measure that can be used to measure the severity of any anxiety disorder, assess the severity and impairment across multiple anxiety disorders, as well as capture subthreshold anxiety symptoms. It was designed to be a very brief questionnaire so that it could be used in many different settings, ranging from a primary care environment to population-based research studies (Campbell-Sills et al., 2009). OASIS is a five-item scale that consists of the following questions: (1) In the past week, how often have you felt anxious?, (2) In the past week, when you have felt anxious, how intense or severe was your anxiety?, (3) In the past week, how often did you avoid situations, places, objects, or activities because of anxiety or fear?, (4) In the past week, how much did your anxiety interfere with your ability to do the things you needed to do at work, at school, or at home?, (5) In the past week, how much has anxiety interfered with your social life and relationships? To answer these questions, respondents are asked to consider all of their experiences (e.g., panic attacks, situational anxieties, worries) and include all of their anxiety symptoms. For each item, a 5-point Likert-type scale is used with the scores ranging from 0-4; the scores for each item are added to represent a total score (ranges from 0-20). A higher score indicates greater anxiety severity and impairment, with a cut-point of eight or higher indicating a probable anxiety disorder. OASIS is a validated measure used in many different populations and settings, ranging from a non-clinical sample of college students to diverse clinical samples in the U.S. and other multicultural populations (Campbell-Sills et al., 2009; Norman et al., 2006; Hermans et al., 2015).

Depression. The 10-item Centre for Epidemiological Studies Depression Scale (CES-D-10) was used to measure self-reported pandemic depression levels. The original CES-D consists of 20 items and has been widely used to identify both clinical and non-clinical depressive symptoms in diverse populations (Radloff, 1977; Shinar et al., 1986). However, due to the length of the 20-item scale, both clinicians and survey researchers are sometimes reluctant to use the full-length scale. A shorter version of the original

CES-D scale was derived in which 10 of the 20 items are used to assess depressive symptomology in the past week (Andresen et al., 1994). In order to shorten the scale, items that did not have high correlations to the total score or items that were highly correlated with each other and therefore repetitive were removed (Andresen et al., 1994). As a result, there are three items on depressed mood, five items on somatic symptoms, and two on positive mood (Baron et al., 2017). The CES-D-10 uses a 4-point Likert-type scale where items are scored from 0-3, wherein 0 is “Rarely or none of the time” and 3 is “Most or all of the time”. The score is reversed for 2 items (5 and 8) which represent positive mood. A final score is determined by totaling the scores of each item; the possible range for the final score is 0-30. A higher score represents greater depressive symptoms, with a cut-point of ten or higher indicating depressive symptoms consistent with clinical depression (Andresen et al., 1994). The CES-D-10 has proven to have strong psychometric properties, demonstrating good reliability in community samples and varying populations, including older adults and adolescents (Irwin et al., 1999; Cheung et al., 2007; Bradley et al., 2010).

3.3.3 Descriptive characteristics

Age. In the questionnaire, participants were asked how old they were in years. For this thesis, age was coded into six categories: “14-19”, “20-24”, “25-34”, “35-49”, “50-64”, “65+”, as well as 3 categories: “14-24”, “25-49”, and “50+” for descriptive analyses. The three-group age variable was created as it includes two meaningful Trans PULSE Canada priority populations—youth and older adults.

Gender. Participants were asked about their current gender identity with the following response options: “Man or boy”, Woman or girl”, “Indigenous or other cultural gender identity (e.g., two-spirit)” or “Non-binary, genderqueer, agender, or a similar identity.”

Sex assigned at birth. Participants reported their sex assigned at birth as “Male” or “Female”.

Province/territory. Participants were asked what province or territory they currently lived in. For this thesis, the three territories were grouped together for analyses due to small sample sizes.

Indigenous status. A binary variable for Indigenous status was created. All participants were asked about their ethnoracial background. Those who selected "Indigenous" were asked a follow-up question on which group they belonged too. Responses that included "First Nations (status)", "First Nations (non-status)", "Métis", "Inuk", or "Indigenous from Canada, don't know which group" were categorized as "Indigenous". Participants who did not select "Indigenous", or who responded "Indigenous from another country" or "Unsure" to the follow-up question, were categorized as "Not Indigenous".

Racialization. A binary variable for racialization was created using two items from the questionnaire: "Are you perceived or treated as a person of colour in Canada?" and "Do you identify as a person of colour?". Response options for these variables were "Yes" or "No". Individuals were coded as "Racialized" if they responded yes to one or both of these items and "Not Racialized" if they did not.

Immigration history. In the questionnaire, participants were asked "What country were you born in?". Possible response options were "Canada", "Outside of Canada" or "Unsure". A binary variable was created to represent immigration history, in which those who were born outside of Canada were classified as being an "Immigrant".

Urban/rural. There were two questions in the questionnaire pertaining to postal code. The first asked participants for their postal code for where they live or get mail. For those who did not want to share their full postal code, there was also an option to share just the first three digits. Both postal code questions required a write-in response. To code a binary variable for living in a rural area, Community Size was used to determine rurality. Community Size was derived from the census metropolitan area/census agglomeration designation. Postal Code Conversion File Plus (PCCF+) version 7B was used to assign the postal codes to communities'/census areas (Statistics Canada, 2018). Those living outside of census metropolitan areas and census agglomerations were coded as living in a rural area or small town (less than 10 000 people).

Education. Survey respondents were asked about the highest level of formal education that they have completed. There were 13 response options, ranging from “Some highschool, no diploma or GED” to “Doctoral or professional degree”. For this thesis, responses were coded into five groups: “<Highschool”, “High school diploma”, “Some college or university or CEGEP”, “College or university degree, or CEGEP degree, including those with some grad school, no degree”, or “Grad/professional degree, including those who reported some Doctoral/professional work, no degree”.

Income. Participants were asked about their total personal income, before taxes and other deductions from all sources in 2019. There were 13 response options, ranging from “Less than $10,000” to “$150,000 or more”. There were also response options for those who did not have or were unsure of their personal income. For the purposes of this thesis, personal income was grouped into the following categories: “No personal annual income”, “<$15,000”, “$15,000-$29,999”, “$30,000-$49,999”, “$50,000-$79,999”, or “$80,000+”.

3.3.4 Confounder variables – minimum sufficient set

Income changes due to COVID-19. The questionnaire asked respondents aged 16 or older “How much of an impact did the COVID-19 pandemic have on your personal income from employment?”. The response options included “Major negative impact”, “Moderate negative impact”, “Minor negative impact”, “No impact”, “Minor positive impact”, “Moderate positive impact”, “Major positive impact”, or “Too soon to tell”. For this thesis, responses were coded into three groups: “Positive impact”, “Negative impact” or “No impact/too soon to tell”. This item was adapted from Statistics Canada (Statistics Canada, n.d.).

Current social support. To measure available social support, the eight-item modified Medical Outcomes Study Social Support Survey (mMOS-SS) was used (Moser et al., 2012). Participants were asked "How often is each of the following kinds of support available to you right now?”. There were 8 items included in the mMOS-SS survey such as, “Someone to help you if you were confined to bed”, “Someone to take you to the doctor if you needed it”, “Someone to have a good time with” etc. For each item, a 5-

point Likert-type scale is used with the scores ranging from 1-5 where 1= “None of the time”, 2= “A little of the time”, 3= “Some of the time”, 4= “Most of the time”, and 5= “All of the time”. The final social support score is determined by computing the average of the scores for all eight items included. A higher score indicates more support (Sherbourne & Stewart, 1991).

COVID-19 related health concerns. Participants were asked about their concerns during the COVID-19 pandemic in regard to their own health, “How concerned are you about each of the following impacts of COVID-19? … My own health”. The response options were “Not at all”, “Somewhat”, “Very” or “Extremely”. This measure was adapted from Statistics Canada (Statistics Canada, n.d.).

Low-income household. This measure was derived according to Statistics Canada’s Low-Income Measure (Statistics Canada, 2021a) using two questions from the questionnaire pertaining to total income from all members living in the household and the number of people supported on the household income. The Statistics Canada Low-Income Measure (LIM) determines low-income households and adjusts household income by the number of people supported on the income. As such, there are different LIM thresholds for different household sizes. Therefore, the LIM compares all the participants’ incomes to the average person’s income while adjusting for household size; those who had fallen below the LIM thresholds were coded as “Low-income household” and those who did not were coded as “Not in a low-income household”.

Pre-pandemic anxiety and depression. Pre-pandemic depression and anxiety measures were coded the same way as the anxiety and depression outcome measures using data from the 2019 questionnaire.

Pre-pandemic gender-affirming care status (2019). Participants were asked “Which of the following applies to your current situation regarding puberty blockers, hormones, and/or surgery?” with the following response options, (1) I have had the gender-affirming medical treatment I need/want, (2) I am in the process of completing gender-affirming medical treatment, (3) I am planning to receive gender-affirming medical treatment, but have not begun, (4) I am not planning to receive gender-affirming medical treatment, or

(5) I am not sure whether I am going to seek gender-affirming medical treatment. For this thesis, those who were not planning or not sure whether they would seek gender-affirming medical treatment were excluded.

3.3.5 Descriptive variables pertaining to gender-affirming care

Most items in the questionnaire that were used to describe gender-affirming care were developed by the Trans PULSE Canada Team, unless otherwise stated.

Gender-affirming care status in 2020. The same item used to measure pre-pandemic gender-affirming care status in 2019 was used to measure gender-affirming care status in 2020.

Take hormones. Respondents who said they have had or were in the process of completing gender-affirming medical treatment were asked if they take hormones (yes/no).

Current access to hormones. For those who said they take hormones, they were also asked if they currently have access to hormones (yes/no).

Interruptions in taking hormones. Participants who said they take hormones were asked whether they had interruptions in taking hormones since March 12, 2020 (yes/no).

Reasons for inability to access hormones. This item was asked to participants who said they had interruptions in taking hormones. Response options included “Couldn’t afford it”, “Couldn’t go to the pharmacy”, “Couldn’t get my prescription renewed”, “Couldn’t get syringes or needles”, “Drug shortages”, “Nobody to help with injections”, “People in my household couldn’t know I’m taking hormones”, and “Other”.

Unable to get new prescription for hormones. Those who were planning or in the process to receive gender-affirming medical treatment were asked if they were unable to get a new prescription or referral for hormones since March 12, 2020. Responses included “Yes”, “No”, and “I haven’t needed this during this time”.

Unable to get new prescription for hormones because of COVID-19 restrictions. For those who were unable to get a new prescription or referral for hormones, they were asked whether this was because of restrictions related to COVID-19 (yes/no).

Booked appointment for gender-affirming surgery. Those who were planning or in the process to receive gender-affirming medical treatment were asked if they had an appointment booked to have a gender-affirming surgery in the future before March 12, 2020 (yes/no).

Surgery appointment canceled due to COVID-19. Those who had a surgery booked were asked whether they had a surgery appointment canceled or postponed due to the current COVID-19 outbreak. Responses included "Yes", "No" and "Not yet, but I expect it will". This questionnaire item was adapted from the TransCare COVID-19 project (TransCare Hamburg, 2020).

Alternate date set for surgery. For participants who experienced surgery cancellations, they were asked whether an alternative date was set for the surgery (yes/no). This questionnaire item was adapted from the TransCare COVID-19 project (TransCare Hamburg, 2020).

Type of surgery cancelled. For those who had a surgery appointment cancelled, they were asked what type of surgery was cancelled or postponed. Response options included "Chest surgery", "Genital gender-affirming surgery", "Removal of uterus (hysterectomy) or removal of ovaries (oophorectomy)", "Voice surgery", "Adam's apple surgery", "Facial surgery", and "Other surgery". This questionnaire item was adapted from the TransCare COVID-19 project (TransCare Hamburg, 2020).

Had this surgery. Participants who had a surgery appointment canceled or postponed due to COVID-19 were asked whether they had this surgery yet (yes/no).

Limited access to gender-affirming health care. All respondents were asked whether the COVID-19 outbreak limited their access to the following aspects of gender-affirming health care: (1) Binders, packers, or gaffs, (2) Non-medical supplies, (3) Medical material that is important after surgery, and (4) Post-operative care following gender-affirming

surgery. Response options included “Yes”, “No” and “Not applicable”. This item was adapted from the TransCare COVID-19 project (TransCare Hamburg, 2020).

3.4 Data considerations

3.4.1 Sample merging and weights

The 2019 and 2020 datasets were merged into one working dataset before conducting any analyses. Participants who had not completed the 2020 COVID questionnaire were removed. For this thesis, weights were applied to all descriptive and regression analyses to ensure that the 2020 survey data would represent the sample from the 2019 survey. Sampling weights were provided by the Trans PULSE Canada team. Variables that were included in the weights were chosen by looking at the differences in the distribution between survey respondents who completed the full length 2019 questionnaire and the 2020 questionnaire. The sample weights for the population ranged from 0.40 to 2.50. Overall, the weighted analyses were used to mitigate biases related to 2019 survey completion, consent for re-contact, reachability and COVID-19 survey participation.

3.4.2 Missing data

536 of 611 survey respondents had complete data for all variables while 75 (12.3%) were missing data for one or more variables. There were no missing data for interruptions in gender-affirming care, anxiety and depression at time point 2, province/territory of residence, educational attainment, social support and gender-affirming care status in 2019. However, other covariates that were included in the regression analyses were missing. By looking at Table 1, we can see that the percentage of missingness for each individual variable was relatively low. The categorical/binary variables that had missing data included COVID-19 related health concerns with 0.16% missing, income changes due to COVID-19 with 1.15% missing and the low-income household measure with 6.87% missing. Two continuous covariates, pre-pandemic anxiety and depression, both had 5.89% missing data.

Table 1

Missingness for the confounder variables

Variable	Missing observations (n)	Percent Missingness (%)*
COVID-19 related health concerns	1	0.16%
Income changes due to COVID-19	7	1.15%
Low-income household	42	6.87%
Pre-pandemic anxiety	36	5.89%
Pre-pandemic depression	36	5.89%

**Note*: This was calculated using a denominator value of 611 which is the analytic sample for this thesis.

Bennett (2001) suggested that when the proportion of missing data is greater than 10%, statistical analyses have the potential to become biased. In this thesis, missingness was below 10% for all variables, however given that there were missing data for a few different variables, a concerning proportion of the sample would be excluded if a complete case analysis was performed for the regression analyses. It was decided that the loss of 75 observations might be substantial in terms of impacts on power and precision (Sterne et al., 2009). Therefore, multiple imputation was used in the regression analyses.

Multiple imputation is commonly used due to its robustness and practicality in dealing with missing data (Berglund & Heeringa, 2014). It has been adapted for use in many commonly used statistical packages, including SAS. Multiple imputation uses the distribution of observed data from other variables to estimate multiple values that are plausible for the missing data (White et al., 2011). There are different methods to multiply impute missing data in SAS. To determine the optimal method for this thesis, we considered the pattern and type of data we were working with. Upon examination of the missing data pattern, it was determined that there was an arbitrary missing data pattern which the Fully Conditional Specification (FCS) and Markov chain Monte Carlo (MCMC) methods could accommodate (Berglund & Heeringa, 2014). For this thesis, there were missing data for both continuous and classification variables. To use the MCMC method with classification variables, a rounding technique must be used to impute these variables. This was not recommended because the FCS method has the

ability to accommodate mixed variable types without post-imputation rounding. Therefore, given the data pattern and types of variables we were using in the analyses, we decided the FCS method would be most appropriate (Berglund & Heeringa, 2014).

The SAS procedure, PROC MI, was used to impute the missing data with the FCS method. A random seed value (SEED=1180431796) was assigned and the number of imputations were specified in this step. Overall, the recommended number of imputations varies in the literature, however a larger number is usually preferred. For low proportions of missing data, it has been reported that between 5 and 20 imputations is appropriate (UCLA Statistical Consulting Group, n.d.). Therefore, we decided to choose 20 imputations given that the only burden of choosing the higher number of this range is increased computational processing (Berglund & Heeringa, 2014). To impute missing data for the select variables, the FCS LOGISTIC command was used for ordinal variables, FCS DISCRIM for nominal variables and FCS REGRESSION for continuous variables. PROC MIANALYZE was then used to combine the results from the 20 imputed datasets and to produce valid inferences (Berglund, 2015).

3.5 Statistical Analysis

All analyses were performed using SAS software, version 9.4.

3.5.1 Objectives 1 and 2: descriptive statistics

To determine the distribution of descriptive statistics and demographics for the entire sample, as well as for each of the four interruptions in gender-affirming care subgroups, the command PROC SURVEYFREQ was used for all classification variables. The WEIGHT statement was also added to compute all frequencies. The SAS survey procedures were selected for this thesis due to the complex nature of the survey data. For example, the SAS survey procedures allow the user to take into account the complex sample design in their analyses which might include stratification, clustering and unequal weights (Nadimpalli et al., 2012). For other SAS procedures, including PROC FREQ, the inferences made are based on assumptions such as simple random sampling and independence of observations. However, when working with survey data with a complex sample design, these assumptions may no longer hold. For this thesis, unequal weights

were used and it is suggested that SAS survey procedures (e.g., PROC SURVEYFREQ) are used when conducting analyses with unequal weights (Vandenbroucke, 2017).

Additionally, since we were only interested in a subpopulation of the participants, a domain analysis was performed for all analyses. According to Lewis (2013), completely restricting a dataset to a subpopulation of interest is risky prior to performing SAS SURVEY procedures; the use of a BY statement was also cautioned against because both can result in incorrect inferences. Lewis (2013) mentions that subsetting the dataset and performing a domain analysis will produce differing results for measures of variability and degrees of freedom. A domain analysis is an alternative procedure that allows the user to analyze a portion of the population that they are interested in while accounting for the complex survey data. With a domain analysis, results are produced for the full sample, as well as for each subsample that are within the domain variable.

For this thesis, we decided to perform a sensitivity test to compare the results obtained from a domain analysis with the results obtained from subsetting the data. For the sensitivity test, we used the PROC SURVEYFREQ procedure and found that both methods produced identical weighted frequencies however, the percentages and standard errors were not equivalent. Given that we used SAS SURVEY procedures, it was decided that performing a domain analysis would be most appropriate for all analyses (Lewis, 2013). For this thesis, one of the domains represented our analytic sample of interest. The excess results produced from the other domain and full population sample were ignored. For the descriptive statistics, the domain variable was included in the TABLES statement to produce separate results that only included our analytic sample. Lastly, confidence intervals were computed for all weighted, descriptive analyses.

3.5.2 Objective 3: differences in anxiety and depression from pre-pandemic to pandemic periods

To address objective 3, pre-pandemic anxiety and depression scores were first subtracted from pandemic anxiety and depression scores to obtain a change score. Then, a paired t-test was used to determine if there was a significant mean difference in anxiety and depression scores between the two time points. Specifically, the command PROC

SURVEYMEANS was used to determine the mean difference values for the anxiety and depression scores. The option “T” was specified to compute the t-values and p-values of the two change scores. Weighted estimates were produced by including a WEIGHT statement and a DOMAIN statement was also specified to compute separate estimates for our subpopulation of interest. Assumptions for a paired t-test were met, including normal distribution and independence (between subjects).

3.5.3 Objective 4: relationship between interruptions in gender-affirming medical care and pandemic anxiety levels

Initially, we were interested in analyzing ‘change’ in the two outcome variables. However, in the literature, some researchers have raised concerns about using change scores as outcomes in regression analyses. Shahar (2009) has argued that using a change model does not estimate a causal effect between two time points. The author mentions that a change model is actually quite similar to cross-sectional models and that it is only superior in terms of having the ability to adjust for time-stable confounders. He also demonstrates how subtracting two cross-sectional models yields a change model to further emphasize that there is nothing conceptually different between the two (Shahar, 2009). As a result, it has been cautioned that change scores are simply a derived variable and that they are not an effect of interest when exploring causal relationships (Shahar & Shahar, 2012). Tennant et al. (2021) also have warned against the use of change scores. Since the change score is a combination of two separate events, it merges the associated causal pathways and potentially introduces inferential bias in observational studies. For this reason, they also suggested using alternative statistical methods. Given the conflicting literature on change models, we decided that for this thesis, it would be most appropriate to use the follow-up (pandemic) anxiety and depression scores as the outcomes in the regression models while adjusting for pre-pandemic anxiety and depression levels.

To examine the relationship between interruptions in gender-affirming care and pandemic anxiety, PROC SURVEYREG was used with both DOMAIN and WEIGHT statements. Also, the imputed dataset was used for all regression analyses. There were three different regression models that were assessed where different covariates and/or interactions were

added to each model. For the first model, we fit a linear regression to look at the relationship between interruptions in gender-affirming care and pandemic anxiety, adjusting for pre-pandemic anxiety. For the second model, we used multiple linear regression to examine the relationship between the exposure and pandemic anxiety, adjusting for pre-pandemic anxiety and other potential confounders. In this model, we also assessed for an interaction between interruptions in gender-affirming care and pre-pandemic anxiety levels because we suspected that one's pre-pandemic anxiety score might modify the relationship between interruptions in care and pandemic anxiety (e.g., if an individual had a very high or low anxiety score pre-pandemic). If the interaction term was not significant (p-value >0.05), it was excluded from the final model. The third model used multiple linear regression to examine the relationship between the exposure and pandemic anxiety adjusting for pre-pandemic anxiety and other potential confounders that were determined from the DAG. This model was reported if the interaction term was not significant in the previous model.

3.5.4 Objective 5: relationship between interruptions in gender-affirming medical care and pandemic depression levels

PROC SURVEYREG was used to conduct linear regression analyses for objective 5. A domain analysis was performed in order to separately analyze our subpopulation of interest and a WEIGHT statement was also included to produce weighted estimates. For model 1, a linear regression model was fitted to assess the relationship between interruptions in care and pandemic depression, adjusting for pre-pandemic depression. For model 2, multiple linear regression was used to determine the association between interruptions in care and pandemic depression while adjusting for pre-pandemic depression and other potential confounders that were determined from the DAG. An interaction term was also added to this model to assess whether pre-pandemic depression might alter the relationship between interruptions in gender-affirming care and pandemic depression. If the interaction term was significant (p-value <0.05), it was included in the final model. The third model used multiple linear regression to examine the relationship between the exposure and pandemic depression, adjusting for pre-pandemic depression and other potential confounders. If the interaction was significant in the previous model,

the main effects model (model 3) was not reported as it would be misspecified. Linear regression assumptions were met, including linearity, homoscedasticity and independence and normal distribution of residuals. Tolerance values were used to assess for potential multicollinearity. No tolerance values were below 0.1, indicating no major concerns regarding multicollinearity (O'Brien, 2007). Potential influential data points were also examined using Cook's D which indicated no issues with highly influential outliers.

Chapter 4

4 Results

This chapter will present the descriptive characteristics of the total sample population as well as for each of the interruptions in gender-affirming care groupings. It will also describe interruptions in gender-affirming medical care during the COVID-19 pandemic and it will present the results for the paired sample t-test analyses. Lastly, the results of the regression models assessing the relationship between interruptions in gender-affirming care and pandemic anxiety and depression will be presented.

4.1 Objective 1: descriptive characteristics of the sample

This section will present the characteristics of the sample population as well as the characteristics of TGNB individuals experiencing interruptions in gender-affirming medical care during the COVID-19 pandemic.

4.1.1 Descriptive characteristics of the total sample population

Descriptive statistics for the total analytic sample (N=611) are presented in Table 2. The sample sizes (N) are unweighted and the proportions and confidence intervals presented are weighted. There were three age groups that participants predominantly belonged to, which were the 20-24 age group (20.0%, 95% CI: 16.5, 23.5), 25-34 age group (34.2%, 95% CI: 30.2, 38.3), and 35-49 age group (24.3%, 95% CI: 20.7, 27.9). Gender identity was relatively equally dispersed among three groups with 32.5% (95% CI: 28.4, 36.6) identifying as woman/girl, 33.6% (95% CI: 29.4, 37.7) as man/boy and 32.1% (95% CI: 28.1, 36.0) as non-binary or similar. A small proportion identified as Indigenous or other cultural identity (1.9%, 95% CI: 0.8, 2.9). The analytic sample had a higher proportion of participants assigned female at birth (61.1%, 95% CI: 56.9, 65.4) compared to assigned male at birth (38.9%, 95% CI: 34.6, 43.1). Study participants mainly lived in Ontario (34.4%, 95% CI: 30.4, 38.4) and British Columbia (20.1%, 95% CI: 16.8, 23.4), with the smallest proportion living in the territories (0.1%, 95% CI: 0.0, 0.3). Most individuals lived in census metropolitan areas (93.5%, 95% CI: 91.2, 95.7) with 6.5% (95% CI: 4.3, 8.8) living in rural areas or small towns. Approximately 7.7% (95% CI: 5.1, 10.2) were

Indigenous and 10.4% (95% CI: 7.8, 13.0) of individuals were racialized (perceived or identified as a person of colour). A relatively small proportion of individuals were immigrants to Canada (10.6%, 95% CI: 8.2, 13.1). Participants were generally well educated with 39.8% (95% CI: 35.7, 44.0) having completed a college or university degree with another 25.9% (95% CI: 22.1, 29.7) having completed some college, university or Collège d'enseignement general et professionnel (CEGEP). For total personal income (before taxes), about one fifth of respondents reported no personal annual income (19.3%, 95% CI: 15.7, 22.8), with most reporting an income of less than $15,000 (27.1%, 95% CI: 23.2, 31.0) and between the income bracket of $15,000 to $29,999 (21.0%, 95% CI:17.5, 24.5).

Table 2

Characteristics of the participants in the analytic sample (N=611)

Characteristic[a]	Unweighted N	Weighted % (95% CI)
Age		
15-19	49	11.5 (8.4, 14.7)
20-24	113	20.0 (16.5, 23.5)
25-34	215	34.2 (30.2, 38.3)
35-49	172	24.3 (20.7, 27.9)
50-64	49	8.1 (5.8, 10.4)
65+	9	1.8 (0.6, 3.0)
Gender		
Woman or girl	192	32.5 (28.4, 36.6)
Man or boy	192	33.6 (29.4, 37.7)
Indigenous or other cultural identity	12	1.9 (0.8, 2.9)
Non-binary or similar	214	32.1 (28.1, 36.0)
Sex assigned at birth		
Male	230	38.9 (34.6, 43.1)
Female	376	61.1 (56.9, 65.4)
Province/territory		
British Columbia	134	20.1 (16.8, 23.4)
Alberta	115	19.2 (15.8, 22.6)
Saskatchewan	18	3.1 (1.5, 4.6)
Manitoba	21	3.0 (1.7, 4.3)
Ontario	230	34.4 (30.4, 38.4)
Quebec	59	15.0 (11.3, 18.8)
New Brunswick	9	1.5 (0.5, 2.5)
Prince Edward Island	4	0.5 (0.0, 1.0)
Nova Scotia	16	2.4 (1.2, 3.7)
Newfoundland and Labrador	4	0.7 (0.0, 1.5)
NWT/Nunavut/Yukon	1	0.1 (0.0, 0.3)
Indigenous status		
Indigenous	38	7.7 (5.1, 10.2)
Not indigenous	571	92.3 (89.8, 94.9)
Racialization[b]		

Racialized	66	10.4 (7.8, 13.0)
Not racialized	543	89.6 (87.0, 92.2)
Immigration history		
Immigrant	75	10.6 (8.2, 13.1)
Not an immigrant	536	89.4 (86.9, 91.8)
Urban/rural		
Living in a rural area/small town	36	6.5 (4.3, 8.8)
Not living in a rural area/small town	574	93.5 (91.2, 95.7)
Education		
< High school	38	10.3 (7.1, 13.5)
High school diploma	55	11.7 (8.6, 14.7)
Some college or university or CEGEP	155	25.9 (22.1, 29.7)
College or university degree	264	39.8 (35.7, 44.0)
Grad/professional degree	99	12.3 (9.8, 14.9)
Personal annual income in 2019		
No personal annual income	106	19.3 (15.7, 22.8)
< $15,000	163	27.1 (23.2, 31.0)
$15,000 - $29,999	127	21.0 (17.5, 24.5)
$30,000 - $49,999	83	13.7 (10.7, 16.7)
$50,000 - $79,999	73	10.8 (8.3, 13.4)
$80,000 +	48	8.1 (5.7, 10.6)

[a] Characteristics were reported from the 2020 survey data

[b] This includes those who are perceived/treated or identify as people of colour

4.1.2 Descriptive characteristics by interruptions in gender-affirming care groupings

Table 3 represents the descriptive characteristics of participants by interruptions in gender-affirming care groupings. Unweighted sample sizes (N) are presented with weighted proportions and confidence intervals. Of the total analytic sample, there were 149 participants (Weighted %: 23.9%) who experienced interruptions in hormones (including inability to get a new prescription or referral). Approximately half of these individuals were between the ages of 25 to 49 (49.5%, 95% CI: 40.8, 58.2) with most of them living in Ontario (36.2%, 95% CI: 28.0, 44.5), British Columbia (17.2%, 95% CI: 10.7, 23.6), or Alberta (19.1%, 95% CI: 12.3, 25.8). There were 7.0% (95% CI: 2.4, 11.7) who also lived in a rural area or small town. Of those who experienced interruptions in hormones, 39.1% (95% CI: 30.4, 47.7) identified as a man or boy, 29.9% (95% CI: 21.7, 38.0) identified as a woman or girl, and 29.5% (95% CI: 22.1, 37.0) as non-binary, genderqueer or an identity similar; 1.5% (95% CI: 0.0, 3.3) identified as Indigenous or another cultural identity. Most participants had received the gender-affirming medical treatment that they needed/wanted (45.1%, 95% CI: 36.4, 53.8) or were in the process of

completing gender-affirming medical treatment pre-pandemic (44.4%, 95% CI: 35.8, 53.0).

There were 23 participants (Weighted %: 3.3%) who experienced a surgical interruption during the COVID-19 pandemic. This group largely consisted of individuals between the ages of 25 to 49 (70.0%, 95% CI: 50.8, 89.2), and all were not living in a rural area or small town (100%, 95% CI: 100.0, 100.0). Similar to those who experienced interruptions in hormones, those who had surgical interruptions largely lived in British Columbia (34.8%, 95% CI: 14.9, 54.7), Ontario (30.5%, 95% CI: 11.9, 49.1) or Alberta (20.0%, 95% CI: 2.1, 37.9). There were 36.1% (95% CI: 15.7, 56.5) who identified as a woman/girl, 38.6% (95% CI: 17.9, 59.3) who identified as a man or boy and 25.4% (95% CI: 8.2, 42.6) who identified as non-binary, genderqueer or an identity similar. In terms of pre-pandemic gender-affirming care status, most participants were in the process of completing gender-affirming medical treatment (95.2%, 95% CI: 86.0, 100.0).

Interruptions in surgery and hormones was the smallest subgroup with 18 participants (Weighted %: 2.5%) who had experienced an interruption in both treatments. More than two-thirds of individuals were between the ages of 25 to 49 (70.2%, 95% CI: 48.2, 92.2). Over half of the group identified as a man or boy (58.8%, 95% CI: 35.8, 81.8), 4.6% (95% CI: 0.0, 13.5) identified as a woman or girl, 29.3% (95% CI: 8.7, 49.8) identified as non-binary, genderqueer or a similar identity and 7.3% (95% CI: 0.0, 20.9) identified as Indigenous or another cultural identity. Almost half of the subgroup resided in Ontario (47.3%, 95% CI: 23.8, 70.8) with most of the other individuals living in either British Columbia (16.8%, 95% CI: 0.0, 34.4) or Alberta (15.8%, 95% CI: 0.0, 32.5). There were also 12.9% (95% CI: 0.0, 29.5) living in a rural area or small town. Most individuals in this group were in the process of completing gender-affirming medical treatment (94.4%, 95% CI: 83.7, 100.0).

The final subgroup consisted of participants who did not experience interruptions in gender-affirming medical care (N=421, Weighted %: 70.3%). There were 60.7% (95% CI: 55.4, 66.0) of individuals in the 25 to 49 age group, 27.5% (95% CI: 22.5, 32.5) in the 14 to 24 age group and 11.7% (95% CI: 8.4, 15.1) in the 50+ age group. The proportion

of participants who identified as woman or girl (34.2%, 95% CI: 29.2, 39.2), man or boy (30.6%, 95% CI: 25.7, 35.5) and non-binary or similar (33.4%, 95% CI: 28.4, 38.3) was relatively similar. Only 1.9% (95% CI: 0.5, 3.2) identified as Indigenous or another cultural identity. Those who did not experience interruptions in care largely resided in British Columbia (20.6%. 95% CI: 16.6, 24.6), Alberta (19.3%, 95% CI: 15.1, 23.4), Ontario (33.5%, 95% CI: 28.7, 38.3), and Quebec (16.7%, 95% CI: 12.0, 21.4). Most individuals in this group lived in census metropolitan areas (93.5%, 95% CI: 90.9, 96.2). In terms of pre-pandemic gender-affirming care status, almost half the participants had received the gender-affirming medical care that they needed or wanted (49.8%, 95% CI: 44.6, 55.1), while 37.7% (95% CI: 32.7, 42.7) were in the process and 12.5% (95% CI: 8.7, 16.4) were planning to receive gender-affirming care but had not begun.

Table 3

Characteristics of TGNB individuals experiencing interruptions in gender-affirming medical care during the COVID-19 pandemic stratified by type of interruption

	Total n=611			Interruptions in hormones[a] n=149 (23.9%)[b]			Interruptions in surgery n=23 (3.3%)[b]			Interruptions in surgery and hormones n=18 (2.5%)[b]			No interruptions n=421 (70.3%)[b]		
	n	Weighted %	CI	n	Weighted %	CI	n	Weighted %	CI	n	Weighted %	CI	n	Weighted %	CI
Age															
14-24	162	31.5	27.3, 35.7	60	45.3	36.6, 54.0	5	21.2	4.1, 38.3	4	24.0	3.3, 44.8	93	27.5	22.5, 32.5
25-49	387	58.6	54.2, 62.9	81	49.5	40.8, 58.2	16	70.0	50.8, 89.2	13	70.2	48.2, 92.2	277	60.7	55.4, 66.0
50+	58	9.9	7.3, 12.5	8	5.2	1.6, 8.8	2	8.8	0.0, 20.6	1	5.8	0.0, 16.8	47	11.7	8.4, 15.1
Gender Identity															
Woman/girl	192	32.5	28.4, 36.6	40	29.9	21.7, 38.0	8	36.1	15.7, 56.5	1	4.6	0.0, 13.5	143	34.2	29.2, 39.2
Man/boy	192	33.6	29.4, 37.7	53	39.1	30.4, 47.7	8	38.6	17.9, 59.3	10	58.8	35.8, 81.8	121	30.6	25.7, 35.5
Indigenous/other cultural identity	12	1.8	0.8, 2.9	3	1.5	0.0 ,3.3	0	0	-	1	7.3	0.0, 20.9	8	1.9	0.5, 3.2
Non-binary, genderqueer or similar	214	32.1	28.1, 36.0	52	29.5	22.1, 37.0	7	25.4	8.2, 42.6	6	29.3	8.7, 49.8	149	33.4	28.4, 38.3
Province/territory															
BC	134	20.1	16.8, 23.4	27	17.2	10.7, 23.6	8	34.8	14.9, 54.7	3	16.8	0.0, 34.4	96	20.6	16.6, 24.6
AB	115	19.2	15.8, 22.6	29	19.1	12.3, 25.8	4	20.0	2.1, 37.9	3	15.8	0.0, 32.5	79	19.3	15.1, 23.4
SK	18	3.1	1.5, 4.6	5	2.5	0.3, 4.8	1	5.3	0.0, 15.3	0	0	-	12	3.3	1.3, 5.2

MB	21	3.0	1.7, 4.3	8	5.3	1.6, 9.1	1	4.8	0.0, 14.0	0	0	-	12	2.2	0.9, 3.5
ON	230	34.4	30.4, 38.4	56	36.2	28.0, 44.5	8	30.5	11.9, 49.1	9	47.3	23.8, 70.8	157	33.5	28.7, 38.3
QC	59	15.0	11.3, 18.8	14	13.0	6.2, 19.9	1	4.6	0.0, 13.5	0	0	-	44	16.7	12.0, 21.4
NB	9	1.5	0.5, 2.5	2	1.0	0.0, 2.5	0	0	-	1	7.6	0.0, 21.9	6	1.5	0.3, 2.7
PEI	4	0.5	0.0, 1.0	0	0	-	0	0	-	0	0	-	4	0.7	0.0, 1.4
NS	16	2.4	1.2, 3.7	6	4.5	0.9, 8.1	0	0	-	2	12.5	0.0, 29.3	8	1.5	0.5, 2.6
NL	4	0.7	0.0, 1.5	2	1.2	0.0, 3.0	0	0	-	0	0	-	2	0.6	0.0, 1.5
YT/NWT/NU	1	0.1	0.0, 0.3	0	0	-	0	0	-	0	0	-	1	0.2	0.0, 0.5
Urban/rural															
Living in a rural area/small town	36	6.5	4.3, 8.8	9	7.0	2.4, 11.7	0	0	-	2	12.9	0.0, 29.5	25	6.5	3.8, 9.1
Not living in a rural area/small town	574	93.5	91.2, 95.7	140	93.0	88.3, 97.6	23	100.0	100.0, 100.0	16	87.1	70.5, 100.0	395	93.5	90.9, 96.2
Pre-pandemic gender-affirming care (GAC) status															
Have had GAC that I need/want	280	45.8	41.5, 50.1	68	45.1	36.4, 53.8	0	0	-	0	0	-	212	49.8	44.6, 55.1
In the process of completing GAC	275	42.6	38.3, 46.8	67	44.4	35.8, 53.0	22	95.2	86.0, 100.0	17	94.4	83.7, 100.0	169	37.7	32.7, 42.7
Planning to receive GAC (not begun)	56	11.6	8.6, 14.7	14	10.5	5.1, 16.0	1	4.8	0.0, 14.0	1	5.6	0.0, 16.3	40	12.5	8.7, 16.4

[a] Includes those who had interruptions in taking hormones or those who were unable to get a new prescription or referral for hormones

[b] These are unweighted N's with weighted proportions

4.2 Objective 2: describing interruptions in gender-affirming medical care during the COVID-19 pandemic

Gender-affirming care status in 2020 and descriptive characteristics pertaining to interruptions in care are presented in Table 4. Unweighted sample sizes (N) are presented with weighted frequencies and confidence intervals. Most participants had received the gender-affirming care that they needed/wanted (45.8%, 95% CI: 41.5, 50.1) or were in the process of completing care (42.6%, 95% CI: 38.3, 46.8) in 2020. There were 500 participants who were taking hormones (91.6%, 95% CI: 89.3, 93.8) and 473 who had access to hormones at the time of taking the survey (94.6%, 95% CI: 92.4, 96.7). Since March 12, 2020, 26.9% (95% CI: 22.7, 31.1) of participants experienced interruptions in hormones. The most frequently cited reasons for inability to access hormones were drug shortages (52.4%, 95% CI: 43.3, 61.5), inability to get a prescription renewed (39.2%, 95% CI: 30.3, 48.2), and inability to go to the pharmacy (20.5%, 95% CI: 12.9, 28.0). Since March 12, 2020, 14.3% (95% CI: 10.3, 18.2) of participants were unable to get a new prescription or referral for hormones. Of these, approximately half reported that it was due to restrictions related to COVID-19 (47.6%, 95% CI: 32.4, 62.8). 18.2% (95% CI: 14.0, 22.5) of the sample had an appointment booked to have gender-affirming surgery, of which approximately half had their appointment cancelled or postponed due to COVID-19 (58.3%, 95% CI: 45.2, 71.4). The three most common surgeries that were cancelled or postponed were chest surgery (50.9%, 95% CI: 34.6, 67.3), genital gender-affirming surgery (33.0%, 95% CI: 17.4, 48.5), and a hysterectomy or oophorectomy (23.9%, 95% CI: 9.7, 38.1). Of those who had a surgical interruption, 37.5% (95% CI: 21.6, 53.5) had an alternative date set for the surgery and 19.9% (95% CI: 6.6, 33.2) had the surgery since the initial cancellation. Participants had also experienced some limitations in accessing additional aspects of gender-affirming health care due to COVID-19, such as access to binders, packers or gaffs (14.3%, 95% CI: 9.9, 18.7), non-medical supplies (14.4%, 95% CI: 10.7, 18.0), postoperative medical supplies (6.1%, 95% CI: 2.1, 10.2), and post-operative care following gender-affirming surgery (21.6%, 95% CI: 15.4, 27.8).

Table 4

Gender-Affirming Care Status and Interruptions in Care due to COVID-19 (N=611)

Gender-Affirming Medical Care Characteristic	N	Weighted % (95% CI)
GAC status in 2020		
Have had GAC that I need/want	280	45.8 (41.5, 50.1)
In the process of completing GAC	275	42.6 (38.3, 46.8)
Planning to receive GAC (not begun)	56	11.6 (8.6, 14.7)
Taking hormones [a]		
Yes	500	91.6 (89.3, 93.8)
No	55	8.4 (6.2, 10.7)
Access to hormones currently [b]		
Yes	473	94.6 (92.4, 96.7)
No	27	5.4 (3.3, 7.6)
Interruptions in hormones since March 12, 2020 [b]		
Yes	139	26.9 (22.7, 31.1)
No	361	73.1 (68.9, 77.3)
Reasons for inability to access hormones [c]		
Couldn't' afford it	12	8.8 (3.7, 13.9)
Couldn't go to the pharmacy	27	20.5 (12.9, 28.0)
Couldn't get my prescription renewed	53	39.2 (30.3, 48.2)
Couldn't get syringes or needles	13	7.9 (3.5, 12.2)
Drug shortages	77	52.4 (43.3, 61.5)
Nobody to help with injections	11	6.5 (2.6, 10.5)
People in my household couldn't know I'm taking hormones	2	1.0 (0.0, 2.4)
Other	11	9.7 (3.7, 15.6)
Unable to get a new prescription or referral for hormones since March 12, 2020 [d]		
Yes	48	14.3 (10.3,18.2)
No	210	62.2 (56.5, 67.9)
Haven't needed it during this time	71	23.5 (18.3, 28.7)
Unable due to restrictions related to COVID-19 [e]		
Yes	24	47.6 (32.4, 62.8)
No	24	52.4 (37.2, 67.6)
Before March 12 2020, had appointment booked to have gender-affirming surgery [d]		
Yes	67	18.2 (14.0, 22.5)
No	264	81.8 (77.5, 86.0)
Surgery appointment canceled/postponed due to COVID-19 [f]		
Yes	41	58.3 (45.2, 71.4)
No	14	23.6 (11.8, 35.3)
Not yet, but I expect it will	12	18.1 (7.6, 28.6)
Alternative date set for surgery [g]		
Yes	15	37.5 (21.6, 53.5)
No	26	62.5 (46.5, 78.4)
Type of surgery that was cancelled/postponed [g]		

Chest surgery	22	50.9 (34.6, 67.3)
Genital gender-affirming surgery	13	33.0 (17.4, 48.5)
Removal of uterus (hysterectomy) or removal of ovaries (oophorectomy)	9	23.9 (9.7, 38.1)
Voice surgery	0	0
Adam's apple surgery	2	4.9 (0.0, 11.8)
Facial surgery	1	2.4 (0.0, 7.3)
Other surgery	0	0
Had surgery since initial cancellation [g]		
Yes	8	19.9 (6.6, 33.2)
No	33	80.1 (66.8, 93.4)
COVID-19 limited access to aspects of gender-affirming health care [h]		
Binders, packers, or gaffs (n=293)	42	14.3 (9.9, 18.7)
Non-medical supplies (e.g., makeup, shaving supplies, wigs) (n=413)	60	14.4 (10.7, 18.0)
Medical material that is important after surgery (e.g. vaginal dilators, chest compress) (n=191)	10	6.1 (2.1, 10.2)
Post-operative care following gender-affirming surgery(n=197)	45	21.6 (15.4, 27.8)

[a] Only asked to those who have had the GAC they need/want or are in the process of completing GAC (n=555)

[b] Only asked to those who said they take hormones (n=500)

[c] Asked to those who had interruptions in hormones since March 12, 2020 (n=139)

[d] Asked to those who are in the process of completing GAC or are planning to receive GAC but have not begun (n=331)

[e] Only asked to those who were unable to get a new prescription or referral for hormones since March 12, 2020 (n=48)

[f] Only asked to those who had an appointment booked to have gender-affirming surgery before March 12, 2020 (n=67)

[g] Only asked to those who had a surgery appointment cancelled or postponed due to COVID-19 (n=41)

[h] Asked amongst the participants for whom this was applicable to

4.3 Objective 3: paired sample t-test analyses for anxiety and depression

Pre-pandemic and pandemic anxiety and depression statistics are presented in Table 5. The OASIS was used to measure self-reported anxiety levels with a possible score range of 0 to 20. The CES-D-10 was used to measure self-reported depression levels (possible score range of 0 to 30). The average pre-pandemic anxiety score was 10.17 (SD=4.12), and the average pre-pandemic depression score was 14.30 (SD=6.74). In terms of pandemic scores, the average anxiety and depression scores were 10.38 (SD=3.98) and 16.41 (SD=6.56), respectively. We also looked at the prevalence of those who were likely experiencing clinical depression during both the pre-pandemic and pandemic periods, and it was determined that 71.1% and 83.1% of our sample was experiencing depressive

symptoms that are consistent with clinical depression, respectively. In regards to pre-pandemic and pandemic anxiety prevalence, 76.7% and 77.6% of respondents had a probable anxiety disorder, respectively.

Table 5

Pre-pandemic and pandemic anxiety and depression statistics

	Mean	Standard Deviation	Standard Error of the Mean	95% CI for Mean	
				Lower	Upper
Pre-pandemic anxiety	10.17	4.12	0.20	9.77	10.57
Pandemic anxiety	10.38	3.98	0.19	10.02	10.74
Pre-pandemic depression	14.30	6.74	0.31	13.70	14.91
Pandemic depression	16.41	6.56	0.30	15.83	17.00

In Table 6, a paired sample t-test is presented which was used to evaluate whether there was a significant difference in anxiety scores from pre-pandemic anxiety to pandemic anxiety. On average, the pandemic anxiety scores were 0.29 points (SD= 3.20, 95% CI: -0.02, 0.61) higher than the pre-pandemic anxiety scores. However, this difference was not statistically significant (t= 1.84, p= 0.0657*)* and it is concluded that there is no evidence from unadjusted analysis to suggest that TGNB persons are experiencing greater levels of pandemic anxiety compared to pre-pandemic anxiety.

A paired sample t-test was also used to assess if there was a difference in depression scores from pre-pandemic depression to pandemic depression and this is displayed in Table 6. On average, the pandemic depression scores were 2.23 points (SD= 5.95, 95% CI: 1.69, 2.76) higher than the pre-pandemic depression scores. There is evidence to suggest that depression scores changed from pre-pandemic to pandemic (t= 8.15, p <0.0001) and that on average, TGNB persons are experiencing greater depressive symptomology since the onset of the pandemic.

Table 6

Paired t-test assessing the difference in anxiety and depression scores from pre-pandemic to pandemic periods

	Paired Differences					t Value	P-value
				95% Confidence Interval of the Difference			
	Mean	Standard Deviation	Standard Error of the Mean	Lower	Upper		
Post-pre anxiety	0.29	3.20	0.16	-0.02	0.61	1.84	0.0657
Post-pre depression	2.23	5.95	0.27	1.69	2.76	8.15	<0.0001

4.4 Objective 4: regression analyses of interruptions in gender-affirming care and anxiety

4.4.1 Model 1— interruptions in gender-affirming medical care as a predictor of pandemic anxiety (adjusting for pre-pandemic anxiety)

The linear regression analysis between the exposure, interruptions in gender-affirming care and the outcome, pandemic anxiety, is presented in Table 7 as Model A. Compared to the reference group—those who did not have interruptions in gender-affirming care—interruptions in taking hormones was not significantly associated with pandemic anxiety after adjusting for pre-pandemic anxiety (β=0.59, *p*=0.0577). Additionally, compared to the reference group, there was also no statistically significant association between surgical interruptions (β=-0.43, *p*=0.4684) or interruptions in taking hormones and surgical interruptions (β=1.49, *p*=0.0539) and pandemic anxiety after adjusting for pre-pandemic anxiety. The R^2 value was 0.4747; therefore, interruptions in gender-affirming care and pre-pandemic anxiety explained 47.47% of the variation in pandemic anxiety.

4.4.2 Model 2— interruptions in gender-affirming medical care as a predictor of pandemic anxiety, assessing for an interaction between interruptions in care and pre-pandemic anxiety levels and adjusting for other potential confounders

The second model involved conducting a multiple linear regression to assess whether there was a significant association between the exposure and outcome after adjusting for confounders and with the addition of an interaction between pre-pandemic anxiety and interruptions in care. The confounders that were adjusted for include: income changes due to COVID-19, current geographic location, current social support, educational attainment, COVID-19 related health concerns, low-income household, pre-pandemic anxiety and depression, and pre-pandemic gender-affirming care status. This model yielded similar results to the first model; after controlling for the covariates, all three interruption categories—interruptions in taking hormones (β=1.62, *p*=0.1102), surgical interruptions (β=-0.96, *p*=0.5546) and interruptions in taking hormones and surgical interruptions (β=0.52, *p*=0.8493)—were not significantly associated with pandemic anxiety when compared to the reference group no interruptions in care. There also was no statistically significant interaction observed between interruptions in care and pre-pandemic anxiety. Therefore, the interaction was removed from the final multiple linear regression model (Model 3).

4.4.3 Model 3— interruptions in gender-affirming medical care as a predictor of pandemic anxiety, adjusting for pre-pandemic anxiety and other potential confounders

A multiple linear regression was conducted with interruptions in care, pandemic anxiety and potential confounders which included income changes due to COVID-19, current geographic location, current social support, educational attainment, COVID-19 related health concerns, low-income household, pre-pandemic anxiety and depression and pre-pandemic gender-affirming care status. The results are reported in Table 7 as Model B. Similar to the first model, after adjusting for additional confounders, the results revealed that there were no observed associations between interruptions in taking hormones (β=0.50, *p*=0.0892), surgical interruptions (β=-0.95, *p*= 0.1124) or interruptions in both hormones and surgery (β=1.28, *p*=0.0826) with pandemic anxiety when compared to the

reference group. The model fit was improved from the first model with more variance being explained with the addition of the independent variables (R^2=0.5489).

Table 7

Anxiety regression models (N=611)

Variable	Model A[a]					Model B[b]				
	β estimate	Standard error	t Value	p value	R^2	β estimate	Standard error	t Value	p value	R^2
No interruptions	Reference group					Reference group				
Interruptions in taking hormones	0.59	0.31	1.90	0.0577	0.4747	0.50	0.30	1.70	0.0892	0.5489
Surgical interruptions	-0.43	0.59	-0.73	0.4684		-0.95	0.60	-1.59	0.1124	
Interruptions in taking hormones and surgical interruptions	1.49	0.77	1.93	0.0539		1.28	0.74	1.74	0.0826	
Pre-pandemic anxiety	0.64	0.04	16.96	<0.0001		0.54	0.05	11.00	<0.0001	

[a] Adjusting for pre-pandemic anxiety

[b] Adjusting for the following minimum sufficient set of confounders: income changes due to COVID-19, current geographic location, current social support, educational attainment, COVID-19 related health concerns, low-income household, pre-pandemic anxiety and depression, pre-pandemic gender-affirming care status

4.5 Objective 5: regression analyses of interruptions in gender-affirming care and depression

4.5.1 Model 1— interruptions in gender-affirming medical care as a predictor of pandemic depression (adjusting for pre-pandemic depression)

The results for this model are presented in Table 8 as Model C. The 2019 depression-adjusted association between interruptions in care and pandemic depression is reported with the interaction term for comparison, as the interaction was significant in further, adjusted models. There were no significant associations between having a surgical interruption or having both a surgical and hormonal interruption with pandemic depression. However, participants who experienced an interruption in taking hormones with a pre-pandemic depression score of 0, had on average a 3.77-point increase in pandemic depression score compared to those who had no interruptions in care (β= 3.77, *p*=0.0270).

For every one-unit increase in pre-pandemic depression score, the pandemic depression score decreased by 0.16 points for individuals who experienced hormonal interruptions compared to those who had no interruptions (β =-0.16, *p*=0.1087). This interaction was not significant in this model, however, values at different levels of pre-pandemic depression are presented for interpretability. For those who experienced an interruption in taking hormones with a pre-pandemic depression score of 14.30 (the sample mean), there was a 1.48-point increase in pandemic depression score compared to those who had no interruptions in care. For TGNB persons who experienced interruptions in hormonal care and had a pre-pandemic depression score of 21.04 (mean + 1SD), there was a 0.40-point increase in pandemic depression relative to those who had no interruptions. Lastly, for participants who had a hormonal interruption and a pre-pandemic depression score of 7.56 (mean – 1SD), there was a 2.56-point increase in pandemic depression compared to individuals who had no interruptions. The model fit was moderate with an R^2 value of 0.3644.

4.5.2 Model 2—— interruptions in gender-affirming medical care as a predictor of pandemic depression, assessing for an interaction between interruptions in care and pre-pandemic depression and adjusting for other potential confounders

The confounder-adjusted results are presented in Table 8 as Model D. The minimum sufficient set of confounders that were adjusted for included income changes due to COVID-19, current geographic location, current social support, educational attainment, COVID-19 related health concerns, low-income household, pre-pandemic anxiety and depression and pre-pandemic gender-affirming care status. Consistent with the first model, in comparison to those who had no interruptions in care, there were no significant associations between having a surgical interruption or having both a surgical and hormonal interruption with pandemic depression after adjusting for additional confounders. However, after adjustment, participants who experienced an interruption in taking hormones with a pre-pandemic depression score of 0 had on average a 3.54-point increase in pandemic depression score compared to those who had no interruptions in care (β= 3.54, p=0.0115). After adjustment, for every one-unit increase in pre-pandemic depression score, the pandemic depression score decreased by 0.16 points for those who experienced hormonal interruptions compared to those who had no interruptions (β =-0.16, p=0.0344). After adjusting for additional confounders in this model, the interaction became significant.

For TGNB persons who experienced interruptions in hormones and had a pre-pandemic depression score of 14.30 (the sample mean), there was a 1.25-point increase in pandemic depression compared to those who had no interruptions, after adjustment of confounders. For individuals who had hormonal interruptions and a pre-pandemic depression score of 21.04 (mean + 1SD), there was a 0.17-point increase in pandemic depression score relative to persons who had no interruptions, after adjustment. Lastly, compared to those who had no interruptions, individuals who experienced an interruption in hormones with a pre-pandemic score of 7.56 (mean – 1SD), had a 2.33-point increase in pandemic depression after adjusting for confounders. With the additional covariates, the model fit was improved in this model as the independent variables explained more variation in the dependent variable (R^2 = 0.4900).

Table 8

Depression regression models (N=611)

Variable	Model C[a]					Model D[b]				
	β estimate	Standard error	t Value	p value	R^2	β estimate	Standard error	t Value	p value	R^2
No interruptions	Reference group					Reference group				
Interruptions in taking hormones	3.77	1.71	2.21	0.0270	0.3644	3.54	1.40	2.53	0.0115	0.4900
Surgical interruptions	3.34	3.00	1.11	0.2662		2.69	2.75	0.98	0.3285	
Interruptions in taking hormones and surgical interruptions	2.22	3.23	0.69	0.4916		0.96	2.38	0.40	0.6864	
Pre-pandemic depression	0.59	0.07	8.40	<0.0001		0.46	0.05	8.75	<0.0001	
Interruptions in taking hormones x pre-pandemic depression	-0.16	0.10	-1.61	0.1087		-0.16	0.08	-2.12	0.0344	
Surgical interruptions x pre-pandemic depression	-0.33	0.23	-1.43	0.1541		-0.33	0.21	-1.60	0.1096	
Interruptions in taking hormones and surgical interruptions x pre-pandemic depression	-0.02	0.16	-0.12	0.9061		0.02	0.11	0.20	0.8387	
No interruptions x pre-pandemic depression	Reference group					Reference group				

[a] Adjusting for pre-pandemic depression

[b] Adjusting for the following minimum sufficient set of confounders: income changes due to COVID-19, current geographic location, current social support, educational attainment, COVID-19 related health

concerns, low-income household, pre-pandemic anxiety and depression, pre-pandemic gender-affirming care status

4.5.3 Model 3— interruptions in gender-affirming medical care as a predictor of pandemic depression, adjusting for pre-pandemic depression and other potential confounders

After testing for an interaction in Model 2, we concluded that one of the interactions was indeed significant, therefore, the main effects model (Model 3) would be misspecified. As a result, this multiple linear regression model was not conducted since the interaction term was significant in the previous model.

Chapter 5

5 Discussion

This chapter will discuss the findings of both the descriptive and regression analyses while also discussing how our results integrate with the previous literature on COVID-19 and transgender health. It will also discuss the strengths and limitation of the current study along with recommendations for future research.

5.1 Summary of results

5.1.1 Changes in anxiety and depression symptoms from pre-pandemic to pandemic periods

For depression, a cut-point of ten or higher indicates the presence of significant depressive symptoms (Andresen et al., 1994). It is important to note that CES-D-10 measures depressive symptoms that are consistent with clinical depression and that this cut-point might not indicate a clinical diagnosis of depression in and of itself. In our study sample, the average pre-pandemic and pandemic depression scores were well above the cut-point of ten. Moreover, there was also a high proportion of individuals crossing this cut-point for both time periods, with an even greater prevalence of probable clinical depression during the pandemic period. This suggests that on average, TGNB persons in our study are experiencing high levels of depressive symptomology that may be consistent with clinical depression. However, it is also important to note that this established cut-point might not map onto clinical depression the same way within TGNB communities. Although this scale is increasingly being used in this population, it is important to note that there are no prior studies that have assessed whether these measurement properties hold in the TGNB population. Therefore, even though a high proportion might cross this threshold, it might not indicate that all these individuals are indeed clinically depressed. Our findings that our sample presented with relatively high levels of depression symptoms is consistent with previous literature (Rotondi, Bauer, Travers, et al., 2011; Rotondi, Bauer, Scanlon, et al., 2011; Veale, Peter, Travers et al., 2017; Pitts et al., 2009).

For anxiety, a cut-point of eight or higher is indicative of a probable anxiety disorder (Campbell-Sills et al., 2009). In our study sample, the average pre-pandemic and pandemic anxiety scores were both above the cut-point of eight. Moreover, we determined that there was a high prevalence of individuals crossing this cut-point value both prior and during the pandemic. This suggests that on average, TGNB persons in our study are experiencing anxiety severity that could be classified as an anxiety diagnosis. Our findings are consistent with previous literature that has found that anxiety levels are heightened in TGNB populations (Jaffray, 2020; Smith et al., 2014; McNeil et al., 2012). Overall, this study supports previous findings that TGNB persons are experiencing a disproportionally high level of anxiety and depression.

Our paired sample t-test analyses revealed that on average, TGNB persons in our sample were not experiencing greater levels of pandemic anxiety compared to pre-pandemic anxiety. However, there is evidence indicating that TGNB individuals were experiencing greater pandemic depressive symptomology compared to pre-pandemic; pandemic depression scores were significantly higher by an average of 2.23 points. This is an interesting finding as we had hypothesized that both anxiety and depression levels would be heightened amidst the pandemic. Aligned with our study findings, a U.S. based longitudinal cohort study reported that on average, psychological distress was higher during the pandemic compared to pre-pandemic (Kidd et al., 2021). Another study of 161 TGNB youth in the U.K. revealed that several youths qualitatively reported that their anxiety and depressive symptoms were exacerbated during the pandemic; however, some youth also reported that their mental health improved during the pandemic due to having more free time to work on their mental well-being, as well as having reduced social anxiety (Jones et al., 2021). Therefore, although some pandemic-related changes could have increased anxiety levels, it is also possible that some TGNB persons in our sample were not as anxious in other aspects of their lives (e.g., social) during the pandemic; this could explain why anxiety levels did not fluctuate much. The PRIDE longitudinal study reported that among the 2288 SGM persons included in their study, depression and anxiety symptoms increased from pre-pandemic to post-pandemic (Flentje et al., 2020). However, they also mentioned that among those who screened positive for anxiety pre-pandemic, there was no significant change in anxiety. Considering that on average, our

sample also consisted of participants with a probable anxiety disorder pre-pandemic and there was no significant change in anxiety score, it is possible that the pandemic measures did not alter anxiety levels for some TGNB persons who were already experiencing anxiety symptoms consistent with a probable anxiety disorder pre-pandemic.

Previous literature has demonstrated that negative or stressful life events are associated with increases in anxious arousal—defined as symptoms of hyperarousal that are specific to anxiety—and anxiety sensitivity (McLaughlin & Hatzenbuehler, 2009; Wardenaar et al., 2014). Specifically, McLaughlin & Hatzenbuehler (2009) mentioned that stressful life events, in particular events that are related to health, were associated with heightened anxiety sensitivity. Given that pandemic-related changes—such as interruptions in gender-affirming care—could have resulted in stressful experiences for TGNB persons, we would have expected changes in anxiety severity from the pre-pandemic to pandemic periods.

5.1.2 Descriptive characteristics of the sample population

In the total sample population, over half the sample was within the age groups of 25-34 and 35-49 years, a greater proportion were assigned female at birth, and participants largely lived in Ontario, British Columbia or Alberta, and were from census metropolitan areas. Considering that these are more of the heavily populated provinces in Canada, it is not surprising that most participants were living in these regions. Indigenous persons account for 4.9% of the general Canadian population (Statistics Canada, 2017a); in comparison, the proportion of Indigenous persons in our study was slightly higher (7.7%). Although most participants were educated, many did not have a personal annual income or were in a lower income bracket. Annual income is largely dependent on an individuals' employment, and the literature has suggested that sexual and gender minorities, including TGNB persons, are often susceptible to workplace discrimination (Geoffroy & Chamberland, 2015). As a result, this might make it increasingly difficult for TGNB persons to find employment or to be promoted to higher positions in their workplace. Additionally, the Trans PULSE Ontario project reported other barriers to employment for TGNB persons such as, inability to get academic transcripts and

references letters that reflect the correct name and gender; some transgender Ontarians had also reported declining job offers due to the potential of working in an unsupportive environment (Bauer et al., 2011). However, it is also important to note that our sample included many youths which might also explain why there were participants who did not have a personal annual income. A worldwide cross-sectional study that investigated COVID-19 impacts on transgender healthcare also had some similar demographics to our study (Koehler et al., 2020). For example, this study had a greater proportion of participants assigned female at birth and participants were also generally highly educated with almost half the sample having received a college or university degree (Koehler et al., 2020). It is not surprising that TGNB persons in our study were generally very educated, considering that Canadians in general are very educated; over 50% of Canadians between the ages of 25 and 64 have completed college or university education (Statistics Canada, 2017b).

5.1.3 Descriptive characteristics by interruptions in gender-affirming care groupings

For objective 1, we also described age, gender identity, province/territory, urban/rural area of residence, and pre-pandemic gender-affirming care status characteristics by interruptions in care groupings. The first group, interruptions in hormones, was the most frequently reported interruption in our sample. There is evidence that other populations, such as the elderly with chronic diseases, were also experiencing interruptions in medications during the pandemic (Hsiao et al., 2020). One of the reasons cited was that elderly persons feared getting infected with COVID-19 when picking up their prescription; it is possible that some participants in our sample were also experiencing hormonal interruptions for this reason. In 2019, most had reported having received the gender-affirming care they need/want or were in the process of completing gender-affirming care. It is important to note that even though participants received the gender-affirming care they needed in 2019, they were still able to experience an interruption in hormones during the pandemic; it is common for TGNB persons to remain on hormone therapy for their lifetime to prevent unwanted changes to secondary sex characteristics.

The second group, interruptions in surgeries, had a relatively small proportion of individuals within it. Most persons were in the process of completing gender-affirming care in 2019 with none having reported that they had received the gender-affirming care that they needed/wanted. It is plausible that most were in the process of completing gender-affirming care in 2019 because they were likely waiting or attempting to schedule their gender-affirming surgery during that time. Moreover, among those who experienced surgery interruptions, it is possible that there was a high proportion of individuals in the 25 to 49 age group because youth are unable to schedule a surgery appointment until they reach a certain age (usually 18 years), and younger adults may still be deciding whether gender-affirming surgery is the right choice for them before starting the process to access a surgery. The third group, interruptions in surgery and hormones, had the smallest number of participants. Similar to the surgical interruptions group, the interruptions in surgery and hormones group also mainly consisted of participants aged 25 to 49, and most participants were in the process of completing gender-affirming care in 2019; which is expected for the same reasons that were mentioned previously.

5.1.4 Interruptions in gender-affirming care during the COVID-19 pandemic

In 2020, participants in our sample largely reported having received the gender-affirming care they needed or that they were in the process of completing gender-affirming care. Among those who had the gender-affirming they needed or were in the process of completing care, approximately 90% reported that they were taking hormones with close to 95% having reported that they had access to hormones at the time of taking the survey. However, approximately a quarter of those individuals who were taking hormones reported a hormonal interruption since March 12, 2020. Given that this survey was administered in October of 2020 and the pandemic was declared in March of 2020, this might suggest that those who had experienced interruptions in hormones during the first few months of the pandemic were no longer experiencing those interruptions by October of 2020. This was before the second wave fully hit in Canada, and so the epidemiological situation was likely more favourable with a greater resumption of activities and less restrictions across the country. As a result, this might explain why less people reported

not having current access to hormones at the time of the survey. However, even with taking this into consideration, we still saw an effect of interruptions in hormones on pandemic depression.

The TransCare Covid-19 project—a worldwide cross-sectional survey that predominantly consisted of participants from European countries—revealed similar results; of those who were accessing hormonal care, 21.8% reported that their current access was restricted (Koehler et al., 2020). The most frequently cited reasons for inability to access hormones in our study were drug shortages, inability to get prescriptions renewed and inability to go to the pharmacy. In contrast to our study, Koehler et al. (2020) reported that the inability to get an appointment with a hormone prescriber was the primary reason for hormone restrictions, whereas our sample reported drug shortages as the main factor for hormonal interruptions. Of those who were taking hormones in our study, approximately half the participants cited drug shortages as the reason behind their hormonal interruptions (52.4%), whereas 26.2% of the participants in the TransCare Covid-19 project reported that they had restricted access due to reasons related to hormonal supply. It is important to mention that drug shortages were noted in Canada before the onset of the pandemic; for example, shortages in injectable drugs, including testosterone, have been recognized prior to the pandemic (PHSA, n.d.). Therefore, drug shortages for TGNB people could have existed prior to COVID-19. Given that Health Canada has reported that there are drug shortages in relation to COVID-19 (Health Canada, 2021), it is also possible that the pandemic further exacerbated drug shortages for TGNB persons.

Another global study that largely consisted of participants from the European and South-East Asia regions reported that about a third of their sample had reduced access in hormones which is relatively similar to our study findings (Jarrett et al., 2021). A U.S. study of 208 TGNB persons found that 32.7% of participants experienced delays in receiving or starting gender-affirming hormones (Kidd et al., 2021); this is also similar to our study findings as almost one third of participants had a hormonal interruption or were unable to get a new prescription/referral for hormones. Therefore, hormonal interruptions commonly occurred in multiple countries all over the globe; this is not surprising since

most countries implemented similar pandemic measures, such as stay-at-home orders, which resulted in service disruptions during the pandemic.

Of those who were in the process or were planning to receive gender-affirming care, almost one fifth of participants had an appointment booked to have gender-affirming surgery prior to the pandemic. Approximately half of these participants had their surgery appointment cancelled or postponed due to COVID-19. This was similar to other healthcare treatments in Canada; Chen-See (2020) reported that over 50% of those receiving cancer care had their appointments cancelled or rescheduled due to COVID-19. In our study, about one third of participants had an alternative date set for the surgery with about one fifth having had the surgery since the initial cancellation. These results are not surprising considering that surgeries deemed as “non-essential” were largely cancelled across Canada; in fact, from March to June 2020, there were approximately 335 000 fewer surgeries performed in Canada in comparison to the previous year (CIHI, 2020). Evidently, this has created a massive backlog of elective surgeries that need to be rescheduled for a later date (Samson, 2021).

The most commonly reported surgery cancellation in our study was chest surgery, followed by genital gender-affirming surgery and hysterectomy or oophorectomy. Previous literature has suggested that top surgeries are much more common compared to bottom surgeries among TGNB populations (Nolan et al., 2019). Therefore, it is not surprising that within our sample, the cancellation of chest surgeries was most common as more participants likely had a chest surgery scheduled relative to other gender-affirming surgeries.

The predominantly European TransCare Covid-19 project reported that among participants who already had an appointment, 15.6% experienced a surgery cancellation or postponement with 19.5% expecting to have a surgery cancellation (Koehler et al., 2020). Similarly, in our study, 18.1% of participants who had an appointment booked to have surgery expected to have a surgery cancellation in the future. Surprisingly, the proportion of TGNB persons in Canada who experienced surgical interruptions was over three times higher compared to the TransCare Covid-19 study. This could suggest that in

general, non-elective surgeries, including gender-affirming surgeries, were cancelled at a much higher rate in Canada compared to European countries. A U.S. based study with a longitudinal cohort of TGNB persons also revealed that 11.1% of their sample had reported a gender-affirming surgery cancellation or postponement (Kidd et al., 2021). Overall, these findings are expected because surgeries deemed non-urgent or elective, including gender-affirming surgeries, were largely cancelled across the globe amidst the pandemic (WHO, 2020a).

Apart from hormonal and surgical interruptions, TGNB persons in our sample also reported limited access to other aspects of gender-affirming health care (e.g., access to binders, packers or gaffs, non-medical supplies including makeup and wigs, medical materials that are important after surgery). It is possible that some individuals may have had reduced access to some of these aspects of care because of the closure of non-essential stores during peak periods of the pandemic. The TransCare Covid-19 project reported relatively similar findings to our study, with 12.4% of TGNB persons in their sample reporting restricted access to binders and packing material, and 16.3% had restricted access to non-medical supplies (Koehler et al., 2020). A global study, that predominantly had participants from Europe and Southeast Asia, reported that among those who were using gender-affirming care services before the onset of the pandemic, 31.1% had reductions in surgical aftercare materials, 36.6% had reductions in cosmetic supplies and services, with 33.3% reporting a reduction in access to body modifiers, including binders and packing materials (Restar et al., 2021). This means that reductions in cosmetic supplies and services and body modifiers was double that of what was reported in our sample for those aspects of gender-affirming healthcare. Moreover, reductions in surgical aftercare were also much higher in the global study compared to our study (31.1% vs. 6.1%).

It is possible that income loss was higher in some European and South-East Asian countries compared to Canada, which in turn may have reduced access to some aspects of gender-affirming healthcare. For example, the study by Restar et al. (2021) reported that due to the pandemic, almost three fourths of their sample anticipated a reduced income. In Canada, CERB was quickly provided to financially support individuals who were

impacted by the COVID-19 pandemic, with other forms of financial support that were provided as the pandemic progressed (Government of Canada, 2021); financial support to this extent may not have been provided in other countries across the globe. Therefore, the financial aid provided by the Canadian government might have mitigated the impact of the pandemic on financial loss and in turn, reduced its effect on access to certain aspects of gender-affirming health care.

5.1.5 Regression analyses of interruptions in gender-affirming care and anxiety

Three different regression models were used to assess whether that was an association between interruptions in gender-affirming care and pandemic anxiety. The first model, which included interruptions in gender-affirming care as a predictor of pandemic anxiety (adjusting for pre-pandemic anxiety), revealed that there was no significant relationship between interruptions in gender-affirming care and pandemic anxiety. The R^2 value was relatively high (R^2= 0.4747) indicating that 47.47% of the variation in pandemic anxiety was explained by the independent variables. The second model adjusted for confounders and included an interaction term as it was suspected that pre-pandemic anxiety levels might modify the relationship between the exposure and outcome. The third and final model assessed for an association between interruptions in gender-affirming care and pandemic anxiety with adjustment of confounders. After adjustment, it was determined that there still was no significant association between interruptions in gender-affirming care and pandemic anxiety. This was surprising given that previous literature has determined positive associations between receiving gender-affirming care and improved mental health (Almazan & Keuroghlian, 2021; Baker et al., 2021; Wernick et al., 2019; White Hughto & Reisner, 2016; Passos et al., 2020). Considering that individuals who seek gender-affirming care are likely experiencing heightened mental health challenges, such as increased anxiety severity related to gender dysphoria, we hypothesized that interruptions would likely affect anxiety levels during the pandemic; however, this was not a finding in our study. Moreover, the R^2 value increased slightly from the first model to the third model (R^2=0.5489 vs R^2=0.4747), indicating that collectively, the additional independent variables that were added to the third model improved model fit slightly. It

would be interesting to assess how much variation in pandemic anxiety is predicted just by pre-pandemic anxiety levels, which was not investigated in our study.

Similar to our findings, a U.S. longitudinal cohort study of TGNB individuals did not find a significant relationship between interruptions in gender-affirming care and greater pandemic psychological distress, after adjusting for pre-pandemic psychological distress. The authors in this study suggested that it is possible that there was no significant association because pre-pandemic psychological distress might be a stronger predictor of heightened psychological distress during the pandemic (Kidd et al., 2020). Therefore, it is possible that in our study, pre-pandemic anxiety was also a stronger predictor of pandemic anxiety levels. In contrast to our study, a global cross-sectional study revealed that there was a relationship between screening positive for anxiety and reduced access to at least one or more gender-affirming resources (Jarrett et al., 2021). It is possible that the investigators in this study found a significant relationship simply because they were unable to control for pre-pandemic anxiety levels. It is also possible that participants in their sample experienced multiple sources of reduced access to gender-affirming care (which were included when examining this relationship), whereas our study solely looked at hormonal and surgical interruptions to assess this relationship.

5.1.6 Regression analyses of interruptions in gender-affirming care and depression

In the final model for the depression outcome, variables encoding interruptions in taking hormones, pre-pandemic depression, and their interaction all remained statistically significant after confounders were controlled. This is not surprising considering there is previous research that has demonstrated the improvements in mental health outcomes upon receiving gender-affirming care (Almazan & Keuroghlian, 2021; Baker et al., 2021; Wernick et al., 2019; White Hughto & Reisner, 2016; Passos et al., 2020). Hormonal interruptions could lead to an unwanted change in secondary sex characteristics and therefore heighten gender dysphoria.

The interaction term between interruptions in taking hormones and pre-pandemic depression became statistically significant in the adjusted model; therefore, the

association between interruptions in hormones and pandemic depression was modified by pre-pandemic depression. Every unit increase in pre-pandemic depression score resulted in the pandemic depression score decreasing by 0.16 points for individuals who experienced hormonal interruptions. The effect of interruptions in hormonal care on pandemic depression was greater for those who had lower pre-pandemic depression levels. In comparison, the effect of hormonal interruptions was smaller for those who had higher pre-pandemic depression scores. This might be the case because for those who already had high pre-pandemic depression levels, their pandemic depression scores could only increase to a certain extent since their score was already high. Contrary to our hypothesis, after adjustment for confounders, all variables representing the association of surgical interruptions or both surgical and hormonal interruptions, pre-pandemic depression, and their interaction remained insignificant. It is possible that there was no relationship between having a surgical interruption and pandemic depression because TGNB persons were much more understanding of their surgery appointments being postponed as the country was in a state of emergency, and there was a potential of extreme hospital overcrowding with COVID-19 patients. The R^2 value increased for the final multiple linear regression model, demonstrating that the model fit improved with the addition of the covariates ($R^2 = 0.4900$).

A global cross-sectional study determined that there was a relationship between screening positive for depression and reduced access to gender-affirming resources due to the pandemic (Jarrett et al., 2021); this aligns with our study findings. In contrast, our findings were different from the U.S. longitudinal study conducted by Kidd et al. (2021); they did not find a significant relationship between interruptions in gender-affirming care and greater psychological distress after adjusting for pre-pandemic mental health levels. Considering that the sample size for their study was much smaller, it is possible that they did not have adequate power to detect a significant association (Kidd et al., 2021); this might explain why their results vary from the findings in this study.

5.2 Strengths and limitations

Researchers have called for more studies to longitudinally examine how impacts of the COVID-19 pandemic have affected TGNB mental health (Restar et al., 2021). One

strength of this study is that we were able to longitudinally examine associations, since data were collected both before and after the onset of the pandemic. This allowed us to establish causal inferences when examining whether interruptions in gender-affirming care were associated with changes in anxiety and depression levels. To our knowledge, there are only a few studies that have collected data on anxiety and depression both pre-pandemic and during the pandemic among TGNB persons. Most were instead cross-sectional study designs, making it difficult to establish any causal inferences in terms of mental health changes. Also, the sample used data from the Trans PULSE Canada study which is the first of its kind to collect data on TGNB health and wellbeing across age groups and provinces/territories in Canada. To our knowledge, Canada does not have a major dataset that has addressed the experiences of LGBTQ2+ Canadians during the pandemic, which may be because data on sexual orientation and gender identity are lacking in COVID-19 research efforts. As a result, this study is the first national study that has examined whether interruptions in gender-affirming care due to COVID-19 was associated with changes in anxiety and depression among TGNB Canadians. This study also described how the pandemic impacted transgender-specific healthcare across Canada, which has not yet been reported in other studies. Another advantage is that our study included a relatively large number of participants who identified as non-binary, genderqueer, agender or a similar identity which has previously been recognized as an understudied population (Motmans et al., 2019). Lastly, our study included individuals aged 15 and older which increases the generalizability of our results to many different age groups.

It is important to note that there are limitations present in this study. First, the participants in this sample were generally highly educated, which was expected considering the Canadian population is one of the most educated populations in the world (Statistics Canada, 2017b). As such, it is possible that less educated persons in the community might not be represented in this sample and thus, the COVID-19 impacts reported in this study might underestimate what was truly experienced for those individuals. Given the relationship between intersectionality and structural inequality, TGNB persons who also belong to other minority or marginalized groups, including racial and ethnic minority groups, might be disproportionately affected by COVID-19 (Bowleg, 2020). Due to the

small proportion of participants who identified or were perceived as people of colour in our TGNB sample, our results may not be generalizable to individuals who belong to more than one marginalized group and experience multiple sources of oppression. Most of our respondents also lived in densely populated provinces (e.g., Ontario) and urban areas; therefore, the findings might be more reflective of persons living in those areas.

The Trans PULSE Canada team recontacted 1184 participants to complete the 2020 questionnaire and had a total of 826 survey respondents. After the removal of six observations, the final sample size for the 2020 COVID-19 survey was 820. Although the retention rate was relatively high and weights were used to try and reduce biases related to survey completion, there is a possibility that differential attrition could have impacted the study results if individuals who were most impacted by the pandemic were the least likely to complete the 2020 questionnaire (Kidd et al., 2021). Conversely, there is also a possibility that those who were heavily impacted by the pandemic were more likely to complete as the 2020 COVID-19 questionnaire was more relevant to them. Additionally, the data collected were self-reported which might influence participants to respond to questions in a manner that is more socially desirable. For example, there is often stigma surrounding the topic of mental health and as such participants might choose to underreport their anxiety and depression symptoms.

Another limitation was the small sample size for certain interruption in gender-affirming care groups. Specifically, there were only 23 and 18 participants in the interruptions in surgery and interruptions in surgery and hormones groups, respectively. Although these groups are quite small, they were not grouped together because they were qualitatively different. We hypothesized that hormonal interruptions would have more of an effect on depression and anxiety than surgical interruptions. Surgery interruptions were happening across the country for various populations, as such TGNB persons might be more understanding of this type of delay as there was a global hospital crisis. In contrast, interruptions in hormones will affect TGNB persons' wellbeing almost immediately. On the other hand, surgical interruptions were likely to last longer than hormonal interruptions and this could also have an influence on anxiety and depression levels. Therefore, there was no a priori knowledge to suggest that interruptions in surgery and

hormones should be grouped with the surgical interruption group instead of the hormonal interruption group. Nevertheless, the results should be interpreted with caution because the small sample sizes in these two groups likely resulted in reduced power, which might have affected the ability to determine a significant association. The small sample sizes could also affect the reliability or precision in our regression estimates.

Our study was conducted in the fall of 2020 however the COVID-19 pandemic was declared in March (2020). It is possible that by the time the questionnaire was administered, hormonal interruptions could have already been resolved. From the data that were collected, it was not possible to know how long or the exact time period that participants experienced certain interruptions. Instead of asking respondents about their mental health during the specific time periods that they may have had interruptions, anxiety and depression levels were measured at the time of taking the questionnaire. Therefore, it is possible that pandemic anxiety and depression levels reported were not reflective of the mental health levels when the actual interruption in care had been experienced. Another limitation in our study is that participants may have misinterpreted the question pertaining to interruptions in hormones in which those who had "intentional interruptions" may have been included, whereas the focus of this study was only on those who had "unintentional interruptions." However, we tried to reduce this as much as possible by going through the "other" reasons for inability to access hormones and re-coding obvious intentional interruptions (e.g., choosing to discontinue or trying to conceive) as no interruptions in hormones.

Residual confounding may have also been present in our study. A DAG was used to determine the minimum sufficient set of confounders to adjust for in order to measure an unbiased association between our exposure and outcomes. Previous literature and a priori knowledge were used for guidance in creating the DAG. Given the limited research available on this novel topic, it is possible that additional, unidentified confounding factors may not have been considered. Also, the survey data that were used to measure the confounding variables may not have been measured precisely; this could lead to residual differences between interruptions in care groups which could ultimately bias the results (Dekkers et al., 2019).

5.3 Future research

This study was able to describe the COVID-19 pandemic impact on access to gender-affirming healthcare, while also examining how interruptions in hormones and surgeries affected anxiety and depression in Canada. Future studies should focus on assessing the relationship between disruptions in post-operative care after recent gender-affirming surgeries and mental health, as complications with surgery aftercare might have a detrimental impact on TGNB health and well-being. Our study found that there was no relationship between interruptions in care and pandemic anxiety; it would be interesting to qualitatively explore why the pandemic might have improved or had a reduced impact on anxiety in TGNB populations. It would also be useful to investigate what interventions might mitigate the impact of the pandemic on TGNB access to gender-affirming healthcare in case of a future resurgence in COVID-19 cases and further restrictions. Future research should also focus on examining whether the changes in depressive symptoms observed in this study were long-term or resolved. Mental health should continue to be monitored throughout and after the pandemic to be able to determine whether there are long-term effects of the pandemic on the mental health of TGNB persons.

For groups with small sample sizes, it is difficult to quantitatively analyze intersections. Therefore, oversampling small groups might be beneficial to create intersections that are large enough for analysis; this would allow researchers to investigate the pandemic effects on individuals with intersecting identities. With a better understanding of how the pandemic has affected these individuals, new interventions and policies can be established to help reduce inequalities that might be present for persons that belong to more than one marginalized group. Also, most COVID-19 data that are available for TGNB persons were collected via online questionnaires; future studies should focus on potentially incorporating multimode research in order to reach very low-income or less educated TGNB people in Canada. Moreover, more research needs to be conducted globally to have a better understanding on how the pandemic may have affected or continues to affect access to gender-affirming healthcare during the pandemic. With many services offered online due to COVID-19, exploring TGNB individuals' experience

with virtual, mental health services would provide practical feedback to mental health service providers, which might improve virtual healthcare that is provided to this community in the future.

Overall, TGNB communities experience high levels of anxiety and depression, and interruptions in gender-affirming care may have increased depressive symptoms in an already highly-depressed group. This is very concerning considering the relationship between anxiety and depression and suicide risk. It is important to investigate whether pandemic-related interruptions and changes have resulted in higher suicidal ideation and behaviour, along with self-harm risks in order to implement necessary interventions that could help at-risk populations, including the TGNB community. Moreover, with the rapid emergence of different variants, it is possible that the pandemic may not be coming to an end anytime soon. As a result, it is important for policy makers to ensure that the impact of pandemic-related changes, including interruptions in gender-affirming care for TGNB persons, are only temporary and that they need to be urgently resolved.

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Appendices

Appendix A: Trans PULSE Canada COVID Cohort Survey 2020 – English – Paper Version

Trans PULSE COVID Cohort Survey – English – Paper Version

About you

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

1. How old are you?

   _____ years old

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

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

Please answer the next question only if you selected "Indigenous" above. Otherwise, please skip to #3.

2a. Are you…? **(Please check all that apply)**

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

- ❑ Unsure

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

- ❍ Yes
- ❍ No

4. Do you identify as a person of colour?

- ❍ Yes
- ❍ No

5. What country were you born in?

- ❍ Canada → Skip to #7
- ❍ Outside of Canada, please specify country: _____
- ❍ Unsure

6. How long have you been living in Canada?

_____ years and _____ months

7. What province or territory do you currently live in?

- ❍ Alberta
- ❍ British Columbia
- ❍ Manitoba
- ❍ New Brunswick
- ❍ Newfoundland and Labrador
- ❍ Nova Scotia
- ❍ Ontario
- ❍ Prince Edward Island
- ❍ Quebec
- ❍ Saskatchewan

- ❍ Northwest Territories
- ❍ Nunavut
- ❍ Yukon

8. Have you been living in your current province/territory since March 12, 2020?

- ❍ Yes
- ❍ No

9. What is the postal code where you live or get mail?

- ❍ My postal code is: __ __ __ __ __ __
- ❍ I don't know my postal code
- ❍ I would rather not share my full postal code. The first three digits are: __ __ __

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

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

11. Are you currently enrolled as a student?

- ❍ Yes, full-time
- ❍ Yes, part-time
- ❍ No

12. What is your sexual orientation? **(Please check all that apply)**

- ☐ Asexual
- ☐ Bisexual
- ☐ Gay
- ☐ Lesbian
- ☐ Pansexual

- ❑ Queer
- ❑ Straight or Heterosexual
- ❑ Two-Spirit
- ❑ Not sure or questioning
- ❑ Other, please specify: _____

The next questions are about sex and gender. The response categories might not be a perfect fit for you, which is why we also want to know how you self-identify!

13. What term(s) do you use to describe your gender?

_____

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

- ❍ Male
- ❍ Female

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

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

Income

If you are not yet 16 years old, please skip to #25 on page 6.

In the next sections, we'll ask about experiences you may have had in the past 12 months (**since today's date in September 2019**), and since **March 12, 2020** - the day after the World Health Organization declared COVID-19 to be a pandemic. We need to ask about both of these timeframes to compare to how you answered the same questions in 2019, and to understand what has changed since the pandemic.

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

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

16. What is your best estimate of the total income from all members living in your household including yourself, before taxes and deductions, from all sources in in 2019? (Include any money your household received from any person or organization.) By household members, we mean people with whom you share income and resources, or who share income and resources with you.

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

17. Including yourself, how many people (in or outside of Canada) were being supported on this income?

_____ people

18. What is your best estimate of your total <u>personal</u> income, before taxes and other deductions from all sources in <u>2019</u>? (include any money you received from any person or organization)

- ❍ I didn't have a personal income
- ❍ Less than $10,000
- ❍ $10,000 to less than $15,000
- ❍ $15,000 to less than $20,000
- ❍ $20,000 to less than $30,000
- ❍ $30,000 to less than $40,000
- ❍ $40,000 to less than $50,000
- ❍ $50,000 to less than $60,000
- ❍ $60,000 to less than $80,000
- ❍ $80,000 to less than $100,000
- ❍ $100,000 to less than $150,000
- ❍ $150,000 or more
- ❍ Unsure

19. <u>Before</u> March 12, 2020, were you receiving any income from the following sources?

- ❍ Public social assistance or welfare
- ❍ Public disability support
- ❍ Both public social assistance/welfare and disability support
- ❍ I did not receive income from either of these sources

20. <u>Since</u> March 12, 2020 did you receive any income from the following sources?

- ❍ Public social assistance or welfare
- ❍ Public disability support
- ❍ Both public social assistance/welfare and disability support
- ❍ I did not receive income from either of these sources

21. <u>Since</u> March 12, 2020, did you receive any of the following types of Employment Insurance benefits? (**Please check all that apply)**

- ❑ Regular
- ❑ Sickness
- ❑ Caregiving or compassionate care
- ❑ Work-sharing
- ❑ Other Employment Insurance benefit
- ❑ Canada Emergency Response Benefit (CERB)
- ❑ Canada Emergency Student Benefit (CESB)
- ❑ Did not receive any benefits

22. Since March 12, 2020, how much income have you received from government funded COVID-19 relief programs (including rent relief)?

$_____

- ❑ I did not receive any relief

23. Which of the following best describes the impact of COVID-19 on your ability to meet financial obligations or essential needs, such as rent or mortgage payments, utilities and groceries?

- ❍ Major negative impact
- ❍ Moderate negative impact
- ❍ Minor negative impact
- ❍ No impact
- ❍ Minor positive impact
- ❍ Moderate positive impact
- ❍ Major positive impact
- ❍ Too soon to tell

24. Which of the following best describes the impact of COVID-19 on your ability to make rent or mortgage payments?

- ❍ Major negative impact
- ❍ Moderate negative impact
- ❍ Minor negative impact
- ❍ No impact
- ❍ Minor positive impact
- ❍ Moderate positive impact
- ❍ Major positive impact

❍ Too soon to tell

25. Which of the following statements best describes the food eaten in your household since September 2019?

❍ You and your household always had enough of the kinds of food you wanted to eat
❍ You and your household had enough to eat, but not always the kinds of food you wanted
❍ Sometimes you and your household did not have enough to eat
❍ Often you and your household didn't have enough to eat

26. Which of the following statements best describes the food eaten in your household since March 12, 2020?

❍ You and your household always had enough of the kinds of food you wanted to eat
❍ You and your household had enough to eat, but not always the kinds of food you wanted
❍ Sometimes you and your household did not have enough to eat
❍ Often you and your household didn't have enough to eat

If you are not yet 16 years old, please skip to the Indigenous Well-Being section (#36 on page 9) if you are Indigenous, or the Your Health section (#39 on page 10) if you are non-Indigenous.

Employment

27. Before March 12, 2020, which of the following best described your personal employment situation? **(Please check all that apply)**

❑ Employed in a permanent full-time position (30 hours or more per week)
❑ Employed in a permanent part-time position (less than 30 hours per week)
❑ Employed on temporary/short term contract (less than a year)
❑ Employed on a fixed term contract, one year or more
❑ Self-employed – no employees
❑ Self-employed – others work for me

- ❑ Worked for pay in the informal economy (e.g. paid in cash or "under the table" in restaurant or construction)
- ❑ Not employed
- ❑ Student
- ❑ Retired
- ❑ On leave
- ❑ Other, specify: _____
- ❑ None of the above

28. Which of the following best describes your current personal employment situation?

(Please check all that apply)

- ❑ Employed in a permanent full-time position (30 hours or more per week)
- ❑ Employed in a permanent part-time position (less than 30 hours per week)
- ❑ Employed on temporary/short term contract (less than a year)
- ❑ Employed on a fixed term contract, one year or more
- ❑ Self-employed – no employees
- ❑ Self-employed – others work for me
- ❑ Work for pay in the informal economy (e.g. paid in cash or "under the table" in restaurant or construction)
- ❑ Not employed
- ❑ Student
- ❑ Retired
- ❑ On leave
- ❑ Other, specify: _____
- ❑ None of the above

29. As a result of the COVID-19 pandemic, has your employment situation changed in any of the following ways? **(Please check all that apply)**

- ❑ Still working, but working less (e.g., lost one of my jobs, reduced hours)
- ❑ Not working, I have lost my job or jobs
- ❑ Temporarily laid-off
- ❑ Start date has been delayed
- ❑ Lost a job that I was supposed to start in the future
- ❑ No longer have employment prospects
- ❑ Currently looking for work
- ❑ No longer looking for work
- ❑ Working more
- ❑ No change

30. How much of an impact did the COVID-19 pandemic have on your personal income from employment?

- ❍ Major negative impact
- ❍ Moderate negative impact
- ❍ Minor negative impact
- ❍ No impact
- ❍ Minor positive impact
- ❍ Moderate positive impact
- ❍ Major positive impact
- ❍ Too soon to tell

31. Since March 12, 2020, has there been a time when you experienced a total loss of personal income from employment?

- ❍ Yes
- ❍ No

32. Since September 2019, have you done sex work or exchanged sex for money or other resources (e.g. shelter, substances, food, or other services)?

- ❍ Yes
- ❍ No → Skip to #33

32a. Have you done sex work since March 12, 2020?

- ❍ Yes
- ❍ No → Skip to #33

32b. Have you seen sex work clients in person since March 12, 2020?

- ❍ Yes
- ❍ No

33. Do you currently have regular face-to-face contact with the public at your work?

- ❍ Yes
- ❍ No

- ❍ I'm not working currently

34. Are you an essential service worker (healthcare, grocery store staff, etc.)?

- ❍ Yes
- ❍ No → Skip to #35
- ❍ Unsure

34a. Which of the following sectors best captures your job?

- ❍ Health care or public health
- ❍ Grocery store
- ❍ Food service
- ❍ Other, please specify: _____

35. Since March 12, 2020, have you started a new job because of COVID-19?

- ❍ Yes
- ❍ No

Indigenous Well-Being

If you are not Indigenous, please skip to the Your Health section on page 10.

The next few questions are about ways that Indigenous trans, two-spirit, non-binary, and gender diverse people are staying healthy during the pandemic. These questions were developed by the team's Indigenous Leadership Group.

36. Are you a part of an Indigenous community? This could be online or in person.

- ❍ Yes
- ❍ No → Skip to #37

36a. Since March 12, 2020, has your access to Indigenous community gatherings (online or in person)…

❍ Increased
❍ Stayed the same
❍ Decreased

37. Can you describe any ways you are staying connected to Indigenous community or culture during the pandemic?

38. Before March 12, 2020, did you participate in ceremony?

❍ Yes
❍ No → Skip to #39

38a. Has your participation changed as a result of COVID-19?

❍ Yes

❍ No → Skip to #39

38b. How has this change impacted your physical, mental, emotional, or spiritual well-being?

Your Health

The next few questions are about your health right now.

39. In general, would you say your health is…?

❍ Excellent
❍ Very good
❍ Good

- ❍ Fair
- ❍ Poor

40. Do you have a compromised immune system?

- ❍ Yes
- ❍ No

41. Do you have diabetes or a chronic condition affecting your lungs, heart or kidneys?

- ❍ Yes
- ❍ No

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

*Note: Episodic disabilities are long-term conditions that are characterized by periods of good health interrupted by periods of illness or disability). These may include, but are not limited to asthma, arthritis, and HIV.

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

- ❑ Autistic
- ❑ Blind
- ❑ Crip
- ❑ Deaf
- ❑ Disabled or living with a disability (including episodic disability*)
- ❑ Chronic pain
- ❑ Chronic illness
- ❑ Chronic health condition
- ❑ Neurodivergent
- ❑ Psychiatric survivor, mad, or person with mental illness

- ❑ Another disability identity not listed here: _____
- ❑ None of the above

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

- ❑ Acquired brain injury
- ❑ Autism or Asperger's
- ❑ Chronic Illness
- ❑ Chronic pain condition
- ❑ Intellectual or developmental disability
- ❑ Intermittent or episodic illness or condition
- ❑ Learning disability
- ❑ Mobility or physical disability
- ❑ Vision impairment
- ❑ Mental health condition
- ❑ Another condition or disability not listed here : _____
- ❑ None of the above

COVID-19 Testing, Diagnosis, and Care

In the next few questions, we would like to ask you about symptoms, testing, and treatment of COVID-19.

44. When a COVID-19 vaccine becomes available, how likely is it that you will choose to get it?

- ❍ Very likely → Skip to #46
- ❍ Somewhat likely
- ❍ Somewhat unlikely
- ❍ Very unlikely
- ❍ Unsure

45. What are the reasons you would not get the COVID-19 vaccine? **(Please check all that apply)**

- ❑ Already had or think I have had COVID-19
- ❑ Do not consider it necessary to get the vaccine
- ❑ Not confident in the safety of the vaccine
- ❑ Do not believe in vaccination
- ❑ Concern about risks and side effects
- ❑ Have a pre-existing medical condition
- ❑ Will wait until it seems safe to get the vaccine
- ❑ Have not yet decided
- ❑ Other reason, please specify: _____
- ❑ Unsure

46. Have you wanted to get tested for COVID-19, but been unable to?

- ❍ Yes
- ❍ No → Skip to #47

46a. In what month(s) did this happen? **(Please check all that apply)**

- ❑ January
- ❑ February
- ❑ March
- ❑ April
- ❑ May
- ❑ June
- ❑ July
- ❑ August
- ❑ September

46b. Why were you unable to get tested?

47. Have you avoided COVID-19 testing or care when you thought you needed it?

- ❍ Yes
- ❍ No → Skip to #48

47a. Have you avoided COVID-19 testing or care because of fear of discrimination as a trans or non-binary person?

- ❍ Yes
- ❍ No

47b. Can you describe why you avoided COVID-19 testing or care?

48. Have you been tested for COVID-19 with a swab since March 12, 2020?

- ❍ Yes
- ❍ No → Skip to #50

48a. In what month(s) were you tested? **(Please check all that apply)**

- ❑ March
- ❑ April
- ❑ May
- ❑ June
- ❑ July
- ❑ August
- ❑ September

49. Have you been diagnosed with COVID-19?

- ❍ Yes
- ❍ No → Skip to #50

49a. In what month were you diagnosed?

- ❍ March
- ❍ April
- ❍ May
- ❍ June
- ❍ July
- ❍ August
- ❍ September

50. Regardless of whether you have been diagnosed with COVID-19, do you think you have had COVID-19 symptoms?

- ❍ Yes → Skip to #52
- ❍ No
- ❍ Unsure

51. If you develop symptoms of COVID-19, do you think you will avoid testing for fear of mistreatment?

- ❍ Yes → Skip to #53
- ❍ No → Skip to #53
- ❍ Unsure → Skip to #53

52. How severe are/were your symptoms and how did you manage them?

- ❍ No symptoms → Skip to #53
- ❍ Mild, no significant symptoms
- ❍ Significant symptoms self-managed in quarantine
- ❍ Significant symptoms managed with medical assistance in quarantine
- ❍ Symptoms requiring hospital treatment for ≤ 1 day
- ❍ Symptoms requiring hospital treatment for > 1 day

52a. In what month did you start having COVID-19 symptoms?

- ❍ March
- ❍ April
- ❍ May
- ❍ June
- ❍ July
- ❍ August
- ❍ September

52b. How long did your symptoms last?

_____ weeks and _____ days

52c. Are you still having symptoms now?

- ❍ Yes
- ❍ No

If you have not been tested for COVID-19, or if you have not wanted to be tested for COVID-19, please skip to #54.

53. When looking for COVID-19 testing or care, have you experienced discrimination?

- ❍ Yes
- ❍ No → Skip to #54

53a. Did this happen because you're trans or non-binary?

- ❍ Yes
- ❍ No

53b. Can you describe the discrimination that you experienced?

Your Mental Health

The next questions are about how you're doing in terms of mental health and well-being, including some questions about suicide and self-harm.

If you need to speak to someone immediately about your mental health, please contact Canada's Trans Life Line (call 877-330-6366), the Indigenous Hope for Wellness Help Line (call 1-855-242-3310), Crisis Services Canada (call 1-833-456-4566 or text 45645 [call 1-866-277-3553 in Quebec]), or Kids Help Phone (call 1-800-668-6868 or text CONNECT to 686868).

54. In general, would you say your mental health is…?

- ❍ Excellent
- ❍ Very good
- ❍ Good
- ❍ Fair
- ❍ Poor

55. Compared to before physical distancing began, how would you say your mental health is now?

- ❍ Much better now
- ❍ Somewhat better now
- ❍ About the same
- ❍ Somewhat worse now
- ❍ Much worse now

56. Below is a list of the ways you might have felt or behaved. Please tell us how often you have felt this way during the past week.

56a. I was bothered by things that usually don't bother me.

Rarely or none of the time (less than 1 day)	Some or a little of the time (1-2 days)	Occasionally or a moderate amount of time (3-4 days)	Most or all of the time (5-7 days)
❍	❍	❍	❍

56b. I had trouble keeping my mind on what I was doing.

Rarely or none of the time (less than 1 day)	Some or a little of the time (1-2 days)	Occasionally or a moderate amount of time (3-4 days)	Most or all of the time (5-7 days)
❍	❍	❍	❍

56c. I felt depressed.

Rarely or none of the time (less than 1 day)	Some or a little of the time (1-2 days)	Occasionally or a moderate amount of time (3-4 days)	Most or all of the time (5-7 days)
❍	❍	❍	❍

56d. I felt that everything I did was an effort.

Rarely or none of the time (less than 1 day)	Some or a little of the time (1-2 days)	Occasionally or a moderate amount of time (3-4 days)	Most or all of the time (5-7 days)
❍	❍	❍	❍

56e. I felt hopeful about the future.

Rarely or none of the time (less than 1 day)	Some or a little of the time (1-2 days)	Occasionally or a moderate amount of time (3-4 days)	Most or all of the time (5-7 days)
❍	❍	❍	❍

56f. I felt fearful.

Rarely or none of the time (less than 1 day)	Some or a little of the time (1-2 days)	Occasionally or a moderate amount of time (3-4 days)	Most or all of the time (5-7 days)
❍	❍	❍	❍

56g. My sleep was restless.

Rarely or none of the time (less than 1 day)	Some or a little of the time (1-2 days)	Occasionally or a moderate amount of time (3-4 days)	Most or all of the time (5-7 days)
❍	❍	❍	❍

56h. I was happy.

Rarely or none of the time (less than 1 day)	Some or a little of the time (1-2 days)	Occasionally or a moderate amount of time (3-4 days)	Most or all of the time (5-7 days)
❍	❍	❍	❍

56i. I felt lonely

Rarely or none of the time (less than 1 day)	Some or a little of the time (1-2 days)	Occasionally or a moderate amount of time (3-4 days)	Most or all of the time (5-7 days)
❍	❍	❍	❍

56j. I could not get “going.”

Rarely or none of the time (less than 1 day)	Some or a little of the time (1-2 days)	Occasionally or a moderate amount of time (3-4 days)	Most or all of the time (5-7 days)
❍	❍	❍	❍

57. The following items ask about anxiety and fear. For each item, please select the answer that best describes your experience over the past week.

57a. How often do you feel anxious?

- ❍ Never
- ❍ Rarely
- ❍ Occasionally
- ❍ Frequently
- ❍ Constantly

57b. When you feel anxious, how intense or severe is your anxiety?

- ❍ I never feel anxious
- ❍ Mild
- ❍ Moderate
- ❍ Severe
- ❍ Extreme

57c. How often do you avoid situations, places, objects, or activities because of anxiety or fear?

- ❍ Never
- ❍ Rarely
- ❍ Occasionally
- ❍ Frequently
- ❍ Constantly

57d. How much does anxiety or fear interfere with your ability to do the things you need to do at work, at school, or at home?

- ❍ Not at all
- ❍ Mild

- ❍ Moderate
- ❍ Severe
- ❍ Extreme

57e. How much does anxiety or fear interfere with your social life and relationships?

- ❍ Not at all
- ❍ Mild
- ❍ Moderate
- ❍ Severe
- ❍ Extreme

The next questions are about suicide and self-harm.

If you need to speak to someone immediately about your mental health, please contact Canada's Trans Life Line (call 877-330-6366), the Indigenous Hope for Wellness Help Line (call 1-855-242-3310), Crisis Services Canada (call 1-833-456-4566 or text 45645 [call 1-866-277-3553 in Quebec]), or Kids Help Phone (call 1-800-668-6868 or text CONNECT to 686868).

58. Since September 2019, have you done anything to hurt yourself on purpose? For example, cutting, burning, scratching, or hitting yourself.

- ❍ Yes
- ❍ No → Skip to #59

58a. Has this happened since March 12, 2020?

- ❍ Yes
- ❍ No

59. Since September 2019, have you seriously considered suicide?

- ❍ Yes
- ❍ No → Skip to #60

59a. Have you seriously considered suicide since March 12, 2020?

- ❍ Yes
- ❍ No

60. Since September 2019, have you attempted suicide?

- ❍ Yes
- ❍ No → Skip to #61

60a. Since March 12, 2020, have you attempted suicide?

- ❍ Yes
- ❍ No → Skip to #61

If you need to speak to someone immediately about your mental health, please contact Canada's Trans Life Line (call 877-330-6366), the Indigenous Hope for Wellness Help Line (call 1-855-242-3310), Crisis Services Canada (call 1-833-456-4566 or text 45645 [call 1-866-277-3553 in Quebec]), or Kids Help Phone (call 1-800-668-6868 or text CONNECT to 686868).

61. Before March 12, 2020, were you receiving mental health support from a community support worker or a support group (in person, over the phone, or online)?

- ❍ Yes
- ❍ No

62. Since March 12, 2020, have you received mental health support from a community support worker or a support group (in person, over the phone, or online)?

- ❍ Yes
- ❍ No

63. Before March 12, 2020, were you talking to a therapist or mental health care professional regularly (in person, over the phone, or online)?

- ❍ Yes
- ❍ No

64. Since March 12, 2020, have you talked to a therapist or mental health care professional (in person, over the phone, or online)?

- ❍ Yes

❍ No

65. Since March 12, 2020, have you not received mental health care that you thought you needed?

❍ Yes
❍ No → Skip to #66
❍ I have not needed mental health care during this time → Skip to #66

65a. Can you explain why you didn't receive this?

Next, we'd like to ask you about cigarettes, vaping, and cannabis.

66. At the present time, do you smoke cigarettes daily, occasionally or not at all?

❍ Daily
❍ Occasionally
❍ Not at all

67. At the present time, do you vape nicotine / e-cigarettes daily, occasionally or not at all?

❍ Daily
❍ Occasionally
❍ Not at all

68. At the present time, do you use cannabis daily, occasionally or not at all?

❍ Daily

- ❍ Occasionally
- ❍ Not at all

The next few questions ask about your alcohol consumption.

When we use the word 'drink' it means:

- one (1) bottle or can of beer or a glass of draft
- one (1) glass of wine or a wine cooler
- one (1) drink or cocktail with 1½ ounces of liquor

69. How often did you have a drink containing alcohol in the past year?

- ❍ Never → Skip to #72
- ❍ Monthly or less
- ❍ 2 to 4 times a month
- ❍ 2 to 3 times a week
- ❍ 4 or more times a week

70. How many drinks did you have on a typical day when you were drinking in the past year?

- ❍ 1 to 2
- ❍ 3 to 4
- ❍ 5 to 6
- ❍ 7 to 9
- ❍ 10 or more

71. How often did you have 6 or more drinks on one occasion over the past year?

- ❍ Never
- ❍ Less than monthly
- ❍ Monthly
- ❍ Weekly
- ❍ Daily or almost daily

72. In the following question, please indicate which substances you have used since September 2019, and whether you used that substance several times a week or more. If you have not used a substance, then you don't have to answer the second question for that substance.

❍ I have not used any of the listed substances

	Since September 2019, have you used this substance?	Since September 2019, have you used this several times a week or more?
Heroin and other street opioids (e.g., fentanyl, "down")	❍ Yes → ❍ No	❍ Yes ❍ No
Prescription opioids not prescribed to you (e.g., codeine, methadone, oxycodone, morphine, fentanyl, hydromorphone, tramadol, buprenorphine)	❍ Yes → ❍ No	❍ Yes ❍ No
Cocaine powder or crack	❍ Yes → ❍ No	❍ Yes ❍ No
Ritalin, or another prescription stimulant not prescribed to you (e.g. Concerta, Dexedrine, Adderall, or Vyvanse)	❍ Yes → ❍ No	❍ Yes ❍ No
Methamphetamine (ice, crystal meth, tina) or other amphetamines (speed)	❍ Yes → ❍ No	❍ Yes ❍ No
Sedatives or sleeping pills (e.g., zopiclone or benzodiazepines such as Xanax, Valium, Serapax, clonazepam)	❍ Yes → ❍ No	❍ Yes ❍ No
Inhalants, glue, solvents	❍ Yes → ❍ No	❍ Yes ❍ No

Synthetic cannabinoids (e.g., K2, Spice)	❍ Yes → ❍ No	❍ Yes ❍ No
Ecstasy (MDA, MDMA)	❍ Yes → ❍ No	❍ Yes ❍ No
Hallucinogens (e.g., LSD, acid, mushrooms, PCP)	❍ Yes → ❍ No	❍ Yes ❍ No
Ketamine (Special K)	❍ Yes → ❍ No	❍ Yes ❍ No
GHB (G)	❍ Yes → ❍ No	❍ Yes ❍ No
Other, please specify:_____	❍ Yes → ❍ No	❍ Yes ❍ No

Health Care

In the next few questions, we would like to learn about your experiences with finding competent and respectful health care and social services.

73. Do you currently have insurance that covers all or part of the cost of your prescription medications?

❍ Yes
❍ No
❍ Unsure

74. Since September 2019, was there ever a time when you felt that you needed health care, other than home care services, but didn't receive it?

❍ Yes
❍ No → Skip to #75

74a. Has this happened since March 12, 2020?

❍ Yes
❍ No

75. Before March 12, 2020, were you receiving home care?

❍ Yes
❍ No → Skip to #76

75a. Since March 12, 2020, have you experienced interruptions or changes to the home care services you were receiving?

❍ Yes
❍ No → Skip to #76

75b. Can you describe the service change or interruptions you experienced, and how this affected you?

Virtual and Tele-Health Care

The next questions are about virtual or tele healthcare, meaning health care or medical advice delivered via phone call, video call, or text message.

76. Since March 12, 2020 have you avoided accessing virtual or tele healthcare because you're trans or non-binary?

- ❍ Yes
- ❍ No

77. Since March 12, 2020 have you accessed virtual or tele healthcare?

- ❍ Yes
- ❍ No → Skip to #78

77a. Since March 12, 2020, did you receive virtual or tele healthcare via… **(Please check all that apply)**

- ❑ Phone call
- ❑ Video call
- ❑ Text message or other direct messaging service
- ❑ Other, please specify: _____

77b. What kind of care did you receive virtually? **(Please check all that apply)**

- ❑ Physical health care
- ❑ Mental health care
- ❑ Other, please specify: _____

If your answer to 77b was not "physical health care", please skip to #78.

77c. Did you access this care because you had symptoms of COVID-19?

❍ Yes
❍ No

78. In general, would you prefer virtual over in-person care when COVID-19 is no longer an issue?

❍ Yes
❍ No

79. Can you explain the reasons for your preference?

Primary Care

The next questions are about primary care.

80. Do you currently have a primary health care provider? By this, we mean one health professional that you regularly see or talk to when you need care or advice for your health.

❍ Yes, a family doctor
❍ Yes, a nurse practitioner
❍ No, I receive primary health care at a walk-in clinic → Skip to #83
❍ Not at the present time → Skip to #83

81. Since March 12, 2020 have you seen or spoken to your primary health care provider?

- ❍ Yes
- ❍ No → Skip to #82

If you have not had symptoms of COVID-19, please skip to #82.

81a. Have you seen or spoken to your primary health care provider about your own symptoms of COVID-19, whether or not you've been diagnosed?

- ❍ Yes
- ❍ No

82. Since March 12, 2020 have you avoided talking to your primary care provider about any health concerns?

- ❍ Yes
- ❍ No → Skip to #83
- ❍ I have not needed primary care during this time → Skip to #83
- ❍ My primary care provider is not seeing non-urgent patients during this time → Skip to #83

82a. What were your reasons for avoiding primary care since March 12, 2020? **(Please check all that apply)**

- ❑ Concern about being exposed to COVID-19
- ❑ My health concern didn't seem urgent or important enough
- ❑ Couldn't bring a support person to appointments
- ❑ Couldn't access patient navigator
- ❑ Concern about how my voice would be perceived over the phone
- ❑ Other, please specify: _____

Emergency Care

The next questions are about going to the emergency room (ER) for issues concerning your own health.

83. Since September 2019, have you avoided going to the emergency room (when you needed care) because you are trans or non-binary?

- ❍ Yes
- ❍ No → Skip to #84
- ❍ I have not needed emergency care during this time → Skip to #85

83a. Did this happen since March 12, 2020?

- ❍ Yes
- ❍ No
- ❍ I have not needed emergency care during this time → Skip to #86

84. Since March 12, 2020 have you avoided going to the emergency room (when you needed care) because you were worried about being exposed to COVID-19?

- ❍ Yes
- ❍ No
- ❍ I have not needed emergency care during this time

Gender-Affirming Medical Care

In the next questions, we would like to learn about your access to gender-affirming medical care during the pandemic. For our purposes, "gender-affirming medical care" refers to puberty blockers, gender-affirming hormones, surgeries, and/or body modifications.

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

- ❍ I have had the gender-affirming medical treatment that I need/want
- ❍ I am in the process of completing gender-affirming medical treatment
- ❍ I am planning to receive gender-affirming medical treatment, but have not begun → Skip to #87
- ❍ I am not planning to receive gender-affirming medical treatment → Skip to #89
- ❍ I am not sure whether I am going to seek gender-affirming medical treatment → Skip to #89

The next questions are about hormones. When we ask about hormones, this includes puberty blockers.

86. Do you take hormones?

- ❍ Yes
- ❍ No → Skip to #87

86a. Right now, do you have access to hormones?

- ❍ Yes
- ❍ No

86b. Since March 12, 2020, have you had interruptions in taking hormones?

- ❍ Yes
- ❍ No → Skip to #87

86c. For what reasons were you unable to access hormones? **(Please check all that apply)**

- ❑ Couldn't afford it
- ❑ Couldn't go to the pharmacy
- ❑ Couldn't get my prescription renewed
- ❑ Couldn't get syringes or needles
- ❑ Drug shortages
- ❑ Nobody to help with injections
- ❑ People in my household couldn't know I'm taking hormones
- ❑ Other, please specify: _____

If you are currently taking hormones (answered yes to #86), please skip to #89.

87. Since March 12, 2020, have you been unable to get a new prescription or referral for hormones?

- ❍ Yes
- ❍ No → Skip to #88
- ❍ I haven't needed this during this time → Skip to #88

87a. Did this happen because of restrictions related to COVID-19 (e.g. clinic closures)?

- ❍ Yes
- ❍ No

88. Before March 12, 2020, did you have an appointment booked to have a gender-affirming surgery in the future?

- ❍ Yes
- ❍ No → Skip to #89

88a. Have you had a surgery appointment canceled or postponed due to the current COVID-19 outbreak?

- ❍ Yes
- ❍ No → Skip to #89
- ❍ Not yet, but I expect it will → Skip to #89

88b. Was an alternative date set for this surgery?

- ❍ Yes
- ❍ No

88c. What kind of surgery was cancelled or postponed? **(Please check all that apply)**

- ❑ Chest surgery, please specify: _____
- ❑ Genital gender-affirming surgery, please specify: _____
- ❑ Removal of uterus (hysterectomy) or removal of ovaries (oophorectomy)
- ❑ Voice surgery
- ❑ Adam's apple surgery
- ❑ Facial surgery
- ❑ Other, please specify: _____

88d. Have you had this surgery yet?

- ❍ Yes
- ❍ No

89. Has the current COVID-19 outbreak limited your access to the following aspects of gender-affirming health care?

89a. Binders, packers, or gaffs

- ❍ Yes
- ❍ No
- ❍ Not applicable

89b. Non-medical supplies (e.g. makeup, shaving supplies, wigs)

- ❍ Yes
- ❍ No
- ❍ Not applicable

89c. Medical material that is important after surgery (e.g. vaginal dilators, chest compress)

- ❍ Yes
- ❍ No
- ❍ Not applicable

89d. Post-operative care following gender-affirming surgery

- ❍ Yes
- ❍ No
- ❍ Not applicable

90. At any point since March 12, 2020, have you needed any of the following services, but been unable to access them because of the COVID-19 pandemic? **(Please check all that apply)**

- ❑ Dental care
- ❑ Optometry or ophthalmology
- ❑ Physical therapy or chiropractic care
- ❑ Religious or spiritual practice
- ❑ Activity groups for youth
- ❑ Child care
- ❑ Immigration or settlement services
- ❑ Legal services

- ❑ Other, please specify: _____
- ❑ None of the above

Your Household

Next we're going to ask some questions about your living arrangements, and household members.

Household members are people you live with, or people who live with you.

91. What is your legal marital status right now?

- ❍ Single, never married
- ❍ Separated
- ❍ Divorced
- ❍ Widowed
- ❍ Living common-law
- ❍ Married

92. On March 12, 2020, what were your living arrangements? **(Please check all that apply)**

- ❍ Housing you own or rent
- ❍ Temporarily with someone who pays for housing
- ❍ Permanently with someone who pays for housing
- ❍ Shelter, motel, in a car, or other unstable housing
- ❍ Institutional housing (e.g. long-term care, military housing, prison)
- ❍ Other, please specify: _____

93. What are your current living arrangements? **(Please check all that apply)**

- ❍ Housing you own or rent
- ❍ Temporarily with someone who pays for housing
- ❍ Permanently with someone who pays for housing
- ❍ Shelter, motel, in a car, or other unstable housing
- ❍ Institutional housing (e.g. long-term care, military housing, prison)
- ❍ Other, please specify: _____

94. Since March 12, 2020, have your living arrangements changed for reasons related to the COVID-19 pandemic?

- ❍ Yes
- ❍ No

95. Since March 12, 2020, have your household members changed for reasons related to the COVID-19 pandemic?

- ❍ Yes
- ❍ No

96. For reasons related to the COVID-19 pandemic, have you lived with a household member who is unsupportive of your gender?

- ❍ Yes
- ❍ No

97. In general, how supportive of your gender identity or expression are the following people? These people may or may not be living with you right now.

	Not at all	Not very	Somewhat	Very	They don't know	Not applicable
97a. Your parent(s) or guardian(s)	❍	❍	❍	❍	❍	❍
97b. Your spouse or partner(s)	❍	❍	❍	❍	❍	❍
97c. Your child(ren)	❍	❍	❍	❍	❍	❍
97d. Your grandchild(ren)	❍	❍	❍	❍	❍	❍

98. Excluding members of your household, how many people in total did you come in close contact with yesterday?

'Close contact' means within 2 meters or 6 feet. Include any people such as co-workers, relatives, neighbours, delivery workers, other shoppers, health professionals and restaurant employees.

- ❍ No contact with people outside my household
- ❍ 1 to 2 individuals
- ❍ Between 3 to 5 individuals
- ❍ 6 or more individuals

99. Excluding members of your household, how many people in total did you come in close contact with during the last 7 days?

'Close contact' means within 2 meters or 6 feet. Include any people such as co-workers, relatives, neighbours, delivery workers, other shoppers, health professionals and restaurant employees.

- ❍ No contact with people outside my household
- ❍ Between 1 to 3 individuals
- ❍ Between 4 and 8 individuals
- ❍ Between 9 and 15 individuals
- ❍ 16 or more individuals

100. When was the last time you touched another person?

- ❍ Today → Skip to #101
- ❍ This week → Skip to #101
- ❍ This month
- ❍ Before March 12, 2020

100a. How much has this lack of human touch bothered you?

- ❍ A lot
- ❍ Somewhat
- ❍ Not at all

The next questions are about intimate partner violence.

If you need to speak to someone immediately about your mental health, please contact Canada's Trans Life Line (call 877-330-6366), the Indigenous Hope for Wellness Help Line (call 1-855-242-3310), Crisis Services Canada (call 1-833-456-4566 or text 45645 [call 1-866-277-3553 in Quebec]), or Kids Help Phone (call 1-800-668-6868 or text CONNECT to 686868).

101. Since September 2019, has a romantic partner done any of the following towards you?

(Please check all that apply)

- ❑ Insulted, swore, shouted, or yelled at you
- ❑ Tried to control who I talked to or where I went
- ❑ Threatened to hurt you
- ❑ Pushed, shoved, shook, or pinned you down
- ❑ Forced or pressured you to engage in a sexual activity when you didn't want to
- ❑ None of the above → Skip to #103

102. Since March 12, 2020, have these behaviours…

- ❍ Increased
- ❍ Stayed the same
- ❍ Decreased

103. Since September 2019, have you done any of the following towards a romantic partner?

(Please check all that apply)

- ❑ Insulted, swore, shouted, or yelled at them
- ❑ Tried to control who they talked to or where they went
- ❑ Threatened to hurt them
- ❑ Pushed, shoved, shook, or pinned them down
- ❑ Forced or pressured the other person to engage in a sexual activity when they didn't want to
- ❑ None of the above → Skip to #105

104. Since March 12, 2020, have these behaviours…

- ❍ Increased
- ❍ Stayed the same
- ❍ Decreased

Next we're going to ask about your experiences finding community and support since March 12, 2020.

105. Since March 12, 2020, how often do you feel…

105a. Left out?

- ❍ Often
- ❍ Some of the time
- ❍ Hardly ever

105b. Isolated?

- ❍ Often
- ❍ Some of the time
- ❍ Hardly ever

105c. That you lack companionship?

- ❍ Often
- ❍ Some of the time
- ❍ Hardly ever

106. Before March 12, 2020, did you have a peer or friend group of other trans and non-binary people? This could be online or in person.

- ❍ Yes

❍ No

107. Since March 12, 2020, has your access to trans and non-binary peer or friend gatherings (online or in person)…

❍ Increased
❍ Stayed the same
❍ Decreased

108. How often is each of the following kinds of support available to you right now?

108a. Someone to help you if you were confined to bed?

None of the time	A little of the time	Some of the time	Most of the time	All of the time
❍	❍	❍	❍	❍

108b. Someone to take you to the doctor if you needed it?

None of the time	A little of the time	Some of the time	Most of the time	All of the time
❍	❍	❍	❍	❍

108c. Someone to have a good time with?

None of the time	A little of the time	Some of the time	Most of the time	All of the time
❍	❍	❍	❍	❍

108d. Someone to prepare your meals if you were unable to do it yourself?

None of the time	A little of the time	Some of the time	Most of the time	All of the time
❍	❍	❍	❍	❍

108e. Someone to help with daily chores if you were sick?

None of the time	A little of the time	Some of the time	Most of the time	All of the time
❍	❍	❍	❍	❍

108f. Someone to turn to for suggestions about how to deal with a personal problem?

None of the time	A little of the time	Some of the time	Most of the time	All of the time
❍	❍	❍	❍	❍

108g. Someone who understands your problems?

None of the time	A little of the time	Some of the time	Most of the time	All of the time
❍	❍	❍	❍	❍

108h. Someone to love you and make you feel wanted?

None of the time	A little of the time	Some of the time	Most of the time	All of the time
❍	❍	❍	❍	❍

The next question is about experiences of discrimination related to the COVID-19 pandemic.

If you need to speak to someone immediately about your mental health, please contact Canada's Trans Life Line (call 877-330-6366), the Indigenous Hope for Wellness Help Line (call 1-855-242-3310), Crisis Services Canada (call 1-833-456-4566 or text 45645 [call 1-866-277-3553 in Quebec]), or Kids Help Phone (call 1-800-668-6868 or text CONNECT to 686868).

109. Since March 12, 2020, have any of the following things happened to you because of COVID-19? **(Please check all that apply)**

- ❑ You were accused of having or spreading COVID-19
- ❑ You were blamed for the pandemic
- ❑ You were stopped by police or security over social distancing concerns
- ❑ Your property was damaged
- ❑ You experienced verbal threats or harassment
- ❑ You were assaulted
- ❑ Other, please specify: _____
- ❑ None of the above → Skip to #110

109a. Is there anything you would like us to know about this?

COVID-19 Concerns and Safety

Finally, we have some questions about your concerns during the COVID-19 pandemic, and how you're managing to stay safe.

110. How concerned are you about each of the following impacts of COVID-19?

110a. My own health

- ❍ Extremely
- ❍ Very
- ❍ Somewhat

- ❍ Not at all

110b. Maintaining social ties

- ❍ Extremely
- ❍ Very
- ❍ Somewhat
- ❍ Not at all

110c. Family stress from confinement

- ❍ Extremely
- ❍ Very
- ❍ Somewhat
- ❍ Not at all

110d. Violence in your home

- ❍ Extremely
- ❍ Very
- ❍ Somewhat
- ❍ Not at all

110e. Increased presence of police and security

- ❍ Extremely
- ❍ Very
- ❍ Somewhat
- ❍ Not at all

110f. Access to hormones or puberty blockers

- ❍ Extremely
- ❍ Very
- ❍ Somewhat
- ❍ Not at all

110g. Backlog of gender-affirming surgeries

- ❍ Extremely
- ❍ Very
- ❍ Somewhat
- ❍ Not at all

110h. My health care will be deemed non-essential

- ❍ Extremely
- ❍ Very
- ❍ Somewhat
- ❍ Not at all

111. Which of the following precautions have you taken to reduce your risk of exposure to COVID-19? **(Please check all that apply)**

- ❑ Stocked up on essentials at a grocery store or pharmacy
- ❑ Filled prescriptions
- ❑ Made a plan for caring for household members who are ill
- ❑ Made a plan for other non-household members (e.g., elderly relatives)
- ❑ Made a plan for communicating with family, friends and neighbours
- ❑ Avoided leaving the house for non-essential reasons
- ❑ Used social distancing when out in public (i.e., made changes in your everyday routine to minimize close contact with others.)
- ❑ Avoided crowds and large gathering
- ❑ Avoided indoor public spaces (e.g. bars or restaurants)
- ❑ Washed your hands more regularly
- ❑ Avoided touching your face
- ❑ Cancelled travel
- ❑ Worked from home
- ❑ Other, please specify: _____
- ❑ None of the above

112. Which of the following precautions have you wanted to take, but haven't been able to?

(Please check all that apply)

- ❑ Stocked up on essentials at a grocery store or pharmacy
- ❑ Filled prescriptions
- ❑ Made a plan for caring for household members who are ill
- ❑ Made a plan for other non-household members (e.g., elderly relatives)
- ❑ Made a plan for communicating with family, friends and neighbours
- ❑ Avoided leaving the house for non-essential reasons

- ❑ Used social distancing when out in public (i.e., made changes in your everyday routine to minimize close contact with others.)
- ❑ Avoided crowds and large gathering
- ❑ Avoided indoor public spaces (e.g. bars or restaurants)
- ❑ Washed your hands more regularly
- ❑ Avoided touching your face
- ❑ Cancelled travel
- ❑ Worked from home
- ❑ Other, please specify: _____
- ❑ I have been able to take the precautions I wanted to

113. Can you tell us how the COVID-19 pandemic has impacted you as a trans or non-binary person, whether positive or negative?

114. Can you tell us some things you've been doing to take care of yourself during the COVID-19 pandemic?

Curriculum Vitae

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Post-secondary Education and Degrees:	Brock University St. Catharines, Ontario, Canada 2014-2018 BSc. University of Western Ontario London, Ontario, Canada 2019-2021 MSc.
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