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The Health of Ontario’s Transgender Communities: Prevalence of and Risk Factors for Depression, "Do-It-Yourself" Transitions, and Health Effects of Cross-Sex Hormones and Surgeries

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A thesis submitted in partial fulfillment of the requirements for the Doctor of Philosophy degree in Epidemiology and Biostatistics

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THE HEALTH OF ONTARIO'S TRANSGENDER COMMUNITIES: PREVALENCE OF AND RISK FACTORS FOR DEPRESSION, "DO-IT-YOURSELF" TRANSITIONS, AND HEALTH EFFECTS OF CROSS-SEX HORMONES AND SURGERIES

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ABSTRACT

The purpose of this dissertation was to develop an understanding of, and draw attention to, the health and service access issues faced by trans (transgender, transsexual, or transitioned) Ontarians. This thesis is based on the Trans PULSE Project, a community-based research (CBR) initiative whose goal is to improve the health of trans people. Data collection was carried out between May 2009 and April 2010 using a quantitative survey. Trans participants were recruited through respondent-driven sampling (RDS), a network-based sampling method developed for the recruitment of hidden populations. Weighted prevalence estimates and 95% confidence intervals were calculated for all variables of interest using methods that compensate for non-random recruitment patterns.

The first manuscript outlines the lessons learned from doing participatory doctoral research, and provides a guide for students in the form of key recommendations. The second manuscript assessed the prevalence of and risk factors for depression among male-to-female (MTF) and female-to-male (FTM) Ontarians. Our findings indicate that depression is widespread among MTFs and FTMs. Furthermore, multivariable regression analyses revealed that the risk factors associated with depression varied between MTFs and FTMs in Ontario. This research is a first step in understanding the complex mental health issues of a highly marginalized community.

The third manuscript characterized and examined the extent of “do-it-yourself” transitions among trans people in Ontario. While self-performed surgeries and current use of non-prescribed hormones were uncommon, this study indicates that trans people’s experiences with providers may have played a role in their willingness to seek hormones from non-medical sources. Lastly, the fourth manuscript explored the long-term positive and adverse health effects associated with hormone use and SRS. We found no evidence that hormone use among MTF and FTM people in Ontario conferred negative effects on health. While some conditions were relatively common (sleep apnea, high cholesterol, and hypertension), almost all other outcomes were rare. These results are informative and may provide health care providers with the knowledge to make more informed treatment and screening decisions. More specifically, our findings show that the fear of “doing harm” by prescribing hormones to trans people is likely unfounded.

Keywords: transgender, transsexual, male-to-female, female-to-male, Ontario, community-based research, survey, respondent-driven sampling, depression, risk factors, hormone use, sex-reassignment surgeries, self-performed surgeries, non-prescribed hormone use, weighted prevalence estimates, multivariable regression analyses.

CO-AUTHORSHIP

This dissertation is composed of four manuscripts, including one that has been accepted for publication in a peer-reviewed journal [Khobzi N, Flicker S. Lessons learned from undertaking CBPR dissertations: The trials and triumphs of two junior health scholars. *Progress in Community Health Partnerships: Research, Education, and Action*]. The manuscripts were prepared by Nooshin Khobzi as part of her dissertation. They were based on analyses of data from the Trans PULSE Project, a community-based research initiative. Data management activities and statistical analyses were conducted by Ms. Khobzi, and she wrote all manuscripts. Ongoing feedback from Ms. Khobzi's advisory committee and the Trans PULSE team was provided during the preparation of these manuscripts. While Ms. Khobzi was the primary author of all manuscripts, the advisory committee and members of Trans PULSE were co-authors as indicated in the footnote at the beginning of each manuscript. Co-authorship was determined based on the: 1) guidelines for authorship developed by the International Committee for Medical Journal Editors,[1] and 2) extent of assistance given by members of the advisory committee and the Trans PULSE team.

The three manuscripts in preparation for publication will *not* be submitted in the versions presented in this thesis. The manuscripts are mainly the work of Ms. Khobzi, thereby ensuring that the integrity of the academic thesis and Ms. Khobzi as an independent researcher are maintained. However, versions submitted for publication may involve extensive editing and revision by Trans PULSE co-authors. The final research output will therefore entail a greater level of involvement from Trans PULSE members than that obtained for the thesis. This process is in accordance with the principles of community-based research, and is consistent with the Terms of Reference developed by Ms. Khobzi and Trans PULSE to guide their collaboration. Finally, a statement is provided in Appendix A outlining the distinct roles and responsibilities of Nooshin Khobzi within Trans PULSE, given the collaborative process used in completing this dissertation.

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[1] Uniform requirements for manuscripts submitted to biomedical journals: Authorship and contributorship [homepage on the Internet]. Philadelphia, PA: International Committee for Medical Journal Editors. 2009 [cited May 15, 2010]. Available from: http://www.icmje.org/ethical_1author.html.

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LIST OF ABBREVIATIONS AND SYMBOLS

α	alpha value
AA	anti-androgens
AIC	Akaike information criterion
AIDS	acquired immune deficiency syndrome
ANOVA	analysis of variance
BMD	bone mineral density
CBR	community-based research
CBPR	community-based participatory research
CCHS	Canadian Community Health Survey
CCPH	Community-Campus Partnerships for Health
CES-D	Center for Epidemiologic Studies Depression
CET	community engagement team
CFS	chronic fatigue syndrome
CI	confidence interval
CPA	childhood physical abuse
CSA	childhood sexual abuse
CV	cardiovascular
DIY	do-it-yourself
DSM	Diagnostic and Statistical Manual of Mental Disorders
e.g.	exempli gratia (for example)
et al.	and others
E	estrogen
EH	endometrial hyperplasia
FM	fibromyalgia
FTM	female-to-male
GnRH	gonadotrophic-releasing hormone
GP	general practitioner
MT	Metropolitan Toronto
HC	high cholesterol
HDL	high-density lipoprotein

HIV	human immunodeficiency virus
IC	investigators committee
i.e.	id est (that is)
LGB	lesbian, gay and bisexual
MOU	memorandum of understanding
MTF	male-to-female
n	sample frequency
NE	needle exchange
OR	odds ratio
OS	osteoporosis
p	p-value
P	progesterone
py	person-years
PCOS	polycystic ovary syndrome
PTSD	post-traumatic stress disorder
RDS	respondent-driven sampling
RDSAT	respondent-driven sampling analysis tool
SD	standard deviation
SES	socioeconomic status
SHC	Sherbourne Health Centre
SRS	sex-reassignment surgeries
T	testosterone
TDD	traditional doctoral dissertations
TOR	terms of reference
U.S.	United States
vs.	versus
VT	venous thrombosis
y, yrs	years

CHAPTER 1

INTRODUCTION

As members of a gender minority, trans (transgender, transsexual, or transitioned) people face a multitude of challenges that may adversely affect their health and well-being. These include experiences of discrimination and stigma that contribute to feelings of shame, anxiety, and depression, (1-3) as well as reduced educational and employment opportunities. (4, 5) For many trans people, the experience of social marginalization may manifest in access barriers to health and social services. In fact, trans people report being mistreated by the staff of hospital and emergency rooms, and rejected from traditional alcohol and drug rehabilitation programs. (6, 7) Thus, many trans people are often unable to obtain comprehensive health care due to the discrimination to which they may be subjected. (7, 8)

1.1 The Trans PULSE Project

In 2005, the Trans PULSE[1] Project was established to improve the health of trans people by engaging in research that is relevant to, and driven by, community members. Using a community-based research (CBR) framework, Trans PULSE responds to calls for more extensive research about trans communities across Ontario. (9) The Project consists of an effective working partnership, guided by an Investigators Committee (IC) of ten members, seven of whom are trans-identified. The IC is comprised of representatives from community organizations, academic partners, and unaffiliated trans community members. Moreover, Trans PULSE entails a two-phased plan, including: 1) community soundings designed to elicit concerns about a range of health and health care issues among trans people in Ontario, and 2) an in-depth quantitative survey. Findings from Phase I informed the creation of the survey; this thesis draws upon data from Phase II.

1.1.2 Community-based research and respondent-driven sampling

The use of CBR is advantageous as it allows for access to heavily stigmatized populations, (10) and addresses potential issues of distrust with research, clinical and

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[1] Refers to taking the pulse of the community by 1) assessing the health, and 2) exploring the lives and experiences of trans people in Ontario.

academic communities among trans people. (7) Community-based research is an approach to research that serves community interests, encourages citizen participation, and is geared towards effecting social change. (11, 12) It has the potential to 1) provide a stronger understanding of lived experiences; 2) heighten the relevancy of the research to community needs; and 3) facilitate the development of trust and ownership of the research process by community members. (13) Trans PULSE has ensured this by working intently to engage community members in defining project priorities and goals at all stages, and in building community capacity through the research process.

The sampling strategy employed in the quantitative phase of Trans PULSE, respondent-driven sampling (RDS), has been shown to work well when integrated into CBR projects, particularly where participants have served an essential role in the recruitment process. (14) Furthermore, RDS is designed for the recruitment of "hidden" populations (i.e. those that cannot be easily enumerated and for which no sampling frames exist) through social networks. (15, 16) While respondent-driven sampling is similar to snowball sampling in that it involves chain referral, RDS allows for a more methodologically rigorous quantitative analysis. By weighting the sample to compensate for the fact that it was obtained in a non-random way, RDS provides externally valid, probability-based estimates of population characteristics, (17) information that is lacking in the field of trans health research. (18) More specifically, RDS allows for the calculation of selection probabilities, provides means for controlling bias resulting from differences in the sizes of personal networks, (15, 17) and provides methods for analysis that take into account the networked nature of the recruitment process. (19, 20)

Phase II of the Trans PULSE Project consists of a large, probability-based sample of socially networked trans people –the first of its kind thus far. Recruitment was carried out between May 2009 and April 2010, and the final sample comprised 433 trans Ontarians 16 years or older. Given time constraints, delays in launching the survey, and the slow pace of data collection, two of the analytic chapters (5 and 6) were based on a preliminary dataset of 308 respondents recruited from May 2009 to the first week of January 2010. The full dataset (N=433) was used for Chapter 4. Proportionate to the population, both the preliminary and final sample sizes used for this thesis are greater than those reported in recently completed, large U.S. internet studies (e.g. Rosser et al.

(21)).

1.2 Thesis objectives

The focus of this thesis was to develop an understanding of, and draw attention to, the health and service access issues faced by trans Ontarians. The present thesis addresses several important gaps in the literature, and is particularly relevant given the paucity of trans-specific literature in the Canadian context.

This thesis consists of three main objectives (listed below), and one supplemental (or secondary) objective: to develop guidelines on the processes involved in doing a CBR dissertation. For graduate students focusing on health issues pertinent to vulnerable communities, CBR methods may serve as an appropriate mode of inquiry. However, while there are a number of useful guides on conducting, writing, and completing traditional doctoral dissertations, (22-24) there are few similar resources for students engaged in CBR. While supplemental, this objective is addressed in the first article (Chapter 3) in order to shed light on the participatory framework used in completing my thesis. This is relevant in providing key background information with regard to the context in which my thesis work was conducted.

1.2.1 Objective 1

Several trans-specific studies outside of Canada have reported high prevalences of depression, ranging from 8% to 72%. (2, 5, 25-33) Variations in results are likely due to differences in sampling strategies and the definitions of depression used. However, the high prevalence estimates of depression are not surprising given the marginalized status of the trans community, and the resulting stigmatization, discrimination and harassment experienced by many trans people. (34)

At present, there are no comparable estimates of depression in Canada’s trans communities, and much of the existing research has not employed standard, valid and reliable measurement tools. For example, one study reported spontaneous changes in depressive mood; (26) however this was not clearly defined and was somewhat unclear as to the direction of change. In another study, participants reported being more emotional and depressed following initiation of hormone therapy. (35) Research findings were based on participants’ own perceptions of change in mental well-being, thus depression-related data were obtained using qualitative methods rather than a standardized measurement tool. As such, one of the principal aims of this thesis was to determine the prevalence of, and risk factors for, depression among trans people using a valid and reliable measure (the Center for Epidemiologic Studies Depression Scale). This research is the first to examine the: 1) prevalence of depression among trans people in Canada, specifically Ontario, using a novel approach (RDS) that allows for the calculation of asymptotically unbiased estimates, and 2) effects of potential general population and trans-specific risk factors on depression.

1.2.2 Objective 2

For many trans people, mental health issues are instigated or exacerbated by limited and inappropriate provisions of care. (36, 37) In Phase I of the Trans PULSE Project (community soundings), participants reported difficulty in finding trans-competent health care providers, both in terms of providing a trans-friendly environment and having specific knowledge of trans health issues. (38) Negative experiences, or fears of having negative experiences, and financial considerations may contribute to the avoidance of health care settings and even self-treatment. In fact, the use of non-prescribed hormones is widespread, with U.S. estimates ranging from 3% to 71%, (39-42) and one study reporting that 23% of male-to-females in New York City were currently taking hormones from a non-medical source. (42) These findings are troubling as non-prescribed hormone users may be at increased risk of adverse health problems due to irregular dosing and monitoring. (43) Given the lack of similar epidemiologic research in Canada, another aim of this dissertation was to characterize and examine the extent of self-performed surgeries and non-prescribed hormone use in Ontario. This study is among the first to characterize "do-it-yourself" (DIY) transitions among trans people, and it provides the groundwork necessary for future research, particularly in terms of areas for improvement in the care provided by physicians. Furthermore, this research highlights the need for longitudinal studies, which may allow for more detailed quantitative analyses of the factors associated with the use of non-prescribed hormones.

1.2.3 Objective 3

Many trans people seek hormonal and surgical interventions in order to align their outward physical sex with their internal gender identity. These services act to eliminate the hormonally induced secondary sex characteristics or genitalia of the natal sex while inducing those of the felt gender. (44) For the most part, there are few contra-indications against cross-sex hormone administration to those who are relatively young and healthy. (44, 45) However, there are *both* beneficial and adverse health effects related to medical transitioning. Research in this area is typically based on clinical studies consisting of a small number of participants. Furthermore, there is limited research on the health effects of medical transitioning among trans Canadians, as almost all of the epidemiologic studies in this field have been conducted in Europe and the United States. Therefore, the final aim of this thesis was to explore the long-term positive and adverse health effects associated with exposure to cross-sex hormones and surgeries among trans Ontarians.

A secondary aim of the preceding analysis was to generate hypotheses that can be tested in future clinical or population-based prospective studies of trans people in Canada. While it is exploratory in nature, this research provides information for trans people and health providers to make more informed treatment and screening decisions. By focusing on both positive and adverse health outcomes, there is the potential for a shift in discourse around the effects from one that is fear-based in terms of risks. The exploratory analysis further addresses a gap in the literature, one that fails to describe both the positive and negative effects of hormonal and surgical medical treatment, (46) particularly in the Canadian context.

1.3 Thesis organization

This dissertation follows an integrated-article format, and is organized into seven chapters. Chapter 2 provides a review and methodological critique of the literature on depression, “do-it-yourself” transitions, and the health effects of cross-sex hormones and surgeries in the trans community. Chapters 3 to 6 contain the articles that address the specific objectives of this thesis. Chapter 3 describes the advantages and challenges of a CBR dissertation, and presents process recommendations for conducting a successful doctoral project using CBR methods. It has been accepted for publication in *Progress in Community Health Partnerships: Research, Education, and Action*. Chapter 4 assesses the prevalence of and risk factors for depression among male-to-female[2] and female-to-male[2] Ontarians. This is followed by Chapter 5, which characterizes and examines the

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[2] Male-to-female and female-to-male represent gender spectrums, i.e. respondents who were assigned a sex at birth but whom currently identify as that of the opposite sex, or fall under the umbrella of trans identities.

extent of “do-it-yourself” transitions. Chapter 6 explores the positive and adverse health effects of exposure to cross-sex hormones and surgeries among trans people in Ontario. Finally, in Chapter 7, a summary and discussion of the main findings is provided.

Full details of the methodology employed in this thesis are provided in Appendix B, and in each of the articles. Furthermore, the present dissertation was developed in collaboration with the Trans PULSE research team. As such, a statement is provided in Appendix A outlining my distinct roles and responsibilities within the Trans PULSE Project. Note that due to the integrated-article thesis format, some sections (e.g. elements of the literature review and methods) are repeated.

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CHAPTER 2

LITERATURE REVIEW

Depression, “do-it-yourself” transitions, and the health effects of cross-sex hormones and surgeries in the trans community: A review and methodological critique

2.1 Introduction

This chapter examines the literature on the health effects of hormones and sex reassignment surgeries, depression, and “do-it-yourself” transitions among trans people. After outlining some important definitions, a brief overview is provided on the prevalence of transgenderism, along with methodological issues in estimating population prevalences. This is followed by a review of the literature on medical transitioning, related controversies, and the positive and adverse health effects of cross-sex hormones and surgeries. Following this, the role of particular factors in affecting depression amongst trans people is reviewed. The consequences of denying access to medically supervised trans-related care are also discussed. Finally, the limitations of the literature on trans health are examined and critically appraised.

2.1.1 Definition of trans

Trans is an umbrella term used to describe people of various gender identities, including but not limited to persons who identify as transgendered, transsexual, female-to-male (FTM), male-to-female (MTF), genderqueer, non-gendered, two-spirited, cross-dressers, drag queens or drag kings. (1) Trans also includes those who may not identify with these terms, but rather as simply men or women with a history of transitioning sex. More specifically, transsexuals are those who live as members of the sex other than the one they were assigned to at birth. (2) Transsexuals tend to seek out hormonal or surgical sex reassignment, and some may also identify as FTM or MTF. (3, 4) Transgender or genderqueer people are those whose gender identity is not completely that of a man *or* woman; their gender identity and expression does not adhere to binary gender norms. (2) Genderqueer is a term coined by trans youth who experience a fluid sense of both their gender identity and sexual orientation, and who do not want to be constrained by absolute (static) conceptualizations. (1) Two-spirited is used as a descriptor by many trans people of Aboriginal descent to capture their true personae as encompassing two genders, instead of the more limiting binary categorization. (1) Cross-dressers are individuals who dress in clothing of the opposite sex for emotional satisfaction, erotic pleasure or both. (5) Finally, drag queens/kings are individuals who cross-dress to entertain, to challenge gender stereotypes, or for personal satisfaction. (5)

2.1.2 Estimating the prevalence of transgenderism

It is difficult to accurately estimate the number of trans people in most, if not all, countries. (3, 6) The difficulty arises from several factors; firstly, trans community members use dynamic terminology when describing their gender identity. (3) The term "trans" actually encompasses a number of categories, (5) as defined in section 2.1.1. In fact, gender is understood as having a strong cultural definition in addition to precise biological and psychosocial components. (5) Defining and measuring trans identities is thus complicated due to the use of critically unexamined and socially constructed categories. (5) Secondly, some community members are "unwilling to allow themselves to be labelled or categorized by labels fixed by someone else." (3) This is compounded by the fact that trans people are a highly marginalized and stigmatized sector of the general population, (3, 5, 7) and thus many do not want to be identified. (7, 8) The trans community is therefore considered a "hidden" population, (5) from which it is difficult to obtain a representative sample. As a consequence, standard epidemiological survey methods do not allow for accurate estimates of prevalence. (5) Regardless, assessing the demography of trans communities in Canada has not been attempted. For example, population-based national health surveys and more specifically, government censuses never include ways to ascertain trans identities in the general population. (5)

Despite these limitations in estimating the number of trans people, the American Psychological Association has recently reported that as many as 2-3% of natal males engage in cross-dressing, at least occasionally. (6) Commonly cited estimates from the Netherlands indicate that 1 in 11,900 natal males and 1 in 30,400 natal females are transsexual. (6, 9, 10) However, several caveats in calculating prevalence must be noted. Firstly, prevalence estimates have been shown to rise with increased tolerance among the medical profession and the wider population, and where services are available and accessible. (11) Secondly, recorded prevalence rises over time as more people seek treatment and as more receive sex reassignment surgeries. (11)

It is unclear as to whether the above estimates are generalizeable to the trans community in Ontario. However, if these estimates were true, then nearly every trans adult in Ontario (population of approximately 12,900,000 (12)) would be currently a client at Sherbourne Health Centre (SHC) in Toronto, (2) which alone has 579 trans-identified clients (as of September, 2010). (13) These numbers do not include trans individuals outside of Toronto, those who do not openly identify as trans (i.e. living stealth), and those receiving trans-related care from physicians or clinics other than the SHC. (2) As such, the preceding numbers may be underestimating the prevalence of transgenderism in Ontario.

2.2 Trans health and medical transitioning

2.2.1 Hormone therapy and sex reassignment procedures

For MTF transitions, endocrinologic feminization occurs via a) direct or indirect suppression of the effects of androgens, and b) induction of female physical characteristics. (14, 15) Androgen suppression is achieved by using agents that a) suppress the production of gonadotrophic-releasing hormone (GnRH) (GnRH antagonists, progestational agents), b) suppress the production of luteinizing hormone (e.g. cyproterone acetate, progestational agents), c) interfere with the production of testosterone and its metabolites (e.g. spironolactone, finasteride, cyproterone acetate); and d) interfere with the binding of androgens to receptors in target tissues (e.g. spironolactone, flutamide, cyproterone acetate). (14, 15) Estrogen is the main agent used to induce female characteristics. (14, 15)

For FTM transitions, endocrinologic masculinization is achieved by the use of testosterone to induce male physical characteristics. (14, 15) Progestins are not usually included in hormone therapy for FTMs, but can be used for a short period of time to assist with the cessation of menses. (15) GnRH antagonists, which cause a decrease in estrogen levels, may be used if testosterone or progestins are not tolerated. (14)

Sex-reassignment surgery (SRS) includes a spectrum of medical surgeries which transform physical sex characteristics into those aligned with the desired sex. (7) For MTFs, these may include: chondrolaryngoplasty (tracheal shave), facial feminization surgeries, vaginoplasty (where the penis is converted into a neo-vagina); breast augmentation; penectomy (removal of the penis); and orchiectomy (removal of the testes). For FTMs, SRS may include: phalloplasty, where skin grafts are used to construct and attach a penis; metoidioplasty, where the enlarged clitoral tissue resulting from testosterone therapy is partially cut loose so it can function like a penis; testicular implants; chest reconstruction (breast tissue reconstructed to produce a male chest); hysterectomy; vaginectomy (removal or closure of the vagina); and salpingo-oophorectomy (removal of the ovaries and fallopian tubes). (7)

2.2.2 Controversies regarding trans identity and medical transitioning

The field of trans health is faced with some important controversies; while not related to this thesis, these will be addressed in order to provide the context within which much of the trans-related research is conducted, as well as the conditions to which many trans people are exposed. The primary source of debate arises with regard to trans identity and mental health. Currently, many trans people receive medical care under the diagnosis of Gender Identity Disorder (GID) in the Diagnostic and Statistical Manual of Mental Disorders (DSM) IV-TR. (16) However, it is often argued that trans identity is *not* a mental disorder and should be a medical, rather than psychiatric, diagnosis. (16, 17) In addition, the use of diagnostic systems is viewed as a tool of social control, where social biases drive the creation and maintenance of diagnoses that label gender expressions differing from the norm as "psychiatric". (18) The controversy continues to grow with the fifth edition of the American Psychiatric Association's DSM-5, (19) which is currently undergoing revisions and is set to be published in May 2013. (20) Some researchers argue that there is a lack of scientific reliability or validity studies supporting the GID diagnosis criteria in DSM-IV (19) and little evidence of pathology. Much of the distress faced by people with gender identity issues is believed to arise from socialization problems; furthermore, gender roles are not seen as dichotomous. (19) In fact, evidence of gender variant expression has existed cross-culturally and throughout history. (18) Others argue that GID should remain in the DSM, but not as a disorder. Instead, GID should be replaced with a term such as gender dysphoria, which would describe someone who is persistently distressed with his or her physical sex characteristics rather than having strong and persistent cross-gender identification. (19) Similar recommendations for changes to the DSM were put forth in a consensus statement published by the World Professional Association for Transgender Health (WPATH). (21) However, under recently proposed revisions to the DSM-5, GID will be replaced with "Gender Incongruence". (22) The American Psychiatric Association has also announced proposed changes to the diagnostic criteria. (22) In general, DSM reform is expected to reduce stigma surrounding trans identity as it did 30 years ago with homosexuality. (19)

Researchers on the other side of the debate hold the view that certain behaviours are part of normal development (e.g. the fulfillment of gender-based roles in maturing children) and therefore it is legitimate for psychiatrists to identify a disorder in those who reject these roles. (19) The contention that gender is not dichotomous is also rejected by these researchers; it is believed that all humans are biologically one or the other sex and that many cultures view gender as a dichotomy. (19) Failing to identify with one's natal gender is thus a dysfunction. Furthermore, transsexualism is not seen as a normal sexual variant and removing GID from the DSM may "legitimize behaviours that are actually disadvantageous" to the persons. (19) While a formal recognition of GID has affirmed its place as a valid health concern, the development of an authentic therapeutic relationship is impaired when the diagnostic evaluation casts the clinician in the role of "gatekeeper". (18) Approval for treatment rests on one's conformity to the diagnostic criteria, thus clients who do not "fit" the criteria outlined may be forced to lie about their experiences or identity, thereby reinforcing the development of a false relationship between therapist and client. (18)

In addition, there is some controversy surrounding SRS. Sex-reassignment surgeries allow harmony between body and self-identity, and for congruent genitalia. The latter allows individuals to appear nude in the presence of sex partners, or in venues such as swimming pool change rooms, without violating social taboos. Having congruent genitalia also reduces one's risk of harm in the event of arrest or search by police, or other authorities. (7, 23) However, not all are convinced by the benefits of SRS. Opponents argue that hormones and SRS are "superficial substitutes for the major psychological adjustments necessary in changing one's gender," (23) while others question whether transsexualism is a medical condition or social problem. A fairly extreme viewpoint was voiced by Janice Raymond in 1979 in *The Transsexual Empire: The Making of the She-Male*. (24) The author claims that sex-reassignment surgeries reinforce stereotypic gender roles rather than challenging socially constructed sex roles.

She has even equated sex reassignment with rape, stating that “All transsexuals rape women’s bodies by reducing the real female form to an artefact, appropriating the body for themselves…” (24)

Finally, a major source of controversy is the concept of autogynephilia (love of oneself as a woman) developed by psychologist Ray Blanchard. (25) It is a label ascribed to a male’s propensity to be sexually aroused by the thought of himself as a female. In Blanchard’s view, autogynephilia, like heterosexuality, homosexuality, or pedophilia, is characterized “by an individual’s tendency to respond with penile erection to the eroticized stimulus, but also includes the capacity for pair-bond formation…with that stimulus.” (25) According to Blanchard and other advocates of his theory (e.g. Bailey (26)), there are only two gender identity disturbances in natal males: homosexual transsexuals (or “true” transsexuals) and autogynephiles (more specifically, MTFs who are bisexual or attracted to women). (25) Several concerns regarding this theory have been raised by the trans community and researchers; for example, many take offence with the paraphiliac categorization of trans people solely based on sexual orientation. (27) As noted by trans advocates, assuming that “trans identities amount to a sexual-only motivation is short-sighted and…reminiscent of pathologizing women’s sexual pleasure under ‘nymphomania’.” (27) Furthermore, Blanchard’s categorizations fail to address and account for the experiences of FTMs.

Psychologist John Michael Bailey’s book, *The Man Who Would Be Queen: The Science of Gender-Bending and Transsexualism*, (26) received severe backlash for its role in further popularizing the concept of autogynephilia. (28-30) The strong reaction was undoubtedly related to the history of criminalization, involuntary committal to mental institutions, denial of basic rights, relentless harassment and assault faced by the trans community. (29) Psychiatry has a long history of participating in the stigmatization and abuse of disenfranchised people, (30) as well as unnecessarily pathologizing trans identities. (31) The resentment and resistance within the trans community to having their identities and realities defined by non-trans researchers is a main factor contributing to the controversies surrounding Bailey’s book. (31) Bockting outlines some of the issues in further detail, (28) many of which also apply to Blanchard’s work: 1) the book is accessible to a lay audience and through its non-academic style makes a convincing case for gender diversity reduced to the two types; 2) the book fails to offer a balanced and well-cited review of the scientific literature, and ignores research that provides evidence of much greater diversity in gender identity; 3) the focus is limited to MTFs, however research on FTMs attracted to natal males shows that they do not fit into the reduced typology; 4) Bailey claims that scholars and clinicians who provide access to sex-reassignment services according to the WPATH guidelines are ignorant of the homosexual vs. autogynephilic typology –mainly because the two types seldom mix and gender clinics only see autogynephilic transsexuals while homosexual transsexuals tend to obtain their hormones on the black market; 5) the preceding claims are not representative of the actual experiences of scholars and clinicians; and 6) Bailey's perceptions are possibly skewed by his reliance on very limited field work with a small sample of trans informants in Chicago gay bars. While autogynephilia may exist in certain trans individuals, it is inappropriate to conclude that *all* MTFs fall either within this category or "homosexual transsexuals".

In general, the controversies surrounding Bailey's book, the theory of autogynephilia, and the inclusion of gender identity disorder in the DSM may contribute to the creation of (or continued) distrust towards researchers and clinicians among trans individuals. This lack of trust adds to the challenges of delivering health services to trans people and threatens the participation of community members in research meant to improve their well-being. (28)

2.2.3 Overview of trans health

Hormonal and surgical services are essential for the health and social integration of many trans people, who may suffer from a constant feeling of psychological discomfort as far as the appearance of the anatomical sex is concerned. (32) Consequently, a relief from this discomfort is sought through hormonal and surgical sex change. (32, 33) However, this is only a concern for those who *need* or *want* to undergo a medical transition. For trans people, the primary goal of hormone therapy is: 1) to eliminate, in so far as possible, the hormonally induced secondary sex characteristics of the birth sex; and 2) to induce those of the desired sex. (34)

There are few contra-indications against cross-sex hormone administration for relatively young and healthy trans people. (34, 35) Contra-indications against estrogen use are a strong family history of breast cancer or prolactin-producing pituitary tumour, and against androgen use severe lipid disorders with cardiovascular (CV) complications, (34) such as hypercholesterolemia and hypertriglyceridemia. (36) Contra-indications against high dose use for either sex steroid are serious CV disease, cerebrovascular disease, thromboembolic disease, obesity, uncontrolled diabetes mellitus, and serious liver disease. (34, 36)

The following section includes a compilation of studies that address both the positive and adverse effects associated with cross-sex hormone therapy and SRS. Such an approach is adopted in response to a gap in the literature, one that fails to describe the positive as well as negative effects of hormonal and surgical medical treatment, (4) particularly in the Canadian context. Short-term effects of transitioning (for example, breast growth, beard growth, muscle mass increase, changes in libido or sexual desire, complications due to surgery) are well documented and included in the review only to provide an overall picture of the transitioning process. The examination of long-term health effects, which are not well-studied, is expected to better inform the provision of health care to those undergoing medical transitions. The review is stratified according to gender spectrum (MTF or FTM) due to the distinct effects of feminizing and masculinizing hormones and surgeries.

2.2.4 Positive health issues related to medical transitioning

1. Feminizing hormone therapy and sex reassignment surgeries

The most important effect sought by MTFs is the induction of feminine physical characteristics. Several studies have observed reductions in body hair growth and sebum production through the use of estrogens plus antiandrogens (33, 37, 38) –agents that block circulating androgens and sebum production almost completely, but inhibit hair growth slowly. (37) Measurable decreases in testosterone levels are also reported, (38, 39) along with reductions in testicular volume (40) and spontaneous erections. (38, 41) While the appearance of the male genitalia is not changed greatly by estrogen therapy, the reduction in volume is considered by patients to be a sign of progress.

Moore et al. (33) reported additionally positive effects, including gynecomastia, enlarged areolae and nipple, softened skin and a favourable redistribution of fat as a result of feminizing hormone therapy. Maximal breast growth (or gynecomastia) after 2 years was also reported by Meyer et al. (41) In another review, an increase in breast size was reported to begin 2-3 months after the start of estrogen-based hormone treatment in MTFs. Levy et al. (35) indicated that only one-third of MTFs achieved more than a B cup, and at least 60% “required” breast augmentation. Furthermore, breast development seemed to be more pronounced in subjects with higher body mass indices. (35)

A prospective, clinical study from the Netherlands further examined the effect of sex steroids on regional fat depots (sites for fat storage) and thigh muscle mass in 20 MTFs. (42) Elbers et al. (42) found that treatment with ethinyl estradiol in MTFs induced a significant increase in all subcutaneous fat depots, with a lesser but proportional increase in the visceral fat depot and a decrease in thigh muscle area. Such changes resulted in a more female type of fat localization. However, Elbers et al. (42) noted that measurements of food intake were inadequate and therefore could not be used to assess whether changes in energy intake induced by hormone therapy had influenced the observed changes in fat deposition. Feminizing hormones can also have positive effects on sexual functioning and aggressive behaviours. Upon androgen deprivation, MTFs can experience reductions in proneness to anger and aggression. (43) Furthermore, those who have undergone surgery report improvements in sexual experience, (44-46) a finding highly correlated with satisfactory cosmetic results. (47) In a small, qualitative study of postoperative MTFs, Rehman et al. (48) found that many continued to engage in sexual intercourse and were able to orgasm following SRS. Those who were able to orgasm reported that the feeling differed post-surgically; for example, as men, the patients felt an intense propulsive sensation at the tip of the penis. As women, orgasms were described as a generalized “warm” feeling, a total body sensation building up gradually to a climax that resolves more slowly. (48) Similar findings with regard to improved sexual function and satisfaction were reported in a recent meta-analysis of 1093 MTFs (1833 trans individuals in total) who had received hormonal therapy as part of sex reassignment. (49)

Beneficial outcomes of feminizing hormones are not limited to the desired changes in secondary sex characteristics and improvements in sexual function, but also extend to positive effects on bone mineral density (BMD). This has been demonstrated in several studies; firstly, the effect of changes in hormonal environment on bone metabolism was examined by Lips et al. (50) Transilial bone biopsies were obtained from

MTFs who had received estrogen and antiandrogen therapy for 8 to 41 months. There was no difference in bone volume, bone surface, or trabecular thickness between transsexuals and controls (healthy natal males). Lips et al. (50) concluded that antiandrogen and estrogen treatment may have suppressed bone turnover and was not associated with bone loss. However, findings were based on a small group of participants (23 MTFs, 11 controls). In a larger, one-year follow-up study, van Kesteren et al. (51) of the Free University Hospital in Amsterdam found that estrogen (in combination with antiandrogens) decreased bone turnover, and subsequently lead to an increase in BMD of the spine among MTFs. (51) Another examination of the long-term effects of cross-sex hormone therapy on the human skeleton revealed that BMD increased significantly after 1 year, but decreased again to baseline levels after 28-63 months of hormone therapy in 20 MTFs. (52) Patients had undergone an orchiectomy 13-35 months after the start of hormone use; thus, continued estrogen treatment may have prevented bone loss after testosterone deprivation via gonadectomy. (52) Note that BMD measurements were performed only at the level of the lumbar spine, which may limit the generalizability of findings.

In a cross-sectional study from Spain, researchers examined the effect of estrogen on bone and mineral metabolism in 27 pre-surgical MTFs, who had been taking estrogen for a minimum of three years, and 26 healthy natal males who had never received estrogenic hormones. (53) No significant differences in crude BMD were detected between the trans and non-trans groups; however, after adjusting for weight and height, the trans group showed higher BMD values, both in the lumbar spine and femoral neck. Therefore, Sosa et al. (53) concluded that chronic administration of estrogens in MTFs may produce an increase in BMD. Similar results were reported in a retrospective study of conducted by Mueller et al. (54)

Ruetsche et al. (55) explored the effects of long-term hormone therapy on cortical and trabecular BMD in 24 post-surgical MTFs recruited from the outpatient department of the University Hospital of Berne. The patients were treated with feminizing hormones for a median of 2.1 years before SRS and 9.7 years after surgery. The authors concluded that BMD was preserved over a median of 12.5 years under antiandrogen and estrogen combination. However, while participants had all received the same hormone regimen, the cross-sectional study design precluded inferences of causality. Similar findings were reported in a much larger, retrospective Dutch study. (56) Gooren et al. (56) found that bone mineral density was preserved during cross-sex hormone administration in 2236 MTFs who had undergone gonadectomy. (56) In particular, estrogens alone were capable of maintaining BMD in MTFs. (56)

Feminizing hormones also contribute to improved cardiovascular health. For example, Polderman et al. (57) found that endothelin (a vasoconstrictor suspected of playing a role in the pathogenesis of hypertension and atherosclerosis) decreased during hormone therapy in MTFs. (57) The authors also reported higher endothelin levels in non-trans men vs. non-trans women, and concluded that sex hormones may modulate endothelin levels, thereby contributing to the understanding of sex-associated differences in susceptibility to atherosclerotic disease. (57) Evidence suggests that the benefits of estrogens on atherogenesis may be due to estrogens' properties as an antioxidant, promoting endothelial vasodilators, inhibiting vasoconstrictors, as well as inhibiting local thrombogenesis in the areas of atherosclerotic plaques. (36)

Elbers et al. (58) assessed the effects of sex steroids on individual components of the insulin resistance syndrome in a prospective study of 20 MTFs in the Netherlands. Differences in sex steroids are believed to be, at least in part, responsible for a lower risk of death from cardiovascular disease in women. (58) In this study, estrogens and anti-androgens increased high-density lipoprotein (HDL) (good) cholesterol and decreased low-density lipoprotein (bad) cholesterol. However, because increases in detrimental components were also observed, the findings did not show unequivocally that estrogens were beneficial to the CV profile of MTFs. Furthermore, the effects of potentially confounding variables (e.g. diet, body mass index) were not accounted for in this study.

Finally, researchers in Australia examined the effects of long-term estrogen therapy on vascular function among MTFs, comparing findings with those observed in natal males and premenopausal (natal) females. (59) Flow-mediated vasodilation was similar in MTFs and natal females but greater than that in natal males. Male-to-females had HDL-cholesterol levels similar to those in natal females and greater than those observed in natal males. On the other hand, triglyceride levels were greater in trans patients than in natal males and females. (59) The authors concluded that long-term estrogen therapy appeared to improve vascular function in MTFs and occurred despite higher triglyceride levels. Nonetheless, the study was based on a small number of trans participants (n=14), and may therefore suffer from reduced external validity.

Sex-reassignment surgeries can also contribute positively to the health of MTFs, as a result of the removal of body parts (e.g. testes) that can develop hormone-related cancers. (60) For example, van Haarst et al., (61) while reporting a case of metastatic prostate carcinoma in a 63-year-old trans patient, argue that the occurrence of this cancer is in fact rare in MTFs. In general, orchiectomy in early life seems to protect against the development of carcinoma of the prostate; however, orchiectomy in middle-aged men may not confer this protection. (61) On the other hand, orchiectomy reduces the risk of testicular cancer to zero, while penectomy protects against penile cancer. Such protection is a beneficial outcome of transitioning that is rarely acknowledged in the literature.

2. *Masculinizing hormone therapy and sex reassignment surgeries*

Positive outcomes in terms of the induction of masculine characteristics include the cessation of menses, (41, 62) increased clitoral length and substantial increases in facial and body hair. (37, 41) Hormone therapy in FTMs also results in elevated testosterone levels, (63) increased muscle mass and a redistribution of fat depots conferring a preferred masculine body type. (42, 63, 64) Masculinizing hormone therapy contributes to additional positive effects, including deepening of the voice, (65) breast atrophy (33) and decreased blood estradiol and progesterone. (38)

The benefits of cross-sex hormone therapy with regard to sexual functioning and aggression are more common in FTMs than MTFs. A review conducted in 1992 reported enhanced sexual interest, fantasies and initiative after androgen administration. (66) Furthermore, no systematic effects of androgens on aggression and anger were found. In another study, the majority of nine postoperative FTMs (four had a phalloplasty, and all had had a mastectomy and hysterectomy) were orgastic and experienced increased sexual satisfaction. (67) Additionally, general satisfaction with surgical results was 89%, and the frequency of sex increased by 100%. Similar results have been reported by others. (33, 38, 43, 46, 47, 49, 62)

Hormone therapy and SRS can also positively impact on socioeconomic status. For example, Bodlund and Kullgren (68) examined social, psychological, and psychiatric outcomes in 19 patients (nine FTMs and ten MTFs) in the process of medically transitioning. Patients, recruited from two regions of Sweden, were followed for five years. The FTM group was found to have a slightly better outcome compared with MTFs. In particular, improvements in socioeconomic status (based on patients' subjective opinions and scored as worsened, unchanged, or improved) and establishing or maintaining relationships was observed when compared to MTFs.

As observed in MTFs, positive outcomes related to BMD have been reported in persons receiving masculinizing therapy, although such reports are uncommon. One prospective study investigated the effects of hormone therapy on BMD and bone metabolism in 35 FTMs. (51) The researchers found no significant changes in urinary parameters of bone resorption; pretreatment values of spinal BMD also did not differ significantly from the values measured after one year. (51) However, bone formation increased, as indicated by an increase in alkaline phosphatase –a serum parameter of bone turnover. Another study examined bone health in 15 FTMs who had undergone hysterectomy and bilateral oophorectomy, after an average of 39 months treatment with testosterone. Patients showed intact trabecular bone structure and increased cortical thickness with low bone turnover indices compared to 11 healthy natal males and eight postmenopausal (natal) females. (35)

Positive results were also observed in a study of 15 FTMs prospectively enrolled for observation at Boston University School of Medicine. (69) After 2 years of treatment with testosterone esters, there was a significant 7.8% increase in mean hip BMD and eleven subjects had a 3.1% increase in BMD at the spine. (69) A cross-sectional study of 15 FTMs conducted at the University Hospital of Berne found that BMD was preserved, or at sites rich in cortical bone, increased to normal male levels under a median of 7.6 years of androgen therapy. (55) Furthermore, Gooren et al.'s (56) clinical experience with 876 FTMs indicated that testosterone administration maintained bone mineral density following oophorectomy. This is due to the fact that testosterone is converted to estradiol, resulting in circulating estradiol levels above the plasma level critical for preserving BMD in natal males. (56)

While feminizing hormones have been found to confer benefits to the cardiovascular system, similar findings have not been reported in FTMs. One study, however, found that testosterone administration in 17 FTMs had an antithrombotic effect, which indicates a reduced risk of venous thrombosis. (70) In another study, researchers from Germany and the Netherlands found no major side effects associated with parenteral long-acting testosterone undecanoate administered to 12 FTMs. (71) Plasma measurements, taken at baseline and after one-year, showed a small but significant decrease in plasma cholesterol and LDL, but plasma HDL did not change significantly. (71) In this case, masculinizing hormones did not have deleterious effects on cardiovascular risk parameters and lead to minor improvements in risk profile; however, findings were based on a small sample of trans participants. Finally, a review by Gooren et al. (72) showed that testosterone administration to FTMs increased HDL cholesterol; blood pressure and arterial stiffness were unaffected by hormone treatment. (72)

Individuals undergoing masculinizing SRS can also expect positive outcomes, as a result of reductions in hormone-related cancer risks, including breast, endometrial, and ovarian cancers. (60) For example, Hage et al. (73) reported two cases of ovarian cancer in FTMs; however, they also noted that such cancers can be prevented if salpingo-oophorectomy is performed. Similarly, hysterectomy protects against uterine cancer, endometrial hyperplasia and endometrial cancer. (38, 74) Following this logic, it is almost certain that FTMs experience reduced risks of breast cancer once they undergo chest reconstruction and a decreased risk of vaginal cancer if a vaginectomy is performed.

2.2.5 Adverse health issues related to medical transitioning

1. Feminizing hormone therapy and sex reassignment surgeries

While there are positive effects associated with feminizing hormone use, the literature is replete with studies documenting adverse outcomes related to transitioning. One of the more severe and commonly cited adverse health effects is the increased risk of thromboembolic disease in persons receiving feminizing hormones. This was evidenced in a retrospective study of 303 MTFs who had been administered estrogen and antiandrogens. (75) A clinically serious side effect of estrogen therapy was venous thrombosis of the legs and pulmonary embolism, which occurred most often during the first year of treatment. In the 235 MTFs who had undergone SRS, 1.7% had been diagnosed postoperatively with venous thrombosis or pulmonary embolism. This low incidence was attributed to a discontinuation of hormone treatment at least 4 weeks before surgery. (75)

As a follow-up to the above study, van Kesteren et al. (76) reviewed the files of 816 MTFs seen in the outpatient department of Free University Hospital between 1975 and 1994. Standardized morbidity ratio and standardized incidence ratio for morbidity were calculated from age-gender-specific rates from the general Dutch population. The authors observed a 20-fold increase in the incidence of venous thrombosis; in 36 subjects venous thrombosis was most likely to have been caused by estrogens and antiandrogens. (76) The annual incidence of venous thrombosis from one to 12 years of treatment was, on average, 0.4%. This incidence compared to a 0.005-0.01% per annum spontaneous incidence in the general (young) population. (35) Toorians et al. (70) also found an increased risk of venous thrombosis in 30 MTFs receiving estrogen, particularly oral ethinyl estradiol. Overall, the absolute risk of venous thrombosis remains relatively low and may decrease with duration of use. (35) The rates of venous thrombosis and pulmonary embolism have in fact declined with the use of transdermal estrogens. (15) Furthermore, Moore et al. (33) report that risks to MTFs are likely dose-related; for example, estrogen administration to natal females for contraception has demonstrated dose-dependent relationships to venous thromboembolytic disease and pulmonary embolism.

Feminizing hormones have also been linked to other conditions of the cardiovascular system. Asscheman et al. (75) reported 14 cases of hypertension in their retrospective study of 303 MTFs; however, four had pre-existing hypertension, while ten developed high blood pressure during sex steroid treatment. The authors also described two cases of myocardial infarction (in a 45 and 50-year old, of which both had a strong family history of heart disease and one smoked 50 cigarettes per day) and one case of transient ischemic attack. (75)

One case of stroke was reported by Biller and Saver in a 27-year-old MTF, who had been receiving conjugated estrogens, medroxyprogesterone, spironolactone, and estradiol. (77) Upon cessation of hormone therapy and administration of daily aspirin, no further clinical events occurred. (77) In addition, van Kesteren et al. (76) observed 5 cases of transient ischemic attacks and one case of non-fatal intracranial haemorrhage (among 816 MTFs) during estrogen therapy. However, morbidity from myocardial infarction was possibly lower than the general male Dutch population, with a standardized incidence ratio of 0.50 (95% confidence interval, 0.24-0.91). Finally, De Cuypere et al. (47) reported that 21% of their MTF patients developed hypertension during sex steroid treatment, 7.1% experienced hypothyroidism and hyperlipidemia, and one patient suffered from a stroke. While data were collected using a clinical, longitudinal study design, the results must be interpreted with caution given the small sample size (32 MTFs), and the lack of control for potentially confounding variables.

Feminizing hormones can also induce adverse effects associated with the metabolic syndrome, including an elevated level of plasma triglycerides, a low level of HDL-cholesterol, and resistance to insulin. Polderman et al. (78) tested whether hormone therapy can induce insulin resistance in 18 healthy MTFs receiving ethinyl estradiol. Reductions in glucose utilization were apparent in the patients over four months of follow-up, indicating that hormone therapy may induce insulin resistance in healthy subjects. (78) Furthermore, Feldman described three cases of new onset Type 2 diabetes mellitus in MTFs. (79) The patients had been receiving feminizing hormone therapy for 10, 11, and 8 months. The author stated that while there is little trans specific evidence on glucose tolerance or diabetes with feminizing therapy, evidence among natal females suggests that estrogen and progestins affect glucose tolerance without increasing the risk of diabetes. (79) However, it is not clear if these findings can be generalized to the trans population; furthermore, sex steroid differences in natal male and female diabetics suggest further complexity in understanding the interaction of estrogen and progestins in MTFs. (79)

Previously, it was noted that Elbers et al. (58) observed increased HDL-cholesterol and decreased LDL-cholesterol as a result of feminizing hormone use. In that same study, these beneficial outcomes were offset by the induction of elevated triglyceride levels, smaller LDL particles, insulin resistance and hypertension. Therefore, the findings did not provide indisputable evidence of the positive effects of feminizing hormones on the cardiovascular system. (58) Finally, a review by Gooren et al. (56) found that weight, body mass index, total body fat, and visceral fat increased during feminizing treatment. These observed changes in cardiovascular risk factors may be caused by an increase in visceral fat in MTFs. (56) Insulin sensitivity was also found to decrease, and was accompanied by an increase in fasting plasma insulin concentration. This finding was in the same direction as in natal males with prostate cancer treated with antiandrogens, thereby indicating that the deleterious effects on insulin sensitivity are due to androgen deprivation. (56)

An excess of prolactin, or hyperprolactinemia, is another adverse outcome experienced by some individuals receiving feminizing hormones. In a large, retrospective study, combined treatment with estrogen and cyproterone acetate in MTFs was found to be associated with a 400-fold increase of hyperprolactinemia (46 cases observed, 0.108 expected in the general Dutch population). (75) Asscheman et al. (75) reported an increase in prolactin levels in all estrogen-treated patients; similar results have been observed by other researchers. (47, 76, 80, 81) Furthermore, one case study reported a prolactin-producing adenoma in a 33-year-old MTF who was given estrogen, starting at 16 years of age. (82) It is still unclear as to whether the adenoma was incidental, the direct effect of estrogen, or mediated via other mechanisms; however, this finding reinforces the view that long-term estrogen therapy may play a role in the genesis of endocrine tumors. (82)

Finally, a review by Gooren et al. (56) reported several additional cases of lactotroph adenoma (prolactinoma) after high-dose estrogen administration in patients with normal serum prolactin concentration before therapy. The authors also recently encountered a case of pituitary microprolactinoma in a MTF, occurring after 14 years of normal-dose estrogen treatment. While causality has not been established, Gooren et al. (56) recommend the monitoring of serum prolactin levels in estrogen-treated MTFs.

Liver abnormalities and gallstones have also been documented in MTFs; for example, three participants (of 60) in Meyer et al.'s (41) longitudinal study experienced an increase in liver enzymes during treatment with ethinyl estradiol. Transient elevation of liver enzymes was also observed by Asscheman et al. (75) in 22 MTFs treated with estrogen and/or cyproterone acetate. In this case, most persistent liver enzyme abnormalities were attributed to hepatitis B and alcohol use. In another retrospective study, van Kesteren et al. (76) observed a rise of liver enzymes in 35 MTF patients without a clear cause, and therefore hormone treatment could have been responsible.

Gallstones occurred *de novo* in 3 cases during feminizing hormone therapy; this was slightly higher than would be expected in the general Dutch population. (76) Other adverse effects, such as galactorrhea (the spontaneous flow of milk from the nipple), (81) migraine (81, 83) and shrinking prostate leading to bladder neck instability with a degree of incontinence (76) may also be associated with the use of feminizing hormones.

Additionally, a small number of hormone-related cancer cases have been reported in MTFs. Van Kesteren et al. (76) encountered one case of prostate carcinoma in a 64-year-old MTF who had been on estrogen therapy for 12 years and had been orchiectomized 11 years before the development of cancer. One case of metastatic prostate carcinoma was also reported in a 63-year-old MTF at the Free University Hospital, Amsterdam. (61) She had received cyproterone acetate and ethinyl estradiol for 10 years and had undergone SRS after 2 years of hormone therapy. A review by Gooren et al. (56) cited two cases of benign prostate hyperplasia in subjects who had been orchiectomized and treated with estrogens for more than 20 years. It is not clear whether these cancers were estrogen sensitive or whether they were present before beginning estrogen administration. (56) Similarly, researchers in Switzerland reported a case of benign prostatic hyperplasia in a MTF patient, 25 years after SRS and under continuous estrogen therapy. (84) Finally, one case of advanced prostate cancer was reported in a 60-year-old MTF in the U.S. (85) The patient had used estrogens almost continuously since she was 19 years of age, and had undergone orchiectomy at age 34 years. (85)

In 1988, researchers reported a case of breast cancer in a 35-year-old MTF after 10 years of estrogen therapy; she was only one of three cases reported previously. (86) A diagnosis of breast cancer was also reported by Ganly and Taylor in a 36-year-old MTF who was given hormone replacement therapy for 14 years. (87) Case reports in MTFs also include three breast carcinomas and two breast fibroadenomas. (88) In a cohort of 2200 MTFs seen at Free University Hospital, Amsterdam, only one case of breast cancer was reported over 30 years. (56) More recently, one case of breast cancer was identified in a 58-year-old African American MTF who had received estrogens between 1969-1978 and 1995-1997. (89) While one might presume that breast cancer is rare in MTFs, a relatively small number of subjects experiencing strong variations in exposure do not allow for firm conclusions in assessing risk. (56) Finally, Lawrence reported one case of vaginal neoplasia in a 36-year-old MTF who had undergone SRS nine years before diagnosis. (90) In general, while the abovementioned cancers may be caused by hormone use, more research is needed, and there is currently no evidence of high risk.

On rare occasions, poor outcomes in terms of sexual functioning in postoperative MTFs have been reported in the literature. Lief and Hubschman, who conducted one of the first studies on sexual functioning in trans persons, found that orgastic capacity declined in MTFs following SRS. (67) Despite the decrease in orgasm, the frequency of sexual intercourse increased by 75%. A reduction in sexual arousability upon androgen deprivation has also been reported in MTFs. (43) Michel et al. (38) and Cohen-Kettenis and Gooren (66) similarly point to the role of feminizing hormones in inducing an abnormally decreased libido and a loss of the capacity to reach orgasm.

Complications arising from SRS are also a reality for many MTFs, including infection, urological problems, would healing problems, (81) urinary stream problems, genital pain, (91) and vaginal stenosis and vaginal stricture. (48) Krege et al. (92) reported major complications in 14% of 66 MTF patients during, immediately and some time after SRS, including severe wound infections, rectal lesion, and necrosis of the distal urethra. In another study, researchers in Ghent, Belgium assessed the effects of SRS on lower urinary tract function. (93) For 19.3% of MTFs, voiding was worse after phalloplasty, and some form of incontinence was reported by 16%. Urinary infection was a problem for 32% who reported an average of 1.7 episodes. (93)

2. *Masculinizing hormone therapy and sex reassignment surgeries*

Masculinizing hormones can also impact negatively on the health of trans people. The most commonly reported adverse effects include acne and weight gain (34, 36-38, 62, 75, 76, 81) in those receiving testosterone therapy. Androgenic hormones are also associated with disturbances in sleep, such as sleep apnea –a condition characterized by episodes of stopped breathing during sleep. (33, 36) In one follow-up study of 42 FTMs, the authors reported three cases of sleep problems (e.g. insomnia). (81)

Masculinizing hormone therapy and SRS also contribute to a loss of bone mass and reduced bone mineral density. Goh and Ratnam (94) evaluated the effects of hormone deficiency, androgen therapy and calcium supplementation on BMD in 79 FTMs attending a Gender Identity Clinic at the National University Hospital in

Singapore. Oophorectomy and remaining in a hormone-deficient state for a long period was associated with a loss of bone mass. Oophorectomized FTMs who had stopped their androgen therapy experienced significant bone loss; however, bone mass was restored by resuming regular androgen therapy. (94) In another study, 19 patients had undergone oophorectomy 13-35 months after the start of hormone therapy. (52) BMD of the spine did not change during the first year but had decreased significantly after 28-63 months following surgery. (52) The testosterone dosage used in FTMs was associated with a decline in estradiol levels, but it did not contribute to maintaining bone mass in those who had undergone SRS. (52) Interestingly, hormone therapy in FTMs has been shown to be both beneficial (51, 69) and harmful to bone health. The conflicting findings are likely related to the fact that individual changes in BMD are highly variable, (35) and the numbers studied are generally small. As such, long-term data from larger studies on osteoporosis risk in FTMs is needed. (35)

Furthermore, hormone therapy in FTMs has been commonly shown to confer adverse effects with regard to the metabolic syndrome, including unfavourable increases in cholesterol levels and the development of insulin resistance. In a study conducted by Meyer et al., (41) 30 FTMs receiving testosterone were followed for an average of 16 months. Cholesterol and triglycerides increased significantly at increasing doses of testosterone. (41) These results point to the possibility of increased risk for coronary heart disease in FTMs treated with testosterone. Furthermore, glucose utilization has been shown to decrease in FTMs receiving hormone therapy, indicating the development of insulin resistance in healthy subjects. (78)

In another study of 39 FTMs, testosterone at supraphysiological doses over 33 months was related to significantly higher levels of triglycerides, total cholesterol, LDL-cholesterol and a significantly lower level of HDL-cholesterol, as compared to FTMs not receiving hormones. (95) The results of this study indicated that testosterone may promote atherogenesis in FTMs. The male predilection for cardiovascular disease may be due to the adverse affects of higher androgen levels on lipid and lipoprotein profiles. (95) In a US study, the authors found that short-term androgen administration to natal females led to the development of insulin resistance, providing further evidence for a relationship between hyperandrogenemia and insulin resistance. (96)

The effects of high-dose androgen therapy on vascular reactivity were assessed in 12 FTMs and 12 healthy natal female control subjects matched for age and smoking history. (97) Tests revealed that HDL-cholesterol levels were lower in FTMs compared with the control subjects, the former having received high-dose androgen for an average duration of 38 months. Furthermore, the authors found that long-term high-dose androgen therapy was associated with impaired vascular reactivity in FTMs vs. female controls. (97) Others have also reported changes in the cardiovascular risk profile that are detrimental to the health of FTMs. (57, 58, 98) However, Gooren et al. (56) argue these changes may be secondary to the increase in weight experienced by patients receiving hormone therapy. In fact, most (if not all) studies in this area of research fail to account for potential confounders (e.g. body mass index), which may call into question the validity of study results. Finally, recurrent myocardial infarction in a FTM treated with androgens has been documented, (75) and two cases of hypertension were observed in a 1-year observational study where patients were administered with short-acting testosterone esters every 2 weeks. (62)

Liver enzyme abnormalities have also been reported in FTMs, however not to the same extent as that seen in MTFs. A retrospective study of 122 FTMs found elevated liver enzymes in seven patients, although most abnormalities could be attributed to hepatitis B and alcohol abuse. (75) Elevated liver enzymes were also reported by van Kesteren et al. (76) and Schlatterer et al. (81) Futterweit indicates that liver enzyme abnormalities are not infrequent when administering masculinizing hormones to FTMs and that in rare instances, FTMs may develop hepatocellular carcinomas, haemorrhagic liver cysts, (38) and jaundice (36).

Furthermore, masculinizing hormone therapy has been linked to polycystic ovary syndrome (PCOS); for example, Futterweit and Deligdisch (99) examined the effects of exogenously administered testosterone in 19 FTMs who underwent bilateral salpingo-oophorectomy after a variable period of androgen therapy. Findings consistent with polycystic ovaries were present in 13 patients, suggesting that increased ovarian concentrations of testosterone may produce the morphological features of PCOS. (99) Spinder et al. (100) reported comparable results. While there is some indication that FTMs have an increased incidence of PCOS before initiating androgen therapy than in the general population, (33, 101) the preceding findings are concerning because PCOS is a risk factor for endometrial cancer. (33)

Other gynaecological effects have also been reported in FTMs receiving masculinizing hormones. Futterweit described a study where three of 19 FTM patients treated with androgen therapy developed endometrial hyperplasia, which may lead to endometrial carcinoma. (36) Such findings have prompted researchers to recommend surgical hysterectomy in testosterone-treated FTMs, thereby protecting against the development of endometrial hyperplasia or cancer. (38) A small number of ovarian cancer cases have also been documented. (73, 102) Gooren et al. (34) further provided anecdotal evidence of breast cancer in residual breast tissue after mastectomy in a FTM; a similar case was reported in a FTM patient after bilateral mastectomy while receiving testosterone therapy. (56) This occurred after 10 years of treatment with testosterone, which is partially aromatized to estradiol. (56) Finally, one case of cervical cancer was reported post-operatively in a FTM in Prague; the patient had started masculinizing hormone therapy at the age of 34 and later underwent an abdominal hysterectomy, bilateral oophorectomy and bilateral subcutaneous mastectomy. (103) This was the first reported case of (pre-invasive) cervical neoplasia. More recently, researchers in Germany have identified the first case of vaginal cancer in a FTM 18 years following SRS. (104) Note that it is unclear as to whether cancer in FTMs is caused by cross-sex hormone therapy, given the small number of reported cases.

Adverse effects of masculinizing hormones on sexual functioning and aggression are not commonly documented. Nonetheless, Michel et al. (38) and Moore et al. (33) have reported potentially unfavourable side-effects such as pathological aggression (or increase in aggression proneness) and hypersexuality. In another study, 12 (of 23) FTMs with erection prosthesis more often experienced pain during intercourse and were therefore less able to reach orgasm. (47)

Disadvantages of SRS in FTM patients are well known; for example, metoidioplasty is relatively free of complications, but it results in a micro penis without the ability for standing urination. (88) Furthermore, phalloplasty is a lengthy multi-stage procedure with the potential for serious complications, such as urinary stenosis. (88) For the most part, complications arising from SRS are rarely reported in FTMs. In one study, three FTMs experienced wound healing problems and one had urological problems. (81) Other complications include voiding, incontinence, straying of urinary stream, urinary tract infection, (93) and nipple necrosis and scarring related to breast reduction. (88)

Overall, the comparatively small numbers of participants studied, and the unavoidable lack of placebo controlled, prospective trials complicate the distinction between the risks of being trans itself and the risks attributable to hormone therapy. (35) Regardless, suspected adverse effects should be offset against the potential consequences of inadequate provision of cross-sex hormone therapy and SRS, which is associated with an increased risk of depression and suicide. (35, 105)

2.3 Depression

Depression is a syndrome characterized by a set of mood-related symptoms, including depressed mood, loss of interest or pleasure, (106, 107) feelings of guilt or low self-worth, disturbed sleep or appetite, low energy, poor concentration and thoughts of death or suicide. (106, 108) The first episode usually occurs in late adolescence or early adulthood, and approximately 50% of those affected experience more than one episode. (106) Major depression, defined according to the presence and severity of specific symptoms in the Diagnostic and Statistical Manual of Mental Disorders (DSM), (106) was cited as the world's leading cause of disability in 2000 by the World Health Organization. (108) It is projected to become one of the most significant contributors to disease burden in high income countries by 2030. (109)

2.3.1 Epidemiology of depression

Estimates from the Canadian Community Health Survey: Mental Health and Well-Being (CCHS 1.2) showed that approximately one Canadian in ten experienced a major depressive episode at some point (lifetime prevalence = 10%-12%); one in twenty in the course of a year (annual prevalence = 4%-5%); and one in fifty at a particular point in time (point prevalence = 2%). (106) At present, there are no comparably reliable estimates in the trans community, given some of the issues in estimating the prevalence of transgenderism discussed previously (see section 2.1.2). Furthermore, there is some evidence that trans people are less likely to seek treatment for depression, fearing that their gender issues will be assumed to be the cause of their symptoms, and that they will be judged negatively. (110) Nonetheless, several trans-specific studies outside of Canada have reported prevalences ranging from 8% to 72%. (75, 111-122) Variations in estimates of the prevalence of depression are likely the result of differences in survey samples, or in the definitions of depression used. In fact, some studies had sampled only MTFs, (111, 114-116, 118, 119) and the sampling methods varied, including venue-based, clinical (75, 121) and Internet-based approaches. (117) Furthermore, studies differed with regard to the measures of depression used, which ranged from valid and reliable tools such as the Center for Epidemiologic Studies Depression (CES-D) Scale to questions on whether respondents had ever been diagnosed with depression. (120)

Currently, researchers do not know what causes depression, mainly because it has no single cause. (106, 123) Some depressive disorders are the result of certain medications or hormonal changes during pregnancy, (106) while others run in families, suggesting a genetic link. (123) A depressive episode can also be triggered by stressful life events, (106) such as trauma, the loss of a loved one, or a difficult relationship. (123) In general, depression is believed to result from a combination of biological, psychological, environmental and genetic factors. (106, 123) Many of these findings with regard to depression are based on general population research. While some factors may not be applicable to the trans community, others strongly and consistently related to depression in the general population are likely to affect the mental health of trans people as well. Although depression research in the trans community is scarce, factors unique to trans people have been identified –these will be discussed in the following section. Where necessary, the review will draw on relevant research from comparable populations, including the lesbian, gay and bisexual (LGB) communities. The experience of minority stress and social stigma among sexual minorities is likely similar to the challenges faced by trans people. In fact, many gays and lesbians experience discrimination and harassment as a result of their (nonconforming) gender presentation. (124)

2.3.2 Risk factors for depression in the trans community

1. Stigma, discrimination and abuse

As members of a gender minority, with even less acceptance than the lesbian, gay and bisexual communities, (125) trans people face undue stigmatization and discrimination. They are marginalized from gay and lesbian communities as well as from heterosexual communities and providers, and are sometimes regarded as pathological or unhealthy. (5) Transphobia, a form of discrimination similar to homophobia and based on fear, ignorance and hatred, (1) is commonly experienced by trans-identified individuals. An extreme form is “transbashing”, whereby physical and sexual violence is directed against trans people. (1)

Discrimination, stigma and victimization create a hostile and stressful social environment that can contribute to mental health problems, (126) including feelings of shame, guilt, (127) anxiety, and depression. (113, 127) In a study of 332 MTF persons of colour, participants reported experiencing several forms of transphobia in both childhood and as adults. (111) These included being made fun of, hearing that trans people are not normal, and experiencing violence. (111) In multivariable analyses, transphobia was identified as the strongest independent contributor to depression, as measured by the CES-D. (111) In another study across the state of Minnesota, 66% of 181 participants reported being discriminated against because of their gender identity or presentation. (128) While 61% indicated problems with depression, it is unclear whether this was related to their experiences with discrimination. (128) Similarly high rates of transphobia were reported in San Francisco by Clements-Nolle et al. (113) Of 515 participants, 62% experienced gender discrimination, 83% experienced verbal gender victimization and 36% reported physical gender victimization. (113) These factors were independently associated with attempted suicide, (113) a common behavioural symptom of depression. (107) A recent study based in New York City echoes the findings of previous researchers; in particular, Nuttbrock et al. (118) reported a strong association between gender-related abuse (psychological and physical) and major depression among 571 MTFs. The effects of both types of abuse were greatest during adolescence, and declined marginally in the later stages of life. Furthermore, Lombardi (129) found that a greater frequency of transphobic events was correlated with higher levels of depression (measured using the CES-D) among 90 U.S. trans participants (45 MTFs, 45 FTMs).

Discrimination has also been cited in the workplace; in a recent, large-scale internet study of trans people across the U.S., 97% of 6,450 participants reported experiencing harassment or mistreatment on the job. (130) Similarly, Irwin et al. (131) found that 60% of lesbian, gay and trans teachers, academics, and educators in Australia experienced some form of discrimination. Trans participants were more likely to face discrimination or harassment. Overall, the effects on individuals included increased stress, depression, illness, loss of self-confidence, increased alcohol and drug use, and attempted suicide. (131) For 59% of the 120 participants, discriminatory actions had negative effects on their personal relationships. In another study of workplace discrimination among gay men, lesbians and trans people, 52% of the 900 participants reported having been the target of homophobic behaviour or harassment. (132) Many were also treated prejudicially or were denied particular benefits available to heterosexual work colleagues in their current workplace. Just over 60% of those who had experienced homophobic harassment or treatment commented that this had resulted in depression. Of those who were recipients of homophobic behaviour, 89% of trans, 60% of gay men and 56% of lesbians experienced depression. (132) Twenty-seven people had attempted suicide due to their experiences with harassment.

Finally, in a cross-sectional study of 332 MTFs, depressed individuals reported levels of exposure to transphobia significantly higher than their counterparts. (115) In turn, depressed individuals were more likely to have engaged in unprotected receptive anal intercourse, a risk factor for HIV transmission. Further evidence of the violence and discrimination faced by trans people was provided by Lombardi et al. (133) Over half of the 402 participants in their study experienced some form of harassment or violence within their lifetime, with a quarter experiencing a violent incident. Economic discrimination (i.e. being fired, not being hired, or being unfairly disciplined) as a result of being trans was the strongest predictor of having experienced a trans-related violent incident. (133) In an Australian study, 87.4% of the 253 participants had experienced at least one form of stigma or discrimination on the basis of gender. (117) Respondents who had experienced a greater number of different types of discrimination were more likely to report being currently depressed, and almost 64.4% of participants reported modifying their activities due to a fear of stigma. (117)

Discrimination can also take the form of racism. While epidemiologic studies on racial discrimination and mental health in trans communities are lacking, research among gay men and ethnic minorities points to serious adverse effects. For example, gay men experiencing racism are at high risk of developing symptoms of psychologic distress, including depression, (134-136) anxiety, and suicidal ideation. (134) As a stressful life experience, racial/ethnic discrimination is broadly recognized as an important contributor to multiple indicators of poorer physical and, especially, mental health status. (137-139) For ethnic minorities, individual and institutional racism can negatively impact health by limiting socioeconomic opportunities. (140) It can also directly affect health in multiple ways; for example, living in a poor neighbourhood with inadequate resources, experiencing racism in medical settings and the stress of experiencing discrimination can have harmful effects on health. (140) The consequences of inequality and discrimination are not well understood; researchers point to the need for longitudinal studies to support a causal relationship (139) and further test the underlying processes and mechanisms by which discrimination can lead to changes in health. (137, 141) However, for those experiencing the dual burden of transphobia and racism, it would not be unreasonable to expect dire effects on mental health.

While stigma and discrimination are important contributors to depressive mood, sexual and physical abuse, particularly in childhood, are also key factors in determining individuals' well-being. In fact, sexual abuse is related to higher levels of depression within both clinical and non-clinical samples. (142) Furthermore, earlier sexual abuse has been significantly associated with current depression, suicidality, risky sexual behaviour, and HIV-positive status. (143) Prevalence estimates of childhood abuse are scarce in the trans community; however, Bockting et al. (128) reported that 23% and 38% of trans people across Minnesota experienced childhood sexual (CSA) and physical abuse (CPA), respectively. In another U.S. study, 40% of 300 trans participants reported being a victim of either physical or sexual abuse in childhood. (144) Similar results have been found in Canada: 55% of 42 transsexuals who attended the Gender Dysphoria Clinic in Vancouver, B.C. had experienced an unwanted sexual event before the age of 18. (145)

Among men who have sex with men, an increasing severity of CSA is significantly associated with greater anger and higher levels of depressive mood. This relationship, while harmful in itself, may result in high-risk sexual behaviour. (146) For natal females, those who experience abuse as children and as adults are more likely to be depressed than those who only experience abuse during adulthood. (142) Cooperman et al. (142) showed that CSA and CPA, along with adult sexual abuse, are significantly associated with depressive symptomatology in 373 HIV-positive women. While abuse negatively affected the lives of all women in the study, lesbian and bisexual women reported higher rates of lifetime sexual and physical abuse than heterosexual women. (142)

In the National Lesbian Health Care Survey, women who had experienced childhood sexual abuse and intimate partner violence reported significantly more daily stress and depression. (147) Intimate partner abuse in men who have sex with men is also strongly correlated with depression. (148) Furthermore, in a study of 1383 gay and bisexual men, early forced sex and parental physical abuse were associated with several negative health outcomes in adulthood including HIV infection and depression. (149) The authors concluded that early abuse predicts adult health outcomes above and beyond adult victimization. (149) A history of childhood sexual or physical abuse is also a significant independent predictor of having received treatment for depression, suicidal ideation, and past suicide attempts in lesbian and heterosexual women. (150) Matthews et al. (150) found that women with histories of sexual or physical abuse were two to three times more likely to have had thoughts of killing themselves and to have acted on these thoughts. Other researchers have reported similar findings in men who have sex with men. (151-154) In general, it is likely that the effect of childhood sexual and/or physical abuse on mental health among trans people is similar to the relationships observed in both LGB and general (non-trans) populations.

2. *Disclosure (coming out)*

Research with lesbian and gay communities indicates that nondisclosure of minority sexual orientation is a known risk factor for depression. (155) Being gay is considered to be a concealable stigma because it can be hidden from others. (156) The added burden of concern over disclosing homosexual identity often results in problems such as preoccupation with the stigmatized attribute, impaired long-term social relationships, negative affect (i.e. depression), anxiety, and decreased self-esteem. (156) In contrast, being trans is not always a concealable identity and many trans people are confronted with the dilemma of being “read” (i.e. failing to pass as the felt gender). For those who wish to pass (i.e. accepted or regarded as a member of the gender with which one identifies or physically presents (157)), being “read” means facing (or fearing) possible humiliation, discrimination and violence. While there is a paucity of research on the mental health effects of coming out in trans communities, the experiences of LGB individuals may be relevant to trans people given that some also identify as lesbian, gay or bisexual. Furthermore, it is possible that coming out and the issues of disclosure faced by members of the LGB community may function similarly among trans people.

According to the literature on LGB health, the coming out process in males seems to be more abrupt and more likely to be associated with depression, (158) while for women the process is characterized by greater fluidity and ambiguity. At the same time, youths face a greater risk of psychosocial problems associated with earlier self-identification as they seem developmentally least equipped to deal with the complex social and behavioural consequences of acquiring a gay identity. (158) Youths who are less open are also more likely to experience depression (143) and those who are questioning their sexual orientation report more feelings of depression than either heterosexual or lesbian, gay and bisexual students. (159)

For lesbians, the level of openness regarding sexual orientation is associated with less fear of being exposed and with more choices about mental health counselling; (160) in fact, depression and disclosure of homosexual identity are negatively correlated. (161) This is similar to findings reported in a study of 105 MTFs: participants reporting higher levels of outness with regard to their gender identity were found to have lower levels of depression. (162) Furthermore, in one study, lesbians and bisexual women who were not out were more likely to have had a suicide attempt vs. heterosexual women. (163) The degree of outness is a proxy for the level of comfort a lesbian or bisexual woman feels with her sexual orientation and can influence the degree of stigmatization she may experience. (163) It is hypothesized that when a woman discloses her sexual orientation, she is more likely to align with peer groups and receive social support that can diminish the likelihood of mental disorders. (163) Alternatively, coming out may put an individual at higher risk of experiencing discrimination or even violence, and thus increased emotional stress. (163)

In a cross-sectional study of 594 gay men, researchers found that concealment of sexual orientation partially mediated the relationship between stigma and depression, whereas depression partially mediated the relationship between concealment and sexually transmitted infections. (156) The authors concluded that both gay-related stigmatization and concealment of sexual orientation were related to poorer mental health. (156) Furthermore, coming out is associated with more positive feelings about one's sexual orientation; however, a less generalized disclosure to others is associated with greater distress. (164) Exposure to heterosexist attitudes held by valued others may explain this distress; for example, those facing hostility often learn to conceal their sexual orientation, which may lead them to conceal large areas of their lives, thereby contributing to social isolation and risk for emotional maladjustment. (164) Finally, in a study of 91 transsexuals, those who had come out to others experienced greater life satisfaction and self-esteem than respondents who had not. (165) Nonetheless, early in the coming out process, trans individuals may use alcohol and drugs to cope with isolation and loneliness. (166) Support from peers, community, and family may help alleviate these challenges. (166)

3. Social and identity support

Social isolation and a lack of overall social support are common in trans individuals, (1, 3, 167, 168) as a result of social intolerance, discrimination, and rejection by loved ones. (169) Isolation is a determinant of emotional ill health and can exacerbate depression, anxiety, substance use, self-harm and suicidality. (1) As such, social support from a (transgender) support group, friends and family can help prevent an emotional collapse. (108) A needs assessment of trans people in Ontario determined that isolation was particularly a problem for those greater than 50 years of age. (1) This is troubling as supportive networks are important in maintaining good health into old age. Trans youth are similarly disadvantaged because they may receive limited social support from parents and siblings. (168) Research in the general population has revealed the protective role of social support against the development of adverse mental health effects, particularly depression. (167, 170-173) Furthermore, individuals with higher levels of social interaction have greater overall well-being. (167) Social support is also a protective factor for trauma survivors at risk for developing post-traumatic stress disorder. (167)

Evidence for the mental and emotional benefits of social support is further provided by findings in the lesbian, gay and bisexual communities. (159, 161, 174-180) Research indicates that friends and partners are the most frequent providers of social support to those who identify as sexual minorities, (177, 179, 181) findings that are echoed in research among MTFs. (111, 168) Regardless of its source in lesbians and gay men, social support is negatively related to depression, either directly or through a buffering of the impact of stressful life experiences. (142) Similarly beneficial effects are expected in trans people, however identity support –defined as the extent to which others accept, positively reinforce, and behaviourally reciprocate one's trans identity (116) – is equally important for the well-being of trans individuals. Support for this perspective was observed in a preliminary study of 43 MTF sex workers in New York City; depressive symptoms were measured using a short (8-item) version of the Center for Epidemiologic Studies Depression (CES-D) Scale. (116) The authors reported a negative and statistically significant association between depressive symptoms and an index of friends' and family support for trans identity. (116)

Involvement in the trans community is a form of social interaction found to be inversely related to depression. (111, 115) Nemoto et al. (111) state that the negative effects of transphobia can be mediated by social support and (trans) community involvement. Furthermore, trans people with larger social networks are more likely to partake in social and political activity. (182) In a study of transgender clubs located in Ohio, U.S., participants with a greater number of trans people and relatives (including spouse/significant other) within their social networks experienced lower depressed mood. (182) In general, community activism encouraged as part of therapeutic intervention for trans people has been shown to optimize clients' self-empowerment, social agency, resilience, and quality of life. (183)

4. Hormone therapy and sex-reassignment surgeries (SRS)

Hormones act on the brain to affect behaviour and mood in two ways: via organizational effects and activational effects. (184) Three activating effects most relevant to depression have been identified. (184, 185) Firstly, sex hormones can cause sensorial changes to receptors in the cortex that indirectly lead to mood changes by secretion of neurotransmitters; thus, a higher sensitivity to the environment could contribute to increased irritation when adverse life events occur. (184, 185) Secondly, metabolic processes can be increased or decreased by sex hormones and can therefore cause mood changes. Thirdly, sex hormones have been found to directly influence the hypothalamus and the hippocampus of the central nervous system. (185) These areas play an important role in the psychological functions of emotion and perception. (184)

Androgen deprivation in men with prostate cancer is linked to an increased prevalence of depression. (186-189) This may be relevant to MTFs receiving anti-androgens; though it should be noted that studies on androgen deprivation in natal males tend to be conducted in older populations, which are more likely to experience co-morbidities, advanced cancers and consequently, depression. (187) More importantly, MTFs tend to feel relieved with androgen suppression whereas non-trans men may feel less masculine, and therefore more likely to develop depressive symptoms. Furthermore, downward fluctuations of estrogen levels (before menstruation, after the birth of a child) in natal females may be responsible for feelings of depression. (185) A review by Rohr found that low estrogen-low testosterone levels and high testosterone-low estrogen levels were correlated with depression. (190) These findings may be applicable to FTMs receiving testosterone and experiencing reductions in plasma estrogen levels; however, relief felt while medically transitioning may contribute to improved mental health.

Non-trans women are about twice as likely as non-trans men to suffer from clinically relevant symptoms of depression. (190, 191) The differences between men and women with regard to the prevalence of depression can be explained by biological characteristics unique to each (e.g. hormonal or genetic predispositions). (191) However, differences in socioeconomic status or level of education and experiences of negative life events cannot be ignored. (191) Interestingly, Australian researchers found that almost twice as many MTFs were suffering from a depressive episode at the time of their study than FTMs. (117) It is unclear as to the reasons for this difference in the prevalence of depression.

For trans people undergoing hormone therapy or SRS, several positive effects with regard to depression can be expected. Initiating hormone therapy has a calming effect on most patients (36) and contributes to diminished feelings of depression. (66) Furthermore, operated patients and trans people undergoing the real life test (a trial period of up to two years where patients live as the desired gender before they are provided with hormones or SRS) suffer less depression vs. those during the diagnostic phase. (32) Two explanations have been suggested for these findings: 1) recognition of trans-identity medically justifies and authorizes the wearing of clothes of the desired sex, and 2) patients are eligible to be operated on, which provides relief. (32) In general, trans people in the initial phases of transitioning experience more distress than in later phases. (192-194) This is further exemplified in a Dutch study of transsexuals who had received SRS between 1986 and 2001. (195) The authors reported a significant drop in the suicide attempt rate from 29.3% to 5.1%; however, this was higher than in the broader population (0.15%). (195) Furthermore, a recent systematic review and meta-analysis found that after sex reassignment including hormones, 78% of trans individuals reported significant improvements in psychiatric symptoms (95% CI = 56-94; 7 studies), including mood and anxiety disorders. (49)

Adopting a female social identity has been linked with lower levels of symptomatic depression, since discomfort or unhappiness in the male gender role is the primary complaint of MTFs. (196) Furthermore, while MTFs have been shown to be less stable vs. FTMs prior to hormone therapy, (185) their emotional stability increases after starting hormones and is maintained post-SRS. This is not surprising given that estrogen is associated with a calming effect (35) and has been used to augment the action of antidepressants. (35, 197) On the other hand, the participants of a qualitative study in Toronto, Canada reported being more emotional and depressed for at least a period of time following initiation of hormonal therapy. (198) Some continued to struggle with depression; however, an overall mental health benefit was evident, with MTFs feeling relieved about reducing the impact of testosterone and the stress of presenting as men, while being able to openly explore dimensions of being female. (198)

Adoption of a male social identity is also associated with a decrease in symptomatic depression. (199) In a study of 60 FTMs, researchers reported a statistically significant negative correlation between depression and gender reorientation. (199) However, an unexamined confounding variable, such as the subject’s expectation of undergoing SRS, was hypothesized to confer beneficial effects on morale. (199) The anticipation of a long sought after procedure may have exerted therapeutic effects before it was even performed. In addition, FTMs who have received testosterone report higher quality of life scores than those who have not, with statistically significant differences in the mental health domains of the Short-Form 36-Question Health Survey. (4) Depression ratings are also lower among post-operative FTMs vs. pre-operative transsexuals. (200) Finally, in a meta-analysis which included 1833 trans participants (1093 MTFs, 801 FTMs), improvements in quality of life (e.g. more stable relationships, better adjustment, satisfaction with sex reassignment, overall happiness and contentment) were reported by 80% of individuals (95% CI = 72-88; 16 studies) who had received hormones as part of sex reassignment. (49)

Adverse effects in terms of mental health are also reported in those undergoing a medical transition. Slabbekoorn et al. (185) found that after 14 weeks of hormone therapy, MTF patients experienced feelings of being tired and flat, tense and nervous, and gloomy and depressed more intensely than FTMs. The authors concluded that the intensity of emotions in MTFs appeared to be influenced by anti-androgen and estrogen treatment, whereas testosterone treatment in FTMs seemed to result in reduced emotional intensity. (185) Furthermore, MTFs attending the Leicester Gender Identity Clinic in England often reported feelings of anxiety and depression; however, patients did not experience significant improvements when examined three or more years following SRS. (201) Similar findings were reported in a recent study from the same clinic. (202) In another study of 303 MTFs, depressive mood changes were cited by 8.3% in the first six months of hormone treatment. (75) While three suicides were observed, Asscheman et al. (75) claimed that an association between the mood changes and suicides was improbable, given they occurred after 1.5, 4, and 8 years of hormone treatment.

5. Sociodemographics

Age is one of the most important demographic factors with regard to mental health. Lesbian, gay and bisexual youth are at increased risk for low self-esteem, depression, (143, 159) suicide, substance use, (5) school problems, family rejection, homelessness and prostitution (158) –factors that may contribute to or exacerbate depressed mood. Trans youth likely experience many of the same problems; (5) for example, a needs assessment in Ontario indicated that self-harm behaviours (e.g. cutting, head-banging) and suicidal thoughts/attempts were prevalent in the trans community, especially amongst youth. (1) Furthermore, nearly all reported attempts of suicide by homosexual men and women occur during the teenage years, and gay adolescents are two to three times more likely to attempt suicide than non-gay peers. (158) The occurrence of these detrimental outcomes may be due to the fact that early and middle adolescents are generally less able to cope with the isolation and stigma of a homosexual (or trans) identity. (158) In addition, a study of 403 lesbians in the U.S. found that younger women more commonly reported past year depression; in fact, younger age was the strongest predictor of the co-occurrence of depression and alcohol dependence symptoms. (203) In general, epidemiological research consistently finds higher rates of major depression among young adults; in 2002, the Canadian annual prevalence of major depression was 6% for 15-45 year olds, 4.4% in 46-65 year olds, and only 2% in those aged 66 or higher. (106)

For older people in general, the sense of impending illness, actual experiences of illness, and dependence coupled with lower income, isolation and loneliness increase rates of depression and suicide. (204) Managing long-term stigma in the form of heterosexism and homophobia is believed to contribute to higher risk for depression, suicide and addictions in older lesbian, gay, bisexual and trans people. (204) Furthermore, those who have maintained their lives in the semblance of heterosexual expectations imposed on them by society are more likely to experience mental health problems. (204) Trans elders specifically may have, as children or young adults, experienced the use of electroshock therapy, forced drugging, aversion therapy, and other invasive and traumatic types of "conversion" therapy – with resulting severe depression, cognitive impairment, or other neurological damage. (205) For frail elders or people with some types of chronic illness (e.g. unstable angina) a medically assisted transition may not be feasible due to health risks. (205) This can lead to depression and despair for people who feel they will never be able to live in their felt gender.

In a review of issues facing those growing old in the gay, lesbian, bisexual and trans communities, Jones (206) reported that depression, alcoholism, and substance use are among the leading health problems. Additionally, in a small study of elderly trans patients, MTFs were withdrawn, and showed signs of depression accompanied by suicidal ideation. (207) Female-to-male patients were also isolated, withdrawn and depressed, mainly as a result of recent losses. Being out of work, physically disabled, or ill contributed to acute depressive, suicidal crises in these participants. (207) Conversely, a recent Australian report on trans health showed a clear relationship between increasing age and lower rates of depression in MTFs; (117) this finding is similar to that reported in the general Canadian population. (106) No relationship between age and depression was found for participants with female on their original birth certificate. (117)

Epidemiological research consistently cites higher rates of depression among singles or once-married individuals (widowed, separated or divorced). (106, 208-210) In a recent Canadian study, the annual prevalence of major depression was 6.8% in singles, 3.4% for married individuals, and 7.9% for divorced/widowed people. (106) Marriage is thought to be protective by shielding from exposure to stress; (208) furthermore, Kessler and Essex (208) note that married individuals are more resilient to the emotional effects of life strains, even when accounting for variations in intimacy. The end of a marriage or common-law union is a stressor that can trigger an episode of depression; (106, 210) although most people recover, depression remains a longer term problem for many separating individuals. (106)

While marriage was not an option until recently for lesbian and gay people in Canada, many trans-identified individuals were married before transitioning and some remain so even after undergoing sex-reassignment. For the most part, marital status is conceptualized as relationship status in the lesbian and gay literature; however, similar research among the trans community is lacking. For lesbians, being in a primary relationship is significantly correlated with decreased depression, while being single and not dating is significantly correlated with increased depression. (181) Other researchers also report significant findings in terms of lower depression rates among lesbian women in primary relationships. (161, 203) Similar results have been reported in men who have sex with men, (146) gay men, (211) and lesbian, gay and bisexual elderly. (175) Undoubtedly, being single or unable to find acceptance from a significant other is also a source of depression in trans people. (212) In particular, many have difficulty finding sexual partners or dealing with the disclosure of non-matching genders and bodies.

6. Socioeconomic factors

Low income earners are consistently reported as having higher rates of depression; (106) in 2002, the annual prevalence of major depression was 11.6% for Canadians in the lowest tertile of income, 5.2% for those in the middle, and 3.6% for Canadians earning the highest income. (106) Low socioeconomic status (SES) is generally associated with high psychiatric morbidity, more disability and poorer access to health care. (213) A meta-analysis revealed that low-SES individuals had higher odds of being depressed; however, the odds of a new episode was lower than the odds of chronic depression. (213) While the authors found compelling evidence for socioeconomic inequality in depression, they also noted that findings may vary according to the way depression is measured, the definition and measurement of SES, and contextual factors such as region and time. (213) Furthermore, an analysis of Epidemiologic Catchment Area panel data indicated that of employed respondents not diagnosed with major depression at first interview, those who became unemployed had over twice the risk of increased depressive symptoms and of becoming clinically depressed as those who remained employed. (214) The reverse causal path from clinical depression to becoming unemployed was not supported. (214)

Trans people face severe economic barriers and hardship as a result of self-identification with the trans community. (3, 5) Many are rejected by their families and have reduced educational and employment opportunities due to harassment and discrimination. (5, 114, 130) Thus trans people commonly experience un(der)employment, poverty, and homelessness. (3, 5, 130, 215) Low income levels can lead to poor housing and subsequent increased risk for problematic substance use, suicidal behaviour patterns, and risky sexual activity. (3) Economic hardships contribute to the numbers of trans sex workers, who engage in survival sex, sex for drugs, or trade sex for services. (5) For example, a study of MTF Asian Pacific Islanders found that depression, unemployment and financial distress were linked with substance use and commercial sex work. (114) Furthermore, sexual or gender minority status in rural communities can further compromise the employment, housing, and health care needs of lesbian, gay, bisexual and trans people. (215) There are typically fewer opportunities for sexual/gender minorities in rural areas (216) as residents tend to hold more conservative values and to be less tolerant of diverse populations. (217) In general, there is greater stigma related to homosexuality (and presumably transsexuality) in rural communities, (217) which may contribute to exacerbated fiscal impoverishment.

The aforementioned findings are further supported by research in the lesbian, gay and bisexual communities. Diaz et al. (134) reported that among gay and bisexual men, experiences of poverty or financial hardship was a strong predictor of psychologic symptoms, including suicidal ideation, anxiety and depressed mood. In another study, income of less than $20,000 was a significant predictor of having been treated for depression in lesbian, bisexual and heterosexual women; education also showed a slight effect. (163) Finally, a study of men who have sex with men from the U.S. and Canada showed that having less than a high school or college degree was associated with depressive symptoms. (218)

7. *Chronic health issues and substance use*

A variety of chronic medical conditions are associated with higher levels of depression, including but not limited to chronic pain, (219) osteoporosis, (220) cancer, (221, 222) HIV/AIDS, (223, 224) and migraine headaches. (225, 226) Though health problems are generally viewed as triggers for depression, the relationships of cause and effect can go both ways. (106) Major depression may predispose individuals to certain chronic illnesses. (225) For example, one study found that Canadians who experienced an episode of severe depression had three times the odds of being diagnosed with heart disease during the next five years than those who did not. (106) Similarly, populations at risk for HIV infection have a high prevalence of pre-existing mood disorders; therefore elevated rates observed after HIV infection may reflect new episodes of pre-existing disorders rather than new-onset depression. (227)

Depression and chronic physical health problems often co-exist; (106) this relationship remains unexamined in the trans community, and research in the gay and bisexual communities is mainly focused on the effects of HIV infection. However, findings may still prove relevant to trans people as high prevalences of HIV, ranging from 11% – 86% have been documented. (112, 228-233) In studies of HIV positive gay and bisexual men, depression is the most prevalent presenting problem, (234) and is significantly influenced by the presence of AIDS (235) and the number (or magnitude) of HIV-related symptoms. (176, 224, 236, 237) Those experiencing HIV-related pain have significantly more advanced disease, more physical and depressive symptoms, and less life satisfaction than men without pain. (238) African American men with symptomatic HIV disease are significantly more depressed than men who are asymptomatic, HIV-antibody negative, or whose HIV status is unknown. (239) Another study of African

American men failed to show significant differences in depressed mood with HIV status. (237) Finally, Chuang et al. (240) reported that men with asymptomatic HIV and AIDS-related complex evidenced greater levels of depressive symptoms, mood disturbance, and trait anxiety than did patients with AIDS.

While chronic physical conditions may greatly impact mood and depressive symptomatology, other mental health issues such as anxiety disorders (e.g. post-traumatic stress disorder (PTSD), panic disorder, social phobia, generalized anxiety disorder) also play a role. (241) Post-traumatic stress disorder is a condition that can result after a person experiences a terrifying event or ordeal, such as a violent assault, a natural disaster, an accident, or military combat. (241) People experiencing PTSD are especially prone to having co-occurring depression. In fact, researchers at the National Institute of Mental Health found that more than 40% of people with PTSD also had depression at one-month and four-month intervals after the traumatic event. (241) Research is limited in the trans community, however there is evidence that anxiety and co-occurring depression are prevalent among trans people. (1, 5, 167)

Like mental health issues, alcohol and other substance use or dependence may co-exist with depression. The co-occurrence of mood disorders and substance abuse is pervasive among the U.S. population. (241) In the trans community, high rates of alcohol and drug use have been documented, (1, 112, 131, 233) mainly related to issues of marginalization, discrimination (131, 242) and self-medication for depression. (242) For trans people, drugs are used as a way to cope with or escape life stresses associated with relationships, sex work, transphobia and financial hardship. (233) While the comorbidity of substance use disorders with depression is common, this association may be explained either by a causal relationship or a shared etiologic factor underlying both conditions. (243) A systematic review found that the association of alcoholism with depression is likely to be attributable to causal factors rather than a shared etiology; however, the lack of unidirectional and consistent patterns of association for depression and other classes of substance use disorders precludes similar conclusions. (243) On the other hand, family and twin studies indicate that the comorbidity between anxiety and depression is explained by a partly shared genetic etiology (244, 245) as well as non-genetic factors, such as environmental influences unique to each twin. (245) Shared genetic and environmental etiologies were also reported in the association between depressive symptoms and anxiety disorders in adolescent girls. (246) Although the preceding findings may not be generalizable to trans communities, it is reasonable to assume that the discrimination, abuse, poverty and rejection contributing to depressive symptomatology in trans people also plays a role in the development of anxiety disorders and problematic substance use.

8. *Access to health care and social services*

For many trans people, the experience of social marginalization manifests in access barriers to health and social services. Namaste's research in Ontario indicates that trans-identified persons are excluded from necessary services through specific administrative policies, procedures, and practices. (247) Many are mistreated by the staff of hospital and emergency rooms, are harassed and beaten by the police, face rejection from traditional alcohol and drug rehabilitation programs, and are denied entry into youth, homeless, and women's shelters. (247, 248) Due to the profound discrimination to which many trans people are subjected, most do not disclose their trans identity within the health care and social service networks. (216, 247) This prevents trans people from obtaining comprehensive health care, since an important part of their lives is neglected. (247) Therefore, while accessing equitable health care in Ontario is a challenge, accessing health care which is trans-inclusive and trans-positive is a much greater challenge. (1) In fact, many trans people have difficulty finding health care and social service personnel willing to work with them. (247)

Findings from Phase I (community soundings) of the Trans PULSE Project support Namaste's research. Utilizing the concept of erasure – "a defining condition of how transsexuality is managed in culture and institutions, a condition that ultimately inscribes transsexuality as impossible" (247) – Bauer et al. (2) reveal the challenges faced by trans people in navigating heath care systems. Trans participants reported difficulty in finding trans-competent health care providers, both in terms of providing a trans-friendly environment and having specific knowledge of trans health issues. (2) Furthermore, trans people were often burdened with having to educate providers, and many had to endure the injustice of being placed in sex-segregated wards that were not appropriate to their felt gender. (2) Not surprisingly, negative experiences or fears of having negative experiences contributed to the avoidance of health care settings, and even self-treatment.

The limited and inappropriate provisions of care received by trans people may instigate or exacerbate mental health issues such as anxiety, depression, (11, 249) low self-esteem, feelings of shame, isolation, and loneliness. (5) An Irish study emphasized the needs of trans people not just for hormone therapy, surgeries or mental health services, but also general health services in common with the rest of the population. (11) Undoubtedly, economic hardships, lack of insurance coverage, and provider ignorance and misconduct contribute to the lack of adequate services for trans people. (5) In rural areas, geographical isolation and confidentiality concerns further compound access issues for lesbian, gay, bisexual and trans people. (215) Overall, the stress related to the (non-)delivery of health care can have significantly negative impacts on health, quality of life, functional capacity, and mental status. (3)

2.4 Adverse consequences of denying access – "Do-it-yourself" transitions

Persons initiating a medical transition can expect to experience some form of health benefit, alongside possibly detrimental side effects. However, denying access to medically supervised hormonal therapy and SRS can lead to serious consequences. As noted by Gorton et al. (250) in their guide for health care providers, an inability to access medically supervised hormonal therapy may contribute to the use of "dietary supplements" or hormones obtained through illegitimate sources (e.g. friend's birth control pills, on-line pharmacies (3, 247, 250)). Hormones can also be bought on the street, in both pill and injection forms. (247) In fact, trans people may share needles with their lovers and friends in order to inject hormones, (247) which increases the risk of transmitting blood borne illnesses such as HIV. (3, 247, 250)

Trans people may be unable to obtain medically supervised hormonal therapy for several reasons: 1) an inability to afford hormones/lack of prescription drug coverage; 2) inflexible treatment protocols that require a successful "real life experience" of living in the new gender role before the administration of hormones or surgery; (11) 3) physicians' unwillingness to prescribe hormones; (247) 4) lack of access to health care providers; (247, 251) 5) lack of trans knowledge on the part of physicians; (2, 247) and 6) living in a small community and wanting to preserve privacy regarding trans-identity. (215, 247)

The denial of services to trans people is an example of their exclusion from the institutional site of health care (2, 247) and thus explains their use of hormones obtained through black market sources.

According to a review by Lawrence, (88) 58% of both MTFs and FTMs had ever used non-prescribed hormones in Washington, DC; in a New York City survey, 39% of MTFs and 9% of FTMs reported using non-prescribed hormones. (88) The figures for the past 6 months were 29% for MTFs and 3% for FTMs in San Francisco. (88) Furthermore, researchers in Virginia reported that nearly 60% of MTFs (n=229) and 22% of FTMs (n=121) had at some point in their lives obtained hormones from someone other than a doctor (from friends, on the street or through the internet). (252) Twenty-nine percent had no blood tests done to monitor the effects of the hormones they took. (252) In Chicago, 71% of MTF (n=31) youth reported obtaining hormones from a non-medical source in the past year, (168) while a recent study of MTFs in New York City indicated that 23% were currently taking hormones from a source that did not include a physician. (251) Likewise, Australian researchers found that 13.1% of 253 participants had ever used non-medically prescribed hormones or supplements for gender-related reasons. (117) Those who had used non-prescribed hormones reported poorer physical and mental health outcomes than those who had not. (117) Finally, the majority of current hormone users in a Filipino study (89.3% of 102) reported taking hormones without medical supervision. (253)

The preceding findings are troubling as non-prescribed hormone users may be at an increased risk of adverse health problems due to irregular dosing and monitoring. Ideally, an individual should have a complete physical examination before initiating (and during) hormone therapy, including blood tests to measure liver and kidney function, blood sugar and cholesterol. (15, 247, 254) In addition to the medical risks of unsupervised hormonal therapy, non-treatment of trans patients can result in worsening psychological outcomes. For example, suicidal rates are significantly lower in treated trans patients than in non-treated; (250) in fact, untreated FTMs have suicide rates as high as 20% while those receiving needed transition-related care have suicide rates of less than one percent. (250) Furthermore, many experience reductions in ridicule, harassment and violence when they transition as their physical attributes are no longer incongruent with their developing gender role. (11, 250)

There are also risks associated with the denial of SRS, such as “do-it-yourself” surgeries. While uncommon, self-removal of testes or breasts have been reported in MTFs (255-261) and FTMs, (5) respectively. Most patients report an inability to afford SRS, being denied transition-related services, long wait-times for surgery, and wanting to force SRS as reasons for taking the transition process into their own hands. (255-261) Furthermore, MTFs who remove their own genitals do so in an attempt to eliminate visible evidence of the masculine form (262) and to rid the body of testosterone. Conducting surgery on oneself is an obviously risky behaviour and can be avoided if sex-reassignment surgeries are more easily attainable.

In general, while there may be some risks for patients who undertake hormonal therapy and SRS, there are perhaps even greater risks associated with non-provision of medically supervised care. (250) Unfortunately, no published studies have characterized or examined the extent of “do-it-yourself” transitions in Canada, a gap in the literature that is addressed in this dissertation.

2.5 Limitations of trans-health literature

The literature on trans health is sparse and limited, and most trans-specific studies consist of sample sizes of less than 200 (for larger studies see 4, 44, 56, 75, 76, 91, 113, 117, 118, 120, 130, 144, 263, 264). Furthermore, participants are typically obtained through convenience sampling methods, such as through clinics and hospitals, or other non-probability sampling techniques (e.g. snowball sampling or Internet-based recruitment (263)). Sampling issues combined with small sample sizes contribute to problems with generalizability; however, as discussed previously, there are challenges to obtaining representative samples of hidden populations (see section 2.1.2). Nonetheless, novel methods are available to obtain large, probability-based samples of the trans community, such as respondent-driven sampling. (265)

The first step in studying the health of trans people is accurately defining, measuring, and sampling trans-identified individuals; however, there are serious challenges to the collection of reliable and valid information. (5) The difficulties stem from the use of largely unexamined and socially constructed categories. (5) Defining the populations to be studied, constructing valid and reliable measures of trans identity representative of these definitions, and sampling and studying sensitive topics are three areas often ignored or left unresolved. (5) As a result, there is significant variation in how trans identity is defined, measured and sampled across studies. (5) A review of public health research articles that sampled lesbians, gays, and bisexuals between 1990 and 1992 found that research publications rarely provided a conceptual definition of the population they sampled, used a range of incompatible methods and measures of sexual orientation to identify and select participants, sampled from settings representative of dramatically different populations, and rarely used probability sampling. (5) As a consequence, participant samples are often unrepresentative of target populations and study findings lack generalizability, thereby limiting the usefulness of research intended to improve the understanding and monitoring of public health concerns in the lesbian, gay, bisexual and trans communities.

Furthermore, studies in the area of medical transitioning typically fail to describe the positive *and* adverse effects of hormonal and surgical medical treatments. (4) By framing sections of the preceding review and specific chapters of this thesis in terms of both positive and negative health effects, there is the potential for a shift in discourse around the effects from one that is fear-based in terms of risks. Furthermore, this comprehensive review has revealed some heterogeneity of results; for example, hormone therapy can be both deleterious (52, 94) and beneficial (51, 69) to bone health in FTMs. Inconsistencies in findings are likely a result of the methodological limitations (sample size concerns, issues with sampling, study design and measurement) plaguing much of the research in trans health.

Studies also vary in their measurements of both medical transitions and trans health outcomes. How these variables are measured determines what kinds of conclusions can be made regarding the relationships between cross-sex hormone therapy/SRS and trans health. In the first place, medical transitions consist of a spectrum of hormonal and surgical interventions. For example, defining SRS is problematic because there are several different surgical procedures that could be performed (i.e. there is no one set of surgeries that *all* FTM or MTF individuals undergo). Similarly, trans clients could be receiving different hormone regimens, although the induction of male or female secondary sex characteristics is the primary purpose for all prescribed treatments. With regard to the measurement of hormone use, in most prospective or follow-up studies, participants' hormone intakes are measured directly over regular intervals via serum testing. (51, 63) Other studies rely on self-reported accounts of hormone use; (53) these differences in measuring hormone exposure undoubtedly contribute to some heterogeneity of results. Furthermore, due to the clinical nature of most of the studies conducted and short follow-up periods, few research articles provide information on long term health effects at various stages of the transitioning process.

In the literature reviewed, a wide variety of health effects related to hormone therapy or sex-reassignment surgeries were examined. Most articles measured clinical outcomes directly, either through direct observation or plasma/serum testing. Therefore, findings likely provide valid information about the health effects associated with medical transitions. However, some outcomes are more subjective; for example, studies on sexuality and aggression in trans populations are often retrospective and provide self-report information, which is subject to biases in terms of recall. (44) Furthermore, MTFs may underreport the frequency of sexual activity due to societal double standards that imply frequent sexual activity with numerous partners is less socially acceptable in women. (44) Similarly, while reported changes might be real and directly associated with altered hormone profiles, Wassersug et al. (198) note that social influences and ideas about gender (e.g. lower sexual drive in women, proneness to anger and aggression in men) may play a part in MTF persons' reactions to hormone therapy.

Finally, comparison groups used in many of the reviewed articles may not be appropriate, and may contribute to invalid estimates of effect. In one study, the beneficial effects of feminizing hormones on bone mineral density in MTFs were determined by comparing results to non-trans male controls. (50) In another study of bone and mineral metabolism, 27 pre-surgical MTFs were compared to 26 healthy (non-trans) males who had never received estrogenic hormones. (53) The choice of controls based on the sex at birth of trans participants is questionable, given that hormone regimens for FTMs and MTFs are intended to produce hormone levels on par with those of natal males and females, respectively. (266) Furthermore, hormone users may experience a shift to a male-like (for FTMs) (72) and female-like (for MTFs) risk profile for specific health outcomes. Thus, if control groups are used, researchers may want to consider comparing MTFs to natal females and FTMs to natal males.

With regard to depression, some of the studies reviewed did not employ standard, valid and reliable measurement tools. For example, one study reported spontaneous changes in depressive mood; (75) however this was not clearly defined and somewhat unclear as to the direction of change. In another study, participants reported being more emotional and depressed following initiation of hormone therapy. (198) Research findings were based on participants' own perceptions of change in mental well-being, thus depression-related data were obtained using qualitative methods rather than a standardized measurement tool. Furthermore, variation in the choice of criteria for diagnosis, of measures, and of respondent samples complicates comparison of findings across studies. (227) Definitions of depression have changed over time and further problems arise due to variations in the measurement tools employed –a choice which is often related to sample size. (227) In national samples with hundreds of respondents, it is not usually feasible to conduct face-to-face psychiatric interviews, thus self-report measures must be employed. However, some of these tools are sensitive but non-specific, and are likely to assess distress rather than syndromal depression. (227) Time range may also vary among studies. Some examine symptoms in the past two weeks, the past month, the past 6 months, the past year, or the patient's lifetime. (227) Clearly, the longer the time-frame, the higher the rate of depression.

Finally, relevant research from the lesbian, gay and bisexual communities was relied upon in reviewing the risk factors for depression in trans people. While informative, these studies may not be generalizeable to the trans community given expected differences in life experiences and health concerns, the most obvious being gender identity. Much of the literature in lesbian and gay populations is also limited in some ways; for example, the samples tend to lack diversity, and variable constructs such as relationships and social support from friends and family are designed to reflect heterosexual experiences. (174) The nature of these constructs in the lives of sexual (and gender) minorities may differ. For example, relationships with family members may possess unique qualities experienced only by lesbians, or friends may play a more significant role in sexual minorities' lives than in heterosexuals. (174) An additional issue related to the study of depression in trans communities was raised by Dutch researchers. T'Sjoen et al. (267) indicated that whether depression in trans persons is due to hormonal changes is debatable. This is due to the fact that trans people experience important life events during the transitioning process, both before and after starting hormones or undergoing surgery, with gains and losses. The authors further state that the question is not whether depression scores are worse in trans participants than in a control group, but whether the score has improved after gender reassignment. (267) In general, studies that address the conceptual and methodological issues in the field of trans health research (as outlined above) are needed in order to obtain valid results that can be used to improve the health of trans people.

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CHAPTER 3

Lessons learned from undertaking CBPR dissertations: The trials and triumphs of two junior health scholars[1]

3.1 Introduction

Young investigators with a passion for social justice and a strong desire to reduce health inequities face many challenges on their doctoral journeys. The first may be building the trust of marginalized communities (1) who now demand greater control of research that takes place in their midst. (2, 3) Adopting a Community-Based Participatory Research (CBPR)[2] framework may be an appropriate strategy for doctoral students who want to work in solidarity with these groups.

Community-based participatory research is an approach to research that serves community interests, encourages citizen participation, and is geared towards effecting social change. (4, 5) By explicitly recognizing the value of local knowledge, CBPR is based on the premise that working with community members as co-researchers renders research more accessible, accountable, and relevant to people's lives. (6) Furthermore, the very process of meaningful participation can be transformative: through active engagement, individuals and communities can become better equipped to make sustainable personal change and challenge structural inequalities. (7)

For graduate students addressing health issues pertinent to vulnerable communities, CBPR methods may serve as an appropriate mode of inquiry. However, while there are a number of useful guides on conducting, writing, and completing traditional doctoral dissertations, (8-10) there are few similar resources for students engaged in CBPR.

Dissertations employing a CBPR framework are unique in that the knowledge generated is meant to address the immediate needs of people in specific settings. (11)

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[1] A version of this chapter has been accepted for publication (Khobzi N, Flicker S. Lessons learned from undertaking CBPR dissertations: The trials and triumphs of two junior health scholars. *Progress in Community Health Partnerships: Research, Education, and Action*. May 2010). Reproduced here with permission from The Johns Hopkins University Press.

[2] CBPR is also known as CBR; participatory research is most commonly denoted as 'CBPR' in the U.S. Thus, we use 'CBPR' instead of 'CBR' in this article as it will be published in a U.S. journal.

Knowledge generation in CBPR is thus typically practice- rather than theory-driven, possibly contributing to opposition from academia. (11) To counter institutional barriers, training and education in this field has expanded, with the inclusion of CBPR curricula in various U.S. organizations (12) and in schools of public health.

As PhD students, we were motivated to become allies and undertake CBPR for several reasons, including an interest in participatory methods, health equity and social justice, and a desire to improve the health of marginalized communities. Unfortunately, there were few examples of CBPR dissertations to be used as guides. Drawing on our own experiences, we aimed to outline the key lessons learned from doing participatory doctoral research. It is hoped that our reflections on lessons learned will provide guidance to future students pursuing CBPR methods.

3.2 Descriptions of our dissertations

Flicker's dissertation was nested in The Positive Youth Project, a CBPR initiative to improve the wellbeing of young people living with HIV in Ontario, Canada. (13) The project was initiated in 2001 by a group of service providers who were trying to develop youth-friendly services for HIV-positive teens and young adults. Flicker was asked by her supervisor to attend these early meetings on behalf of their lab. She became very involved with the group and was asked to support the writing of several grant proposals as well as the coordination of the research. With funding from the Ontario HIV Treatment Network and the Canadian Foundation for AIDS Research, 35 qualitative interviews were conducted with young people living with HIV. Flicker trained a group of HIV-positive youth to become peer researchers, (14) who partnered in all aspects of the research including developing research instruments and protocols, analysis (15) and dissemination. (15-17) The original group of service providers remained committed co-investigators throughout and were key advocates in using the research results to inform innovative new programs and approaches to services. Furthermore, several of the partnering organizations collaborated on the development and launch of a bilingual health promotion website (www.livepositive.ca). Many were also co-authors on chapters in Flicker's dissertation. The participatory partnership approach adopted was highlighted at several conferences (13) and later became the foundation for Flicker's ongoing work in partnering with youth on health promotion research.

Khobzi's dissertation is being conducted in collaboration with the Trans PULSE Project, a CBPR initiative striving to improve the health of trans (transgender, transsexual, and transitioned) people in Ontario. Its overarching aim is to use a social-determinants-of-health framework in order to understand how social exclusion affects the health of Ontario's trans communities. Trans PULSE was initiated in 2005 by trans community members and an ally, and is currently guided by a central ten-person Investigators Committee (IC), seven of whom are trans-identified. The IC consists of representatives from trans community organizations, academic partners, and unaffiliated trans community members. Khobzi joined the project by building off the relationships formed by her advisor, who was a Principal Investigator on Trans PULSE. Khobzi had started working with Trans PULSE as a research assistant, and was asked to join the team in the initial phases of survey development as a doctoral student. Community members have been heavily involved in Khobzi's dissertation, by participating in the conception of thesis questions, development of pertinent survey items, providing feedback on the dissertation proposal prior to submission, and reviewing and editing thesis articles.

The community engagement plan for Trans PULSE was developed using the principles of good community-campus partnerships outlined by the Community-Campus Partnerships for Health. (18) The process of CBPR employed in Trans PULSE has been presented at various forums, including the 2007 Ontario HIV Treatment Network Conference, and the 2008 Canadian Professional Association for Transgender Health Conference. Presentations are available on the Trans PULSE website. (19) Trans community members are not only engaged in, but control much of the project, including the development of research questions, survey design, participant recruitment, and research dissemination (20) (e.g. conference presentations, authorship). Additional details are available in Table 3.1.

It should be noted that our relationships with the two projects differed considerably. Flicker's immersion in her study as Coordinator resulted in a different set of experiences than Khobzi's relationship with Trans PULSE. For example, Khobzi served as a PhD student on the Trans PULSE team, under the guidance of a supervisor who was also a Principal Investigator. She was thus buffered from challenging team

Table 3.1 Partnership and project descriptions for the Positive Youth and Trans PULSE Projects

Research Project	**Positive Youth Project**	**The Trans PULSE Project**
Research Question	What can we do to better support young people living with HIV?	How does social exclusion affect the health of Ontario's trans communities?
Partners	A public health research unit, a hospital, a national AIDS service organization, grassroots POZ youth group	A primary health care centre, a community centre, representatives from the trans community, academic partners
Governance	An investigator team comprising representatives from all partners met quarterly; a youth advisory committee met weekly	An investigator team made up of representatives from all partners met monthly
Role of Doctoral Student	Co-investigator and primary research coordinator (2002-2006)	Researcher (2007-present)
Design	35 in-depth semi-structured qualitative interviews with HIV positive youth	In-depth quantitative survey (Phase II)
Recruitment	Youth advisors assisted with developing creative recruitment strategies, including poster collages and word of mouth	Peer-driven recruitment method using respondent-driven sampling (RDS)
Data Collection	All interviews were conducted by doctoral student	Surveys were self-administered and available in multiple modes
Data Analysis	A collaborative coding framework was designed and implemented with youth advisory; highly participatory	Design of analysis and interpretation of survey results conducted collaboratively with trans team members
Dissemination	Peer reviewed publications Conference presentations Youth friendly 'zines and fact sheets Community workshops Bilingual website for poz youth	Peer reviewed publications Conference presentations Fact Sheets, Resource Sheets and e-Bulletins Short summary articles Stand-alone graphs

dynamics. In contrast, Flicker faced several boundary issues as a Co-investigator and Coordinator of her project.

3.3 Lessons learned

3.3.1 Lesson 1: Understanding the differences between Traditional Doctoral Dissertations (TDD) and the Community-Based Participatory Research (CBPR) approach

In reflecting on our experiences vs. those of our friends, colleagues, and supervisors, we have identified key differences at each stage of the research process: ethics, research team formation, design, data collection, analysis, and dissemination (Table 3.2). We were not aware of most of the observed differences until we had completed our dissertations. As such, having this knowledge upfront may be useful to students considering whether to pursue a CBPR dissertation. We should also note that there is a range in the degree to which projects are participatory, and that the boundaries between the two approaches can be fluid.

In general, undertaking a participatory project entails working with multiple stakeholders: we were accountable not only to our supervisors and thesis committees, but also to our community partners. While all students need to undergo ethical review for their projects through academic institutions, we also underwent communal review given the CBPR nature of our dissertations. In our experience, this process was facilitated by developing a Terms of Reference (TOR) or Memorandum of Understanding (MOU). With regard to team formation, we invested more heavily in team-building than colleagues doing a TDD. Furthermore, in the design stage of a TDD, research questions might be informed by gaps in the literature and areas of interest to the student and her supervisor. Our CBPR dissertations differed in that we also worked collaboratively with community members to develop research questions, dissertation proposals, and instruments. While our supervisors and committee members provided methodological guidance in order to ensure academic rigour, community members played a vital role by providing feedback on important issues of feasibility and endorsed the value of our proposed work in the community.

We also continued to work with members of the community when collecting and analyzing data. Finally, the dissemination of research products resulting from a TDD is

Table 3.2 Comparison of traditional doctoral dissertations and the community-based participatory research (CBPR) approach

Stages of Research Process	Traditional Dissertation	CBPR Dissertation
Ethics	• Students' projects undergo ethical review solely by the academic institution • Ethical questions are related to the assessment of individual risk	• Our projects underwent ethical review by the academic institution *and* the community • Ethical questions are related to community risk
Research Team Formation	• Students build collaborations with typical members of a doctoral research team, including supervisors and thesis committee members	• We collaborated with supervisors, thesis committee members *and* community partners. • Agreements on how to "work together" were developed with community partners
Design	• Research questions are usually based on the literature and areas of interest to the student or supervisor • Dissertation proposals, research tools and instruments are developed along with the supervisor and based on the literature	• We identified research questions in collaboration with the community • Proposals, research tools and instruments were designed in collaboration with community members, and were based on lived experiences as well as academic knowledge
Data Collection	• Students are primarily responsible for data collection • Many research projects are based on secondary data sources	• We worked on a team, alongside members of the community • Our CBPR projects included primary research, and peer research assistants were used
Analysis	• Analysis is usually conducted in isolation, with consultation sought from the student's thesis committee	• We led analyses pertinent to our dissertations; community members were actively involved with interpretation
Dissemination	• Traditional academic outputs are expected • Papers resulting from the student's thesis may include academic authors	• Creative and community-friendly dissemination strategies were used • Papers and presentations resulting from our theses included community members as co-authors

typically achieved through academic venues (e.g. manuscripts and conference presentations). Under a CBPR approach, it is expected that community-friendly outputs will also be developed, including plain language reports, accessible mixed media such as YouTube videos (see http://www.youtube.com/watch?v=bqbVw4Vzpi4 for an example from the Trans PULSE Project), websites (see www.livepositive.ca) and Fact Sheets.

3.3.2 Lesson 2: Being aware of and able to clearly articulate the advantages of CBPR doctoral dissertations

Through reflecting on our experiences with CBPR during doctoral training, we identified several advantages (Table 3.3). It is important to be aware of the benefits of doing a CBPR dissertation, as we were 1) expected to regularly defend our use of participatory methods during our proposal defenses, thesis examinations and later “job talks” and 2) able to use and impart the skills we gained from using CBPR to obtain relevant research positions following the completion of our doctoral projects. Firstly, in our experience the process of co-creation was both an important advantage and challenge, given that it is the main component of a CBPR project. By including multiple perspectives (triangulation), our projects allowed for enriched interpretations and research results, thereby contributing to process validity. (11) Secondly, several motivating sources, such as community members, academic departments, and our supervisors, contributed to the timely completion of our theses. Thus, we learned to work efficiently and productively in order to meet community and academic deadlines. Furthermore, while relationship building in CBPR projects is time-consuming, (21) it allowed for meaningful community involvement in our doctoral projects, and access to greater resources. This is closely linked to the third advantage of a CBPR dissertation: although we were not ourselves community “insiders”, we were able to gain a broader understanding of the lived experiences of community members by conducting applied research. In addition, doctoral dissertations based on CBPR can have a direct impact at the community level. For example, Flicker’s work contributed to a shift in the programming by one of the agency partners, resulting in more responsive programs. (14)

The role often played by the student as an advocate and social movement member is the fourth advantage of using a CBPR approach in doctoral studies. As activist researchers, we continue to feel pride in our doctoral work as it not only resulted in our dissertations, but also advanced knowledge and produced some real change in people's lives through mobilizing action. This was particularly relevant for us, given that we aimed to build academic careers that focus on social justice and health equity. Having multiple roles and responsibilities is the fifth advantage, as it allowed us to acquire transferable skills by working with an interdisciplinary team, refine our communication skills, and observe different stages of a research project. These experiences prepared us for a future in academia and the public sector, given that many research projects occur in collaboration with multiple stakeholders. The sixth advantage also stems from working on a large-scale participatory initiative, as we gained practical experience in negotiating authorship and control over key aspects of our projects (e.g., criteria for author ordering on papers, inclusion of survey questions relevant to our projects).

3.3.3 Lesson 3: Acknowledging and planning for the possible challenges of CBPR doctoral dissertations

We also identified several challenges to conducting a CBPR dissertation (Table 3.3). Firstly, with regard to co-creation, competing priorities may prove to be a challenge, especially if there is discord or disagreement between the sources to which the student is accountable. For example, when the authenticity of a participant's account was in doubt in Flicker's doctoral research, members of the thesis committee wanted the data discarded. However, the community members vied to retain the youth's information. Flicker ultimately decided to include the respondent in the analysis; however, this was not without much thought and exploration into the handling of implausible narratives. (15) Secondly, while creating conditions for meaningful participation can be rewarding, it takes much time and effort. Consequently, CBPR might not fit within the timeframes of university systems. (22) For our doctoral projects, we participated in valuable, but time-consuming activities such as building relationships and trust with the community; holding research meetings with community members, supervisor(s), and advisory committees; and partaking in research-related events, including symposiums and community outreach. Thirdly, working in the area of applied research can be difficult, as academic audiences may be sceptical of the generalizability and validity of research results, given ideas

Table 3.3 Advantages and challenges of a community-based participatory research (CBPR) dissertation

Issues	Advantages	Challenges
Process of Co-creation	• We obtained feedback from many people and accessed greater team resources • Member checking and feedback process allowed for the inclusion of multiple perspectives, and an enriched analysis	• Competing priorities, even among (often heterogeneous) communities, may arise • Multiple "bosses", means that we had to negotiate and balance the needs of all involved • Multiple perspectives may also confuse, challenge, and disrupt research
Timelines	• Community expectations motivated us to stay on track, and ensured the timely completion of our dissertations	• Thesis must be completed within a particular timeframe; however, the participatory project may be on-going
Applied Research	• Our doctoral research may directly impact at the community level, from knowledge production to Knowledge Transfer and Exchange • We were able to observe and experience the relevance of our work	• Ensuring the generalizability and validity of research results for an academic audience may be challenging • In our experience, publishing was sometimes difficult (or delayed), which could be disadvantageous early in our academic careers
Activist Researcher	• For our CBPR projects, we served as advocates and were involved in community movements • Passion, commitment to social change, and being an ally acted as motivators	• Can be difficult to take a critical stance if research conclusions challenge the status quo or are potentially unflattering to the community
Multiple Roles and Responsibilities	• Prepared us for a future in academia, as many large-scale research projects are collaborative • We acquired transferable skills by observing the application of theory in real time	• Undertaking coordinator roles resulted in boundary issues
Ownership and control	• We gained experience in negotiating authorship and control over different stages of our projects	• Issues regarding authorship may emerge • The community may exercise veto power over the student's work

around “objectivity” that privilege distance from research participants.

The fourth challenge of a CBPR dissertation is related to doing activist research, as students may encounter ethical issues related to the dissemination of potentially unflattering data. While it may be necessary to include findings in one’s dissertation in order to report the objective nature of the data, the community may fear further stigmatization (23) and/or the reputation of the university may be adversely affected (e.g. if findings implicate a major donor to the university). Thus, students should consider the repercussions if data are released prematurely or in an insensitive manner. (23) Having multiple roles and responsibilities, – i.e. as a research coordinator and researcher – is the fifth challenge, given that students may experience boundary tensions. As a coordinator, the student may become involved in the personal lives of community members, while attempting to maintain independence and conduct research pertinent to her dissertation. This was experienced by Flicker, who assisted participants in The Positive Youth Project with housing and personal issues even as she worked with them on her doctoral research. The final challenge stems from the fact that issues regarding authorship may emerge when working on a large CBPR project, particularly if criteria for author ordering, use of data, or appropriate acknowledgements have not been previously established. We found it useful to emphasize the standard guidelines for authorship developed by the International Committee for Medical Journal Editors (24) to partners involved with our dissertations. However, in order to avoid misunderstandings regarding authorship credit, we would have benefited from clarifying the requirements of co-authorship at the initial phases of our doctoral work.

3.3.4 <u>Lesson 4:</u> Recognizing aspects of the CBPR process that contribute to the successful completion of doctoral projects

We have outlined six main suggestions for those who may be considering or already conducting a CBPR dissertation (Table 3.4). The suggestions are derived from elements of the CBPR process that were employed in our own dissertations. Thus, students pursuing CBPR doctoral projects may benefit from applying the successes of our experiences to their own research. First, we learned how to ally with marginalized communities. Community-based participatory research often involves vulnerable groups that may distrust research. Accordingly, we made efforts to 1) be sensitive to the experiences of community members, 2) recognize the value of different forms of knowledge, and 3) validate and respect the contributions of community partners. Engaging communities in all aspects of the research process, and using valid research tools permit the interpretation of data in ways that reflect important “insider knowledge”, thereby improving internal study validity and community relevance. (25) A limitation of both of our experiences was that community members were not involved in the dissertation defense. Others may want to consider having a community representative on the defense committee, or inviting a community partner to the event. Secondly, we found it useful to invest in and commit to building trust with the community, which entailed attending regular meetings and community events. Although time-consuming, it yielded a smooth working partnership with community members, and greater access to community resources. An important component of trust building is transparency about the constraints and vulnerabilities inherent to being a student, and one’s commitments to the community project, given that students may move on (or away) after graduating. In Flicker’s case, following graduation she found herself in a new demanding, temporary position that did not give her the same flexibility to choose her own projects. Staying connected to the community meant many late nights and weekend meetings.

Thirdly, we came to appreciate the importance of building partnerships with communities that were affiliated with our supervisors. This helped in overcoming the institutional obstacles described by Gibbon, (22) such as the acceptance of our CBPR dissertations by our thesis and examination committees. Furthermore, we found that issues such as competing priorities were resolved by our supervisors, who understood our needs as students and those of the communities involved. As noted by Maguire, (26) students would benefit from seeking out faculty who are at the very least open to CBPR. Fourthly, by joining an existing CBPR project, we were able to access additional funding and resources. This further contributed to the acceptance of our CBPR dissertations by academic departments, funding agencies, and peer-reviewed journals. The entry process for working with a community and trust building were also greatly simplified given the connections that had already been established.

Table 3.4 Key suggestions for doctoral students considering or conducting a community-based participatory research project

1. Learn to become an ally with marginalized communities
• Acknowledge and acquire the special skills necessary in working with marginalized communities • Continual dialogue, validation, and respect of all team members are important in producing internally valid study results • Engagement involving openness and mutual learning ensures the relevance and appropriateness of the thesis to the community • Understand and value the critical importance of community knowledge, and do not assume your academic knowledge is superior
2. Invest in and commit to building trust
• Be transparent and clear about the skills or resources to be contributed, the academic process, and time commitments • Transparency allows for the development of realistic expectations by community members of what the student can do, and how the working partnership will be formed. Do not make promises you are not sure you can keep (e.g. to be around five years later)
3. Seek a supervisor who is affiliated with the CBPR project (preferably as Principal Investigator)
• Students benefit from the experience and support of a supervisor who understands both her needs and those of the community • Trust in the supervisor by the community research team facilitates the CBPR process for students, and contributes to the acceptance of the student's dissertation by academic departments • Students should seek thesis committee members who are supportive of CBPR or experienced with participatory research
4. Join an existing project
• Provides access to funding and resources • Contributes to greater acceptance of dissertations conducted using CBPR • Allows for a smoother entry process and contributes to trust building
5. Develop a "Terms of Reference"
• Outlines the roles and responsibilities of all those involved and ensures the independence of the dissertation • Guidelines provided for authorship and acknowledgements • Allows for development of Knowledge Transfer & Exchange strategies
6. Seek out mentors, networks of CBPR researchers, and additional resources
• Resources related to the CBPR field should be actively sought while working on one's dissertation in order to expand one's knowledge base and sources of support • Examples of relevant resources include: Community-Campus Partnerships for Health (CCPH), (27) CBPR-specific conferences, and other researchers' CBPR dissertations

Our fifth suggestion stems from our positive experiences in adopting a Terms of Reference (TOR) or Memorandum of Understanding (MOU) in collaboration with team members. A TOR is a living document that outlines the roles and responsibilities of all those involved. It is a tool for good process meant to prevent conflict, (27) and may be necessary in ensuring the independence of one's dissertation. For instance, in Trans PULSE a TOR was developed to ensure that community needs were met first and foremost, and that ethical research was conducted. A subsection was created for Khobzi that bound her to the TOR, but also acknowledged that academic institutions demand autonomy for their PhD students (Appendix D). A TOR may also outline guidelines for authorship and acknowledgements in papers resulting from one's dissertation, and delineate commitments to Knowledge Transfer & Exchange strategies.

Finally, since the use of CBPR methods for doctoral research remains uncommon, (22) students working on CBPR projects may sometimes feel isolated. We found it useful to seek out networks and allies of students and researchers who work in the CBPR field in order to cultivate a sense of belonging. One important network that we have benefited from is Community Campus Partnerships for Health. (27)

A doctoral candidate who has invested in building her CBPR skills would be wise to use them to her advantage in the job market. Increasingly, schools of Public Health and other academic institutions are seeking community-engaged faculty with an interest in bridging community-university relations through their teaching, research, and service. Furthermore, facing ever-increasing pressures and demands due to the new culture of accountability, community organizations and all levels of government are interested in hiring and consulting with PhD-level researchers. Those with successful experience working in partnership with communities during their doctoral work may be in a position of strength on the job market. Flicker found that her CBPR experience was a definite asset when she was applying for academic positions.

3.4 Conclusions

While much has been written about CBPR, there is a paucity of information specific to the needs of doctoral students. (11) To date, few researchers have attempted to address this gap, with only a handful publishing practical guides. (11, 22, 26) This paper provides an additional and current resource for doctoral students, based on our experiences while working on CBPR projects. Our suggestions are consistent with those of Herr and Anderson, (11) Maguire, (26) Gibbon (22) and Engelman, (28) particularly in terms of trust and relationship building, (11, 26, 28) professional growth of the student researcher, (11, 28) need for personal and institutional support, (26, 28) the importance of becoming involved in an ongoing or established CBPR project, (11, 26) challenges of collaborating with multiple stakeholders, (11, 28) the time-consuming nature of CBPR-dissertations (11, 22, 26) and the issue of project control. (11, 26) In addition, we identified key elements of a successful CBPR dissertation that have not been discussed elsewhere, including the need for a TOR or MOU; seeking out mentors, networks of CBPR researchers, and additional resources; and acknowledging the particular research and social skills required in working with marginalized communities.

Furthermore, while Herr and Anderson's (11) guide is detailed and highly instructive, it is specific to U.S. institutions, and Gibbon (22) and Maguire (26) do not provide clear guidelines for students who are new to the CBPR approach. Our paper is useful for multiple academic settings, and provides a clear description of the differences between CBPR- and traditional-dissertations. We describe the lessons learned from using CBPR for our doctoral projects and provide a guide for students in the form of key recommendations. Nonetheless, our paper is limited in some ways. First, suggestions are based on reflections on just two (our own) dissertations, and informal comparisons of CBPR doctoral projects to traditional theses. Therefore, the suggestions presented in this paper may not be appropriate for all students, academic institutions, or communities involved. Second, our approach is not the only means to attempting participatory research within the framework of doctoral dissertations: there are definitely other ways in which students can become involved. Third, much of the paper was written from the perspective of students designing a project from scratch, rather than using secondary data. However, our recommendations for conducting successful doctoral research through CBPR may be applicable to both primary and secondary research. In the end, despite many of the obstacles and challenges discussed, we found the process of engaging in CBPR deeply rewarding, and hope that our experiences are useful to others.

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CHAPTER 4

Prevalence of and Risk Factors for Depression in Transgender Ontarians: A Cross-Sectional Study[1]

4.1 Introduction

Depression is a syndrome characterized by a set of mood-related symptoms, including loss of interest or pleasure, (1, 2) feelings of guilt or low self-worth, disturbed sleep or appetite, poor concentration and thoughts of death or suicide. (1, 3) Estimates from the Canadian Community Health Survey: Mental Health and Well-Being (CCHS 1.2) showed that approximately one Canadian in ten experienced a major depressive episode at some point in their lives, one in twenty in the course of a year, and one in fifty at a particular point in time. (1) At present, there are no comparably reliable estimates in Canada's trans community, a diverse group of people whose gender identity diverts from societal norms.

Trans is a broad term that includes people of various gender identities; for example, persons who identify as transsexual, female-to-male (FTM), male-to-female (MTF), transgender, and genderqueer. Trans also includes those who may not identify with these descriptors, but rather as simply men or women with a history of transitioning sex. More specifically, transsexuals are those who live as members of the sex other than the one they were assigned at birth. Transsexual persons tend to seek out hormonal and/or surgical interventions to align their outward physical sex with their internal gender identity. (4, 5) Transgender or genderqueer people are those whose gender identity is not completely that of a man *or* woman. Transgender is often used as an umbrella term, and "genderqueer" was coined by trans youth to describe having a fluid sense of both gender identity and sexuality. (6)

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[1] A version of this chapter is in preparation to be submitted for publication (Khobzi N, Bauer G, Kaay M, Scanlon K, Travers R. Prevalence of and risk factors for depression in transgender Ontarians: A cross-sectional study. *Canadian Journal of Community Mental Health*.)

Several studies outside of Canada have reported high prevalences of depression among trans people, ranging from 8% to 72%. (7-14) These estimates are not surprising given the marginalized status of the trans community, and the resulting stigmatization, discrimination and harassment experienced by many trans people. (15) Transphobia, a form of discrimination based on fear and hatred, may contribute to significant depression and poor mental health, (7, 16) as well as reduced education and employment opportunities. (10, 17, 18) Research in groups that also experience gender-related stigma, e.g. gay and bisexual communities, has shown that poverty is a strong predictor of depressed mood, (19) and in Canada, the annual prevalence of major depression is highest for those in the lowest tertile of income. (1)

Social isolation and a lack of overall social support are common among trans people. (6, 20) Isolation is a determinant of emotional ill health and can exacerbate depression, anxiety, substance use and suicidality. (6) Hormones and sex-reassignment surgeries (SRS) can also affect psychological well-being. Initiating estrogen therapy has a calming effect on most MTF patients (21) and contributes to diminished feelings of depression. (22) Furthermore, operated patients and trans people undergoing a real life test (a trial period required by some providers, where patients live as the felt gender before they are provided with hormones or SRS) suffer less depression compared with those during the earlier diagnostic phase. (23) However, adverse effects in terms of mental health have been reported in MTFs undergoing a medical transition, including feelings of being tired and flat, tense and nervous, and gloomy and depressed. (24-26) In contrast, FTMs who have received testosterone report higher quality of life scores than those who have not, with statistically significant differences in the mental health domains of the Short-Form 36-Question Health Survey. (5) Also, among FTMs undergoing phalloplasty procedures, those who had completed surgery reported lower depression ratings than those who had not yet had surgery. (27)

Finally, depression and chronic physical health problems often co-exist, (1) including but not limited to chronic pain, (28) osteoporosis, (29) HIV/AIDS (30, 31) and cancer. (32, 33) These relationships remain unexamined in the trans community, however studies of HIV positive gay and bisexual men indicate that depression is the most common presenting problem, (34) and is significantly influenced by the number (or magnitude) of HIV-related symptoms. (35-38) While chronic physical conditions may greatly impact mood and depressive symptomatology, other mental health issues such as anxiety disorders (e.g. post-traumatic stress disorder, generalized anxiety disorder) also play a role. (39) In fact, there is some evidence that anxiety and co-occurring depression are prevalent among trans people. (6, 17)

Many of the current findings with regard to the risk factors for depression are based on the general population, and although research in the trans community is scarce, factors unique to trans people have been identified. Risk factors that are strongly and consistently related to depression in the general population (or comparable groups, e.g. lesbian, gay, and bisexual communities, which may similarly experience stigma as a result of their nonconforming gender presentation) might also affect the mental health of trans people. However, this possibility is unresearched in the trans-health literature, a gap that is addressed in the present study using a large, population-based sample of socially networked trans people. More specifically, the purpose of this project was to determine the prevalence of and risk factors for depression in trans people who are living, working or receiving health care in Ontario, Canada.

4.2 Methods

4.2.1 The Trans PULSE Project

The present study uses data from the Trans PULSE Project, a community-based research initiative that aims to improve the health of trans people. Trans PULSE is an Ontario-wide project, guided by a Committee of ten investigators, seven of whom are trans-identified. Phase I entailed a set of community soundings designed to obtain feedback about a range of health and health care issues from trans Ontarians; Phase II involved a quantitative survey that utilized a respondent-driven sampling (RDS) method. Findings from Phase I informed the creation of the quantitative survey. This paper draws upon data from Phase II. The Trans PULSE Project was approved by the Research Ethics Board for Non-Medical Research Involving Human Subjects at The University of Western Ontario, Canada. Informed consent was obtained from all participants in the study.

4.2.2 Sampling design

Recruitment was carried out between May 2009 and April 2010 using RDS, a network-based sampling method developed for the recruitment of hidden populations. (40) Traditional network-based designs (i.e. snowball sampling) require an initial set of subjects who participate in the study and serve as "seeds" to help researchers identify other subgroup members to be included in the study. (41) Samples obtained through these methods are heavily influenced by the choice of initial seeds, and are biased towards favouring more cooperative subjects and individuals who are part of larger social networks. (41)

In RDS, seeds are enlisted as participants in the study and provided with unique coupons to recruit eligible peers into the study. Recruits receive a similar number of coupons, as do their referred respondents and this process is continued until the desired sample size is met or equilibrium is reached. Equilibrium is a state in which the estimates converge around a stable sample composition that does not change during subsequent cycles of recruitment. (40) Limiting seeds in the number of respondents they can recruit (40) and providing recruitment incentives (40, 42) increase the length of recruitment chains, thereby allowing the sample to reach equilibrium. This ensures that the final sample composition is not biased towards the characteristics of the seeds. (40) In addition, RDS requires the tracking of network referral patterns (i.e. who invited whom to participate), and knowledge of how connected each member is to their community. The personal network size of each participant (i.e. number of trans people they know in Ontario who are eligible to participate in the study) is used in weighted analyses to compensate for the over-sampling of respondents with larger social networks. (41, 43)

In the Trans PULSE Project, 16 trans people were established to begin the recruitment process and to serve as the initial participants of the study. While the characteristics of seeds are independent of the final sample (given sufficiently long referral chains) under RDS, a broad representation of population characteristics among the seeds accelerates the rate at which equilibrium is reached. (44) As such, the selected participants were sociodemographically diverse with regard to income, age, ethnicity, immigration status, and area of residence. Seeds were recruited through community organizations, social venues, online and by word-of-mouth using a formal application process. Twenty-two additional seeds were added once we had ensured that four to five waves of participants had been recruited. Re-seeding was deemed appropriate by the Investigators Committee due to the slowing of recruitment, and the fact that two of the original seeds had not yet recruited any peers.

The survey instrument was developed in English and was available in multiple modes including online, telephone interview with language interpretation (if needed), and paper-and-pencil. Items concerning a range of demographic and health-related topics were included in the survey. With regard to eligibility, participants had to be trans-identified, living, working, or receiving health care in Ontario, and aged 16 or over. Upon completion of the survey, each seed selected three eligible trans people within their personal networks as Wave One of the study. Each recruit was in turn able to invite up to three trans people to participate as Wave Two, and so on. Primary incentives valued at $20 were offered, with the participant choosing between receiving a gift card or donating their honorarium to a trans-related charity.

Our final sample comprised 433 participants. Given the length of the survey (87 pages in total), respondents were asked to submit each of the five survey sections individually when participating on-line. Twenty-nine participants had not completed the entire survey, thus analyses were limited to those who had submitted sections pertinent to this study. The present paper is based on data obtained from 399 respondents; of the 34 excluded, 7 were seeds who had not completed the questionnaire or had been unproductive (i.e. unable to recruit peers). Overall, 31 seeds were included in this study.

4.2.3 Measures

Outcome. Depression was assessed using the Center for Epidemiologic Studies Depression (CES-D) Scale, a 20-item measure that asks about the frequency of experiencing each depressive symptom during the previous week on a 4-point scale of 0 (rarely) to 3 (most or all of the time). (45) Depression scores from the CES-D can range from 0-60, with higher scores indicating the presence of more symptomatology. A score of 16 or above is generally used to classify depression; (45-47) thus, the outcome was dichotomized, i.e. participants with scores ≥ 16 were defined as being depressed. If more than four items were missing, the scale was not scored. (45) On the other hand, if one to four items were missing, scores on the completed items were summed, the total was divided by the number of items answered and multiplied by 20. (48) A reliability analysis showed that the scale had strong internal consistency in our data (Cronbach's alpha (α) = 0.93).

Risk factors for depression.

Several risk factors unique to the trans community, as well as others strongly and consistently related to depression in the general population were assessed for inclusion in multivariable models. In order to reduce sparse cells in multivariable modelling, response categories for variables were collapsed where needed. Details on the specific survey questions used for this paper are provided in Appendices B (Table B.1) and C.

Sociodemographics. Age in years was included in models in its original form and as a quadratic term, given that depression tends to be lowest among the middle-aged. (49) The quadratic term was only retained in the final model if statistically significant. Relationship status was dichotomized: single (single and not dating or single and dating) vs. in a relationship (monogamous, open, or polyamorous relationship). Newcomer status was dichotomized (living in Canada for < 5 years vs. ≥ 5 years) as recent immigration has been shown to be protective with regard to depression. (50) Area of residence was also dichotomized (Metropolitan Toronto vs. outside Metropolitan Toronto) based on the postal codes (first three digits) provided by the respondents. This was deemed appropriate as 1) almost half of the unweighted sample was from Metropolitan Toronto, and 2) the majority of trans-specific services are located in Toronto, thus trans people residing in Metropolitan Toronto may have greater access to appropriate mental health, health care, and social services.

Socioeconomic factors. Income-to-needs ratios were obtained by dividing the midpoint of the categories for household gross yearly income by household size. (51) This is a more meaningful measure than an income variable used in its original form as the resources available to a family size of one with \$50,000 are very different versus a larger family with the same income. (51) The midpoint of household incomes above \$100,000 (highest cut off in the questionnaire) was assigned a value of \$185,000. This was derived from the Canadian 2001 Census, in which the average income for the highest income decile (range: more than \$117,849) was \$185,070. (52) Furthermore, employment status was defined as unemployed (those not employed, receiving disability, employment insurance, or general social assistance), other (includes part-time employment, those on leave from work, students, and retired participants), and full-time employment.

Additional socioeconomic variables tested for inclusion in multivariable models were education (completed high school or less, some postsecondary, postsecondary graduate) and housing (stably housed vs. not). The latter housing category includes currently homeless individuals, those living in a group home, long-term care facility, self-contained room in a motel or boarding house, couch-surfing or staying at a friend's house, squatting, rehabilitation facility, prison, or other housing situation.

Discrimination and abuse. Childhood abuse was assessed by asking respondents if they had ever experienced sexual or physical abuse before age 16. Participants who had been sexually abused were also more likely to have been physically abused, thus a composite variable was created: any abuse (sexual or physical), no abuse, and "rather not answer" or "don't know." In addition, an 11-item scale for transphobia was constructed that measured the frequency of negative experiences associated with being trans (modified from measures used by Sugano et al. (16) and Diaz et al. (19)). Examples of items used include "How often have you been made fun of or called names for being trans?" and "How often have you heard that trans people are not normal?". Responses were scored on a 4-point scale ranging from 0 (never) to 3 (many times). The final score for each respondent was the sum of their ratings for all of the items, with higher numbers reflecting more frequent experiences of transphobia. (16)

A similar 10-item scale appropriate for the trans community was developed to measure the frequency of experiences of racism; for example, "How often have you been uncomfortable in trans spaces because of your race or ethnicity?" "How often were you treated rudely or unfairly because of your race or ethnicity?" This measure was based on a version used by Diaz et al., (19) and was dichotomized (no experiences of racism vs. any experience of racism) due to a lack of variability, i.e. over 50% of the total sample scored zero for all items in the scale. The transphobia and racism scales were scored only for participants who had completed at least 80% of the items. (16) Furthermore, the scales showed high levels of internal consistency in our data: transphobia, Cronbach's $\alpha = 0.81$; racism, $\alpha = 0.92$. The reliability coefficients are comparable with those reported by Sugano et al. (16) and Diaz et al. (19)

Social and identity support. The availability of social support was assessed using 19 questionnaire items (α = 0.97 in our data) obtained from the Medical Outcomes Study Social Support Survey. (53) The questions were scored on a 5-point Likert scale ranging from 1 (none of the time) to 5 (all of the time), and the final score for each respondent was computed by averaging across all 19 items. (53) A higher score for the overall support index indicates more support. (54) In addition, perceived identity support – defined as the extent to which others (e.g. parent(s), trans friends, co-workers) support, or are expected to support one's gender identity – was measured using a metric developed for our study. Options for 16 possible sources of identity support were scored from 1 (not at all supportive) to 4 (very supportive). A composite variable was created by averaging across scores for actual and expected experiences of identity support. Finally, respondents were asked for the frequency in which they participated in activities with voluntary organizations in the past year. The measure was categorized as "moderate to high involvement" (at least once a week or once a month) vs. "little or no involvement" (at least 3 or 4 times a year, once a year, or not at all).

Hormone therapy and sex-reassignment surgeries (SRS). Hormone use was measured by asking respondents whether they currently take hormones (yes, under medical supervision; yes, without medical supervision; and no). In order to reduce sparse cells in multivariable modelling, this variable was dichotomized: yes vs. no (includes those who had never taken hormones). Furthermore, the stage of medical transition was measured in our study by asking participants to select the situation that best applies to them: have medically transitioned (hormones and/or surgery), in the process of medically transitioning, planning to medically transition, not planning to medically transition, the concept of "transitioning" does not apply, and not sure whether or not to medically transition. This question was collapsed into 4 categories; more specifically, "not planning to medically transition" and "the concept of 'transitioning' does not apply" were grouped into one category.

Respondents were also asked if they had undergone a number of procedures (e.g. orchiectomy, vaginoplasty, phalloplasty, facial surgeries, mastectomy), and the year in which they had undergone each surgery. While depression ratings are lower among post-operative vs. pre-operative transsexuals, (27) anecdotal reports from trans community members indicate that having recently had surgery may contribute to poorer mental health. Furthermore, the first year after SRS is typically not representative of the long-term emotional and psychological status of patients. (55) These findings suggest that many trans people require a period of adjustment following SRS. Thus, a composite measure was constructed to account for the time since surgery: recent surgery (respondents who had undergone any surgery between 2008 and 2010), any surgery before 2008, and never had surgery. Respondents who indicated undergoing multiple procedures both recently and before 2008 were coded as having had recent surgery.

Living in felt gender (coming out). Trans people who report higher levels of outness have been found to have lower levels of depression. (56) As such, living full-time in one's felt gender is expected to confer beneficial effects in terms of mental health. For this paper, we asked respondents whether they were currently living in their felt gender (full-time, part-time, no), and if yes, at what age they had begun doing so. A composite variable was constructed to account for the potentially different effects of living in one's felt gender for a long vs. short time: living full-time in felt gender for ≤ 3 years, living full-time in felt gender for > 3 years, and living in felt-gender part-time or not at all.

Passing, whether one is accepted or regarded as a member of the gender with which one identifies, was also assessed in our study, given that failing to pass may result in possible humiliation, discrimination and violence. (57) Participants were asked how often they encountered people who knew they were trans without being told so (always, very frequently, occasionally, about half the time, rarely, very rarely, or never). This question was reverse coded and collapsed into three categories: rarely pass (always, very frequently, or occasionally), sometimes/often pass (about half the time or rarely), and almost always or always pass (very rarely or never).

Chronic health issues and sexual satisfaction. A variety of chronic medical conditions are associated with higher levels of depression. Respondents who were not usually pain-free or physically comfortable, or had ever been diagnosed with HIV, cancer, fibromyalgia, osteoporosis or diabetes were defined as experiencing major chronic physical health issues. These particular conditions were included because they are strongly and consistently related to depression in the literature, and were expected to be more common than other health problems (e.g. stroke). Those who had ever been diagnosed with schizophrenia, borderline personality disorder, dissociative identity disorder or anxiety disorders were coded as experiencing major mental health issues. Finally, sexual satisfaction –defined as the tendency to be highly satisfied with the sexual aspects of one's life (58) – is a potentially important determinant of mental health in trans people as many have difficulty finding sexual partners or dealing with disclosure of non-matching genders and bodies. (59) This variable was measured using a 5-item subscale ($\alpha = 0.96$ in our study) from the Multidimensional Sexual Self-Concept Questionnaire (MSSCQ). (58) The MSSCQ consists of a 5-point Likert scale, with each item scored from 0 (not at all characteristic of me) to 5 (very characteristic of me). Items in the subscale were averaged so that higher values corresponded to greater levels of satisfaction. (58)

4.3 Statistical analyses

Data quality was examined using frequency tables for categorical variables as well as descriptive statistics and plots for continuous variables. Univariate exploratory analyses were used to determine how best to model quantitative covariates. The distribution of missingness was also examined. Four variables were missing data on at least 5 percent of cases; two of these variables were excluded from multivariable analyses. Income-to-needs ratio had the greatest proportion of missing (14%, n=54), which is likely non-ignorable given the sensitive nature of the variable. Due to the statistical relationship between income and other income-related variables, (60) we used less sensitive, surrogate variables in multivariable modeling such as education and employment status (both with less than 1% missing). Newcomer status was missing data on 8 percent of cases, and was excluded due in part to a lack of variability. More specifically, ninety percent of all respondents had been living in Canada for greater than 5 years. Furthermore, newcomer status was not associated with the outcome in a complete case analysis.

Upon exclusion of the preceding variables from multivariable analyses, we observed 309 respondents with complete cases. Of the 90 participants with any missing, 89% (n=80) were only missing on 1 or 2 variables. One respondent was missing on all variables of interest. In addition, 90% (n=20) of variables included in this analysis were missing data on 3 percent or fewer cases. Since missing data were minimal, it was decided that fewer biases would be introduced by estimating reasonable values for respondents for which data were missing, than by excluding them in analyses. (61) A straightforward imputation technique (overall mean and median imputation), was employed in order to preserve the sample size by reducing the loss of cases resulting from list-wise deletion in multiple regression. Imputation was not employed for: the outcome (n=8 with missing data), one respondent who was missing on all relevant variables, descriptive statistics, and bivariate analyses.

The mean was only used for continuous variables where the percentage difference between the mean and the median was less than 10 percent. In cases where the median differed from the mean by 10 percent or more, the median value was used in order to ensure extreme values did not affect imputation estimates. For ordinal variables, the median value of response codes was the value that was imputed for missing cases. The median value was determined by examining the frequency distribution for the variable of interest and then selecting the response value where the cumulative percentage contained 50 percent. The most frequent category was used to impute missing values for nominal and binary variables, except for area of residence (Metropolitan Toronto vs. outside Metropolitan Toronto) given that missingness on this variable was relatively high (5.3%, n=21). Instead, a random imputation technique (coin toss) was used for each missing value. Note that responses to this variable were almost equally distributed, i.e. 45.4% of all respondents resided in Metropolitan Toronto and 49.4% lived outside Metropolitan Toronto. It is recognized that single imputation reduces variability in scores, resulting in the underestimation of variances and standard errors. (60) If sample sizes had been smaller and there was a greater proportion of missing values, multiple imputation procedures would have been considered.

4.3.1 Prevalence estimation

Weighted prevalence estimates and 95% confidence intervals were calculated for all variables of interest using RDSAT version 6.0. (62) Population inferences obtained from RDSAT are based on analytical methods presented by Heckathorn and Salganik. (40, 41) More specifically, estimates are weighted according to information on the proportional recruitments across groups and the mean network size for each group. (40, 41, 63) This permits calculation of population estimates that 1) compensate for over-sampling of groups with larger network sizes, and 2) control for differences in recruitment effectiveness and degrees of homophily, i.e. preference for connections to one's own group. (42, 63) Confidence intervals derived from RDSAT are based on a modified bootstrapping methodology that mimics the features of RDS recruitment. (64) The resampling procedure was carried out 10,000 times for each confidence interval in this study.

4.3.2 Model building and multivariable regression

SAS version 9.2 (65) was used for all statistical analyses. Bivariate analyses were conducted using simple logistic regression to compute odds ratios and corresponding 95% confidence intervals. Indicator variables were created for all categorical variables with more than two categories. For the multivariable analyses, multiple logistic regression models were performed using the following model building strategies:

i. An automated backward elimination procedure was used to limit the number of general population risk factors in the final model and avoid over-fitting. Age, a key sociodemographic variable, was forced to remain in the model. Backward elimination is typically preferred over forward and stepwise regressions as it is less sensitive to model specifications. (66) Additional benefits of backward elimination are described by Harrell (67) and Sun et al. (66) A criterion of alpha=0.15 was used so that parsimonious models explaining the variability of the dependent variable would be obtained but potentially important risk factors would not be removed.
ii. Variables retained through the backward elimination procedure were included in multiple logistic regression models along with all trans-related variables.
iii. Conceptually similar and strongly associated trans-specific variables (stage of medical transition, surgery, current hormone use, and living in felt gender) were tested to determine if any should be removed, by comparing different models using the Akaike information criterion (AIC). (68)

Following model building, regression diagnostics were performed to ensure that the data fit the proposed models. Failure in model fit was examined by looking for multicollinearity among the explanatory variables, and linearity in the log odds of the outcome. The latter was assessed in continuous variables by introducing quadratic terms into the model.

4.3.3 Weights and adjustments for sampling design

Individualized weights were used to adjust for the over-sampling of respondents with larger social networks and differences in recruitment effectiveness. Weights were obtained from RDSAT 6.0, and computed for each respondent based on individual degrees (personal network size) and a partition analysis of the outcome (depression). (69) When these weights are generated for the dependent variable, they can weight the entire data set for multivariable analyses. (69) Comparisons between weighted and unweighted data were conducted to assess the impact of weighting on the results. Considerable differences were observed, thus only weighted results are presented in this paper (see Appendix E for unweighted multivariable models).

Appropriate adjustments for the lack of independence among respondents were applied to the final multivariable model using SAS surveylogistic procedures. In RDS, some respondents typically recruit more than one other eligible peer, thus individual-level errors are potentially correlated with the explanatory variables in the model. (70) In this case, participants who share a recruiter are treated as being a cluster. (70) Furthermore, respondents who share a seed are members of the same recruitment tree; the latter represents a higher level of clustering (70) in which shared recruiter clusters are nested. (70) Note that seeds do not have recruiters, and are thus not part of a shared recruiter cluster. To ensure that seeds were included in multivariable analyses, each seed was assigned a unique shared recruiter cluster number. In this study, there were 31 recruitment tree clusters, and 236 shared recruiter clusters (of maximum size 3). Finally, subgroup analyses in surveylogistic were carried out using the domain statement in order to obtain appropriate estimates of variance. (71)

4.4 Results

In the initial phase of analysis, tests for interaction effects by gender spectrum (MTF and FTM) were conducted for all trans-related variables (see Table 4.1 for a listing of the specific variables). Statistically significant and qualitative interactions were observed, thus all subsequent analyses were performed separately for MTFs and FTMs.

See Appendix E for details on the procedures followed to test for interaction effects, and the results of the assessment.

4.4.1 Recruitment characteristics

The sample included 10 recruitment waves, based on the longest recruitment chain. The estimated number of waves required to reach equilibrium ranged from: 2 for depression, 2 to 5 for all trans-related risk factors, and 2 to 8 for all general population risk factors of interest. The preceding estimates were obtained using RDSAT version 6.0. (62) Note that the number of waves required to reach equilibrium is variable-specific, and dependent on the characteristics of initial recruits. (69) Furthermore, under standard RDS interpretation, if equilibrium is reached within a single recruitment chain, then equilibrium is reached for the entire sample (72) because the sample will have sufficient "sociometric depth" (number of links from the terminus of the longest chain to its seed). (63) This ensures that all members of the target population have a nonzero probability of selection. The number of waves attained in this study exceeded those required for equilibrium to be approximated. This indicates that our sample composition was independent of the initial recruits, (44) and homophily, or network clustering and segmentation, was not high. Details regarding calculations of the required number of waves can be found in the RDSAT user manual. (69)

4.4.2 Characteristics of trans Ontarians

The characteristics of trans Ontarians are described in Table 4.1. In general, 20-29 year olds represented the largest age group among both MTFs and FTMs. While 49.3% (95% CI = 38.9, 58.6) of MTF Ontarians had received postsecondary degrees, 23.4% (95% CI = 14.9, 32.4) were unemployed, and 40.4% (95% CI = 29.6, 51.8) fell in the lowest income-to-needs ratio category (< \$15,000 per person). A similar pattern in terms of high levels of education without corresponding levels of employment and income was observed among FTMs. Furthermore, most trans Ontarians were stably housed, and few were newcomers to Canada. Sexual or physical childhood abuse was experienced by the majority of MTFs and FTMs. Diagnoses of schizophrenia, borderline personality disorder, dissociative identity disorder or anxiety disorders were also common. Note that of those identified as having a major mental health issue, 74.2% (95% CI = 60.1, 87.7) of MTFs, and 84.9% (95% CI = 75.5, 92.6) of FTMs, had only been diagnosed with

Table 4.1 Weighted prevalence estimates for general population and trans-specific risk factors among trans Ontarians, by gender spectrum

Characteristic	**Male-to-Female % (95% CI)[a] (n=191)**	**Female-to-Male % (95% CI)[a] (n=207)**
General population risk factors		
Age, y (range 17-77)		
16-19	3.2 (0.7, 6.8)	11.7 (5.3, 20.4)
20-29	33.4 (24.6, 46.8)	48.1 (37.7, 57.3)
30-39	22.4 (14.4, 31.5)	24.8 (16.9, 33.5)
40-49	16.5 (8.9, 24.2)	11.8 (5.3, 20.3)
≥ 50	24.5 (13.4, 32.3)	3.6 (0.3, 7.7)
Area of residence		
Metropolitan Toronto	24.5 (15.2, 31.9)	42.8 (28.8, 53.6)
Outside Metropolitan Toronto	75.5 68.2, 84.8)	57.2 (46.4, 71.2)
Income-to-needs ratio, $/person		
< 15,000	40.4 (29.6, 51.8)	50.0 (38.2, 60.5)
15,000 to < 30,000	16.8 (9.6, 24.6)	34.6 (25.1, 46.2)
30,000 to < 45,000	8.8 (3.4, 18.3)	4.8 (1.9, 7.6)
≥ 45,000	34.0 (22.2, 43.9)	10.6 (4.7, 18.0)
Education		
High school or less	19.8 (12.9, 27.9)	35.5 (27.2, 45.4)
Some college or university	30.9 (22.5, 40.1)	25.7 (17.8, 33.4)
Postsecondary graduate	49.3 (38.9, 58.6)	38.7 (29.2, 47.7)
Employment status		
Full time	37.8 (28.5, 47.3)	39.3 (30.3, 47.0)
Unemployed	23.4 (14.9, 32.4)	16.6 (9.9, 23.9)
Other[b]	38.8 (29.8, 48.4)	44.1 (35.8, 54.1)
Housing		
Stable	87.2 (79.7, 93.7)	95.5 (92.0, 98.5)
Unstable	12.8 (6.3, 20.3)	4.5 (1.5, 8.0)
Relationship status		
Single	68.3 (59.2, 76.0)	48.2 (39.0, 57.4)
In relationship	31.7 (24.0, 40.8)	51.8 (42.6, 61.1)
Newcomer status		
< 5 yrs in Canada	6.1 (1.5, 12.2)	2.0 (0.4, 4.5)
≥ 5 yrs in Canada	93.9 (87.8, 98.5)	98.0 (95.5, 99.6)

Characteristic	**Male-to-Female % (95% CI)[a] (n=191)**	**Female-to-Male % (95% CI)[a] (n=207)**
Childhood abuse		
Any abuse[c]	72.3 (61.3, 81.8)	65.7 (57.3, 75.1)
No abuse	21.2 (12.6, 31.1)	28.4 (20.1, 36.1)
Don't know/rather not answer	6.5 (2.2, 12.0)	5.9 (1.9, 10.4)
Community involvement		
Moderate to high involvement	46.7 (35.8, 54.9)	49.9 (41.1, 59.9)
Little or no involvement	53.3 (45.1, 64.3)	50.1 (40.1, 58.9)
Major mental health issues		
Yes	28.8 (21.6, 38.3)	63.0 (53.5, 72.2)
No	71.2 (61.7, 78.4)	37.0 (27.9, 46.5)
Chronic physical health issues		
Yes	45.4 (36.0, 56.3)	38.7 (29.4, 46.8)
No	54.6 (43.7, 64.1)	61.3 (53.3, 70.7)
Racism		
Any exposure	38.8 (28.7, 48.2)	50.0 (40.2, 59.0)
No exposure	61.2 (51.8, 71.3)	50.0 (41.0, 59.8)
Social support[d]		
1.0 to < 2.5	26.2 (16.5, 36.8)	16.4 (8.9, 24.4)
2.5 to < 3.5	25.5 (19.4, 34.0)	21.7 (14.6, 29.9)
3.5 to 5.0	48.3 (37.4, 57.2)	61.9 (52.3, 71.4)
Sexual satisfaction[d]		
< 1.0	50.9 (39.7, 60.5)	30.0 (21.9, 40.2)
1.0 to < 2.5	24.1 (17.7, 33.4)	35.1 (26.5, 43.5)
2.5 to 4.0	25.0 (16.6, 32.8)	34.9 (25.5, 43.8)
Trans-specific risk factors		
Passing		
(Almost) always	40.6 (31.5, 50.4)	50.8 (41.4, 59.8)
Half the time/often	28.3 (19.6, 36.3)	27.8 (20.8, 36.0)
Rarely or never	31.1 (23.4, 39.8)	21.4 (14.8, 28.4)
Transphobia[d]		
< 11.0	25.7 (16.2, 34.2)	39.6 (30.7, 49.5)
11.0 to < 21.0	54.5 (46.2, 65.2)	48.3 (38.3, 57.4)
21.0 to 31.0	19.7 (11.6, 27.9)	12.1 (6.3, 19.0)

Characteristic	**Male-to-Female % (95% CI)[a] (n=191)**	**Female-to-Male % (95% CI)[a] (n=207)**
Living in felt gender		
Full-time ≤ 3 yrs	28.5 (20.8, 39.3)	17.9 (12.2, 24.7)
Full-time > 3 yrs	17.4 (10.6, 23.5)	31.8 (22.5, 41.4)
Part-time or not at all	54.1 (43.7, 63.7)	50.3 (39.7, 60.5)
Perceived identity support[d]		
1.0 to < 2.0	9.8 (2.7, 18.5)	4.6 (0.3, 7.6)
2.0 to < 3.0	28.5 (20.5, 36.8)	30.8 (22.4, 41.3)
3.0 to 4.0	61.7 (52.3, 70.8)	64.5 (55.7, 74.3)
Current hormone use		
Yes	46.2 (36.7, 56.9)	38.5 (28.7, 46.2)
No	53.8 (43.1, 63.3)	61.5 (53.8, 71.3)
Stage of medical transition		
Medically transitioned	22.7 (14.3, 30.7)	21.9 (13.6, 28.3)
In the process	34.2 (27.0, 45.4)	16.9 (10.6, 20.5)
Planning, but not begun	18.7 (10.9, 25.9)	40.1 (30.7, 48.9)
Not planning/concept does not apply	14.4 (9.1, 23.8)	10.4 (5.9, 24.0)
Not sure	10.0 (3.6, 14.1)	10.7 (5.8, 14.9)
Surgery		
Recent surgery	6.3 (2.7, 10.7)	10.6 (5.7, 15.2)
Surgery before 2008	12.2 (4.7, 17.0)	14.0 (9.0, 20.9)
Never had surgery	81.5 (75.2, 90.6)	75.4 (66.9, 82.9)

Note. CI, confidence interval; y, years.

[a] Weighted prevalence estimates and 95% CIs obtained from RDSAT version 6.0.

[b] Other employment includes part-time, on leave from work, students, and retired participants.

[c] Any childhood abuse includes experiences of sexual or physical abuse before age 16.

[d] Continuous/scale measures –higher scores indicate greater levels of social support, sexual satisfaction, transphobia, and perceived identity support.

anxiety disorders.

With regard to potential risk factors unique to the trans community, an estimated 40.6% (95% CI = 31.5, 50.4) of MTF Ontarians were able to almost always or always pass in their felt gender (versus 50.8% (95% CI = 41.4, 59.8) of FTMs). Furthermore, the majority of trans Ontarians had experienced moderate to high levels of transphobia, and many were living in their felt gender part-time or not at all. Finally, most of both MTF and FTM Ontarians were not currently using hormones, and had never undergone a surgical procedure.

4.4.3 Risk factors for depression in the trans community

Bivariate associations in MTFs.

Among MTFs in Ontario, 61.2% (95% CI = 52.7, 70.3) scored at least 16 on the CES-D (sample frequency, n=111), and were thus classified as being depressed. The unweighted scores ranged from 0 (no depressive symptomatology) to 54, with a mean of 21.2 (standard deviation (SD) = 13.0) and a median of 19.0. Bivariate analyses are presented in Table 4.2. The crude tests of association revealed that the odds of depression were almost four times greater for MTFs living outside Metropolitan Toronto compared with those living in Metropolitan Toronto (95% CI = 1.42, 10.76). In addition, MTFs who had some college or university education were significantly more likely to be depressed than MTFs with completed postsecondary degrees. On the other hand, those experiencing higher (vs. lower) levels of social support were significantly less likely to be depressed, and the odds of depression were 12 times greater for unemployed MTFs compared with those who worked full-time (95% CI = 2.86, 52.14). Of the trans-specific risk factors, frequent exposure to transphobia was significantly associated with depression.

Bivariate associations in FTMs.

Among FTM Ontarians, 66.4% (95% CI = 59.2, 75.2) were identified as being currently depressed (sample frequency, n=116). The unweighted scores on the CES-D ranged from 0 (no depressive symptomatology) to 57, with a mean of 20.3 (SD = 13.0), and a median of 19.0. The crude tests of association revealed that the odds of depression were almost three times greater for FTMs who had ever been diagnosed with schizophrenia, borderline personality disorder, dissociative identity disorder, or anxiety disorders, versus those who had never been diagnosed with any of the preceding conditions (95% CI = 1.10, 6.36). In addition, FTMs experiencing higher (vs. lower) levels of social support and sexual satisfaction were significantly less likely to be depressed.

Of the trans-specific risk factors, frequent exposure to transphobia was significantly associated with depression. On the other hand, those experiencing higher

Table 4.2 Bivariate associations between depression and potential risk factors of interest

Risk factors	**Male-to-Female OR (95% CI)**[a]	**Female-to-Male OR (95% CI)**[a]
General population		
Age (y)	0.97 (0.93, 1.00)	1.02 (0.98, 1.06)
Area of residence		
Metropolitan Toronto	1.00	1.00
Outside Metropolitan Toronto	3.91 (1.42, 10.76)*	1.37 (0.60, 3.15)
Income-to-needs ratio, $/person		
< 15,000	2.43 (0.64, 9.19)	3.02 (0.69, 13.22)
15,000 to < 30,000	0.28 (0.07, 1.10)	1.57 (0.35, 7.09)
30,000 to < 45,000	0.52 (0.07, 3.72)	1.78 (0.28, 11.18)
≥ 45,000	1.00	1.00
Education		
High school or less	2.26 (0.78, 6.56)	2.30 (0.80, 6.66)
Some college or university	2.84 (1.00, 8.06)*	0.82 (0.30, 2.30)
Postsecondary graduate	1.00	1.00
Employment status		
Full time	1.00	1.00
Unemployed	12.22 (2.86, 52.14)*	2.27 (0.61, 8.37)
Other[b]	1.08 (0.40, 2.95)	0.84 (0.35, 2.01)
Housing		
Stable	1.00	1.00
Unstable	3.81 (0.97, 14.97)	0.79 (0.19, 3.19)
Relationship status		
Single	1.83 (0.79, 4.26)	1.35 (0.61, 2.98)
In relationship	1.00	1.00
Newcomer status		
< 5 yrs in Canada	1.00	1.00
≥ 5 yrs in Canada	0.64 (0.08, 5.26)	1.18 (0.14, 9.84)
Childhood abuse		
Any abuse[c]	3.01 (0.87, 10.48)	2.16 (0.81, 5.72)
No abuse	1.00	1.00
Don't know/rather not answer	0.22 (0.03, 1.80)	0.61 (0.08, 4.81)

Risk factors	**Male-to-Female** **OR (95% CI)[a]**	**Female-to-Male** **OR (95% CI)[a]**
Community involvement		
Moderate to high involvement	1.00	1.00
Little or no involvement	0.44 (0.17, 1.14)	0.65 (0.30, 1.44)
Major mental health issues		
Yes	1.40 (0.57, 3.41)	2.64 (1.10, 6.36)*
No	1.00	1.00
Chronic physical health issues		
Yes	1.66 (0.60, 4.58)	2.47 (0.97, 6.30)
No	1.00	1.00
Racism		
Any exposure	1.64 (0.63, 4.28)	1.31 (0.59, 2.92)
No exposure	1.00	1.00
Social support	0.52 (0.31, 0.87)*	0.56 (0.33, 0.94)*
Sexual satisfaction	0.72 (0.49, 1.06)	0.55 (0.40, 0.75)*
Trans-specific		
Passing		
(Almost) always	1.00	1.00
Half the time/often	1.00 (0.31, 3.23)	0.94 (0.36, 2.44)
Rarely or never	1.15 (0.35, 3.76)	0.76 (0.28, 2.07)
Transphobia	1.13 (1.02, 1.25)*	1.12 (1.05, 1.21)*
Living in felt gender		
Full-time ≤ 3 yrs	1.27 (0.46, 3.49)	0.69 (0.23, 2.05)
Full-time > 3 yrs	1.00	1.00
Part-time or not at all	0.72 (0.27, 1.92)	2.08 (0.74, 5.88)
Perceived identity support	0.59 (0.29, 1.23)	0.33 (0.13, 0.82)*
Current hormone use		
Yes	1.00	1.00
No	0.62 (0.23, 1.67)	2.80 (1.29, 6.08)*

Risk factors	**Male-to-Female OR (95% CI)**[a]	**Female-to-Male OR (95% CI)**[a]
Surgery		
Recent surgery	0.72 (0.11, 4.64)	1.84 (0.49, 6.87)
Surgery before 2008	1.00	1.00
Never had surgery	0.98 (0.23, 4.24)	5.29 (1.88, 14.85)*
Stage of medical transition		
Medically transitioned	1.00	1.00
In the process	1.98 (0.66, 5.88)	1.23 (0.46, 3.29)
Planning, but not begun	2.86 (0.50, 16.32)	5.15 (1.64, 16.16)*
Not planning/concept does not apply	0.28 (0.05, 1.76)	1.45 (0.23, 9.34)
Not sure	0.70 (0.11, 4.50)	1.26 (0.33, 4.84)

Note. OR, odds ratio; CI, confidence interval; y, years.

[a] Standard errors and odds ratios were adjusted for sampling design (individualized weights; recruitment tree and shared recruiter clusters) using surveylogistic procedures in SAS version 9.2.

[b] Other employment includes part-time, on leave from work, students, and retired participants.

[c] Any childhood abuse includes experiences of sexual or physical abuse before age 16.

*p<0.05

(vs. lower) levels of perceived identity support were significantly less likely to be depressed, and the odds of depression were 2.8 times greater for FTMs not currently using hormones compared with current users (95% CI = 1.29, 6.08). Finally, FTM Ontarians who had never had surgery were significantly more likely to be depressed than FTMs who had undergone any surgical procedure before 2008, and those who were planning to medically transition but had not begun were five times more likely to be depressed than FTMs who had medically transitioned (95% CI = 1.64, 16.16).

Multivariable associations in MTFs.

For the multiple logistic regression analyses, the following trans-specific variables were removed from the final model: living in felt gender and surgery. This resulted in a more precise (narrower confidence intervals) and better specified model, as the smallest AIC value was obtained upon removal of the aforementioned variables. Furthermore, diagnostic tests indicated that there were no significant problems related to multicollinearity (i.e. all variance inflation factors obtained by fitting the model using linear regression were less than 10). In addition, assumptions of the final model related to

Table 4.3 Multiple logistic regression models for depression regressed onto general population and trans-specific risk factors: Male-to-Female spectrum

	OR (95% CI)[a]	**Adjusted for shared recruiter cluster (95% CI)**[b]	**Adjusted for recruitment tree cluster (95% CI)**[b]	**Adjusted for recruitment tree and shared recruiter clusters (95% CI)**[b]
Age (y)	0.98 (0.93, 1.03)	(0.93, 1.03)	(0.93, 1.03)	(0.93, 1.03)
Employment status				
Full-time	1.00	Referent	Referent	Referent
Unemployed	8.33 (1.52, 45.65)*	(1.48, 46.94)*	(1.49, 46.66)*	(1.42, 48.74)*
Other	1.75 (0.49, 6.26)	(0.47, 6.60)	(0.49, 6.29)	(0.46, 6.67)
Community involvement				
Moderate to high involvement	1.00	Referent	Referent	Referent
Little or no involvement	0.25 (0.08, 0.77)*	(0.08, 0.78)*	(0.08, 0.77)*	(0.08, 0.79)*
Childhood abuse				
Any abuse	4.56 (1.15, 18.07)*	(1.14, 18.31)*	(1.15, 18.10)*	(1.13, 18.37)*
No abuse	1.00	Referent	Referent	Referent
Don't know/rather not answer	1.90 (0.15, 24.44)	(0.15, 24.06)	(0.14, 25.05)	(0.14, 25.01)
Social support	0.53 (0.28, 1.01)	(0.28, 1.01)	(0.28, 1.01)	(0.28, 1.01)
Area of residence				
MT	1.00	Referent	Referent	Referent
Outside MT	3.19 (1.08, 9.45)*	(1.04, 9.79)*	(1.07, 9.49)*	(1.03, 9.88)*

	OR (95% CI)[a]	Adjusted for shared recruiter cluster (95% CI)[b]	Adjusted for recruitment tree cluster (95% CI)[b]	Adjusted for recruitment tree and shared recruiter clusters (95% CI)[b]
Passing				
(Almost) always	1.00	Referent	Referent	Referent
Half the time/often	0.10 (0.03, 0.42)**	(0.03, 0.40)**	(0.03, 0.41)**	(0.03, 0.38)***
Rarely or never	0.11 (0.03, 0.47)**	(0.03, 0.47)**	(0.02, 0.48)**	(0.03, 0.47)**
Transphobia	1.09 (0.98, 1.22)	(0.98, 1.22)	(0.98, 1.22)	(0.98, 1.22)
Perceived identity support	0.26 (0.09, 0.74)*	(0.10, 0.68)**	(0.09, 0.74)*	(0.10, 0.68)**
Current hormone use				
Yes	1.00	Referent	Referent	Referent
No	0.46 (0.07, 3.14)	(0.07, 3.02)	(0.07, 3.13)	(0.07, 3.01)
Stage of medical transition				
Medically transitioned	1.00	Referent	Referent	Referent
In the process	1.75 (0.41, 7.41)	(0.43, 7.20)	(0.41, 7.41)	(0.43, 7.18)
Planning, but not begun	4.59 (0.55, 38.60)	(0.62, 34.21)	(0.54, 39.35)	(0.60, 35.29)
Not planning/concept does not apply	0.13 (0.01, 1.83)	(0.01, 2.00)	(0.01, 1.79)	(0.01, 1.91)
Not sure	1.12 (0.11, 11.50)	(0.12, 10.68)	(0.11, 11.61)	(0.12, 10.84)

Note. OR, odds ratio; CI, confidence interval; y, years; MT, Metropolitan Toronto.

[a] Standard errors and odds ratios were adjusted using individualized weights in SAS version 9.2 (surveylogistic procedures).

[b] Standard errors were additionally adjusted for clustering using surveylogistic procedures in SAS version 9.2.

* $p<0.05$; ** $p<0.01$; *** $p<0.001$

linearity in the log odds were not violated, as quadratic terms tested in the regression analyses were not statistically significant, and did not improve model fit.

Table 4.3 displays the results from the multivariable analyses among MTFs, with and without adjustments for each level of clustering. Of the general population risk factors tested for removal in backward elimination (performed using individualized weights from RDSAT), education, housing, racism, relationship status, having a major mental health condition, having a major chronic physical health condition, and sexual satisfaction were dropped from the final model (i.e. non-significant at alpha=0.15). The final logistic regression model (adjusted for recruitment tree and shared recruiter clusters) indicated that unemployed MTFs were significantly more likely to be depressed than those employed full-time. On the other hand, those with little or no involvement in community organizations were significantly less likely to be depressed compared with MTFs who frequently participated in voluntary groups. Furthermore, MTFs who had experienced childhood sexual or physical abuse (vs. those who had not), were 4.56 times more likely to be depressed (95% CI = 1.13, 18.37), holding all other variables in the model constant. Living outside MT, as opposed to living in MT, was similarly detrimental to the mental health of MTFs. In terms of trans-specific variables of interest, MTFs who rarely or never passed, or passed half the time/often, were significantly less likely to be classified as depressed compared with those who almost always or always passed in their felt gender. Finally, MTFs experiencing greater (vs. lower) levels of perceived identity support were significantly less likely to be depressed.

Multivariable associations in FTMs.

For the multiple logistic regression analyses among FTMs, the following trans-specific variables were removed from the final model: current hormone use and surgery. This resulted in a more precise and better specified model, as the smallest AIC value was obtained upon removal of the aforementioned variables. Furthermore, diagnostic tests revealed that there were no apparent violations to the assumptions of linearity in the log odds or multicollinearity.

Table 4.4 displays the results from the multivariable analyses, with and without adjustments for each level of clustering. Of the general population risk factors tested for removal in backward elimination, employment status, housing, relationship status,

Table 4.4 Multiple logistic regression models for depression regressed onto general population and trans-specific risk factors: Female-to-Male spectrum

	OR (95% CI)[a]	**Adjusted for shared recruiter cluster (95% CI)[b]**	**Adjusted for recruitment tree cluster (95% CI)[b]**	**Adjusted for recruitment tree and shared recruiter clusters (95% CI)[b]**
Age (y)	1.01 (0.95, 1.07)	(0.96, 1.06)	(0.95, 1.07)	(0.96, 1.07)
Education				
High school or less	2.17 (0.27, 17.66)	(0.25, 18.69)	(0.27, 17.62)	(0.25, 18.56)
Some college or university	1.23 (0.34, 4.50)	(0.33, 4.63)	(0.34, 4.44)	(0.33, 4.56)
Postsecondary graduate	1.00	Referent	Referent	Referent
Childhood abuse				
Any abuse	2.96 (0.92, 9.52)	(0.94, 9.32)	(0.92, 9.50)	(0.94, 9.30)
No abuse	1.00	Referent	Referent	Referent
Don't know/rather not answer	0.66 (0.08, 5.34)	(0.07, 6.66)	(0.08, 5.38)	(0.06, 6.84)
Major mental health issues				
Yes	2.56 (0.97, 6.71)	(0.92, 7.08)	(0.96, 6.79)	(0.91, 7.19)
No	1.00	Referent	Referent	Referent
Social support	0.80 (0.45, 1.43)	(0.46, 1.39)	(0.45, 1.43)	(0.46, 1.39)
Sexual satisfaction	0.50 (0.32, 0.76)**	(0.32, 0.76)**	(0.32, 0.76)**	(0.32, 0.76)**

	OR (95% CI)[a]	**Adjusted for shared recruiter cluster (95% CI)[b]**	**Adjusted for recruitment tree cluster (95% CI)[b]**	**Adjusted for recruitment tree and shared recruiter clusters (95% CI)[b]**
Passing				
(Almost) always	1.00	Referent	Referent	Referent
Half the time/often	2.42 (0.66, 8.86)	(0.72, 8.15)	(0.65, 8.96)	(0.71, 8.20)
Rarely or never	2.13 (0.58, 7.85)	(0.60, 7.48)	(0.58, 7.78)	(0.62, 7.33)
Transphobia	1.17 (1.05, 1.30)**	(1.05, 1.29)**	(1.05, 1.29)**	(1.06, 1.29)**
Perceived identity support	0.60 (0.19, 1.90)	(0.19, 1.91)	(0.19, 1.94)	(0.18, 1.95)
Living in felt gender				
Full-time ≤ 3 yrs	0.46 (0.12, 1.84)	(0.11, 1.94)	(0.12, 1.86)	(0.11, 1.97)
Full-time > 3 yrs	1.00	Referent	Referent	Referent
Part-time or not at all	2.04 (0.63, 6.56)	(0.62, 6.70)	(0.63, 6.60)	(0.61, 6.78)
Stage of medical transition				
Medically transitioned	1.00	Referent	Referent	Referent
In the process	0.53 (0.09, 3.17)	(0.09, 2.99)	(0.09, 3.19)	(0.09, 3.02)
Planning, but not begun	6.33 (1.35, 29.65)*	(1.29, 31.09)*	(1.42, 28.15)*	(1.40, 28.66)*
Not planning/concept does not apply	0.60 (0.06, 6.55)	(0.05, 6.87)	(0.06, 6.44)	(0.06, 6.68)
Not sure	0.53 (0.07, 4.26)	(0.07, 4.33)	(0.07, 4.10)	(0.07, 4.10)

Note. OR, odds ratio; CI, confidence interval; y, years.

[a] Standard errors and odds ratios were adjusted using individualized weights in SAS version 9.2 (surveylogistic procedures).

[b] Standard errors were additionally adjusted for clustering using surveylogistic procedures in SAS version 9.2.

*$p<0.05$; ** $p<0.01$

community involvement, having a major chronic physical health condition, racism, and area of residence were dropped from the final model (i.e. non-significant at alpha=0.15). The final logistic regression model (adjusted for recruitment tree and shared recruiter clusters) indicated that FTMs experiencing greater (vs. lower) levels of sexual satisfaction were significantly less likely to be depressed. Conversely, more frequent exposure to transphobia was significantly associated with depression, holding all other variables in the model constant. Finally, FTMs who were planning to medically transition but had not begun, as opposed to those who had transitioned, were 6.33 times more likely to be depressed (95% CI = 1.40, 28.66).

4.5 Discussion

While this study is the first to examine risk factors for depression among trans Ontarians, findings must be interpreted cautiously. Our research is both exploratory (hypothesis-generating) and analytical in nature, and given the cross-sectional study design, we cannot make causal inferences. Furthermore, because we do not have a comparison group of non-trans Ontarians, our findings only point to possible variation *within* trans communities. Thus, we cannot determine which factors contribute to differences between the general population and trans communities with regard to depression.

In general, we found that trans Ontarians were predominantly young adults, highly educated, and lived outside Metropolitan Toronto. The demographic characteristics were similar to trans people in the United States. (73) The majority of MTFs (61.2 %; 95% CI = 52.7, 70.3) and FTMs (66.4%; 95% CI = 59.2, 75.2) scored at least 16 on the CES-D, and were thus identified as being currently depressed. The prevalence of depression is higher than estimates from other studies. (7-14) Note that while some of these studies had used the CES-D to measure depression, (7, 9, 10, 13) all differed from Trans PULSE with regard to sampling, study design, and study location. In particular, convenience sampling (e.g. venue-based or targeted sampling) methods were employed in all of the cited studies assessing depression among trans people. Furthermore, according to the Canadian Community Health Survey (CCHS), the past-year national rate of depression was 5.2% (Cycle 3.1, 2005-2006). (74) Similarly, 4.8% (95% CI = 4.3, 5.3) of Ontarians were identified as being depressed in the past 12 months

(CCHS, Cycle 1.2). (75) The longer the time frame used to inquire about symptoms (e.g. past year versus past 6 months), the higher the rate of depression. (31) As such, estimates from the CCHS would likely be lower if a shorter time frame (e.g. past week, as in the CES-D) were used to assess depressive symptomatology. The burden of depression is therefore clearly greater among trans Ontarians than the general Canadian population.

4.5.1 Depression in MTFs

Bivariate analyses revealed that several general population and trans-specific risk factors were significantly associated with depression among MTFs. For example, we observed that MTFs experiencing higher (vs. lower) levels of transphobia were significantly more likely to be depressed. However, transphobia became non-significant in the final multiple logistic regression model. This finding contradicts results from a U.S. study of MTFs of colour, which indicated that transphobia was the strongest independent contributor to depression, controlling for demographic and socio-psychological variables. (7) Given that few other studies have investigated the potential risk factors for depression among trans people, it is difficult to determine why particular characteristics failed to remain statistically significant. An explanation for the present finding may relate to the role played by employment status in multivariable analyses. Our study indicates that unemployed MTFs were significantly more likely to be depressed compared with those who worked full-time. It is possible that transphobia had an indirect effect on depression through employment status, as exposure to stigma and discrimination has been shown to contribute to unemployment in MTFs. (10, 76, 77) In fact, additional tests revealed that the association between transphobia and unemployment was marginally significant (p=0.0795). Furthermore, the direct (harmful) effect of unemployment on the mental health of MTFs is consistent with findings in the general population. More specifically, unemployment in U.S. adults has been shown to be independently associated with an increased risk of becoming clinically depressed. (78) Due to the cross-sectional nature of the present study, the reverse relationship is also possible; i.e. respondents who were chronically depressed may have been unable or unwilling to work.

In addition, multivariable analyses indicated that MTFs who passed less frequently were significantly less likely to be depressed than MTFs who almost always or always passed. This finding is unexpected given that being unable to pass in one's felt gender could mean facing possible humiliation, discrimination and violence, (57) experiences that may contribute to poor mental health. It is possible that MTFs who were unable to pass did not actually want or care to pass, and therefore being "read" did not lead to increased depressive symptomatology. Another explanation for the present finding relates to the fact that some MTFs cannot pass in their felt gender. Research has shown that the masculinization of FTMs is less identifiable than the feminization of MTFs, e.g. certain physical characteristics remain more identifiable in MTFs, including voice timbre, and size of hands and feet. (23) Thus, passing is just not an option for some MTFs, who may consequently experience greater levels of outness and comfort with their gender identity. This may in turn impact the mental health of MTFs through direct beneficial effects. In fact, MTFs who report higher levels of outness have been found to have lower levels of depression. (56) It is also possible that MTFs who are unable to pass may be more likely to align with peer groups and receive social support that can diminish the likelihood of depression. Social support may therefore mediate the effects of passing on depression; however, passing remained significant in multivariable analyses even after accounting for social support. Finally, additional tests revealed that passing was strongly associated with transphobia. This may provide further explanation as to the reasons why transphobia became non-significant in the final multiple logistic regression model.

Involvement in community organizations (e.g. school groups, support groups, religious groups) became significant in multivariable analyses, indicating that MTFs with little or no involvement in social groups (in the past year) were less likely to be depressed compared with MTFs frequently involved in group activities. This contrasts with results presented by Nemoto et al., (7) in which involvement in the transgender community was significantly and inversely related to depression among MTFs. Note that our variable was defined more broadly, i.e. not limited to involvement in trans groups, and may therefore capture different aspects of community involvement. While our finding was unexpected, it is possible that depressed MTFs were more likely to seek involvement in voluntary organizations or associations. This is supported by a treatment model for client self-empowerment presented by Raj, (79) in which community activism is encouraged as part of a therapeutic intervention for trans people to optimize social agency, resilience, and quality of life, including mental health.

Furthermore, MTFs who had experienced childhood sexual or physical abuse were significantly more likely to be depressed than those who had not, holding all other variables in the model constant. The strong relationship observed between childhood abuse and depression was not unexpected, and is consistent with research both in the general population, and lesbian, gay, and bisexual communities. (80-82) Respondents living outside Metropolitan Toronto were also more likely to be depressed compared with MTFs living in Metropolitan Toronto. One possible explanation for this finding is that trans people living in Metropolitan Toronto may be receiving more appropriate general and trans-specific mental health care services. In addition, societal acceptance of trans identities may be greater in Metropolitan Toronto, versus other regions in Ontario. However, area of residence was significantly associated with depression, even after accounting for transphobia. Another possible explanation is that trans-related support groups and resources may be lacking or unavailable outside Metropolitan Toronto, which may increase the likelihood of depression.

Finally, in bivariate analyses those experiencing higher (vs. lower) levels of social support were significantly less likely to be depressed. In multivariable analyses, social support was a marginally significant protective factor of depression (p=0.0517). Social support may therefore impact the mental health of MTFs through direct beneficial effects. This finding is comparable with research in the general population, in which social support is conceptualized as a crucial factor in the prevention or alleviation of adverse mental health outcomes. (83-85) Note that social support may also play a mediating role in the association between passing and depression, as described earlier. Similarly, a significant independent relationship between identity support and depression was observed, indicating that MTFs experiencing greater (vs. lower) levels of perceived identity support were significantly less likely to be depressed. This finding is consistent with results from a study among MTF sex workers, in which the authors reported a negative association between depressive symptoms and an index of friends' and family members' support for trans identity. (86)

4.5.2 Depression in FTMs

In bivariate analyses, we observed statistically significant protective effects of social support and perceived identity support on depression among FTMs. However, both support-related variables became non-significant in the final multiple logistic regression model. Given that few other studies have investigated the potential risk factors for depression among trans people, it is difficult to determine why particular characteristics failed to remain statistically significant. An explanation for the present finding may relate to the protective role played by sexual satisfaction in multivariable analyses. Our study indicates that FTMs who were highly satisfied with the sexual aspects of their lives were significantly less likely to be depressed (versus those experiencing lower levels of satisfaction). Given that many trans people face difficulty in finding sexual partners or dealing with disclosure of non-matching genders and bodies, having an accepting and supportive partner(s) may result in increased levels of sexual satisfaction. It is therefore possible that sexual satisfaction not only impacts the mental health of FTMs through direct beneficial effects, but it may also mediate the effects of social and identity support on depression. In fact, additional tests revealed that identity support was significantly associated with sexual satisfaction; however, the plausibility of the mediating relationship may depend on the *source* of support, particularly support received from sexual partners. Note that depressive disorders may also lead to a loss of sexual interest, characterized by loss of libido or decrease of sexual desire. (87) Thus, due to the cross-sectional nature of this study, the reverse relationship is also possible; i.e. depressed FTMs may be more likely to experience lower levels of sexual satisfaction.

Furthermore, transphobia remained significant in multivariable analyses, indicating that FTMs exposed to greater levels of discrimination were more likely to be depressed than those with less frequent experiences of transphobia. This result is not unexpected given that discrimination, stigma and victimization have been shown to create a hostile and stressful social environment that contributes to mental health problems. (88-90) In fact, our finding is consistent with research among trans communities in the U.S., (7, 91) and other populations which commonly experience social discrimination, including sexual (19, 88) and racial minorities. (88, 92) Planning to medically transition, but having not begun (versus having medically transitioned) was also a strong contributor to depression in bivariate and multiple regression analyses. This finding is supported by research which suggests that operated patients suffer less depression vs. those during the diagnostic phase. (23) Overall, trans people in the initial phases of transitioning may experience more distress than in later phases. (93-95) However, it is also possible that depressed FTMs may be unable to medically transition as a result of being denied access to hormones or surgeries. This stems from the fact that psychotherapy with a mental health professional is usually required throughout the transitioning period, (96) thus trans patients may have to demonstrate improving or continuing stable mental health before hormones or surgeries are provided. (96)

Finally, in bivariate analyses those who had ever been diagnosed with schizophrenia, borderline personality disorder, dissociative identity disorder, or anxiety disorders were significantly more likely to be depressed than FTMs who had never been diagnosed with any of the preceding conditions. In multivariable analyses, having a major mental health condition was a marginally significant risk factor for depression (p=0.0752). Given concerns with the potentially different effects of anxiety disorders on depressive mood (compared with schizophrenia, borderline personality disorder, and dissociative identity disorder), multivariable models were re-examined using a revised, three-category version of the mental health variable: diagnosed only with anxiety disorders; diagnosed with schizophrenia, borderline personality disorder, or dissociative identity disorder, with or without anxiety disorders; and none (reference). The effects of the preceding mental health categories on depression were similar, i.e. results were comparable in terms of the magnitude and direction of association. Furthermore, we observed no changes in the conclusions; thus the original coding for the mental health variable was retained. Note that anxiety disorders were the most common of all four mental health conditions. In fact, among 108 FTMs who were identified as having a major mental health issue, 103 had been diagnosed with an anxiety disorder. Of these, 16 had also been diagnosed with schizophrenia, borderline personality disorder, or dissociative identity disorder.

In general, the comorbidity of depression with other mental health issues, particularly anxiety disorders, (39, 97) is common and may be explained by a causal relationship or a shared etiologic factor. (97) Longitudinal studies have indicated that anxiety disorders predate depression (39) more often than the reverse. (97) Thus, being diagnosed with a major mental health condition may directly contribute to depressive mood. However, another explanation for the present finding is that transphobia may be a shared risk factor for depression *and* other major mental health conditions, since subsequent analyses indicated that transphobia was significantly associated with the latter. This hypothesis is supported by research which demonstrates that discrimination and victimization are related to several measures of psychological distress, including anxiety and depression. (90)

4.5.3 Limitations

The present study has strengths worth noting. First, it is the largest study of trans people in Canada, and is the first to explore the effects of risk factors unique to the trans community, as well as others strongly and consistently related to depression in the general population. Second, our paper raises awareness regarding the burden of depression on the trans community in Ontario, and reveals segments of the community that are vulnerable to developing mental health issues. Third, our sample was obtained using RDS – a probability-based method designed for the recruitment of "hidden populations", (40) which provides asymptotically unbiased estimates of prevalence. (64, 44) However, several limitations also exist. Our study is cross-sectional, thus we cannot make rigorous causal assertions. More specifically, temporality is a potential issue given that depression can be a chronic condition, which may precede (or cause) the risk factors of interest. Furthermore, RDS is only suitable for sampling populations with a contact pattern, (42, 44) thus it will not capture isolated persons or those who are not networked within the trans community. It is possible that severely depressed people are more likely to be isolated, and therefore may not have been captured in this study.

Another limitation of our research is that we used a measure of current depressive symptomatology (CES-D), rather than a diagnosis of clinical depression. In fact, the CES-D assesses the occurrence of symptoms only during the past week, and may be sensitive to temporal fluctuations in the depressive experience. However, this was not a major issue in this paper as we did not intend to diagnose participants. Furthermore, the scale is not validated for trans communities, thus commonly used cut-points (e.g. ≥ 16) may result in misclassification of depression in trans Ontarians. In general, the CES-D has highly acceptable validity and reliability properties that hold across general population subgroups, (45) and it is frequently used both in general population and trans-related research. Therefore, employing the CES-D in Trans PULSE was advantageous, given that it allowed for comparisons with other studies measuring depression in trans communities. Additionally, there is no standard scale to measure exposure to transphobia; as such, one was developed specifically for Trans PULSE. While the scale was not validated in the trans community, it was based on measures used in previous trans-related research. (16) Items were refined in collaboration with trans members of the Investigators Committee, thereby further ensuring face validity. Future research should focus efforts on developing a scale that may more accurately assess stigmatization and discrimination specific to being trans-identified.

Furthermore, regression analyses in this paper focused on the main effects of general population and trans-specific risk factors on depression. However, interaction (moderator) and mediator effects are possible; for example, social support is believed to buffer against the impact of stressful life experiences. (98) For MTFs, social support may buffer against the adverse effects of childhood sexual or physical abuse on mental health. In other words, it is likely that among those receiving the most social support, the effect of abuse on depression would be less than among those with the least social support. (98) More research is therefore required on the potential moderating role of social support on the relationship between childhood abuse and depression among MTFs. For FTMs, it would be informative to test whether sexual satisfaction mediates the effects of social and identity support on depression, with a particular focus on support obtained from sexual partners.

Finally, in multivariable analyses, adjustments for shared recruiter and recruitment tree clusters were made using SAS surveylogistic procedures. Confidence intervals from the weighted model were similar to estimates from models adjusted for clustering. In some cases, confidence intervals from the former were actually wider than those obtained from adjusted models. There are a few potential explanations. First, the use of surveylogistic procedures may not have completely or accurately accounted for clustering in our data. Second, clustering may not have had a significant effect on our sample. This possibility was examined using one-way ANOVA tests; (70) note that for consistent coefficient estimation, we are only concerned with clustering that is related to the outcome variable. (70) We found no significant clustering at the shared recruiter (F-value=1.17, *p*=0.146) and recruitment tree levels (F-value=1.24, *p*=0.186), indicating that clustering may not be associated with the outcome variable.

4.6 Conclusions

This study is a first step in understanding the complex mental health issues of a highly marginalized community. As members of a gender minority, trans people face a multitude of challenges that adversely affect their health and well-being. Not surprisingly, our findings indicate that depression may be widespread among trans Ontarians, and is possibly a major public health concern. While several key risk and protective factors were identified, bivariate associations of the variables of interest with depression revealed few similarities between MTFs and FTMs. In fact, only transphobia and social support were common risk and protective factors for depression, respectively. Furthermore, multivariable analyses indicated that the risk factors for depression differed between MTFs and FTMs. Note that both sample size and the prevalence of depression were approximately equal in analyses conducted among MTFs and FTMs. The observed differences are therefore unlikely to be due to varying levels of power. Nonetheless, our findings indicate that the potential causes and pathways to poor mental health may differ between the groups. This may be a result of vast differences in life challenges and experiences. For example, we found that MTFs were typically older, and compared to FTMs, a much lower proportion had been 1) diagnosed with mental health issues other than depression, and 2) exposed to racism. Furthermore, a greater proportion of FTMs (versus MTFs) experienced high levels of sexual satisfaction, were in a relationship, and able to almost always or always pass. However, fewer were currently using hormones and had ever undergone a surgical procedure.

While we have addressed a major gap in the literature, additional empirical evidence is needed to gain a firm understanding of the risk factors for depression among trans people, and the differences between MTFs and FTMs. In this way, measures aimed at improving mental health can be targeted towards the potentially diverse needs of each group. Prospective studies will be necessary in providing greater support for causal associations. In addition, there are currently no standard guidelines on conducting multiple regression analyses on data obtained using RDS. Although attempts were made to account for the sampling design, we cannot be certain that clustering was adequately adjusted for in this study. More work is therefore required in developing appropriate methods for multivariable modeling of RDS data.

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CHAPTER 5

Non-Prescribed Hormone Use and Self-Performed Surgeries: “Do-It-Yourself” Transitions in Ontario’s Transgender Communities[1]

5.1 Introduction

Many trans (transgender, transsexual, or transitioned) people seek to align their outward physical sex with their internal gender identity through hormonal and surgical interventions. These services act to eliminate the hormonally induced secondary sex characteristics and genitalia of the natal sex while inducing those of the felt gender. (1) In Ontario, Canadian citizens, permanent residents, and long-term work permit holders receive provincially funded health coverage; however prescription medications, including hormones, are not provided universally. Exceptions are made for seniors, low-income residents, and those receiving disability supports from the provincial government. Private insurance may be purchased by Ontarians who are ineligible for provincial health or prescription drug coverage.

In 1998, the Government of Ontario delisted coverage for sex reassignment surgeries (SRS) from the Ontario Health Insurance Program, only to reinstate funding in 2008. During this 10 year period, patients were required to pay out-of-pocket for sex reassignment procedures. Presently, patients approved by the Gender Identity Clinic program operated by the Centre for Addiction and Mental Health in Toronto receive full coverage for SRS. (2)

Barriers to accessing medically supervised hormonal therapy and SRS can lead to the use of “dietary supplements” or hormones obtained through illegitimate sources. (3-5) Hormones can also be bought on the street, in both pill and injection forms. (5) In fact, trans people may share needles with their lovers and friends in order to inject hormones, (5) which increases the risk of transmitting blood borne illnesses. (3-5) In rare instances, “do-it-yourself” (DIY) surgeries, e.g. removal of testes or breasts, have been reported in

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male-to-female (MTF) transsexuals (6-12) and female-to-males (FTMs), (13) respectively.

The use of non-prescribed hormones is widespread; in fact, U.S. estimates range from 3% to 71%, (14-17) with one study reporting that 23% of MTFs in New York City currently take hormones from a non-medical source. (17) These findings are troubling as non-prescribed hormone users may be at increased risk of adverse health problems due to irregular dosing and monitoring. (18, 19) Non-treatment of trans patients can also result in worsening psychological outcomes. (3) Furthermore, many trans people experience reductions in harassment when they transition as their physical attributes are no longer incongruent with their developing gender role. (3, 20) Thus far, no published studies have characterized or examined the extent of "do-it-yourself" transitions in Canada, a gap in the literature that is addressed in this paper.

5.2 Methods

This study is based on the Trans PULSE Project, an Ontario-wide community-based research initiative. Recruitment began in May 2009 using respondent-driven sampling (RDS), a probability-based method designed to gather individuals through networks of friends. (21, 22) In RDS, "seeds" (initial participants) are enlisted to take part in the study, and to recruit a set number of eligible peers, who in turn recruit other peers. The chain-referral process continues until the desired sample size is met or equilibrium is reached. Equilibrium is a state in which the estimates converge around a stable sample composition that does not change during subsequent cycles of recruitment. (23) By limiting seeds in the number of respondents they can recruit (21) and providing incentives, (21, 24) we may increase the length of recruitment waves, thereby allowing equilibrium to be reached (within six waves or less (23)). As such, the final sample composition will be independent of the seeds. (21, 25)

To begin the recruitment process in Trans PULSE, 16 well-connected trans people were selected to serve as the initial participants. The seeds were sociodemographically diverse, in terms of income, age, ethnicity, area of residence, and immigration-status. Twenty seeds were added once four to five waves of participants had been recruited; this was deemed appropriate due to the slowing of recruitment, and the fact that two of the original seeds had not yet recruited any peers.

The questionnaire was developed in English and was available online, via telephone interview with language interpretation (if needed), and paper-and-pencil. A range of demographic and health-related topics were covered in the survey. With regard to eligibility, respondents had to be 16 years of age or older, trans-identified, and living, working, or receiving health care in Ontario, Canada. Upon completion of the survey, each seed could recruit up to three eligible trans people within their personal networks as Wave One of the study. Each recruit was in turn able to invite up to three trans people to participate as Wave Two, and so on. Incentives valued at $20 were offered (gift card or donation of honorarium to a trans-related charity).

From May 2009 to the first week of January 2010, 308 participants were recruited. In order to ease the burden of completing our lengthy survey (87 pages), respondents were asked to submit sections individually when participating on-line. Nineteen participants had not completed the entire survey, thus analyses were based only on those who had submitted sections pertinent to this paper. Our sample comprised 286 respondents; of the 22 excluded, nine were seeds who had not completed the questionnaire or had been unable to recruit peers. In the end, 27 seeds were included in this study.

5.2.1 Measures

DIY variables. Respondents who were currently taking hormones were asked for the source(s) from which they received hormones (family doctor or general practitioner (GP), specialist, internet pharmacy, friend or relative, street/strangers, herbals or supplements, and veterinary sources). Those who had obtained hormones from sources other than or in addition to a GP or specialist were defined as users of non-prescribed hormones. "Do-it-yourself" surgeries were also assessed by asking participants if they had ever performed any surgical procedures on themselves.

Hormone access variables. Health care barriers to accessing legitimate hormone sources included having a regular GP (yes, no), having insurance coverage for hormones (yes, no, not sure), and having ever been denied a prescription for hormones (yes, no, never tried to get a prescription). A composite variable was constructed measuring respondents' (trans-specific) negative experiences with providers who could affect access to or prescribe hormones: family doctors, walk-in-clinic doctors and mental health providers. Examples of negative experiences included whether a physician had ever refused to see them or ended care because they were trans, belittled or ridiculed them for being trans, or refused to examine parts of their body because they were trans. Participants who had checked any of the experiences listed for each provider were coded as having had trans-specific negative experiences.

Sociodemographic barriers to accessing legitimate hormone sources included area of residence and annual personal income. The former was dichotomized as Metropolitan Toronto (MT) vs. outside MT based on the postal codes (first three digits) provided by the respondents. This was deemed appropriate as 1) almost half of the (unweighted) sample was from MT, and 2) the majority of trans-specific services are located in Toronto, thus trans people residing in MT may have greater access to transition-related services. Annual personal income was categorized as < \$15,000; \$15,000 to less than \$40,000; and ≥ \$40,000.

5.2.2 Analysis

Estimates of population prevalences and 95% confidence intervals were obtained using RDSAT version 6.0. (26) In RDSAT, inferences are based on analytical methods proposed by Heckathorn and Salganik. (21, 25) Prevalence estimates are weighted by the mean network size for each group and the transition probabilities (i.e. proportional recruitments across groups). (21, 25, 27) RDS estimates therefore account for the over-sampling of groups with larger network sizes, as well as homophily (i.e. preference for recruiting within one's own social group). (24, 27) Confidence intervals derived from RDSAT are based on an iterative resampling procedure, which mimics the features of RDS recruitment. (28) Confidence intervals were based on 10,000 iterations. A case series design was used to characterize respondents currently taking non-prescribed hormones.

5.3 Results

Based on the longest recruitment chain in our sample, 10 recruitment waves were obtained. The number of waves required for equilibrium (obtained from RDSAT) ranged from: 3 to 6 for employment and all hormone-related variables; 4 for gender spectrum, education, income and ethnicity; 8 for area of residence and age; and 2 for trans-specific negative experiences with providers. The number of waves required to reach equilibrium is variable-specific, and dependent on the characteristics of seeds. (29) Note that under standard RDS interpretation, equilibrium is reached for the entire sample once equilibrium has been reached within a single recruitment chain. (30) In this study, the number of waves attained exceeded those required for equilibrium to be approximated, thereby indicating that our sample composition was independent of the initial recruits. Furthermore, according to the work of Ramirez et al., (31) homophily, or network clustering and segmentation, was not high. Details on the calculations for the required number of waves can be found in the RDSAT user manual. (29)

Weighted prevalence estimates for sociodemographics, hormone use and health care barriers to hormone access are presented in Table 5.1. Characteristics are presented for the total sample and separately for those currently using hormones and those not reporting current use. Overall, a large proportion of trans people in Ontario were 20-29 years of age (45.0%; 95% confidence interval [CI] = 36.2, 55.2). Most were highly educated, however 50.8% (95% CI = 41.9, 61.1) were earning an annual personal income of < $15,000. Furthermore, full-time employment was more prevalent among Ontario trans people currently using hormones than non-users (users: 50.5%; 95% CI = 39.9, 61.4; non-users: 30.6%; 95% CI = 18.8, 42.3).

With regard to hormones, an estimated 59.4% (95% CI = 49.8, 67.6) of trans people in Ontario had ever used hormones, 25.3% (95% CI = 15.8, 34.7) had ever used non-prescribed hormones, and 56.1% (95% CI = 46.4, 64.8) were currently using hormones. Current users most commonly obtained hormones from a legitimate source (family doctor, followed by a specialist, e.g. endocrinologist). Eight respondents (4.9% of Ontario trans people; 95% CI = 0.8, 9.5) reported obtaining hormones from (or in addition to) a non-medical source; these participants were defined as DIY hormone users. Additionally, most but not all current users in Ontario were receiving regular blood tests to monitor the effects of hormones on their bodies (72.0%; 95% CI = 67.5, 84.4), and many current users injected their hormones (56.6%; 95% CI = 41.9, 67.1). Needles or syringes were more often obtained from pharmacies, followed by doctor's offices and needle exchanges.

Table 5.1 Weighted prevalence estimates for sociodemographics, hormone use and barriers to hormone access for trans people in Ontario, by current hormone status

Characteristic (n)	**Current Users % (95% CI) (n=183)**	**Non-Users % (95% CI) (n=101)**	**Total % (95% CI)**
Sociodemographics			
Gender spectrum[a]			
Male-to-Female (133)	48.0 (36.0, 59.5)	43.1 (26.5, 49.1)	47.4 (37.8, 56.4)
Female-to-Male (152)	52.0 (40.5, 64.0)	56.9 (50.9, 73.5)	52.6 (43.6, 62.2)
Age, y (range 16-77)			
16-19 (20)	3.1 (0.4, 8.1)	14.8 (7.5, 29.8)	8.7 (4.2, 15.7)
20-29 (115)	41.2 (30.7, 53.1)	46.6 (31.5, 59.7)	45.0 (36.2, 55.2)
30-39 (68)	25.2 (17.3, 32.5)	10.6 (4.8, 17.4)	18.8 (13.4, 24.7)
40-49 (43)	22.9 (12.5, 35.2)	15.7 (6.6, 27.9)	18.7 (10.8, 26.8)
≥ 50 (38)	7.6 (3.4, 12.7)	12.3 (3.1, 18.4)	9.0 (4.0, 12.6)
Area of residence			
MT (130)	29.3 (17.1, 39.2)	34.4 (22.8, 55.5)	31.7 (22.6, 42.9)
Outside MT (144)	70.7 (60.8, 82.9)	65.5 (44.6, 77.2)	68.3 (57.1, 77.4)
Employment status[nm]			
Full time (116)	50.5 (39.9, 61.4)	30.6 (18.8, 42.3)	41.5 (33.2, 49.3)
Part time (92)	27.5 (20.4, 39.3)	22.2 (10.9, 32.6)	25.7 (19.6, 33.3)
Unemployed (63)	18.6 (12.7, 27.0)	31.3 (18.3, 44.6)	24.3 (17.8, 32.0)
Other[b] (93)	28.4 (20.2, 38.6)	30.4 (18.4, 43.8)	30.8 (24.1, 39.0)
Education			
Less than high school (31)	3.8 (0.7, 6.8)	30.6 (21.4, 49.2)	16.2 (9.5, 24.5)
High school (37)	15.7 (9.1, 23.8)	17.0 (8.1, 25.7)	17.6 (11.2, 22.8)
Some college or university (79)	30.9 (22.3, 42.1)	35.9 (21.5, 44.5)	31.7 (26.0, 40.6)
Postsecondary graduate (137)	49.6 (39.2, 59.3)	16.5 (8.7, 24.8)	34.5 (26.0, 41.2)
Personal income, $			
< 15,000 (116)	44.0 (34.3, 56.6)	56.3 (37.9, 72.6)	50.8 (41.9, 61.1)
15,000–< 40,000 (82)	27.5 (20.8, 39.1)	36.2 (20.9, 53.1)	29.5 (21.9, 38.3)
≥ 40,000 (65)	28.4 (14.8, 36.3)	7.5 (2.5, 15.1)	19.8 (11.4, 27.1)

Characteristic (n)	**Current Users % (95% CI) (n=183)**	**Non-Users % (95% CI) (n=101)**	**Total % (95% CI)**
Ethnicity[nm]			
White Canadian (209)	81.9 (74.6, 90.2)	81.2 (73.3, 89.2)	80.9 (74.8, 86.9)
White European (93)	25.7 (18.5, 35.3)	19.0 (10.5, 26.8)	23.7 (17.9, 30.5)
Aboriginal (23)	4.8 (2.4, 7.9)	5.1 (1.8, 10.5)	4.7 (2.8, 7.5)
East Asian (11)	4.4 (0.6, 11.3)	4.8 (1.7, 10.1)	4.6 (1.8, 9.3)
Black (8)	5.2 (0.3, 11.9)	0.5 (0.2, 1.4)	3.6 (0.4, 7.6)
Other[c] (36)	12.1 (4.6, 18.6)	11.7 (4.9, 20.1)	12.8 (6.7, 18.0)
Hormone use			
Ever used non-prescribed hormones[d] (57)	24.6 (13.3, 33.8)	33.4 (8.5, 73.8)	25.3 (15.8, 34.7)
Hormone regimen[e, nm]			
Progesterone (25)	12.0 (5.8, 25.2)	---	---
Estrogen (80)	51.4 (38.0, 66.1)	---	---
Anti-androgens (54)	27.5 (18.3, 38.0)	---	---
Testosterone (97)	48.2 (33.1, 62.0)	---	---
Sources of hormones[e, nm]			
Family doctor (132)	69.6 (53.7, 81.5)	---	---
Specialist (55)	33.8 (23.7, 52.3)	---	---
Internet pharmacy (3)	**	---	---
Friend/relative (4)	**	---	---
Street/strangers (1)	**	---	---
Herbals or supplements (3)	2.4 (0.0, 6.9)	---	---
Received blood tests to monitor hormones[e]			
Regularly (136)	72.0 (67.5, 84.4)	---	---
Not regularly (38)	24.8 (12.2, 28.0)	---	---
No (9)	3.3 (0.8, 8.4)	---	---
Inject hormones (106)[e]	56.6 (41.9, 67.1)	---	---
Source(s) of syringes or needles [f, nm]			
Pharmacy (55)	51.0 (30.1, 69.7)	---	---
Doctor's office (51)	38.4 (21.9, 56.5)	---	---
Friends (10)	9.4 (0.7, 28.5)	---	---
Needle exchange (19)	19.0 (8.5, 36.4)	---	---

Characteristic (n)	**Current Users % (95% CI) (n=183)**	**Non-Users % (95% CI) (n=101)**	**Total % (95% CI)**
Health care barriers to hormone access			
Had a regular GP (251)	84.4 (71.5, 91.7)	87.5 (77.6, 94.7)	87.1 (80.1, 91.9)
Had coverage for hormones			
Yes (136)	65.2 (55.1, 73.5)	5.5 (1.8, 9.6)	39.4 (30.5, 46.5)
No (89)	26.8 (18.9, 36.3)	38.7 (26.2, 50.3)	32.4 (25.8, 39.7)
Not sure (60)	7.9 (3.9, 13.4)	55.7 (44.7, 69.0)	28.2 (20.6, 36.9)
Ever denied prescription for hormones			
Yes (58)	**	**	16.3 (10.7, 21.7)
No (161)	**	**	57.2 (48.6, 65.1)
Never tried to get a prescription (65)	**	**	26.6 (18.7, 35.8)
Ever had trans-specific negative experiences with providers (166)	54.3 (39.2, 60.7)	39.8 (25.1, 52.1)	48.8 (39.7, 56.5)

Note. CI, confidence interval; n, sample frequency; nm, not mutually exclusive; MT, Metropolitan Toronto. Non-current users included respondents who had never used hormones (n=84). --- Not applicable; ** At least one group was too small to generate confidence intervals.

[a] Gender spectrum refers to respondents assigned male or female sex at birth but who currently identify as that of the opposite sex, or fall under the umbrella of trans identities.

[b] Other employment includes on leave from work, student, and retired.

[c] Other ethnicity includes Latin American, Indo-Caribbean, South Asian, Middle Eastern, and South East Asian.

[d] Based on subgroup of respondents who had ever used hormones.

[e] Based on subgroup of respondents who currently use hormones.

[f] Based on subgroup of respondents who inject hormones.

While the prevalence of having a regular family doctor was high in our study (87.1%; 95% CI = 80.1, 91.9), 32.4% (95% CI = 25.8, 39.7) of trans people reported not having prescription drug coverage for hormones. Coverage was highest among current users of hormones, which is not surprising given that most obtained their hormones from a medical professional. The prevalence of having ever been denied a prescription for hormones was also relatively high (16.3%; 95% CI = 10.7, 21.7). Finally, the majority of Ontario trans people resided outside MT, and 48.8% (95% CI = 39.7, 56.5) had at some point had trans-specific negative experiences with providers. Current hormone users were more likely than non-current users to report such negative experiences (users: 54.3%; 95% CI = 39.2, 60.7; non-users: 39.8%; 95% CI = 25.1, 52.1).

Table 5.2 outlines the characteristics of the eight non-prescribed hormone users within this study. Similar to overall estimates among Ontario trans people, most of the DIY respondents were under 40 years of age and highly educated. On the other hand, the majority of cases were unemployed and had ever been denied a prescription for hormones. While non-medical sources for hormones were used by all cases, three had also obtained hormones from a GP, and only two were receiving regular blood tests. Six of eight non-prescribed hormone users were low income (< $15,000 in past year), and reported trans-specific negative experiences with providers. One of the DIY respondents served as an initial recruit (i.e. seed) in this project.

With regard to “do-it-yourself” surgeries, three respondents indicated having performed surgical procedures on themselves. A 23 year-old MTF had attempted an orchiectomy, while a 34 year-old MTF had removed her own testicles when she was 23 years of age. Furthermore, a 25 year-old FTM had performed a mastectomy on himself in 2006. All three identified as white, resided in MT, had a regular family doctor, and were currently living with a mental health disability. The two participants in their 20s earned less than $15,000, while the 34 year-old MTF earned an annual personal income of greater than $40,000.

Table 5.2 Characteristics of 8 non-prescribed hormone users within the Trans PULSE Project

Characteristic	DIY 1	DIY 2	DIY 3	DIY 4	DIY 5	DIY 6	DIY 7	DIY 8
Sociodemographics								
Gender spectrum	MTF	MTF	MTF	MTF	MTF	FTM	FTM	FTM
Age, y	40-49	30-39	30-39	30-39	20-29	40-49	20-29	20-29
Area of residence	Outside MT	Outside MT	MT	Outside MT	Outside MT	MT	Missing	MT
Employment status	Not employed	Not employed	Full-time	Not employed	Other	Not employed	Not employed	Part-time, other
Education	Some college or university	College or university graduate	Some college or university	Some college or university	Some college or university	Less than high school	College or university graduate	High school
Personal income in past year, $	15,000 – < 40,000	< 15,000	≥ 40,000	< 15,000	< 15,000	< 15,000	< 15,000	< 15,000
Ethnicity	White Canadian	White Canadian	European	White Canadian	European, Aboriginal	White Canadian, Black, Aboriginal	European	European, East Asian

Hormone use								
Hormone regimen	P, E, AA	E	P, E, AA	P, E	P, E, AA	T	T	T
Current source(s) of hormones	Internet	HS	GP, internet	Internet, FR, HS	FR, street/ strangers	GP, HS	FR	GP, FR
Received blood tests to monitor hormones	Not regularly	No	Regularly	No	No	Not regularly	No	Regularly
Inject hormones	No	No	No	No	Yes	Yes	No	Yes
Sources of syringes or needles	--	--	--	--	Friends, NE	NE	--	Pharmacy, DO, NE
Health care barriers to hormone access								
Had a regular GP	No	No	Yes	Yes	No	Yes	No	Yes
Had coverage for hormones	No	Not sure	Yes	Not sure	Not sure	Yes	No	Yes
Ever denied prescription for hormones	No	Never tried	Yes	Yes	Yes	Yes	Yes	Yes
Ever had trans-specific negative experiences with providers	No	Yes	Yes	Yes	Yes	Yes	Missing	Yes

MTF, male-to-female; FTM, female-to-male; MT, Metropolitan Toronto; P, progesterone; E, estrogen; AA, anti-androgen; T, testosterone; GP, general practitioner; FR, friend or relative; HS, herbals or supplements; DO, doctor’s office; NE, needle exchange.

5.4 Discussion

This study described non-prescribed hormone use among trans people in Ontario, Canada, applying a methodological innovation to improve the reliability and validity of our findings. We aimed at overcoming some of the limitations of previous research by using respondent-driven sampling (RDS).

Trans Ontarians were predominantly white, young adults, highly educated but with low personal incomes, and lived outside MT. The demographic characteristics were similar to trans people in the United States. (32) We found that 56.1% (95% CI = 46.4, 64.8) of trans people in Ontario were currently using hormones, and 4.9% (95% CI = 0.8, 9.5) of current users had obtained their hormones from non-medical sources.

The prevalence of DIY hormone use among trans Ontarians is relatively low when compared to other reports. (14-17) Potential explanations for this difference include the fact that all other published findings are based outside of Canada (mainly the U.S.). Greater societal acceptance of trans identities and better access to medical care in Ontario, including lower prescription drug costs, may allow for improved provision of services to trans people. However, it should be noted that 24.8% (95% CI = 12.2, 28.0) of current hormone users were not regularly receiving blood tests to monitor the effects of hormones on their bodies. Thus, much is still needed in terms of delivering adequate health care to trans people in Ontario. Furthermore, trans Ontarians were highly educated, implying that most understood the importance of obtaining and using hormones from a medical source. Finally, the low prevalence of non-prescribed hormone use in our study vs. published reports could be a function of differences in study design and sampling. Trans PULSE is the only study reporting DIY hormone use among trans people recruited through RDS; also, estimates are based on both MTFs and FTMs, while other studies targeted only MTFs. (16, 17)

While we report a small number of non-prescribed hormone users, several characteristics of the DIY cases are notable. Four of the eight cases had a regular GP, six had ever been denied a prescription for hormones, and one case had never tried to obtain a prescription for hormones. Furthermore, six DIY cases had trans-specific negative experience with providers at some point in their lives. Similar to Namaste's research in Ontario, (5) these findings indicate that non-prescribed hormone users were excluded from the institutional site of health care through *institutional erasure*. This concept refers to the dearth of policies and protocols (or the ineffectuality of existing policies) that accommodate trans identities. (5, 33) Thus, trans people who are denied hormones often feel that they are being judged, and are forced outside the formal institution of health care. (5) In this way, trans people are *erased* from the social world in and through the practices of general practitioners who refuse to work with them. (5) The negative experiences (or fears of having them for those who do not attempt to get a prescription) contribute to self-treatment and self-protection through avoidance of health care settings. (33)

The low income status of six DIY cases also suggests that respondents may have been unable to afford hormones given that most either did not have insurance coverage or were unsure of whether hormones were covered. Five DIY cases had received hormones from multiple and non-traditional sources, which could be due to their wish to accelerate the transition process. While this was not asked in our survey, other studies have found that this may explain why some trans people obtain hormones from multiple sources. (17) Furthermore, all three cases who injected hormones obtained needles or syringes from needle exchanges. Thus, needle exchange programs need to ensure that appropriate gauges of needles for intramuscular injections are available for trans clients.

Trans people are also denied access to sex-reassignment surgeries (SRS) and many are unable to afford SRS. While uncommon, self-performed surgeries have been reported, including cases of MTF and FTM transsexuals removing their own genitals (6-12) and breasts, (13) respectively. Three respondents in our study reported performing or attempting a surgical procedure on themselves. Two of the cases had done so during the time in which SRS was de-listed in Ontario (time frame unknown for third respondent). Conducting surgery on oneself is an obviously risky behaviour, and while it cannot be known for certain, it may have been avoided in these respondents if sex-reassignment surgeries had been more readily available.

5.4.1 Limitations

This study has limitations worth noting. First, the data were self-reported, including information on the sources of hormones. This could not be validated, although the use of a self-administered survey available both on-line and via paper-and-pencil may have reduced reporting bias. Second, we were unable to conduct more detailed quantitative analyses given the small number of current non-prescribed hormone users. Future researchers should consider using a longitudinal study design, which may allow for the 1) identification of a greater number of DIY cases, and 2) examination of risk factors associated with obtaining hormones from a non-medical source. Third, our use of an in-depth and long survey may have resulted in the over-selection of highly educated trans people, who may have been healthier overall and receiving better health care (i.e. using hormones obtained through medical sources). This was also exemplified by the fact that only one respondent in the total sample had ever used a needle or syringe to inject hormones that had been used by someone else. Nevertheless, our study is based on a probability sample of social networks within the trans community –the *first* of its kind thus far. Furthermore, we have addressed a major gap in the literature, as there are currently *no* published studies that have characterized "do-it-yourself" transitions among trans people.

5.5 Conclusions

We have drawn attention to the number of trans people who are not getting the care they need, and the characteristics of those forced to obtain services through illegitimate means. Our findings point to directions for further research in Canada, particularly in terms of areas for improvement in the care provided by physicians. While limited to data from eight non-prescribed hormone users, our study indicates that trans people's experiences with providers may play a role in their willingness to access hormones from non-medical sources. Attempts can be made to prevent trans persons fears of seeking care from medical professionals. In this regard, providers should be sensitive to the needs of trans people, promote a trans-friendly environment in practice settings, and not hastily deny services if they can be provided. Addressing the specific needs of trans people will help ensure that all those requiring transition-related services will receive them from the safest and most appropriate sources, with regular monitoring of their health.

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CHAPTER 6

An Exploratory Analysis of the Effects of Hormones and Surgeries on the Health of Transgender People in Ontario[1]

6.1 Introduction

Many trans people experience a persistent feeling of psychological discomfort as far as the appearance of the anatomical sex is concerned. (1) In order to align their outward physical sex with their internal gender identity, and to alleviate feelings of distress, trans people may seek out hormonal and surgical interventions. These procedures are intended to reduce or minimize the presentation or appearance of specific secondary sex characteristics or genitals. For the most part, there are few contraindications against hormone use and surgeries for those who are relatively young and healthy. (2, 3) However, as is the case with most medical treatments, there are beneficial and adverse health effects associated with hormone use and surgical procedures.

Feminizing hormones used by male-to-females (MTFs) can contribute to improved cardiovascular (4, 5) and bone health (6, 7), as well as a favourable (i.e. more feminized) redistribution of fat. (3, 8-10) On the other hand, feminizing hormonal regimens are also associated with an increased risk of venous thrombosis, (11, 12) insulin resistance and diabetes, (5, 13-15) and excess prolactin levels. (11, 12, 16-18) A small number of hormone-related cancers have also been reported in case studies of MTFs, including prostate cancer, (12, 14, 19) breast cancer (14, 20, 21) and vaginal neoplasia. (22)

Masculinizing hormone therapy in female-to-males (FTMs) also confers beneficial effects, including increases in bone mineral density (23) and a reduced risk of venous thrombosis. (24) With regard to adverse health effects, unfavourable changes in cholesterol profile, (5, 8, 20, 25, 26) insulin resistance (13) and impaired vascular reactivity (27) have been reported. Furthermore, masculinizing hormones have been

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[1] A version of this chapter will be prepared to be submitted for publication (Khobzi N, Bauer G, Kaay M, Pyne J, Scanlon K. An exploratory analysis of the effects of hormones and surgeries on the health of transgender people in Ontario. *Journal to be determined*.)

linked to polycystic ovarian disease in trans men who had retained their ovaries. (28, 29) Other gynaecological effects reported in FTMs receiving hormones include endometrial hyperplasia, (25) ovarian cancer, (30, 31) breast cancer in residual breast tissue after mastectomy, (2) and cervical cancer. (32) The removal of body parts susceptible to hormone-related cancers through sex-reassignment surgeries (SRS) can reduce or eliminate the risk of certain malignancies, including prostate and testicular cancers (19) in MTFs, and ovarian, uterine and cervical cancers (20, 30, 33) in FTMs.

Thus far, the safety of long-term hormone use has not been established. (34) Furthermore, there is a paucity of research on the health effects of medical transitioning among trans Canadians, as almost all of the epidemiologic studies in this field have been conducted in Europe and the United States. The purpose of this study was to explore the long-term positive and adverse health effects associated with hormone use and SRS among trans Ontarians. The underlying aim of the exploratory analysis was to generate hypotheses that can be tested in future clinical or population-based prospective studies of trans people in Canada. This study addresses several gaps in the literature, and is based on a novel, population-based sample of socially networked trans community members.

6.2 Methods

6.2.1 The Trans PULSE Project

The Trans PULSE Project is an Ontario-wide community-based research initiative. The Project has been guided by a ten-person Investigators Committee; seven of the investigators are trans-identified. A mixed-methods approach was employed, consisting of both qualitative and quantitative components. This paper draws upon data from the quantitative (survey) phase of Trans PULSE. The Trans PULSE Project was approved by the Research Ethics Board for Non-Medical Research Involving Human Subjects at the University of Western Ontario, Canada. Informed consent was obtained from all participants in the study.

6.2.2 Sampling design

Recruitment began in May 2009 using respondent-driven sampling (RDS), a network-based sampling method designed for recruiting hidden populations. (35) Chain-referral designs typically require an initial set of study participants (seeds) who help researchers identify other community members to be recruited. (36) These methods may result in samples that are biased: 1) by the choice of seeds, and 2) towards favouring individuals with larger social networks. (36) In RDS, seeds not only participate in the study, but they are also permitted to recruit a set number of eligible peers into the study, who in turn recruit other peers. This process is continued until the desired sample size is met or equilibrium is reached. Equilibrium is facilitated by limiting the number of peers that seeds are allowed to recruit (35) and providing incentives. (35, 37) These strategies increase the length of recruitment chains, thereby ensuring that the final sample is independent of the characteristics of the seeds. (35, 38) Furthermore, network referral patterns and knowledge of how connected each member is to their community are tracked in RDS. The personal network size of each participant is used in weighted analyses to adjust for the over-sampling of respondents with larger social networks and differential recruitment effectiveness. (36, 39)

In our study, 16 trans people were recruited to serve as seeds. These initial participants were sociodemographically diverse, particularly with regard to area of residence, income, age, ethnicity, and immigration-status. Note that a broad representation of characteristics among the seeds accelerates the rate at which equilibrium is reached. (40) Seeds were recruited through social venues, community organizations, by word-of-mouth, and online. Twenty seeds were added once four to five waves of participants had been recruited. This was deemed appropriate by the Investigators Committee given the slow pace of data collection.

The survey was developed in English and was available in multiple modes (online, telephone interview, and paper-and-pencil). In terms of eligibility, participants had to be at least 16 years of age, living, working, or receiving health care in Ontario, and trans-identified. Upon completion of the survey, each seed was allowed to recruit three eligible trans people from their personal networks as the first wave of the study. Each recruit was then allowed to invite up to three trans people to participate as the second wave, and so on. Primary incentives valued at $20 were offered.

We recruited 308 participants from May 2009 to the first week of January 2010. Nineteen participants had not completed the entire survey, thus analyses were limited to data obtained from respondents who had submitted sections pertinent to this paper. The sample comprised 281 respondents; of the 27 excluded, 9 were seeds who had not completed the questionnaire or had failed to recruit peers. Ultimately, 27 seeds were included in this study.

6.2.3 Measures

Outcome variables. Respondents were asked if they had been diagnosed with any of the following health outcomes, as identified from transition-related research in the literature and consultations with the Investigators Committee: breast cancer, cervical cancer, chronic fatigue syndrome, diabetes, elevated liver enzymes, elevated prolactin levels, endometrial cancer, endometrial hyperplasia, fibromyalgia, gall stones, heart attack, high blood pressure, high cholesterol, pulmonary embolism, osteoporosis, ovarian cancer, penile cancer, polycystic ovary syndrome, prostate cancer, sleep apnea, stroke, testicular cancer, thyroid condition, uterine cancer, vaginal cancer, and venous thrombosis. Each outcome was coded as a dichotomous variable (yes/no). If participants indicated "yes" to any of the preceding conditions, they were then asked to provide the year in which they were diagnosed.

Exposure variables: Hormone use, orchiectomy and oophorectomy. This study focused on the main agents used to induce female and male secondary sex characteristics, as well as surgical interventions that affect endogenous hormone production. Masculinizing hormones or procedures of interest included testosterone, progesterone, and oophorectomy. Pertinent feminizing hormones or procedures included progesterone, estrogens, anti-androgens and orchiectomy. Respondents were asked if they had ever taken any of the preceding hormones (yes/no), the year in which they first started taking each hormone, the total amount of time (in years) they had been on each hormone (excluding any breaks), whether they had undergone an oophorectomy or orchiectomy, and if so, the year in which they had undergone the surgery. Given that both anti-androgens and orchiectomy block testosterone production (i.e. have similar effects on endogenous hormone levels), all MTF respondents who had undergone an orchiectomy were grouped with (or coded as being) anti-androgen users. Furthermore, the time since oophorectomy was calculated by subtracting the year in which participants had had the surgery from the year of survey completion (2009). Person-years (py) of use for each hormone and since oophorectomy (for FTMs) were calculated by summing the total amount of time respondents had been on each hormone and the total amount of time since oophorectomy, respectively.

Sociodemographic variables. Estimates were stratified according to gender spectrum (MTF or FTM) given the substantially different effects of feminizing and masculinizing transition-related services. Gender spectrum refers to respondents who were assigned a sex at birth (male for MTFs, female for FTMs) but currently identify as that of the opposite sex, or fall under the umbrella of trans identities.

Smoking history was also examined, given that smoking cessation is strongly recommended before initiating hormone therapy. (41) Furthermore, smoking is a potential confounder as it is associated with several health outcomes included in this study, such as breast cancer, (42) type-2 diabetes, (43) fibromyalgia, (44) gall stones, (45) and thyroid disorders. (46, 47) Respondents were asked if they had smoked 100 or more cigarettes in their lifetime (yes/no), and if so, whether they currently smoked daily, occasionally, or not at all. Daily or occasional smokers were defined as "current smokers" and respondents who had smoked more than 100 cigarettes in their lifetime but were not currently smoking were defined as "former smokers". Those who were not currently smoking and had smoked less than 100 cigarettes in their lifetime were defined as "never smokers". Finally, age (in years) was of interest given that the prevalence of many chronic health conditions increases with age, including hypertension, (48) high blood cholesterol, (49) and breast (50) and prostate cancers. (51)

6.2.4 Analysis

For all variables of interest, weighted prevalence estimates and 95% confidence intervals were calculated using RDSAT version 6.0. (52) Population estimates in RDSAT are based on the empirical and theoretical work of Heckathorn and Salganik. (35, 38) Estimates are weighted according to the transition probabilities and mean network size for each group. (35, 38, 53) Prevalence estimates therefore account for 1) differences in recruitment effectiveness and homophily, (37, 53) and 2) the over-sampling of groups with larger network sizes. Calculations of standard errors and confidence intervals are based on a modified bootstrapping methodology that replicates the features of RDS. (54) Resampling was carried out 10,000 times for this study. Furthermore, for each hormone or surgery of interest, calculations pertaining to the number of outcome cases among users and the person-years of use (or since oophorectomy) excluded information on respondents who were diagnosed *prior* to initiating hormones (or undergoing oophorectomy). This strategy was employed in order to reduce bias resulting from issues with temporality.

6.3 Results

6.3.1 Recruitment characteristics

Ten recruitment waves were obtained in our sample, based on the longest recruitment chain. The estimated number of waves required to reach equilibrium ranged from: 4 for gender spectrum, 7 for age, 3 for education, 2 for smoking, 3 to 6 for all hormone-related variables, and 2 to 5 for all health outcomes for which cases were reported. Calculations of the estimated number of waves required for equilibrium were obtained from RDSAT. (52) Note that estimates are variable-specific and dependent on the characteristics of the seeds. (55) The number of waves attained in this study substantially exceeded that required for equilibrium to stabilize the sample composition. This indicates that our sample was independent of the seeds, and that all members of the target population had a nonzero probability of selection. (53) Furthermore, based on the work of Ramirez et al., (40) homophily, or network clustering and segmentation, was not high.

6.3.2 Characteristics of Ontario's trans communities

Weighted prevalence estimates for hormone use and diagnosed health outcomes are presented in Table 6.1. Characteristics are presented for the total sample and separately for MTFs and FTMs. Overall, a large proportion of trans people in Ontario were 20-29 years of age (46.6%; 95% confidence interval [CI] = 37.4, 56.5). Most of Ontario's trans people were highly educated, and 55.3% (95% CI = 47.1, 63.2) had never smoked. However, current smoking was more prevalent among Ontario trans people identifying as FTM (34.2%; 95% CI = 22.8, 44.2; MTF: 18.6%; 95% CI = 11.6, 29.2).

With regard to hormone use, an estimated 58.6% (95% CI = 48.3, 66.6) of trans people in Ontario reported ever using hormones, while 55.2% (95% CI = 45.5, 63.6) were currently using hormones. About half of MTFs had ever taken estrogens (59.1%; 95% CI = 45.7, 72.7), while 51.8% (95% CI = 38.8, 62.9) of FTMs in Ontario had at

Table 6.1 Weighted prevalence estimates for hormone use and diagnosed health outcomes among trans people in Ontario, by gender spectrum

Characteristic (n)	**Male-to-Female % (95% CI) (n=130)**	**Female-to-Male % (95% CI) (n=150)**	**Total % (95% CI)**
Age, y (range 16-77)			
16-19 (19)	3.5 (0.6, 8.1)	13.9 (6.2, 26.1)	8.9 (3.9, 15.8)
20-29 (114)	39.6 (26.3, 55.2)	53.5 (39.8, 64.5)	46.6 (37.4, 56.5)
30-39 (68)	19.4 (11.6, 27.2)	20.2 (12.6, 29.4)	19.3 (14.0, 25.1)
40-49 (41)	19.4 (10.2, 32.1)	11.5 (3.0, 22.1)	16.2 (9.1, 23.9)
≥ 50 (37)	18.1 (8.0, 25.6)	0.9 (0.1, 1.8)	9.0 (4.1, 12.9)
Education			
Less than high school (30)	14.5 (5.9, 25.9)	18.9 (12.4, 34.5)	16.5 (9.9, 24.1)
High school (35)	16.6 (7.8, 24.7)	15.6 (8.2, 22.0)	15.6 (10.2, 21.0)
Some college or University (78)	27.3 (18.5, 36.2)	33.5 (22.8, 44.8)	32.2 (26.1, 40.9)
Postsecondary graduate (136)	41.6 (31.8, 52.5)	32.0 (18.8, 40.1)	35.8 (26.9, 42.9)
Smoking			
Current (81)	18.6 (11.6, 29.2)	34.2 (22.8, 44.2)	28.2 (20.9, 35.2)
Former (61)	11.1 (6.8, 17.5)	20.5 (12.2, 29.7)	16.6 (11.5, 23.1)
Never (136)	70.2 (58.7, 77.9)	45.3 (35.3, 59.1)	55.3 (47.1, 63.2)
Ever taken hormones			
Progesterone (51)	28.6 (17.4, 39.8)	3.1 (0.4, 6.8)	14.3 (8.1, 20.2)
Estrogen (95)	59.1 (45.7, 72.7)	1.0 (0.1, 2.0)	27.5 (19.5, 35.2)
Anti-androgens (91)	56.1 (47.7, 71.3)	2.9 (0.2, 5.4)	27.1 (19.5, 34.2)
Testosterone (100)	0.6 (0.1, 1.5)	51.8 (38.8, 62.9)	28.2 (20.1, 36.4)
Current hormone use			
Progesterone (25)	*25	*0	13.0 (6.2, 25.3)
Estrogen (79)	*79	*0	51.5 (39.0, 67.5)
Anti-androgens (54)	54.2 (37.4, 70.1)	3.0 (0.3, 1.3)	29.0 (19.0, 38.4)
Testosterone (95)	*0	*95	48.0 (31.1, 59.8)
Duration on progesterone	(PY = 173.0)	(PY = 41.9)	
< 1 year (16)	13.5 (5.5, 22.5)	0.8 (0.1, 1.8)	5.9 (2.1, 10.3)
≥ 1 year (35)	16.4 (9.8, 25.7)	2.3 (0.1, 6.7)	8.4 (4.4, 12.6)
Never (229)	70.0 (57.9, 80.0)	96.9 (92.6, 99.5)	85.7 (79.7, 91.9)

Characteristic (n)	Male-to-Female % (95% CI) (n=130)	Female-to-Male % (95% CI) (n=150)	Total % (95% CI)
Duration on estrogen	(PY = 480.0)	(PY = 25.3)	
< 1 year (25)	16.9 (8.5, 23.0)	0.6 (0.1, 1.6)	7.6 (4.1, 11.3)
≥ 1 year (70)	42.5 (32.4, 57.6)	0.4 (0.0, 1.1)	19.9 (13.3, 26.2)
Never (185)	40.6 (26.8, 53.8)	99.0 (97.8, 99.8)	72.5 (65.1, 80.2)
Duration on anti-androgens	(PY = 316.1)	(PY = 0.75)	
< 1 year (24)	*20	*4	7.7 (4.2, 11.1)
≥ 1 year (63)	*63	*0	18.9 (12.9, 25.6)
Never (189)	*43	*146	73.3 (66.0, 80.8)
Duration on testosterone	(PY = 0.5)	(PY = 342.7)	
< 1 year (22)	*2	*20	8.9 (4.2, 12.1)
≥ 1 year (70)	*0	*70	15.6 (8.8, 23.0)
Never (180)	*128	*52	75.6 (68.5, 84.2)
Time since oophorectomy[a]	(PY = 9.0)	(PY = 101.0)	
≥ 1 year (22)	*1	*21	4.5 (2.3, 7.4)
Never (248)	*123	*125	95.5 (92.6, 97.7)
Diagnosed health outcomes[b]			
Breast cancer (1)	*1	*0	0.4 (0.4, 1.3)
Cervical cancer (1)	*0	*1	0.4 (0.4, 1.3)
Endometrial hyperplasia (1)	*0	*1	0.4 (0.4, 1.3)
PCOS (5)	*0	*5	1.6 (0.2, 3.6)
CFS (3)	*2	*1	1.3 (0.1, 3.3)
Diabetes (11)	2.9 (0.8, 5.2)	1.3 (0.2, 2.8)	2.0 (0.9, 3.4)
Elevated liver enzymes (11)	2.4 (0.9, 4.7)	2.3 (0.6, 4.9)	2.2 (1.1, 3.8)
Elevated prolactin levels (4)	*2	*2	1.1 (0.2, 2.6)
Fibromyalgia (5)	*2	*3	2.0 (0.2, 4.2)
Gall stones (6)	*3	*3	*6
Heart attack (3)	0.9 (0.1, 2.2)	0.0 (0.0, 0.1)	0.4 (0.0, 1.1)
Hypertension (30)	19.8 (9.3, 31.1)	2.1 (0.7, 4.0)	9.6 (5.1, 15.3)
High cholesterol (25)	8.4 (2.3, 16.5)	3.0 (0.8, 5.5)	5.5 (2.5, 9.7)
Osteoporosis (5)	0.6 (0.1, 1.4)	0.5 (0.2, 1.3)	0.5 (0.1, 1.1)

Characteristic (n)	Male-to-Female % (95% CI) (n=130)	Female-to-Male % (95% CI) (n=150)	Total % (95% CI)
Sleep apnea (22)	6.6 (1.4, 11.4)	7.4 (2.7, 12.6)	6.8 (3.3, 10.0)
Thyroid condition (13)	3.9 (0.7, 8.5)	2.6 (0.7, 5.1)	3.2 (1.1, 5.5)
Venous thrombosis (3)	*1	*2	0.2 (0.0, 0.4)

Note. CI, confidence interval; n, sample frequency; PY, person-years of hormone use or since oophorectomy; PCOS, polycystic ovary syndrome; CFS, chronic fatigue syndrome. * Sample frequencies provided where RDS estimates could not be generated.

[a] Two respondents had undergone an oophorectomy less than 1 year ago at the time of the survey, but were coded as "Never" in order to reduce sparse cells.

[b] 83 respondents were diagnosed with at least one health condition; however, the total number of cases is greater than 83 given that several participants (n=36) were diagnosed with multiple outcomes.

some point used testosterone. Male-to-females in Ontario who had taken progesterone, estrogen, and/or anti-androgen regimens were more likely to have done so for at least one year. Similarly, many FTM testosterone users had been on the regimen for one year or more. Note that 20 MTFs had undergone an orchiectomy (19 of which had also used anti-androgens), and were thus grouped with anti-androgen users. Among all hormone users, MTFs taking estrogens reported the largest number of person-years of exposure (480 py).

There were no reported cases of the following health outcomes: endometrial, ovarian, uterine, vaginal, penile, prostate, and testicular cancers; pulmonary embolism; and stroke. The most commonly reported adverse conditions among Ontario trans people were hypertension (9.6%; 95% CI = 5.1, 15.3), sleep apnea (6.8%; 95% CI = 3.3, 10.0), and high cholesterol (5.5%; 95% CI = 2.5, 9.7). Male-to-female Ontarians were more likely to have been diagnosed with almost all outcomes of interest, however it should be noted that MTFs tended to be older than FTMs (MTFs ≥ 50 years of age: 18.1%; 95% CI = 8.0, 25.6; FTMs ≥ 50 years of age: 0.9%; 95% CI = 0.1, 1.8).

6.3.3 Health effects of hormone therapy and oophorectomy

Table 6.2 presents outcome cases and person-years (py) of use for MTFs, according to type of hormone ever used. All estimates exclude information on respondents who had been diagnosed with an outcome *prior* to initiating each hormone.

Table 6.2 Number of outcome cases and person-years of use among MTFs, by type of hormone ever used[a]

	Progesterone (n=42)[b]		Estrogen (n=90)[b]		Anti-androgens (n=87)[b]		Never users (n=33)
Outcome	**No. of cases[c]/ No. of users**	**Person-years of use**	**No. of cases[c]/ No. of users**	**Person-years of use**	**No. of cases[c]/ No. of users**	**Person-years of use**	**No. of cases/No. of never users**
Breast cancer	1/42	173.0	1/90	480.0	0/87	316.1	0/33
Chronic fatigue syndrome	0/42	173.0	2/90	480.0	2/87	316.1	0/33
Diabetes	0/40	140.5	1/86	434.8	1/84	307.8	1/33
Elevated liver enzymes	0/42	173.0	2/88	473.2	2/85	313.5	1/33
Elevated prolactin levels	0/42	173.0	2/90	480.0	2/87	316.1	0/33
FM	1/42	173.0	2/90	480.0	1/87	316.1	0/33
Gall stones	1/42	173.0	2/89	479.3	1/86	315.3	0/33
Heart attack	0/41	170.5	0/89	477.5	0/86	312.1	0/33
High blood pressure	2/34	158.3	3/77	443.2	2/75	287.8	4/33
HC	3/39	167.4	6/85	473.5	5/82	307.0	2/33
OS	1/41	143.0	2/89	444.0	2/87	316.1	0/33
Sleep apnea	2/41	171.3	6/86	469.4	6/83	306.5	1/33

	Progesterone (n=42)[b]		Estrogen (n=90)[b]		Anti-androgens (n=87)[b]		Never users (n=33)
Outcome	**No. of cases[c]/ No. of users**	**Person-years of use**	**No. of cases[c]/ No. of users**	**Person-years of use**	**No. of cases[c]/ No. of users**	**Person-years of use**	**No. of cases/No. of never users**
Thyroid condition	0/39	166.2	1/85	463.7	1/82	302.5	0/33
VT	0/41	169.8	1/90	480.0	1/87	316.1	0/33

Note: MTF, male-to-female; FM, fibromyalgia; HC, high cholesterol; OS, osteoporosis; VT, venous thrombosis.

[a] Cases who had used multiple hormones may be included in more than one column across outcome rows.

[b] Total number of users of each hormone. This number is not constant, i.e. for each outcome and hormone examined, the number of users is the total minus the number of cases diagnosed prior to initiating the hormone.

[c] For each outcome and hormone examined, cases who had never used the hormone in question or who had been diagnosed prior to initiating the hormone, were excluded.

The number of cases among those who had never used hormones is also presented. Among hormone users, ten MTFs (of 19 in total) for which case information was included had been diagnosed with multiple outcomes. All (except for 2) were at least 30 years of age, and white Canadian/European (one respondent was white Canadian and Aboriginal, while another identified as East Asian). Nine participants had never smoked, all indicated multiple hormone use (duration ranged from 0.1 to 37 years), and one respondent with elevated liver enzymes had also been diagnosed with Hepatitis C. Two had served as seeds in the project.

Most of the health conditions explored among MTFs were rare or nonexistent (e.g. heart attack, diabetes). High blood cholesterol, sleep apnea, and hypertension were reported in comparatively larger numbers than other outcomes experienced by MTFs; however, they were still rather uncommon. For each hormone of interest, there was no observed pattern with regard to the number of outcome cases per person-years of use. For example, among estrogen users, higher estimates of person-years of use were not typically indicative of a greater number of reported cases.

In addition, two MTFs had used testosterone, and although reasons were not provided for this use, one respondent indicated being unsure of having been diagnosed with an intersex condition. Neither of these two participants had developed any of the outcomes listed. Another MTF respondent had undergone an oophorectomy, given that she had been born intersexed[2]. The respondent was diagnosed with several outcomes, including breast cancer, prior to having had surgery; however, these diagnoses occurred subsequent to having started progesterone and estrogen use. The number of cases for each outcome among individuals who reported never using hormones was small or nonexistent, and slightly less common than those who had used hormones (except for diagnoses of hypertension).

The number of outcome cases and person-years of hormone use/since oophorectomy for FTMs are presented in Table 6.3. All estimates exclude information on respondents who had been diagnosed with an outcome *prior* to initiating each hormone (or undergoing an oophorectomy). Case information is provided according to the type of hormone used and oophorectomy, as well as among never users of hormones. Among FTMs who had used hormones or undergone an oophorectomy, nine respondents (of 17 in total) for which case information was included had been diagnosed with multiple outcomes. All (except for 2) were ≥ 30 years of age and most identified as white Canadian/European. Six had never smoked, five currently smoked, and six were former smokers. Many were only taking testosterone (duration of use ranged from 2 to 37.5 years), and one of 17 FTMs had served as an initial recruit (i.e. seed) in this project.

Similar to MTFs, most of the health outcomes were rare or nonexistent among FTM respondents (e.g. cervical cancer, endometrial hyperplasia, gall stones, and osteoporosis). Relatively common outcomes included hypertension, high cholesterol, and sleep apnea. For each hormone or procedure of interest, there was no observed pattern with regard to the number of outcome cases per person-years of use.

Furthermore, five FTMs had used estrogens, and although reasons were not provided for such use, two respondents indicated being born intersexed and another was not sure of having been diagnosed with an intersex condition. There was one reported heart attack (among five estrogen users, or 25.33 py), one case of high cholesterol

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[2] Among all MTFs in this study, 23 were unsure if they had been diagnosed with a medically-recognized intersex condition, and 7 were born intersexed.

Table 6.3 Number of outcome cases and person-years of hormone use/since oophorectomy among FTMs, by type of hormone or surgery[a]

	Progesterone (n=9)[b]		**Testosterone (n=98)[b]**		**Oophorectomy (n=25)[b]**		**Never users (n=50)**
Outcome	**No. of cases[c]/ No. of users**	**Person-years of use**	**No. of cases[c]/ No. of users**	**Person-years of use**	**No. of cases[c]/ No. with procedure**	**Person-years since surgery**	**No. of cases/No. of never users**
Cervical cancer	0/9	41.9	0/97	341.3	0/24	99.0	0/50
Chronic fatigue syndrome	0/9	41.9	0/97	338.5	1/25	101.0	0/50
Diabetes	0/9	41.9	1/96	336.0	2/25	101.0	1/50
Elevated liver enzymes	0/8	41.6	3/97	342.7	0/23	98.0	1/50
Elevated prolactin levels	0/9	41.9	1/98	342.7	0/25	101.0	1/50
EH	0/9	41.9	0/97	341.3	0/24	99.0	0/50
FM	0/9	41.9	1/96	337.6	1/25	101.0	0/50
Gall stones	0/9	41.9	0/97	338.5	0/24	78.0	2/50
Heart attack	0/9	41.9	1/98	342.7	0/25	101.0	0/50
High blood pressure	1/9	41.9	4/95	327.5	2/22	71.0	1/50
HC	1/9	41.9	5/94	335.1	3/25	101.0	1/50
OS	0/9	41.9	0/97	341.6	0/25	101.0	1/50
PCOS	0/8	41.6	1/96	341.5	0/25	101.0	2/50

	Progesterone (n=9)[b]		**Testosterone (n=98)[b]**		**Oophorectomy (n=25)[b]**		**Never users (n=50)**
Outcome	**No. of cases[c]/ No. of users**	**Person-years of use**	**No. of cases[c]/ No. of users**	**Person-years of use**	**No. of cases[c]/ No. with procedure**	**Person-years since surgery**	**No. of cases/No. of never users**
Sleep apnea	1/9	41.9	6/96	336.3	3/24	100.0	3/50
Thyroid condition	0/9	41.9	2/94	322.7	0/24	101.0	1/50
VT	1/9	41.9	1/97	335.7	0/24	96.0	0/50

Note: FTM, female-to-male; EH, endometrial hyperplasia; FM, fibromyalgia; HC, high cholesterol; OS, osteoporosis; PCOS, polycystic ovary syndrome; VT, venous thrombosis.

[a] Cases who had used multiple hormones and undergone an oophorectomy may be included in more than one column across outcome rows.

[b] Total number of users of each hormone, and respondents who had undergone an oophorectomy. This number is not constant, e.g. for each outcome and hormone examined, the number of users is the total minus the number of cases diagnosed prior to initiating the hormone.

[c] For each outcome and hormone (or surgery) examined, cases who had never used the hormone (or undergone an oophorectomy) or who had been diagnosed prior to initiating the hormone (or undergoing an oophorectomy), were excluded.

(among four estrogen users, or 25.25 py), and one case of sleep apnea (among four estrogen users, or 25.25 py). Four additional FTM participants had ever used anti-androgens, and only one was unsure of having been diagnosed with a medically-recognized intersex condition[3]. One case each of hypertension, high cholesterol, sleep apnea, and venous thrombosis was reported among four anti-androgen users (0.8 py). The number of cases for each outcome among never users was quite small, and either similar to those who had used hormones, or slightly more common (for gall stones, osteoporosis, and polycystic ovary syndrome).

6.4 Discussion

This study described the health effects of exposure to hormones and sex-reassignment surgeries (SRS) among trans people in Ontario, Canada, applying a novel sampling strategy to improve the reliability and validity of our findings. We aimed at

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[3] Among all FTMs in this study, 18 were unsure if they had been diagnosed with a medically-recognized intersex condition, and 7 were born intersexed.

overcoming some of the limitations of previous research by using respondent-driven sampling (RDS).

Trans Ontarians were predominantly white, young adults, and highly educated. The demographic characteristics were similar to trans people in the United States. (57) We found that 58.6% (95% CI = 48.3, 66.6) of trans people in Ontario had ever used hormones, and 55.2% (95% CI = 45.5, 63.6) were currently using hormones. The vast majority of hormone users in the trans community had either not been diagnosed with any health outcomes of interest, or had developed a condition(s) before initiating hormone use or surgery.

The most commonly reported outcomes among both MTF and FTM hormone users were hypertension, high cholesterol, and sleep apnea. Adverse effects of hormone use on cardiovascular health in trans people are well-known; (9, 58) however, in the general population, older age is also associated with high blood pressure and hypercholesterolemia. (48, 49) Among MTFs who had developed hypertension and/or high cholesterol after starting hormone use (n=8), only four had been 40 years of age or older at the time of diagnosis. Similarly, only three of eight FTM hormone users were at least 40 years of age when diagnosed with the aforementioned conditions. While limited to a small number of cases, these findings indicate that hormone use may be the main contributor to cardiovascular health problems in Ontario trans people. However, additional risk factors for hypertension and high blood cholesterol (e.g. overweight and obesity, sodium intake) were not explored.

Furthermore, sleep apnea has been shown to be worsened or unmasked by hormone use, particularly androgen therapy. (25, 59, 60) Risk is greater in persons who are obese, have chronic obstructive pulmonary disease, or smoke. While we do not have information on the former two conditions, four of the six MTF hormone users who had been diagnosed with sleep apnea indicated being former smokers. In addition, among FTMs who had developed sleep apnea after starting hormones or undergoing oophorectomy (n=7), three currently smoked and two were former smokers. Thus, smoking may have played an important role in the onset of sleep apnea in participants diagnosed following the initiation of transition-related services.

In general, we found no evidence that hormone use among MTF and FTM people in Ontario conferred negative effects on health. Hormone users were healthy overall, and similar to those who had never used hormones with regard to diagnosed health outcomes. Some conditions were more common than expected (e.g. sleep apnea), however almost all other outcomes were rare, which may be a result of the relatively young sample obtained through RDS. For the most part, there is no reason to expect much greater risk of disease among hormone users receiving proper treatment and follow-up, given that hormone regimens for FTMs and MTFs are intended to produce hormone levels on par with those of natal males and females, respectively. (61) However, it is possible for hormone users to experience a shift to a male-like (for FTMs) (58) and female-like (for MTFs) risk profile for specific health outcomes. Unfortunately, this could not be examined in our study given the relatively rare occurrence of disease.

Although we report a small number of outcome cases, our study is informative as it may provide trans community members and health care providers with the knowledge to make more informed treatment and screening decisions. More specifically, our findings show that the fear of "doing harm" by prescribing hormones to trans people (3, 62) is likely unfounded. Furthermore, this paper presents long-term data on the health effects of hormone use and surgeries, given that the participants of our population sample were not all receiving the same standardized care, and many were at various stages of the transitioning process. On the other hand, the majority of published findings are based on clinical studies which tend to be of a short-term nature, and consist of a small number of participants. In fact, since complications occurring in the longer term are often seen in general practice, adverse outcomes are likely underreported in the literature. (34) Thus, our large, population-based study of trans Ontarians may have captured some of these "underreported" cases.

6.4.1 Limitations

This study has several limitations worth noting. First, the data were self-reported, including information on the year in which respondents first started taking each hormone, the total amount of time (in years) they had been on each hormone, and the years in which participants had had surgery and been diagnosed with the health outcomes of interest. These measures could not be validated, and may therefore be subject to recall bias. Second, our study is cross-sectional, thus we cannot make rigorous causal assertions regarding the effects of hormones on health. Attempts were made to reduce bias resulting from temporality issues, by including information only on respondents who had been diagnosed with an outcome after initiating hormone use (or undergoing oophorectomy). However, case information on participants missing data with regard to the date of diagnosis or the year in which they had started hormone use (n=8) was not excluded. This was deemed appropriate given that we could not determine for certain whether these respondents had been diagnosed with a condition prior to the initiation of hormones. Third, we were unable to measure the effects of multiple hormone use for those on combined hormone regimens, as we could not determine the length of time in which hormones were taken concurrently.

Fourth, our calculations of person-years of hormone use and since oophorectomy are likely overestimated, as we do not know the number of years in which respondents had used each hormone before being diagnosed with a condition. For example, a participant with 10 years of estrogen use may have been on hormones for only five years before a diagnosis, however all 10 years would be included in person-time estimates. Finally, our use of an in-depth and lengthy survey may have resulted in the over-selection of highly educated trans people, who may have been healthier overall and thus receiving better health care (i.e. obtaining appropriate hormonal regimens and follow-up). Education has been shown to improve access to care by increasing access to information, enhancing self-esteem, and increasing one’s ability to adopt new health concepts and participate as an equal in client-provider interactions. (63)

6.5 Conclusions

We have drawn attention to the health conditions faced by trans Ontarians, and the characteristics of hormone users. While some adverse effects were reported, most hormone users had not been diagnosed with any outcomes of interest. Surprisingly, one of the more common outcomes was sleep apnea, as six and seven cases were reported among MTF and FTM hormone users, respectively. In fact, we report the largest number of cases in the literature. These findings point to the potential causative role of *both* masculinizing and feminizing hormones, adding to trans-health research that suggests androgen use is a significant contributor to the development of sleep apnea. (25, 60)

Thus, future clinical or population-based prospective studies of trans people in Canada should examine not only the independent effects of hormones on sleep apnea (controlling for confounders such as smoking and obesity), but also the specific role of feminizing hormones.

In addition, while high cholesterol and hypertension are commonly reported conditions among hormone users in trans-specific studies, this had not been shown to be a problem among trans Canadians until now. Our study therefore reiterates the need for regular monitoring of the cardiovascular profile of trans patients by health care providers. Overall, we would recommend continual monitoring of the effects of hormones throughout the period of treatment, as this is consistent with the long-term provision of any type of medication. Evaluations should also include regular screenings for reproductive cancers, given that long-term exposure of ones gonads/genitalia and breast tissue to cross-sex hormones may contribute to increased risk of malignancies. (34) Lastly, while we have addressed a major gap in the literature, clinical or population-based prospective studies of trans people in Canada would contribute to a better understanding of the long-term health effects of hormones and surgeries.

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CHAPTER 7

DISCUSSION AND FUTURE DIRECTIONS

As members of a gender minority, trans people face a multitude of challenges that may affect their health and well-being. Given the dearth of trans-specific research in Canada, the focus of this thesis was to develop an understanding of the experiences of trans Ontarians with regard to health and service access issues, using a community-based research (CBR) framework. The overriding goal of the present thesis was to produce knowledge that may foster social change.

7.1 Summary and discussion

Community-based research methods may serve as an appropriate mode of inquiry for graduate students addressing health issues pertinent to vulnerable communities. In fact, engaging trans community members at all stages of the research process ensured that 1) outcomes were relevant to community needs and priorities, and 2) thesis findings were interpreted in ways that reflect important "insider knowledge", thereby improving internal study validity. (1, 2) However, there are few examples of CBR dissertations to be used as guides. This gap in the literature was addressed in Chapter 3, which outlined the lessons learned from doing participatory doctoral research, and provided a guide for students in the form of key recommendations.

The study presented in Chapter 4 assessed the prevalence of and risk factors for depression among male-to-female (MTF) and female-to-male (FTM) Ontarians. We found that MTFs and FTMs were highly educated, although many were unemployed and fell in the lowest income-to-needs ratio category (< $15,000 per person). Both groups also experienced high prevalences of childhood sexual and/or physical abuse, as well as chronic physical health conditions such as HIV, cancer, fibromyalgia, osteoporosis, and diabetes. Similarly, many MTFs and FTMs were exposed to discrimination in the form of transphobia. Not surprisingly, our findings indicate that depression is widespread among both MTFs (61.2%; 95% CI = 52.7, 70.3) and FTMs (66.4%; 95% CI = 59.2, 75.2).

Bivariate associations of variables of interest with depression revealed few similarities between MTFs and FTMs. Among FTMs, having a major mental health issue (e.g. anxiety disorder, schizophrenia, borderline personality disorder, or dissociative identity disorder), not currently using hormones, having never had surgery, and planning to medically transition (but not begun) were significant risk factors for depression; identity support and sexual satisfaction were significant protective factors. On the other hand, living outside Metropolitan Toronto, having some college or university education, and being unemployed were significant risk factors for depression among MTFs. Only transphobia and social support were common risk and protective factors for depression, respectively.

Furthermore, multivariable analyses indicated that the risk factors for depression differed between MTFs and FTMs. For MTFs, depression was significantly impacted by the independent effects of employment, community involvement, childhood abuse, area of residence, passing, and identity support. However, the main effects of sexual satisfaction, transphobia, and stage of medical transition were important contributors to depression in FTMs. Caution is warranted when comparing the effects of particular variables on depression between MTFs and FTMs, as variables in the final models for each group were adjusted for different factors. Nonetheless, our analyses revealed that the potential causes and pathways to poor mental health potentially differed between the groups[1], which may be a result of considerable differences in life challenges and experiences. Note that while this research was exploratory in nature, it is the first to quantitatively examine risk factors for depression among trans people.

Chapter 5 characterized and examined the extent of "do-it-yourself" transitions among trans people in Ontario. While self-performed surgeries and current use of non-prescribed hormones were uncommon, this study suggests that trans people's experiences with providers may have played a role in their willingness to seek hormones from non-medical sources. An inability to access sex-reassignment surgeries (SRS) may have also contributed to self-performed surgeries among trans Ontarians. Lastly, the paper presented in Chapter 6 explored the long-term positive and adverse health effects associated with hormone use and SRS. We found no evidence that hormone use among MTF and FTM people in Ontario conferred negative effects on health. While some conditions were relatively common (e.g. sleep apnea, high cholesterol, hypertension), almost all other outcomes were rare. Chapters 5 and 6 are the first population-based

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[1] Alternatively, the effects of depression *on* the risk factors of interest may differ between MTFs and FTMs.

studies in Canada to draw attention to the 1) number of trans people who are not getting the care they need, and 2) health conditions faced by trans Ontarians using transition-related services, respectively.

7.2 Implications of findings

The findings of the present research have important implications for policy and future research. Our findings suggest that depression is a major public health concern among trans Ontarians. Several approaches to improving the mental health of trans people exist; for example, health professionals should 1) be aware of the increased risk for depression among trans patients and clients, and 2) provide sensitive mental health services that actively address the realities of trans experience. The need for appropriate services is even more pressing outside large urban centres, given that MTFs living outside Metropolitan Toronto were more likely to be depressed than those living in Metropolitan Toronto. This finding also indicates that greater trans-specific resources and support programs may be required outside Metropolitan Toronto.

Furthermore, as members of a highly marginalized community, trans people experience challenges that negatively impact on their mental health. In fact, we found that experiences of transphobia contributed to increased depressive symptomatology. Greater acceptance among the general population and understanding of the experiences of trans communities may help to reduce the occurrence of transphobic events. One way to address this issue is for governments and funding agencies to support research that is relevant to the needs of trans communities. By doing so, we may eradicate informational erasure, which “encompasses both a lack of knowledge regarding trans people and trans issues and the assumption that such knowledge does not exist even when it may. It is manifest in research studies…and in the information learned by or readily accessible to health care providers and policy makers.” (3) Thus, we must also work to facilitate the dissemination of findings to the general population, trans communities, and policy makers. Similarly, we found that trans Ontarians were highly educated, however many were unemployed. Among MTFs, unemployed participants were more likely to be depressed than MTFs who worked full-time. Employment discrimination is therefore another issue in need of being addressed. Currently, human rights protections for trans people have been held to exist under the grounds of sex or disability under both provincial human rights codes and the Canadian Human Rights Act. (4) However, there is a lack of explicit protections for trans people. By failing to formally address the discrimination experienced by trans people, a state of uncertainty is created regarding trans human rights protections. (4) This prevents both would-be human rights violators as well as trans people themselves from knowing that these rights and protections exist. (4) Efforts at both the Provincial and Federal levels are currently being made to include explicit trans human rights protections. (4)

To eliminate “do-it-yourself” transitions, attempts can be made to diminish trans persons’ fears of seeking care from medical professionals. In this regard, providers should be sensitive to the needs of trans people, promote a trans-friendly environment in practice settings, and not hastily deny services if they can be provided. Addressing the specific needs of trans people will help ensure that all those requiring transition-related services will receive them from the safest and most appropriate sources, with regular monitoring of their health. Implementing medical school curricula that focus on the health issues of trans people, and training practicing physicians in trans primary care (including endocrine therapy) may contribute to improvements in the provision of health care. The use of existing Canadian standards of care for hormone therapy (5, 6) may facilitate this process. Note that in 2008, funding for SRS was reinstated in the Ontario Health Insurance Program, following a 10 year period in which patients were required to pay out-of-pocket for sex reassignment procedures. While we reported three cases of self-performed surgeries that may have occurred during this 10 year period, further research may be required in the coming years in order to determine whether coverage for SRS reduces the occurrence of “do-it-yourself” transitions.

The finding that high cholesterol and hypertension were relatively common conditions among hormone users highlights the importance of regular monitoring of the cardiovascular profile by health care providers. In general, continual monitoring of the effects of hormones throughout the period of treatment is necessary, as this is consistent with the long-term provision of any type of medication. Evaluations should also include regular screenings for reproductive cancers, given that long-term exposure of one’s gonads/genitalia and breast tissue to cross-sex hormones may contribute to increased risk of malignancies. (7) Nonetheless, most hormone users had not been diagnosed with any outcomes of interest. In fact, hormone users in Ontario were healthy overall, and similar to those who had never used hormones with regard to diagnosed health outcomes. Our results therefore indicate that the fear of “doing harm” by prescribing hormones to trans people (8, 9) is likely unfounded.

7.3 Directions for future research

Further research is needed on the experiences of trans people across Canada. While the present thesis highlights the health and service access issues faced by trans Ontarians, similar research is lacking in other regions of the country. Our findings are not generalizeable to trans people outside of Ontario, and may only be used to address the health and social needs of those residing in this province. A greater number of studies are therefore needed in order to improve the lives of *all* trans Canadians. Future research should also include prospective studies, which may provide greater support for causal associations with regard to the risk factors for depression and health effects of hormones and SRS. In addition, using a longitudinal study design may allow 1) researchers to identify a larger number of DIY cases, and 2) for more detailed analyses related to the factors forcing trans people to seek hormones from non-medical sources. Researchers may also want to consider including a comparison group of non-trans participants, in order to shed light on the factors that contribute to differences in health outcomes between trans communities and the general population. Furthermore, additional work is required in developing appropriate methods for multivariable analyses on data obtained using RDS, as there is currently no standard approach used in the RDS literature. Doing so may allow for the assessment of more complex models that account for interaction effects and mediation.

Future research on mental health, and particularly depression, in trans people should include validation studies of the Center for Epidemiologic Studies Depression (CES-D) scale. While the CES-D has been applied in previous trans-related research, it is not validated for trans communities; thus, commonly used cut-points (e.g. ≥ 16) in the general population may result in the misclassification of depression among trans people. As such, the validity and reliability properties of the CES-D need to be examined among trans communities. Future studies should also explore whether the experiences of depressive symptomatology differ between trans people and the general population, and if so, the feasibility (or usefulness) of a depression measure designed specifically for trans people. Additional research on the risk factors for depression is also necessary in order to provide greater empirical evidence and support (or lack thereof) for our findings. Furthermore, developing a firm understanding of the differences between MTFs and FTMs may be required, so that measures aimed at improving mental health can be targeted towards the potentially diverse needs of each group. Expanding on the groundwork presented in this thesis will allow researchers to gain more insight into the factors contributing to depression among trans Canadians.

Finally, the present thesis employed a participatory research framework. Although not without challenges, the process of engaging in CBR was rewarding for the researchers and community members involved. As such, future doctoral students and investigators should consider using CBR methods, particularly when working with marginalized communities. Research institutions and funding agencies should further facilitate and promote research that serves community interests and encourages citizen participation. In general, further research including trans people at all stages of the research process may be required in order to fully address issues pertinent to community members. In this way, research findings may impact not only at the community level, but also exact change in policy and programme implementation.

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APPENDIX A: Statement on My Role

A.1 My role within the Trans PULSE Project

As a PhD student and researcher on the Trans PULSE team, I developed my dissertation in collaboration with the Investigators Committee (IC). The aims of this thesis were of interest to Trans PULSE from its inception, thus my dissertation falls within the scope of the project's larger objectives. However, the research questions addressed by my thesis are distinct from the initially funded goals of Trans PULSE (i.e. to use a social determinants of health framework in order to understand how social exclusion mediates HIV vulnerability in trans communities). As such, my dissertation functions as an independent project, while addressing the needs and concerns of the trans community. Given the community-based research framework used in Trans PULSE, several aspects of the research process were not in my control. Nonetheless, I was fully responsible for key aspects of my thesis.

More specifically, the IC was in control of the following project decisions: selection of project partners and members of the Trans PULSE team, funding sources, target population and planned sample size, recruitment strategy and honoraria, prioritization of research areas relevant to trans communities, data collection, and tracking of network referral patterns. Overall, much of the initial stages of the project were planned by the IC.

I was responsible for and in control of the following: designing survey questions and measures pertinent to my thesis (E3-E5, J3-J5, J7-J11, K1, K3, N4, N7-N9, N26-N27, Q4, and S3-S6), data cleaning and coding for my thesis, conducting analyses, writing my dissertation, and presenting findings in multiple formats, including the preparation of manuscripts to be published in peer-reviewed journals ("Lessons learned from undertaking CBPR dissertations: The trials and triumphs of two junior health scholars" is accepted for publication in *Progress in Community Health Partnerships: Research, Education, and Action*).

Research questions for my thesis were developed in collaboration with the IC. Thesis aims regarding non-prescribed hormone use and the long-term effects of transition-related services were especially informed by concerns voiced by the IC and the participants of seven community soundings held in 2006. The findings from these soundings were integral to shaping areas of research for my thesis. Feedback was sought at important stages of my dissertation (measure selection, survey item development, interpretation of findings and final products) in order to ensure that my work was relevant and appropriate to the trans community. In general, I had the final say in all thesis-related output, I was fully responsible for completing all thesis-related analyses and writing, and I was accountable to Trans PULSE, my supervisor and the Department of Epidemiology & Biostatistics.

APPENDIX B: Details of Methodology

B.1 The Trans PULSE Project

The Trans PULSE Project is a community-based research (CBR) initiative which aims to improve the health of trans (transgender, transsexual, or transitioned) people in Ontario. It responds to calls for more research about trans Ontarians, (1) and aspires to produce knowledge that will promote social change. Trans PULSE was initiated in 2005 by trans community members and the Sherbourne Health Centre (SHC). The Project is guided by an Investigators Committee (IC), which consists of 10 people, seven of whom are trans-identified. The IC is comprised of representatives from community organizations (SHC, The 519 Church St. Community Centre), academic partners (OHTN, The University of Western Ontario and Wilfrid Laurier University), and unaffiliated trans community members. Dr. Greta Bauer is the Principle Investigator for the survey phase of the Trans PULSE Project.

The main goal of Trans PULSE is to use a social-determinants-of-health framework in order to understand how social exclusion affects the health of Ontario's trans communities. Housing issues, family supports, health care access, alcohol & drug use, and social service access are some of the specific topics addressed by Trans PULSE. The Investigators Committee is heavily involved in the development of research questions, which are shaped by information attained from the literature, community soundings, and the personal experiences of trans IC members. A two-phased plan was employed, including community soundings (Phase I) and a quantitative survey (Phase II).

B.2 Community-based research

Community-based research (CBR) is defined as "systematic inquiry, with the participation of those affected by the issue being studied, for the purposes of education and taking action or affecting social change." (2) Principally, CBR methods stress research *with*, rather than *on* communities, thereby affirming the value of communities' experiential knowledge and underscoring the importance of a collaborative process. (2) As noted by Namaste, (3) historical distrust with research and clinical and academic communities specifically, presents a challenge when working with trans communities. Therefore, a CBR approach is advantageous as it provides a stronger understanding of the lived experiences of trans people, will heighten the relevancy of the research to community needs, and will facilitate the development of trust and ownership of the research process by community members. (2) Trans PULSE has ensured this by working intently to engage community members in defining project priorities and goals at all stages, and in building community capacity through the research process.

In Phase I, seven community soundings were held across Ontario (Toronto, Ottawa, and Guelph) to seek input from a greater breadth of trans people. The data, from 85 trans people and 4 allies, provided qualitative information that informed the development of research questions and the design of survey measures. The community soundings, designed and carried out by trans IC members, allowed trans people from across Ontario to become involved in all aspects of the research, from delineating the research questions to determining relevant strategies for capacity building and knowledge transfer. A brief online "sounding" for service providers contributed additional information at the developmental stage of the project.

Using CBR to examine (trans) health issues helps to ensure that outcomes are relevant to community needs and priorities, that a large and diverse array of community members are sampled, and that community resources are drawn upon to effectively disseminate knowledge and catalyze social and political change. (4) Community-based research allows for access to heavily stigmatized and hidden populations, including trans communities, (5) and contributes to higher response rates by providing motivation for participation. (2) Furthermore, collaborating with community members in all aspects of the research process permits the interpretation of data in ways that reflect important "insider knowledge" on sensitive topics, thereby improving internal study validity. (2, 5) Overall, community ownership in research projects help validate epidemiological findings and the acceptance of survey instruments in the community. (6)

As part of the Trans PULSE Project's commitment to capacity building, 16 trans people were established to begin the recruitment process. The selected participants resided across Ontario (Toronto – 7, Hamilton – 2, Ottawa – 2, London, Sudbury, Peterborough, Georgetown, and North Bay – 1 each) and were sociodemographically diverse with regard to: income, age, ethnicity, and immigration status. All 16 trans Ontarians served on the Community Engagement Team (CET) and have been involved in the project at two stages: 1) providing input into the survey design; and 2) as "seeds" who recruited the first wave of participants.

Finally, there are some challenges to undertaking community-based research, such as conflict between community members and academic researchers in relation to time pressures and constraints, and the analysis or interpretation of data. (7) Community-based research is time consuming and might not fit within the time frames set by academic institutions. (8) Conflicts may also arise with regard to the pace at which the researcher and community members want the project to unfold. (8) Furthermore, recognizing the difference between an academic understanding of an issue and the lived experience of that issue by a community is important as it can have profound implications for the validity of CBR. (7) Nonetheless, through continued dialogue and shared reflection, an agreed upon perspective can prevail. (7) In addition, ethical issues may arise with regard to the dissemination or release of sensitive or potentially unflattering data. (9) Community members may fear that "unflattering data may (further) stigmatize their communities" (9) while researchers may feel the need to publish findings in order to report the objective nature of the data. (9) As a result, academic partners must consider the repercussions to the community if data are released prematurely or in an insensitive manner. (9)

B.3 Sampling design and recruitment: Respondent-Driven Sampling

Recruitment was carried out between May 2009 and April 2010 by the Trans PULSE team using respondent-driven sampling (RDS). The sampling strategy employed is a probability-based method designed for the recruitment of "hidden populations" through social networks. (12, 13) Commonly used non-probability sampling methods of hidden populations, such as snowball sampling, facility-based sampling, and targeted sampling all suffer from selection bias and reduced external validity. (14) Conversely, time-location sampling (TLS) uses ethnographic mapping to compile a list of locations where hidden populations tend to congregate, and develops a sampling frame from which to choose a probability sample of sites. (14) However, TLS may also lead to selection bias, unless all or a very high percentage of sites where subgroup members congregate are identified and included in the sampling frame. (14)

While respondent-driven sampling is similar to snowball sampling in that it involves chain referral, RDS allows for a more methodologically rigorous quantitative analysis. By weighting the sample to compensate for the fact that it was obtained in a non-random way, RDS provides externally valid probability samples and allows for accurate inferences about the characteristics of a population, (14) information that is lacking in the field of trans health research. Snowball sampling requires an initial set of subjects who participate in the study and serve as “seeds” to help identify other subgroup members to be included in the sample. (14) The sample composition is heavily influenced by the choice of initial seeds and is biased towards favouring more cooperative subjects and those part of larger social networks. (14) In RDS, seeds are enlisted as participants in the study and provided with unique coupons to recruit eligible peers into the study; recruits receive a similar number of coupons, as do their referred respondents, until the sample size is met or equilibrium is reached. Equilibrium is a state in which the estimates converge around a stable sample composition that does not change during subsequent cycles of recruitment. (14) Limiting seeds in the number of respondents they can recruit (12) and providing recruitment incentives (12, 15) increase the length of recruitment waves, thereby allowing equilibrium to be reached (typically within six waves or less (14)). According to Markov chain theory, this ensures that the final sample composition is not biased towards the characteristics of the seeds. (12, 16)

Respondent-driven sampling allows for the calculation of selection probabilities, provides means for controlling bias resulting from differences in the sizes of personal networks (12, 14) and provides methods for analysis (i.e. bootstrapping) that account for the networked sampling design. (16, 17) Respondent-driven sampling also works well when integrated into CBR projects, particularly where participants have served an essential role in the recruitment process, becoming active advocates for the study. (18) Nonetheless, there are some limitations to RDS: 1) it cannot be used to analyze continuous variables unless the sample is aggregated into levels; i.e. age categories; (19) 2) RDS is only suitable for sampling populations with a contact pattern, (13, 15) thus it will not capture isolated persons or those who are not networked within the trans community; 3) information on each participant’s network size is crucial in calculating population estimates; however, given the self-reported nature of this measure, it may be inaccurate and could therefore bias estimates; (13, 17) 4) RDS methods do not necessarily contribute to unbiased results, as the degree of bias depends on sample size, i.e. respondent-driven sampling is asymptotically unbiased (or consistent); 5) bootstrap procedures for variance estimation produce only 85% coverage for a 90% confidence interval; (17) nonetheless, bootstrapped confidence intervals outperform the naïve procedure, (17) and; 6) if recruitments from personal networks are not random it could introduce bias into the sampling process; (16) however there is some evidence that respondents recruit randomly from their friends. (16) The random recruitment assumption is plausible in this study because the research design facilitated participation by all community members; (19) for example, incentives offered were salient to respondents from all income groups and the survey was available in multiple modes.

In this study, recruitment began with the Community Engagement Team, and the 16 members served as seeds who recruited the first wave of participants. Upon completion of the survey, each seed selected three eligible trans people within their personal networks as Wave One of the study. Each of those participants was in turn able to invite up to three trans people to participate as Wave Two, and so on. Participants were given a small number of coupons (three) so that the sample would go though several recruitment waves and to limit bias due to “super-recruiters”. (16) Long recruitment chains ensure that members of the trans community have a nonzero probability of being reached and allow the sampling process to converge to equilibrium. (16) Twenty-two additional seeds (Toronto – 12, Ottawa – 4, Guelph, Kitchener, Cornwall, Hamilton, Simcoe, and Kingston– 1 each) were added once we had ensured that four to five waves of participants had been recruited. The new seeds included four trans members of the Investigators Committee, one staff member of the Trans PULSE team, and 17 community leaders who were able to facilitate and monitor their recruits. Re-seeding was deemed appropriate by the Investigators Committee due to the slowing of recruitment, and the fact that two of the original seeds had failed to recruit any peers. Finally, primary incentives valued at $20 were offered, with the participant choosing between receiving a gift card or donating their honorarium to a trans-related charity. These options allowed participants to maintain anonymity (donation or e-mailed gift card), and provide an option to those unable to cash cheques (gift card).

The final sample comprised 433 trans Ontarians 16 years or older. Two of the analytic chapters (5 and 6) were based on a preliminary dataset of 308 respondents recruited from May 2009 to the first week of January 2010. The full dataset (N=433) was used for Chapter 4.

B.4 Recruitment characteristics

The sample included 10 recruitment waves, based on the longest recruitment chain. The number of waves attained in this study exceeded those required for equilibrium to be approximated. Under standard RDS interpretation, if equilibrium is reached within a single recruitment chain, then equilibrium is reached for the entire sample (20) because the sample will have sufficient "sociometric depth" (number of links from the terminus of the longest chain to its seed). (21) This indicates that our sample composition was independent of the initial recruits, and according to the work of Ramirez et al., (22) homophily, or network clustering and segmentation, was not high.

While our study appears to have reached equilibrium, there are some limitations of the recruitment process worth noting. It was discovered that some respondents were recruiting on behalf of their isolated recruits, who may not have known any other eligible trans people, and were thus unable to recruit participants. We are unaware of how often this had happened. Furthermore, at least 2 respondents had posted YouTube videos to recruit respondents, yet it is unclear as to whether they recruited strangers or trans people who were part of their social networks. The preceding events may have contributed to biased estimation. For example, the recruitment patterns may be inaccurate as respondents were possibly linked to recruits (via the coupon system) that they did not know. Thus, participants may appear more connected then they actually are, and the random recruitment assumption may not have been met. This could have influenced the estimates in unknown ways. (16)

In addition, the use of a long and in-depth survey, coupled with difficulty in obtaining community "buy in" to the RDS method, contributed to a slow recruitment process. Nonetheless, Trans PULSE obtained the largest sample of trans people in Canada, which represents a higher proportion of the population than in recently completed, large U.S. internet studies (e.g. Rosser et al. (23)).

B.5 Survey development

This thesis draws upon data from Phase II (quantitative survey) of the Trans PULSE Project. The survey instrument was developed in English and was available in multiple modes including online, telephone interview with language interpretation (if needed), and paper-and-pencil. Usually, a single method of administration is used; however a multi-modal approach was best suited to this project as some trans people are connected only to virtual communities, whereas others may only be accessible through a paper-and-pencil survey. It was expected that samples of less geographically concentrated populations could be drawn by using telephone interview and an on-line survey.

A range of demographic and health-related topics were covered in the quantitative survey, including items pertinent to my dissertation. These were selected through discussions with the Investigators Committee, and information gathered from literature review and qualitative analysis of Community Sounding data. Survey development was further guided by members of the Community Engagement Team, who assisted with topic prioritization. The one-year process of survey development included the following: an investigators' retreat, a meeting with the CET on topic prioritization, follow-up conference calls with the CET, and numerous in-person meetings with the IC. Validated measures were used where they seemed applicable; however, none had been validated on trans samples. The lived experiences of trans IC members and the expertise of academic partners were used to refine questions in order to ensure face validity.

The survey underwent multiple iterations of pre-testing by all members of the IC and staff. The survey was then pilot tested with members of the CET. The following aspects of the questionnaire were examined: typographical errors, item flow, proper use of skip patterns, perceived difficulty (or burden) of answering the survey questions, inclusion of all possible experiences in response options, appropriateness of item wording, and length of time to complete the survey. Upon correction of issues arising from the pilot, a downloadable/uploadable PDF final version of the survey was developed using Adobe LiveCycle v8.2, (11) which allowed for the creation of variable names and codes for response options. The survey was subsequently tested with the CET and members of the IC for technological performance on a variety of computers of differing vintages and operating systems. The functionality of the programming with regard to the sampling process was evaluated using the following procedure: 1) the Project Manager began the piloting by completing the survey, and submitting it on-line; 2) each of the three tickets received upon completion of the survey were forwarded to three members of the team, who then completed and submitted the survey, and so on. The technical aspects of data collection were also evaluated; in particular, we tested whether: 1) responses to the survey were correctly uploaded to a database (MySQL) developed for Trans PULSE, 2) appropriate ticket numbers for recruitment were provided to each person upon completion of the survey; 3) recruitment information (i.e. who recruited whom) was correctly uploaded to MySQL; and 4) incentives were issued.

B.6 Measures

An overview of the measures used in each manuscript is provided in Table B.1. The measures used in the analyses are described in detail in each of the respective manuscripts (Chapters 4 to 6). An abridged version of the data collection instrument containing variables relevant to this thesis is provided in Appendix C.

B.7 General data procedures

Tracking of network referral patterns

In RDS, network referral patterns (i.e. who invited whom to participate), and knowledge of how connected each member is to their community, is tracked. The personal network size of each participant (i.e. number of trans people they know in Ontario who are eligible to participate in the study) can be used in weighted analyses to compensate for the over-sampling of respondents with larger social networks; (14, 24) this information is also used to calculate selection probabilities. In order to identify referral patterns, seven-digit ticket numbers were randomly generated prior to initiation of sampling, and maintained in a master list. All new participants required a number to participate, as given them by a previous participant (via recruitment coupons). Seeds received the first set of randomly generated numbers and upon completion of the survey, each seed was given three ticket numbers from those available in the list to recruit eligible Wave 1 participants. This process was carried out for all respondents who completed the survey. Ticket numbers that were issued and used (as indicated by a submitted survey) were tracked in MySQL. Network diagrams of the recruitment patterns pertaining to the preliminary (N=308) and final datasets (N=433) were obtained using NETDraw (25) (Figures B.1 and B.2).

Data collection

Recruitment coupons contained the following information: ticket number, website for the on-line survey and a 1-800 phone number for Trans PULSE (attended by the Project Manager, Principle Investigator, and the author of this thesis during allotted times). The on-line survey was available on a secure website in which each participant was required to enter their ticket number, answer eligibility and security questions, and provide consent and contact information for future research (optional). It was separated into five parts, each to be submitted individually, in order to ease the burden of participating in our lengthy survey (87 pages in total). If an IP address appeared for two linked participants (recruiter and recruit), a message directed them to call in for their incentive. The incentive was provided only if the respondent called and stated that they had not completed the survey twice. While this was not an issue in Trans PULSE, the procedure was implemented in order to avoid duplicated surveys, at least as far as possible given the anonymous nature of the study.

Respondents unable to complete the survey on-line were asked to call Trans PULSE in order to acquire a paper-and-pencil survey. The paper-and-pencil survey was sent to participants with a pre-paid return envelope once eligibility was established. Follow-up contact was made with respondents who had completed the survey and provided contact information, but who had failed to recruit peers into the study. Furthermore, those who had consented and disclosed contact information through the on-line questionnaire, yet who had not begun the survey were contacted with a gentle reminder of the importance of participating in the study. Information on what to do if respondents had encountered technical difficulties, or lost their ticket number was also provided. Overall, 92.4% (n=400) and 7.6% (n=33) of respondents completed the survey on-line and via paper-and-pencil, respectively. No participants requested to complete the survey via telephone interview.

Table B.1 – Overview of variables used in analytic manuscripts

Manuscripts	**Variables used (question number)**
Chapter 4: Prevalence of and Risk Factors for Depression in Transgender Ontarians: A Cross-Sectional Study	*Outcome variable:* depression – CES-D (Q6) *Risk factors:* age (B1), income-to-needs ratio (B24 and B25), employment status (L4), education (B15), housing (M3, M17 and M18), relationship status (B31), newcomer status (B11), childhood abuse (N26 and N27), major chronic physical health issues (I1, S3, and S6), major mental health issues (Q4), transphobia (N9), racism (N4), involvement in community organizations (N25), social support (N2), perceived identity support (N10 and N16), passing (N7), sexual satisfaction (P14), living in felt gender (coming out) (B34 and B35), current hormone use (J9), stage of medical transition (B43), time since surgery (K1 Column 5 – all procedures except for “facial hair removal” and “hair transplants”) *Effect modifier:* gender spectrum[a] – male-to-female or female-to-male (B2)
***Chapter 5*:** Non-Prescribed Hormone Use and Self-Performed Surgeries: “Do-It-Yourself” Transitions in Ontario’s Transgender Communities	*DIY variables:* current use of non-prescribed hormones (J11), ever used non-prescribed hormones (J8), self-performed surgeries (K3 and K3a) *Barriers to hormone access:* regular family doctor (E1), prescription drug coverage (J4), denied prescription hormones (J5), area of residence (B20), annual personal income (B27), trans-specific negative experiences with providers (E7, E9 and G6) *Sociodemographic and hormone use variables:* age (B1), gender spectrum (B2), employment status (L4), education (B15), ethnicity (B5), ever taken hormones (J6), currently taking hormones (J9), hormone regimen (J10), ever received blood tests to monitor effects of hormones (J12), currently inject hormones (J13), sources of syringes or needles (J14)

Note: CES-D, Center for Epidemiologic Studies Depression Scale; DIY, do-it-yourself.

[a] Gender spectrum refers to respondents who were assigned a sex at birth but currently identify as that of the opposite sex, or fall under the umbrella of trans identities.

Table B.1 (Continued) – Overview of variables used in analytic manuscripts

Manuscripts	**Variables used (question number)**
Chapter 6**:** An Exploratory Analysis of the Effects of Hormones and Surgeries on the Health of Transgender People in Ontario	*Outcome variables:* breast cancer, cervical cancer, chronic fatigue syndrome, diabetes, elevated liver enzymes, elevated prolactin levels, endometrial cancer, endometrial hyperplasia, fibromyalgia, gall stones, heart attack, high blood pressure, high cholesterol, pulmonary embolism, osteoporosis, ovarian cancer, penile cancer, polycystic ovary syndrome, prostate cancer, sleep apnea, stroke, testicular cancer, thyroid condition, uterine cancer, vaginal cancer, venous thrombosis (S6) *Hormone use and surgery-related variables:* ever taken hormones (J6), hormone regimen and year of first use (J7 Columns 2 & 3), currently taking hormones (J9), current hormone regimen (J10), duration on progesterone (J7 Column 4), duration on estrogen (J7 Column 4), duration on anti-androgens (J7 Column 4), duration on testosterone (J7 Column 4), ever had an oophorectomy (K1 Column 4), time since oophorectomy (K1 Column 5), ever had an orchiectomy (K1 Column 4), time since orchiectomy (K1 Column 5) *Sociodemographic variables:* gender spectrum (B2), age (B1), smoking (R1 and R2), education (B15)

Data management

Code books were created for Trans PULSE and included variables names, codes for response options, and any special instructions needed for coding a particular item. Data from the paper-and-pencil surveys were entered into the on-line questionnaire by the Project Manager and the author of this thesis. Prior to data entry, the surveys were reviewed for completeness and errors (e.g. contingency checking). The on-line survey was linked to a database (MySQL), to which responses were automatically transferred. Raw data were stored on project servers at the RBC building in London, Ontario. All datasets used for analysis were saved onto a Schulich School of Medicine & Dentistry networked drive accessible only by Dr. Greta Bauer and students working on the Trans PULSE Project.

Data cleaning

All data used in this thesis were checked for errors using SAS v9.2. (26) Two major types of error checking, range checking and contingency checking, were conducted in all data sets prior to any statistical analyses. Range checking involves verifying that only valid ranges of numbers were used in coding the answers to a particular question. (27) If errors were found, correct answers were inferred logically or based on responses to related questions. For example, two-digit answers (e.g. 78) to questions regarding "year" were assigned four-digit responses (e.g. 1978). A missing value code was assigned to questions which could not be inferred correctly. Contingency checking involved comparing responses between related questions, in particular those that were associated with skip patters. (27)

Figure B.1 – Network diagram of preliminary recruitment patterns (N=308)

🟡 = seed

🔴 = recruit

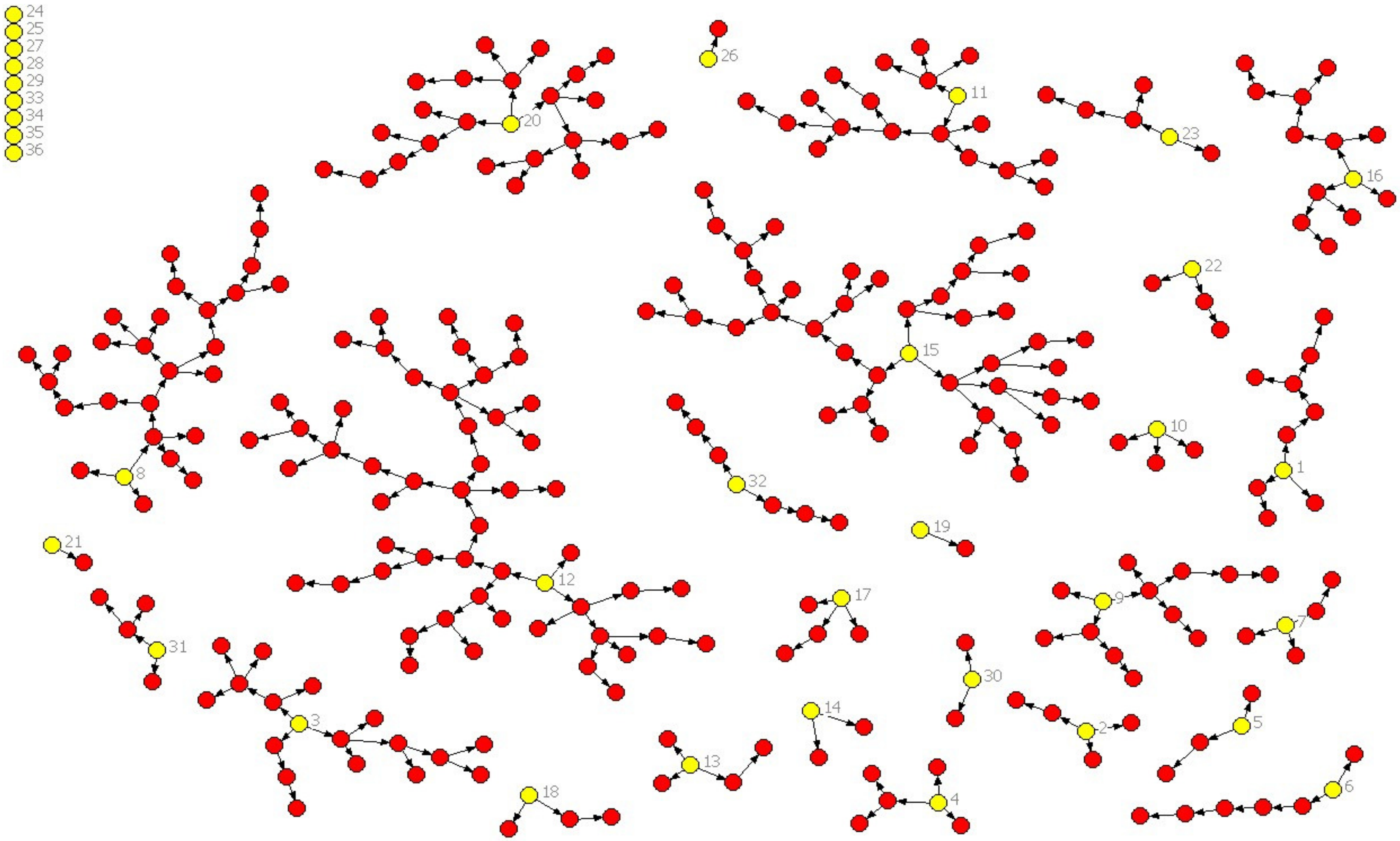
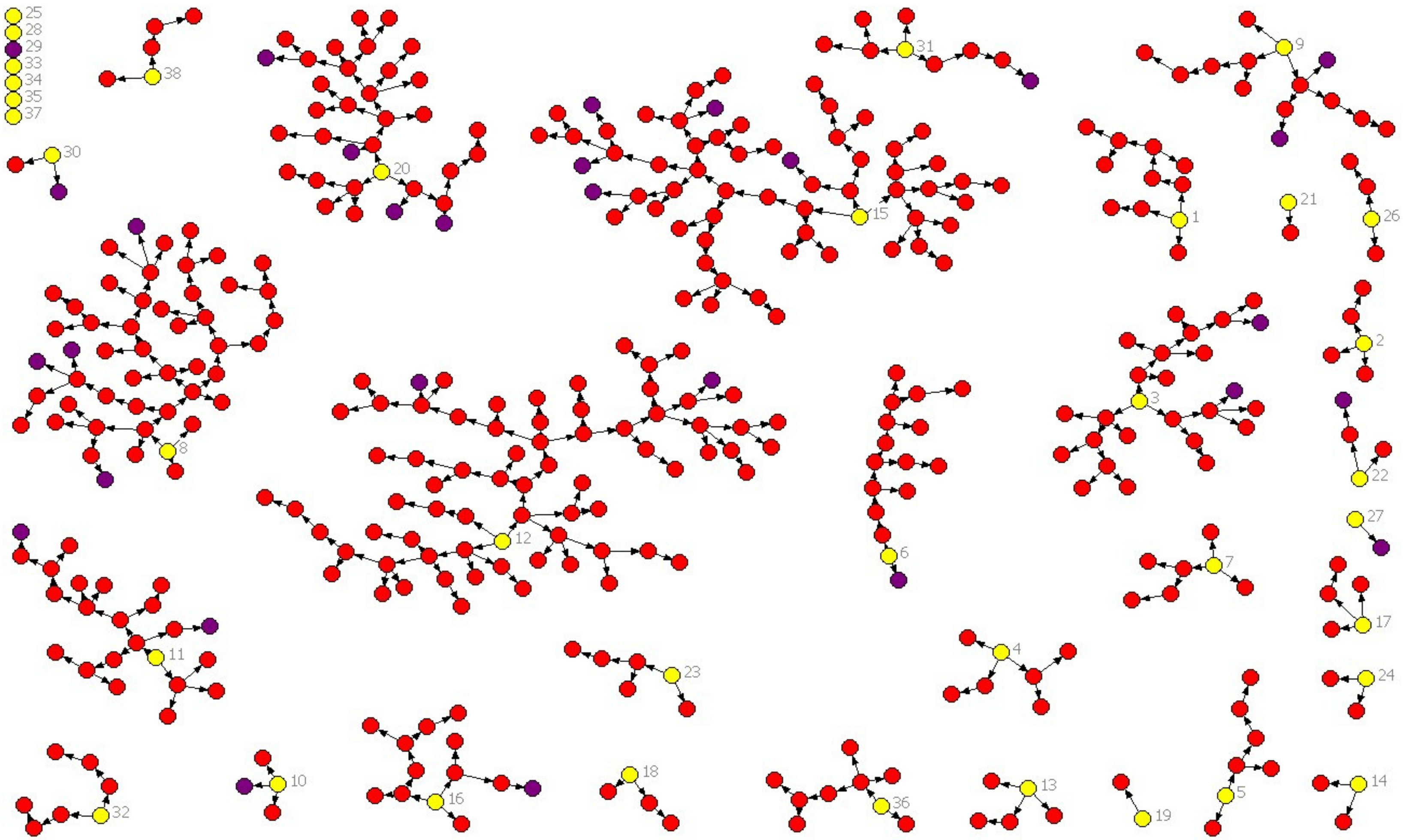


Figure B.2 – Network diagram of final recruitment patterns (N=433)

🟡 = seed 🔴 = recruit
🟣 = seed/recruit (partially completed survey)



Analyses

Data manipulation (e.g. merging of survey data with respondents' network information), variable coding and analyses were performed using SAS v 9.2. (26) In order to account for the features of RDS recruitment, SAS data files were converted to text (tab delimited) files, and imported into the RDS Analysis Tool (RDSAT) version 6.0. (28) The analysis tool was used to obtain asymptotically unbiased population proportions and confidence intervals. RDSAT generates weighted population estimates using information on the proportional recruitments across groups and the estimated mean network size for each group. (12) Population inferences obtained from RDSAT are based on analytical methods presented by Heckathorn, (12, 13). As an illustrative example of this technique, consider a population where all individuals are members of two mutually exclusive categories, groups A and B, respectively. In this manner, the proportional size of A is estimated by

$$P_a = S_{ba}N_b / S_{ba}N_b + S_{ab}N_a \ (13)$$

where S_{ab} is the proportion of Bs selected for recruitment by As, S_{ba} is the proportion of As selected for recruitment by Bs, and N_a and N_b are the network sizes for groups A and B, respectively. The estimated proportional size of A is thus negatively related to its network size (N_a) and positively related to the other group's network size (13); this adjustment compensates for the over-sampling of the group with the larger network size. The above weighted equation also controls for differences in recruitment effectiveness (13).

Confidence intervals derived from RDSAT are based on a modified bootstrapping methodology that mimics the features of RDS recruitment. (17) The sample is initially divided into two sets based on how respondents were recruited; for example, participants recruited by members of group A, and those recruited by someone in group B (in the case of two mutually exclusive categories). A seed is then chosen with uniform probability from the entire sample, and based on the group membership of the seed, the statistical algorithm then samples (with replacement) from either group A or B. (17) This process continues until the bootstrap sample equals the same size as in the original study. Next, RDSAT produces an estimate of the population prevalence (P_a) based on the replicate sample and the previous equation. This procedure was repeated 10,000 times for our study. Finally, the replicate estimates are ranked and used to construct an appropriate confidence interval. In this case, we specified a 95% confidence interval in RDSAT, which was calculated using the percentile method. (17) For the percentile method, the endpoints of the 95% confidence interval are defined to be the two replicate estimates, such that 2.5% of the replicate estimates fall below the interval, and 2.5% of the replicate estimates fall above the interval. (17) This proposed resampling algorithm, in conjunction with the percentile method produces confidence intervals that work well in an absolute sense and produce better coverage than a standard symmetric confidence interval for a proportion. (17)

With regard to multivariable analyses, individualized weights were used to adjust for the over-sampling of respondents with larger social networks and differences in recruitment effectiveness. This approach represents a generalization of the weighted prevalence estimates obtained from RDSAT to the multivariable model. Weights were obtained from RDSAT, and computed for each respondent based on individual degrees (personal network size) and a partition[1] analysis of the outcome. (29) When these weights are generated for the dependent variable, they can weight the entire data set for multivariable analyses. (29)

Furthermore, appropriate adjustments for the lack of independence among respondents were applied to multivariable models using SAS surveylogistic procedures. In RDS, respondents typically recruit more than one eligible peer, thus individual-level errors may be correlated with the outcome or explanatory variables in the multivariable logistic model. (30) In this case, participants who share a recruiter are treated as being a cluster, which has a maximum size of three (corresponding to the number of peers that a study participant is permitted to recruit). (30) Furthermore, respondents who share a seed are members of the same recruitment tree; the latter represents a higher level of clustering (30) in which shared recruiter clusters are nested. (30) Note that seeds do not have recruiters, and are thus not part of a shared recruiter cluster. To ensure that seeds were

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[1] A "partition" is a user-defined set of groups. The groups are defined by common traits, e.g. 'depressed', or 'not depressed'.

included in multivariable analyses, each seed was assigned a unique shared recruiter cluster number. A variety of analyses were used within each analytic manuscript; these are described in detail in each respective thesis article (Chapters 4 to 6).

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Appendix C: Abridged version of the Trans PULSE Survey

Introduction

Thank you so much for taking the time to answer the questions in this survey. The results will go a long way to help promote equality for trans communities in Ontario and beyond. We greatly appreciate your contribution.

This survey will eventually be completed by 1000 trans-identified[1] people and people of trans experience across Ontario. We've chosen particular kinds of questions to make sure that the results are useful to trans communities, meaningful to us, and able to affect our lives for the better.

Why is this survey important?
This survey is important because it is driven and owned by community members who want to improve our quality of life. It's essential to be able to have every voice heard and to have the real experiences of what it is like to be trans or to transition in Ontario in order for services to change and to understand how the health of our community is affected by the problems and challenges thrown our way.

Where did the questions on this survey come from?
Some of the questions in this survey were designed by members of our communities, and other questions come from existing surveys so we can compare our results to theirs – this will enhance the success of our study in creating change and improving things for us.

We know that some of the questions on the survey may seem very straightforward and basic. What's really unique about this survey is that we've written many questions that relate to our real lives – for example, the supports in our lives, how we feel about ourselves, the health issues that concern us, and our experiences with services. Understanding these issues can help us promote change for trans communities. This survey is also important because trans people across Ontario told us these issues were meaningful.

What will come of the results of this survey?
The survey itself is not the final step of our project. Once we've collected the surveys from you and analysed the information, we will be talking to 60 to 80 trans people in more detail to help us understand our results. Input from trans people is so important to make sure results are interpreted from our perspective. We will ensure that the results of this study do not sit on a shelf somewhere, but rather are put into action to improve our health and well-being.

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[1] ***A note on the following term:***
"trans, trans-identified or trans experience" - these phrases are used in different places in the survey and in the articles and information created by the Trans PULSE Project more generally. Identities and labels are important parts of our lives and how we think about ourselves. At the same time, it's difficult to use a single term to cover all people who are trans, transgendered, cross-dressers, transsexual, genderqueer, or those who have transitioned and identify simply as 'women' or 'men.' So, we've decided to use these phrases as a means of including all trans people, with an understanding that some people may not always identify as trans at all times and stages in their life.

B. About You

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

B1. How old are you?

__________ years

B2. What was your assigned sex at birth?

☐ Male
☐ Female

B3. Have you been diagnosed with a medically-recognized intersex condition?

☐ Yes
☐ No
☐ Unsure

B4. Which of the following describes your present gender identity? (Please check all that apply)

☐ Boy or Man
☐ Girl or Woman
☐ FTM
☐ MTF
☐ Trans Boy or Trans Man
☐ Trans Girl or Trans Woman
☐ Feel like a girl sometimes
☐ Feel like a boy sometimes
☐ T Girl
☐ She-male
☐ Two-spirit
☐ Intersex
☐ Crossdresser
☐ Genderqueer
☐ Bi-gender
☐ Other – specify _________________________

B5. Which of the following reflect your ethno-racial background? (Please check all that apply)

☐ Aboriginal (First Nations, Métis or Inuit)

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

B6. How do you identify your own ethno-racial background?

Please specify: ____

B7. Are you perceived or treated as a person of colour?

- ☐ Yes
- ☐ No

B8. What is your first language?

Please specify: __________________________

B9. What languages are most often spoken in your home?

First language: __________________________

Second language: __________________________

Third language: __________________________

B10. What country were you born in?

- ☐ Canada
- ☐ Other – specify _________________________

B11. How long have you been living in Canada?

_________ years ________ months

B12. Are you?

- ☐ First Nations
- ☐ Métis

☐ Inuit
☐ None of the above

B13. What is your status in Canada?

☐ Canadian citizen
☐ Permanent resident / landed
☐ Refugee
☐ Refugee Claimant / PRRA / Judicial Review
☐ Work permit / temporary work papers
☐ Visitor permit
☐ Student permit
☐ Undocumented / Non-Status / Without papers
☐ I don't know
☐ Other, please specify: ____

B14. Are you <u>currently</u> enrolled in elementary school, middle school, high school, college, trade school, or university?

☐ Yes, full-time
☐ Yes, part-time
☐ No

B15. At this point, what level of education have you <u>completed</u> (in Canada or any other country)?

☐ Did not graduate from high school
☐ High school graduate
☐ Some college or trade school
☐ College or trade school graduate
☐ Some university
☐ University - bachelor's degree
☐ University - graduate or professional degree
☐ I don't know

B16. When you were a child, what was the religious or faith practice of your family? (Please check all that apply)

☐ Aboriginal Spirituality
☐ Agnostic
☐ Anglican
☐ Atheist
☐ Bahá'í
☐ Buddhist
☐ Catholic
☐ Hindu

- ☐ Jewish
- ☐ Mennonite
- ☐ Amish
- ☐ Islamic
- ☐ Protestant Christian
- ☐ Sikh
- ☐ Unitarian
- ☐ No religion
- ☐ Other – specify:________________________________

B17. How religious or faith-based was your upbringing?

1	2	3	4	5	6
not at all	a bit	somewhat	fairly	quite	extremely

B18. What is your current religious or faith practice? (Please check all that apply)

- ☐ Aboriginal Spirituality
- ☐ Agnostic
- ☐ Anglican
- ☐ Atheist
- ☐ Bahá'í
- ☐ Buddhist
- ☐ Catholic
- ☐ Hindu
- ☐ Jewish
- ☐ Mennonite
- ☐ Amish
- ☐ Islamic
- ☐ Protestant Christian
- ☐ Sikh
- ☐ Unitarian
- ☐ No religion
- ☐ Other – specify:________________________________

B19. Right now, how religious or spiritual are you?

1	2	3	4	5	6
not at all	a bit	somewhat	fairly	quite	extremely

B20. What are the first three digits of your postal code?

- ☐ The first three digits of my postal code are: __ __ __
- ☐ I don’t know my postal code
- ☐ I don’t have a postal code, as I don’t have a home right now
- ☐ I don’t have a postal code, as I am in the military

☐ I don't have a postal code, as I am in the prison system

B21. Do you live on a reserve?

☐ Yes
☐ No

B22. How do you <u>currently</u> identify? (Please check all that apply)

☐ Bisexual
☐ Gay
☐ Lesbian
☐ Asexual
☐ Pansexual
☐ Queer
☐ Straight or Heterosexual
☐ Two-Spirit
☐ Not sure or questioning
☐ Other - specify _________________________

B23. Are you attracted to…? (Please check all that apply)

☐ Trans men
☐ Non-trans men
☐ Trans women
☐ Non-trans women
☐ Genderqueer or bigendered people
☐ None of the above
☐ Other, specify __________________

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.

B24. What is your best estimate of the total income, before taxes and deductions, of <u>all household</u> members from all sources in the past 12 months?

☐ Less than $5,000.00
☐ $5,000 to less than $10,000
☐ $10,000 to less than $15,000
☐ $15,000 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 or more
☐ I don't know
☐ I'd rather not say

B25. Including yourself, how many people were being supported on this household income? Please include everyone who is being supported, including those who may live outside of Canada.

________ people

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 not only jobs, but income earned through activities ranging from public speaking to sex work to child care.

B26. From which of the following sources did your household receive any income in the past 12 months? (Please check all that apply)

☐ Wages and salaries
☐ Income from self-employment
☐ Dividends and interest (e.g. on bonds, savings)
☐ Employment Insurance (E.I.)
☐ Worker's compensation
☐ Benefits from Canada or Quebec Pension Plan
☐ Retirement pensions, superannuation and annuities
☐ Old Age Security and Guaranteed Income Supplement
☐ Child Tax Benefit
☐ Provincial or municipal social assistance or welfare (including Ontario Works or Ontario Disability Support Program-ODSP)
☐ Child support
☐ Alimony
☐ None
☐ Other (e.g. rental income, scholarships, parental support)
Please specify:
____

B27. What is your best estimate of your total personal income, before taxes and other deductions, from all sources in the past 12 months?

☐ Less than $5,000.00
☐ $5,000 to 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 or more
☐ I don't know
☐ I'd rather not say

B28. If you have socially or medically transitioned and are living in your felt gender, what is your best estimate of the <u>highest</u> annual <u>personal</u> income you earned, before taxes and other deductions, from all sources <u>before you transitioned</u>?

☐ Less than $5,000
☐ $5,000 to less than $10,000
☐ $10,000 to less than $15,000
☐ $15,000 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 or more
☐ I don't know
☐ I'd rather not say
☐ Not applicable

B29. Are you currently living with any of the following? (Please check all that apply)

☐ Labelled with an intellectual disability
☐ Learning disability
☐ Autism, Aspergers or neuro-diverse spectrum
☐ Mental health disability (including depression)
☐ As a survivor of the psychiatric system
☐ Blind, low vision or visual impairment
☐ Physical or mobility disability
☐ Chronic pain
☐ Chronic illness
☐ None of the above

B30. Are you?

☐ Deaf
☐ Deafened
☐ Hard of hearing

☐ None of the above

B31. What is your <u>current</u> relationship status?

☐ Single and not dating
☐ Single and dating
☐ In a monogamous relationship
☐ In a non-monogamous (open) relationship
☐ In a polyamorous (multiple people) relationship

B32. What is your <u>legal</u> marital status <u>right now</u>?

☐ Never married
☐ Separated
☐ Divorced
☐ Widowed
☐ Living common-law
☐ Married

B33. About how old were you when you first became aware that your own sense of your gender did not match your body or physical appearance?

_______ years old

B34. Are you currently living in your felt gender?

☐ Yes, full-time
☐ Yes, part-time
☐ No

B35. If yes, at what age did you begin living in your felt gender?

_______ years old

☐ Not applicable

B36. In your day-to-day life, do you use a different name or pronoun from the one that you were given at birth, one that better reflects your gender identity?

☐ Yes
☐ No

B37. Have you asked <u>any</u> of the following people to call you by a different name or pronoun, one which reflects your gender identity?

	Have done	Plan to do	Do not plan on doing	Not applicable
My parent(s)	☐	☐	☐	☐
My sibling(s)	☐	☐	☐	☐
My spouse(s) or partner(s)	☐	☐	☐	☐
My child(ren)	☐	☐	☐	☐
My extended family	☐	☐	☐	☐
My roommates	☐	☐	☐	☐
My trans friends	☐	☐	☐	☐
My non-trans friends	☐	☐	☐	☐
My church/temple/mosque	☐	☐	☐	☐
My cultural community	☐	☐	☐	☐
My co-workers	☐	☐	☐	☐
My employer	☐	☐	☐	☐
My supervisor/boss	☐	☐	☐	☐
My teachers	☐	☐	☐	☐
My school	☐	☐	☐	☐
My classmates	☐	☐	☐	☐

B38. Have you legally changed your name to reflect your current gender identity?

☐ Yes
☐ No

B39. If No, do you want to?

☐ Yes
☐ No

B40. For the following forms of legal identification, are you listed as "male" or "female?"

	Male	Female	I don't have this/ not relevant
Driver's license	☐	☐	☐
Birth certificate	☐	☐	☐
OHIP card (health card)	☐	☐	☐
Canadian passport	☐	☐	☐
Other (non-Canadian) passport	☐	☐	☐

Certificate of Indian status card	☐	☐	☐
Canadian citizenship card	☐	☐	☐
Canadian permanent resident card	☐	☐	☐
Canadian armed forces card	☐	☐	☐
"Bring your ID" Card/age of majority card	☐	☐	☐

B41. Do your academic transcripts accurately reflect your current name and gender identity?

☐ Yes
☐ No
☐ Not applicable

B42. Can you get letters of reference (for jobs, school, etc.) that accurately reflect your current name and gender identity?

☐ Yes
☐ No
☐ Not applicable

B43. Which of the following applies to your <u>current</u> situation regarding hormones and/or surgery?

☐ I have medically transitioned (hormones and/or surgery)
☐ I am in the process of medically transitioning
☐ I am planning to transition, but have not begun
☐ I am not planning to medically transition
☐ The concept of "transitioning" does not apply to me
☐ I am not sure whether I am going to medically transition

B44. If you started or completed a medical transition, how old were you when you began?

__________ years old

☐ Not applicable

B45. Why is changing your body important to you? (Please check all that apply)

☐ For my self-esteem
☐ For my mental well-being
☐ For my safety
☐ For employment reasons
☐ To be comfortable in my own body
☐ My work depends directly on my body presentation

- ☐ It’s <u>not</u> important to me
- ☐ Other (please specify): ________________________

E. Family Medicine

E1. Do you have a regular family doctor?

- ☐ Yes (skip to E2)
- ☐ Not at the present time

E1a. If no, have you ever tried to get a family doctor and not been able to?

- ☐ Yes (skip to E5)
- ☐ No (skip to E5)

E2. Does your *current* family doctor know about your trans identity or experience?

- ☐ Yes
- ☐ No
- ☐ I’m not sure

E3. How comfortable are you discussing your trans status and trans-specific health care needs with your family doctor? (Please check only ONE response)

- ☐ Very uncomfortable
- ☐ Uncomfortable
- ☐ Comfortable
- ☐ Very comfortable

E4. How knowledgeable is your family doctor about trans-specific health care needs? (Please check only ONE response)

- ☐ Not at all knowledgeable
- ☐ Somewhat knowledgeable
- ☐ Knowledgeable
- ☐ Very knowledgeable

E5. How comfortable would you be discussing your trans status and/or trans-related health care needs with a doctor you did not know? (Please check only ONE response)

- ☐ Very uncomfortable

☐ Uncomfortable
☐ Comfortable
☐ Very comfortable

E6. Do you use walk-in clinics as your primary source of health care?

☐ Yes
☐ No

E6a. If yes, how comfortable are you discussing your trans status and/or trans-related health care needs with a doctor at a walk in clinic? (Please check only ONE response)

☐ Very uncomfortable
☐ Uncomfortable
☐ Comfortable
☐ Very comfortable

E7. For each of the following, has a <u>family doctor</u> ever…? (Please check all that apply)

☐ Refused to see you or ended care because you were trans
☐ Used hurtful or insulting language about trans identity or experience
☐ Refused to discuss or address trans-related health concerns
☐ Told you that you were not really trans
☐ Discouraged you from exploring your gender
☐ Told you they don't know enough about trans-related care to provide it
☐ Belittled or ridiculed you for being trans
☐ Thought the gender listed on your ID or forms was a mistake
☐ Refused to examine parts of your body because you're trans
☐ None of the above
☐ Not applicable, I have never used this service

E8. Have you ever had to educate a <u>family doctor</u> regarding your needs as a trans person?

☐ Yes, provided a lot of education
☐ Yes, provided some education
☐ Yes, provided a little education
☐ No

E9. For each of the following, has a <u>walk in clinic doctor</u> ever…? (Please check all that apply)

☐ Refused to see you or ended care because you were trans
☐ Used hurtful or insulting language about trans identity or experience
☐ Refused to discuss or address trans-related health concerns
☐ Told you that you were not really trans
☐ Discouraged you from exploring your gender

☐ Told you they don't know enough about trans-related care to provide it
☐ Belittled or ridiculed you for being trans
☐ Thought the gender listed on your ID or forms was a mistake
☐ Refused to examine parts of your body because you're trans
☐ None of the above
☐ Not applicable, I have never used this service

E10. Have you ever had to educate a walk-in clinic doctor regarding your needs as a trans person?

☐ Yes, provided a lot of education
☐ Yes, provided some education
☐ Yes, provided a little education
☐ No

G. Trans-related Mental Health Care

G1. Have you ever used mental health services related to your trans identity or experience?

☐ Yes
☐ No (skip to Section H)

G2. Whom did you see or talk to? (Please check all that apply)

☐ Family doctor or general practitioner
☐ Psychiatrist
☐ Psychologist
☐ Nurse
☐ Social worker or counsellor
☐ Aboriginal Elder
☐ Religious or spiritual leader
☐ Support group
☐ Other, please specify: ____________________

G3. At what age did you first see a mental health care provider to discuss your trans identity or experience?

_____________ years old

G4. Thinking back to your <u>overall</u> experiences discussing your needs as a trans person with a mental health care provider, how satisfied were you with your experience?

☐ Very Satisfied
☐ Satisfied
☐ Neither Satisfied nor dissatisfied
☐ Dissatisfied
☐ Very dissatisfied

G5. Thinking back to your <u>most recent</u> experience discussing your needs as a trans person with a mental health care provider, how satisfied were you with your experience?

☐ Very Satisfied
☐ Satisfied
☐ Neither Satisfied nor dissatisfied
☐ Dissatisfied
☐ Very dissatisfied

G6. For each of the following, when you used mental health care services related to your trans identity, has a mental health care provider <u>ever</u>…? (Please check all that apply)

☐ Refused to see you or ended care because you were trans
☐ Used hurtful or insulting language about trans identity or experience
☐ Refused to discuss or address trans-related health concerns
☐ Told you that you were not really trans
☐ Discouraged you from exploring your gender
☐ Told you they don't know enough about trans-related care to provide it
☐ Belittled or ridiculed you for being trans
☐ Thought the gender listed on your ID or forms was a mistake
☐ None of the above

G7. When using mental health care services related to your trans identity, have you ever had to educate your <u>mental health</u> provider regarding your needs as a trans person?

☐ Yes, provided a lot of education
☐ Yes, provided some education
☐ Yes, provided a little education
☐ No

G8. In the past 12 months, have you used mental health care services related to your trans identity or experience?

☐ Yes
☐ No (<u>skip to Section H</u>)

G9. Whom did you see or talk to <u>in the past 12 months</u>? (Please check all that apply)

☐ Family doctor or general practitioner
☐ Psychiatrist
☐ Psychologist
☐ Nurse
☐ Social worker or counsellor
☐ Aboriginal Elder
☐ Religious or spiritual leader
☐ Support group
☐ Other, please specify: ____________________

I. HIV-Related Care

I1. Are you….?

☐ HIV Positive
☐ HIV Negative (<u>skip to Section J</u>)
☐ I don't know (<u>skip to Section J</u>)
☐ I would rather not say (<u>skip to Section J</u>)

J. Gender-Related Hormones

J1. What is your <u>primary</u> source of information regarding hormones?

☐ Family
☐ Friends
☐ Internet/Websites
☐ Trans community people and organizations
☐ Doctor (GP, Specialist)
☐ Medical Journals
☐ Other(s) – specify _________________________

J2. Do you feel you have enough information about hormones for gender transition or gender confirmation?

☐ Yes
☐ No
☐ Not sure
☐ I do not need information on hormones

J3. Do you have prescription drug coverage of any kind?

- ☐ Yes, through the province (Ontario Drug Benefits or Trillium Drug Program)
- ☐ Yes, through employer- or school-provided insurance
- ☐ Yes, through parent's insurance
- ☐ Yes, through private insurance I have purchased
- ☐ Yes, through having Aboriginal status
- ☐ Yes, through the military
- ☐ Yes, through the federal prison system
- ☐ No

J4. Whether or not you are now taking them, do you have prescription drug coverage <u>for hormones</u>?

- ☐ Yes
- ☐ No
- ☐ Not sure

J5. Have you <u>ever</u> tried to get a prescription for hormones and not been able to?

- ☐ Yes
- ☐ No
- ☐ I have never tried to get a prescription for hormones

J6. Have you <u>ever</u> taken hormones for trans-related reasons?

- ☐ Yes (<u>skip to J7)</u>
- ☐ No

J6a. If you have <u>never</u> taken hormones, which best describes your situation?

- ☐ Not planning on taking hormones
- ☐ Still deciding if taking hormones is right for me
- ☐ Can't find a doctor to prescribe hormones
- ☐ Other, please specify: ________________________________

If you have <u>never</u> taken hormones, skip to Section K

J7. In the following table, please specify whether you have ever taken any of the listed hormones, the year you started taking each type of hormone(s), and the total amount of time you have been on each hormone, excluding any breaks.

Column 1	**Column 2**	**Column 3**	**Column 4**
Hormones	**Have you ever taken the hormone(s) listed in Column 1?**	**If you check ‘yes’ for any hormone in Column 2, please state the year you *first* started taking the hormone(s)**	**If you check ‘yes’ for any hormone in Column 2, please state the total amount of time you’ve been on the hormone(s), excluding any breaks**
Progesterone	☐ Yes →	_______ year	_____ years _____ months
	☐ No		
Estrogen	☐ Yes →	_______ year	_____ years _____ months
	☐ No		
Testosterone blockers/ anti-androgens	☐ Yes →	_______ year	_____ years _____ months
	☐ No		
Testosterone	☐ Yes →	_______ year	_____ years _____ months
	☐ No		
Puberty blockers	☐ Yes →	_______ year	_____ years _____ months
	☐ No		

Other, please specify ____________________	☐ Yes → ☐ No	________ year	______ years ______ months

J8. From which source(s) have you <u>ever</u> received your hormones? (Please check all that apply)

☐ Family doctor or GP
☐ Specialist (e.g. endocrinologist)
☐ Internet pharmacy
☐ Friend or relative
☐ Street/strangers
☐ Herbals or supplements
☐ Veterinary sources
☐ Other(s) – specify ____________________________

J9. Do you <u>currently</u> take hormones?

☐ Yes, under medical supervision
☐ Yes, without medical supervision
☐ No (s<u>kip to Section K)</u>

J10. Which hormone(s) are you <u>currently</u> taking? (Please check all that apply)

☐ Progesterone
☐ Estrogen
☐ Anti-androgens / Testosterone blockers
☐ Testosterone
☐ Puberty blockers
☐ Other(s) – specify ________________________

J11. From which source(s) do you <u>currently</u> get your hormones? (Please check all that apply)

☐ Family doctor or GP
☐ Specialist (e.g. endocrinologist)
☐ Internet pharmacy
☐ Friend or relative
☐ Street/strangers
☐ Herbals or supplements
☐ Veterinary sources
☐ Other(s) – specify ___________________________

J12. Have you ever received blood tests to monitor the effect of hormones on your body?

☐ Yes, I receive regular blood tests
☐ Yes, but not regularly
☐ No
☐ I'm not sure whether blood tests were done

J13. Do you take hormones by injection?

☐ Yes
☐ No (<u>skip to Section K</u>)

J14. Where do you get your syringes or needles? (Check all that apply)

☐ Pharmacy
☐ Doctor's office
☐ Friends
☐ Needle exchange
☐ Street
☐ Other(s), please specify: ____________________________

J15. Have you ever been in a situation where you had to use a needle or syringe to inject your hormones that had been used before by someone else?

☐ Yes

- ☐ No
- ☐ Don't know

J16. Do you think you have enough knowledge about how to safely inject hormones?

- ☐ Yes
- ☐ No
- ☐ Don't know

K. Surgery and Body Modifications

K1. For each of the following procedures, please indicate which applies to you:

	Don't Want/Need	Considering	Want	Have Had	Year Had
Orchiectomy (removal of testicles)	☐	☐	☐	☐ →	_______
Vaginoplasty (SRS/GRS; making a vagina)	☐	☐	☐	☐ →	_______
Hysterectomy (removal of uterus)	☐	☐	☐	☐ →	_______
Oophorectomy (removal of ovaries)	☐	☐	☐	☐ →	_______
Metaoidioplasty (releasing the clitoris)	☐	☐	☐	☐ →	_______
Urethral lengthening	☐	☐	☐	☐ →	_______
Testicular Implants (creating testicles)	☐	☐	☐	☐ →	_______
Phalloplasty (making a penis)	☐	☐	☐	☐ →	_______
Breast Augmentation (making breasts bigger)	☐	☐	☐	☐ →	_______
Breast Reduction (making breasts smaller)	☐	☐	☐	☐ →	_______
Mastectomy or Chest Reconstruction ('top surgery')	☐	☐	☐	☐ →	_______
Facial Surgeries (feminization/masculinization)	☐	☐	☐	☐ →	_______
Vocal Chord Surgery (making voice higher)	☐	☐	☐	☐ →	_______
Facial Hair Removal (laser or electrolysis)	☐	☐	☐	☐ →	_______
Adams Apple Shave	☐	☐	☐	☐ →	_______
Hair Transplants	☐	☐	☐	☐ →	_______
Other – specify _______________	☐	☐	☐	☐	_______

K2. How much money have you spent out-of-pocket on hormones, silicone and any of the above procedures?

☐ None
☐ $1 to less than $1,000
☐ $1,000 to less than $2,500
☐ $2,500 to less than $5,000
☐ $5,000 to less than $10,000
☐ $10,000 to less than $20,000
☐ $20,000 to less than $50,000
☐ $50,000 to less than $100,000
☐ $100,000 or more

K3. Have you ever performed any of the above procedures <u>on yourself</u>?

☐ No
☐ Yes

K3a. If so, please tell us what you did:

____
____
____

K4. Have you <u>ever</u> injected silicone?

☐ Yes
☐ No (<u>skip to Section L</u>)

K5. In the <u>past 12 months</u>, how many times have you injected silicone?

☐ None
☐ 1
☐ 2
☐ 3
☐ 4
☐ 5
☐ More than 5 times

K6. Have you ever been in a situation where you had to use a needle or syringe to inject silicone that had been used before by someone else?

☐ Yes
☐ No
☐ Don't know

L. Making Money

L1. Do you currently have any of the following assets? (Please check all that apply)

- ☐ Retirement savings (RRSPs, RIFs, or pension from employer)
- ☐ GICs, stocks, or mutual funds outside of RRSPs
- ☐ Home you own
- ☐ Rental property (residential or commercial)
- ☐ Car that is owned outright
- ☐ Other assets: ________________________________
- ☐ None of the above

L2. Do you currently have any of the following debts? (Please check all that apply)

- ☐ Credit card debt
- ☐ Line of credit
- ☐ Mortgage
- ☐ Loan debt (e.g. car loan, medical loan, student loan)
- ☐ Other debt: _________________________________
- ☐ None of the above

L3. Has being trans affected your credit history?

- ☐ Yes, for the better
- ☐ Yes, for the worse
- ☐ No

L4. Which of the following describes your employment situation? (Check all that apply)

- ☐ Employed in a permanent full-time position (35 hours or more per week)
- ☐ Employed in a permanent part-time position (less than 35 hours per week)
- ☐ Employed on contract full-time (35 hours or more per week as a temporary or casual worker)
- ☐ Employed on contract part-time (less than 35 hours per week as a temporary or casual worker)
- ☐ Self-employed full-time (35 hours or more per week)
- ☐ Self-employed part-time (less than 35 hours per week)
- ☐ On leave from work
- ☐ Not employed (not a student, retired, or disabled)
- ☐ Student
- ☐ Retired
- ☐ Receiving disability (ODSP)
- ☐ Receiving Employment Insurance (EI)
- ☐ Receiving General Social Assistance (welfare or workfare)

L5. About how many hours a week do you usually work at your job or business? If you usually work extra hours, paid or unpaid, please include these hours.

_______ Hours

L6. How many jobs do you currently have?

_________ Jobs

L7. How long have you been in your <u>current</u> job (if you work multiple jobs, respond based on the longest job you <u>currently</u> have)?

____________ years _____________ months

L8. What type of paid work do you do right now (Check all that apply)?

☐ No paid work
☐ Accounting/Finance/Insurance/Banking
☐ Administrative/Clerical
☐ Aesthetics/Hair/Make-up
☐ Agriculture, Forestry, & Fishing
☐ Arts, Entertainment, and Media
☐ Automotive/Motor Vehicle
☐ Building Construction/Skilled Trades
☐ Business
☐ Computer Services/Hardware/Software
☐ Consulting Services
☐ Counselling
☐ Creative/Design
☐ Customer Support/Client Care
☐ Drug Trade
☐ Editorial/Writing
☐ Education/Training
☐ Electronics
☐ Engineering
☐ Escort work
☐ Food Services/Hospitality/Travel/Tourism
☐ Government and Policy
☐ Healthcare/medicine
☐ Legal services/law
☐ Manufacturing
☐ Military
☐ Nonprofit
☐ Personal Care and Service
☐ Printing/Editing/Writing
☐ Research/academia

- ☐ Retail/Sales
- ☐ Science/biotechnology
- ☐ Sex Work
- ☐ Sports and Recreation/Fitness
- ☐ Other: ____

L9. How satisfied are you with your job or main activity?

- ☐ Very satisfied
- ☐ Satisfied
- ☐ Neither satisfied nor dissatisfied
- ☐ Dissatisfied
- ☐ Very dissatisfied

L10. Right now, do you work in the field/job you would like to be working in?

- ☐ Yes (<u>skip to L11</u>)
- ☐ No

L10a. Why are you not working in the field/job you would like to be working in? (Please check all that apply)

- ☐ There are no jobs available in my field
- ☐ Do not have necessary education/training
- ☐ Education/training earned in another country is not recognized as equivalent in Canada
- ☐ Fear of discrimination for being trans
- ☐ Previous experiences of discrimination for being trans
- ☐ Employers do not accommodate my disability
- ☐ Disability
- ☐ Other, please specify: ___________________________

L10b. What is the <u>one</u> main reason why you are not working in the field/job you would like to be working in?

- ☐ There are no jobs available in my field
- ☐ Do not have necessary education/training
- ☐ Education/training earned in another country is not recognized as equivalent in Canada
- ☐ Fear of discrimination for being trans
- ☐ Previous experiences of discrimination for being trans
- ☐ Other forms of discrimination
- ☐ Employers do not accommodate my disability
- ☐ Other, please specify: ___________________________

L11. Have you ever done sex work or exchanged sex for money or other resources (e.g. shelter, drugs, food)?

☐ Yes
☐ No (skip to L12)

L11a. If yes, what were your reasons for doing so? (Please check all that apply)

☐ There were no other jobs or sources of income I could find
☐ It paid well
☐ It was necessary to pay for living expenses
☐ It was necessary to pay for transition-related expenses (e.g. surgery, hormones)
☐ To be part of a community
☐ To affirm my gender identity
☐ It made me feel attractive
☐ None of the above

L11b. How would you describe your experience with sex work?

☐ Entirely positive
☐ Mostly positive
☐ An equal mix of positive and negative
☐ Mostly negative
☐ Entirely negative

L12. When applying for a job, have you ever not provided references from a previous job because of your trans identity or experience?

☐ Yes
☐ No

L13. Have you ever declined a job offer due to a lack of a trans-positive work environment?

☐ Yes
☐ No

L14. Do you believe you've ever been turned down for a job because you are trans?

☐ Yes
☐ No
☐ Unsure

L15. If you medically and/or socially transitioned in the workplace, how often were your employers and coworkers accepting during this period of time?

- ☐ Always
- ☐ Very frequently
- ☐ Occasionally
- ☐ About half the time
- ☐ Rarely
- ☐ Very rarely
- ☐ Never

L16. Have you ever been fired, constructively dismissed, or laid off because of your trans identity or gender expression?

- ☐ Yes
- ☐ No
- ☐ Not sure

L17. Please <u>rank your monthly expenses</u> from most important to least important, <u>with 1 being the most important</u>.

Designate all items that are not expenses for you because don't have them or they are paid by someone else as not applicable (N/A).

_____ Rent or home payment
_____ Groceries
_____ Hormones
_____ Other prescription drugs
_____ Alcohol and/or recreational drugs
_____ Saving for surgery
_____ Transportation-related expenses
_____ Hair removal
_____ Saving money for education
_____ Paying off money borrowed for education (student loan)
_____ Paying off money borrowed for surgery or other gender-related medical care
_____ Paying off other debt
_____ Clothing
_____ Vacation
_____ Entertainment
_____ Providing for my children
_____ Sending money home to family
_____ Saving money for retirement
_____ Saving money for other purposes
_____ Legal expenses
_____ Counselling

M. Living and Eating

M1. Which of the following statements best describes the food eaten in your household in the past 12 months? (Choose ONE)

☐ 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
☐ Don't know

M2. Was that often true, sometimes true, or never true in the past 12 months?

☐ Often true
☐ Sometimes true
☐ Never true
☐ Don't know

M3. Which best describes your current housing situation?

☐ I own a house
☐ I rent a house
☐ I own an apartment or condo
☐ I rent an apartment or condo
☐ I live in housing on a Reserve
☐ I live on a Metis Settlement
☐ I live in an Inuit Hamlet
☐ I live in subsidized or public housing
☐ I live in a group home
☐ I live in a long-term care facility
☐ I live in a seniors home or retirement home
☐ I live with my parents or family
☐ I live in a boarding school
☐ I live in a student residence
☐ I live in a self-contained room in a motel or boarding house
☐ I live in a shelter(s)
☐ I couch-surf or stay at a friend's house
☐ I am squatting
☐ I live on the street
☐ I live in a rehabilitation facility
☐ I live in military housing
☐ I live in a prison
☐ Other – Specify ____

M4. In the past 5 years, how many different places have you lived?

_____________places

M5. How long have you been in your current dwelling?

____________ years ___________months

M6. Have you ever moved to a different city or town for your own safety because you were trans?

☐ Yes
☐ No

M7. Have you ever moved to a different city or town to be closer to trans-related services you needed?

☐ Yes
☐ No

M8. Have you ever been asked or told to leave your parent's or other guardian's house (where you were living) for being trans?

☐ Yes
☐ No
☐ I was not out as trans while living with parents/family

M9. Have you ever been asked or told to leave your home by your spouse or partner (who you were living with) for being trans?

☐ Yes
☐ No
☐ I have never been out as trans while living with a partner or spouse

M10. Has being trans affected your rental history?

☐ Yes, for the better
☐ Yes, for the worse
☐ No

M11. Considering your income, how difficult is it for you to meet your monthly housing-related costs? Housing costs include rent, mortgage, property taxes and utilities only.

☐ Very difficult

- ☐ Fairly difficult
- ☐ A little difficult
- ☐ Not difficult at all
- ☐ Don’t know
- ☐ Refused

M12. Have you ever lost housing or a housing opportunity due to your trans status or gender expression?

- ☐ Yes
- ☐ No
- ☐ Unsure

M13. Are you worried that you will lose your housing because of your trans status or gender expression?

- ☐ Yes
- ☐ No

M14. Have you ever accessed a shelter as a trans person?

- ☐ Yes
- ☐ No (<u>skip to M15</u>)

M14a. As a trans person, did you feel safe at the shelter?

- ☐ Yes
- ☐ No

M14b. At the shelter, did you experience hostility or verbal harassment because of your trans status or gender expression?

- ☐ Yes
- ☐ No

M14c. At the shelter, did you experience physical harassment or violence because of your trans status or gender expression?

- ☐ Yes
- ☐ No

M15. Have you ever been <u>refused</u> access to a shelter because of your trans status or gender expression?

- ☐ Yes
- ☐ No

M16. Have you avoided accessing a shelter due to transphobia?

☐ Yes
☐ No

These next few questions are about your history of homelessness. By homeless we mean that you don't have a fixed, regular, and adequate night-time residence or you stay in a shelter, welfare hotel, transitional program or any place not usually used for sleeping, such as streets, cars, movie theatres, abandoned buildings, etc. People living in jail are not considered homeless.

M17. Based on the above definition, have you <u>ever</u> been homeless while presenting in your felt gender?

☐ Yes
☐ No (<u>skip to M20</u>)

M18. Are you <u>currently</u> homeless?

☐ Yes
☐ No

M19. Thinking about your most recent or current episode of homelessness, where did you sleep or where are you sleeping?

☐ In a shelter
☐ Outside on the street
☐ In a motel or hotel
☐ Outside in parks
☐ With a friend or friends
☐ In a car
☐ With a family member
Other - Specify: ________________________________

M20. Have you <u>ever</u> spent any time in a jail, presenting as your felt gender?

☐ Yes, both federal and provincial
☐ Yes, federal
☐ Yes, provincial
☐ No (skip to Section N)

M20a. Were you in a jail appropriate to your felt gender?

☐ Yes
☐ No
☐ Some of the time

M20b. As a trans person, did you usually feel safe in jail?

☐ Yes
☐ No

M20c. In jail, did you experience hostility or verbal harassment in jail because of your trans status or gender expression?

☐ Yes
☐ No

M20d. In jail, did you experience physical harassment or violence because of your trans status or gender expression?

☐ Yes
☐ No

M21. In the past twelve months, have you spent any time in a jail?

☐ Yes, both federal and provincial
☐ Yes, federal
☐ Yes, provincial
☐ No

N. Your Life Experiences

Next are some questions about the support that is available to you.

N1. About how many close friends and close relatives do you have, that is, people you feel at ease with and can talk to about what is on your mind?

_______ Close friends

N2. How often is each of the following kinds of support available to you if you need it:	**None of the Time**	**A little of the time**	**Some of the time**	**Most of the time**	**All of the time**
Someone to help you if you were confined to bed?	☐	☐	☐	☐	☐
Someone you can count on to listen to you when you need to talk?	☐	☐	☐	☐	☐
Someone to give you advice about a crisis?	☐	☐	☐	☐	☐
Someone to take you to the doctor if you needed it?	☐	☐	☐	☐	☐
Someone who shows you love and affection?	☐	☐	☐	☐	☐
Someone to have a good time with?	☐	☐	☐	☐	☐
Someone to give you information in order to help you understand a situation?	☐	☐	☐	☐	☐
Someone to confide in or talk to about yourself or your problems?	☐	☐	☐	☐	☐
Someone who hugs you?	☐	☐	☐	☐	☐
Someone to get together with for relaxation?	☐	☐	☐	☐	☐
Someone to prepare your meals if you were unable to do it yourself?	☐	☐	☐	☐	☐
Someone whose advice you really want?	☐	☐	☐	☐	☐
Someone to do things with to help you get your mind off things?	☐	☐	☐	☐	☐
Someone to help with daily chores if you were sick?	☐	☐	☐	☐	☐
Someone to share your most private worries and fears with?	☐	☐	☐	☐	☐

Someone to turn to for suggestions about how to deal with a personal problem?	☐	☐	☐	☐	☐
Someone to do something enjoyable with?	☐	☐	☐	☐	☐
Someone who understands your problems?	☐	☐	☐	☐	☐
Someone to love you and make you feel wanted?	☐	☐	☐	☐	☐

N3. How often do people you encounter perceive you as a person of colour?

- ☐ Always
- ☐ Very frequently
- ☐ Occasionally
- ☐ About half the time
- ☐ Rarely
- ☐ Very Rarely
- ☐ Never

N4. For each of the following, please indicate how often you've had this experience.

	Never	Once or twice	Sometimes	Many times
1. As you were growing up, how often were made fun of or called names because of your race or ethnicity?	☐	☐	☐	☐
2. As you were growing up, how often were you hit or beaten up because of your race or ethnicity?	☐	☐	☐	☐
3. As an adult, how often were you made fun of or called names because of your race or ethnicity?	☐	☐	☐	☐
4. How often were you treated rudely or unfairly because of your race or ethnicity?	☐	☐	☐	☐
5. How often have you experienced some form of	☐	☐	☐	☐

police harassment because of your race or ethnicity?				
6. How often have you been turned down for a job because of your race or ethnicity?	☐	☐	☐	☐
7. How often have been uncomfortable in trans spaces because of your race or ethnicity?	☐	☐	☐	☐
8. How often have had difficulty finding lovers because of your race or ethnicity?	☐	☐	☐	☐
9. How often have you been objectified sexually because of your race or ethnicity?	☐	☐	☐	☐
10. In sexual relationships, how often do you find that partners pay more attention to your race or ethnicity than to who you are as a person?	☐	☐	☐	☐

N5. How accepting of ethno-racial diversity is the trans community?

☐ Completely accepting
☐ Mostly accepting
☐ Somewhat accepting
☐ Slightly accepting
☐ Not at all accepting

N6. How accepting of gender diversity is your ethno-racial community?

☐ Completely accepting
☐ Mostly accepting
☐ Somewhat accepting
☐ Slightly accepting
☐ Not at all accepting

N7. How often do people you encounter know you are trans without being told so?

- ☐ Always
- ☐ Very frequently
- ☐ Occasionally
- ☐ About half the time
- ☐ Rarely
- ☐ Very Rarely
- ☐ Never

N8. In general, do you *want* people to know you're trans without being told?

- ☐ Yes
- ☐ No
- ☐ Don't care

N9.

	Never	Once or Twice	Sometimes	Many times
How often have you been made fun of or called names for being trans?	☐	☐	☐	☐
How often have you been hit or beaten up for being trans?	☐	☐	☐	☐
How often have you heard that trans people are not normal?	☐	☐	☐	☐
How often have you been objectified or fetishized sexually because you're trans?	☐	☐	☐	☐
How often have you felt that being trans hurt or embarrassed your family?	☐	☐	☐	☐
How often have you had to try to pass as non-trans to be accepted?	☐	☐	☐	☐

How often do you suspect you have been turned down for a job because of your trans identity	☐	☐	☐	☐
How often have you had to move away from your family or friends because you’re trans?	☐	☐	☐	☐
How often have you experienced some form of police harassment for being trans?	☐	☐	☐	☐
How often do you worry about growing old alone?	☐	☐	☐	☐
How often do you fear you will die young?	☐	☐	☐	☐

If you have <u>not</u> begun a social transition or come out as your felt gender, please skip to N16.

N10. In general, how supportive of your gender identity or expression are the following people? (Please check one for each)

	Not at all supportive	Not very supportive	Somewhat supportive	Very supportive	Not applicable
My parent(s)	☐	☐	☐	☐	☐
My sibling(s)	☐	☐	☐	☐	☐
My spouse(s) or partner(s)	☐	☐	☐	☐	☐
My child(ren)	☐	☐	☐	☐	☐
My extended family	☐	☐	☐	☐	☐
My roommates	☐	☐	☐	☐	☐
My trans friends	☐	☐	☐	☐	☐
My non-trans friends	☐	☐	☐	☐	☐
My church/temple/mosque	☐	☐	☐	☐	☐
My cultural community	☐	☐	☐	☐	☐
My co-workers	☐	☐	☐	☐	☐
My employer	☐	☐	☐	☐	☐
My supervisor/boss	☐	☐	☐	☐	☐
My teachers	☐	☐	☐	☐	☐
My school	☐	☐	☐	☐	☐
My classmates	☐	☐	☐	☐	☐

N11. Since starting your transition and/or coming out as trans, has the number of people you would call ‘close friends’…?

☐ Increased a lot
☐ Increased somewhat
☐ Stayed about the same
☐ Decreased somewhat
☐ Decreased a lot

N12. Since transitioning or identifying as trans, has your quality of life: (please check only one)

☐ Gotten a lot better
☐ Gotten somewhat better
☐ Stayed the same
☐ Gotten somewhat worse
☐ Gotten a lot worse

N13. Have you ever experienced the following because you're trans or because of your gender expression?

- ☐ Silent harassment (e.g. being stared at, being whispered about)
- ☐ Verbal harassment
- ☐ Physical intimidation and threats
- ☐ Physical violence (e.g. being hit, kicked or punched)
- ☐ Sexual harassment (e.g. cat calling, being propositioned)
- ☐ Sexual assault (e.g. unwanted sexual touching or sexual activity)

N14. If you experienced physical violence and or sexual assaults, did you report the incident to the police?

- ☐ Yes
- ☐ No

N15. Have you ever avoided any of the following situations because of a fear of being harassed, being read as trans, or being outed? (please check all that apply)

- ☐ Public transit
- ☐ Grocery store or pharmacy
- ☐ Malls or clothing stores
- ☐ Schools
- ☐ Travelling abroad
- ☐ Clubs or social groups
- ☐ Gyms
- ☐ Church/synagogue/temple or other religious institution
- ☐ Public washrooms
- ☐ Public spaces (e.g. parks)
- ☐ Restaurants or bars
- ☐ Cultural or community centres
- ☐ None of the above

If you have begun or completed a transition or come out as your felt gender, skip to N21.

N16. If you have not transitioned or come out, how supportive of your gender identity or expression do you expect the following people will be? (Please check one for each)

	Not at all supportive	Not very supportive	Somewhat supportive	Very supportive	Not applicable
My parent(s)	☐	☐	☐	☐	☐
My sibling(s)	☐	☐	☐	☐	☐
My spouse(s) or partner(s)	☐	☐	☐	☐	☐
My child(ren)	☐	☐	☐	☐	☐

My extended family	☐	☐	☐	☐	☐
My roommates	☐	☐	☐	☐	☐
My trans friends	☐	☐	☐	☐	☐
My non-trans friends	☐	☐	☐	☐	☐
My church/temple/mosque	☐	☐	☐	☐	☐
My cultural community	☐	☐	☐	☐	☐
My co-workers	☐	☐	☐	☐	☐
My employer	☐	☐	☐	☐	☐
My supervisor/boss	☐	☐	☐	☐	☐
My teachers	☐	☐	☐	☐	☐
My school	☐	☐	☐	☐	☐
My classmates	☐	☐	☐	☐	☐

N17. After you begin your transition or come out as trans, do you expect the number of people you would call ‘close friends’ to…?

☐ Increase a lot
☐ Increase somewhat
☐ Stay about the same
☐ Decrease somewhat
☐ Decrease a lot

N18. After you begin your transition or come out as trans, do you expect your quality of life will

☐ Get a lot better
☐ Get somewhat better
☐ Stay the same
☐ Get somewhat worse
☐ Get a lot worse

N19. Do you expect that you will experience the following because you’re trans or because of your gender expression? (Check all that apply)

☐ Silent harassment (e.g. being stared at, being whispered about)
☐ Verbal harassment
☐ Physical intimidation and threats
☐ Physical violence (e.g. being hit, kicked or punched)
☐ Sexual harassment (e.g. cat calling, being propositioned)
☐ Sexual assault (e.g. unwanted sexual touching or sexual activity)

N20. Do you expect that you will avoid any of the following situations because of a fear of being harassed, being read as trans, or being outed? (please check all that apply)

☐ Public transit
☐ Grocery store or pharmacy

- ☐ Malls or clothing stores
- ☐ Schools
- ☐ Travelling abroad
- ☐ Clubs or social groups
- ☐ Gyms
- ☐ Church/synagogue/temple or other religious institution
- ☐ Public washrooms
- ☐ Public spaces (e.g. parks)
- ☐ Restaurants or bars
- ☐ Cultural or community centres
- ☐ None of the above

N21. Do you *personally* know of other trans people who have experienced the following because they're trans or because of their gender expression?

- ☐ Silent harassment (e.g. being stared at, being whispered about)
- ☐ Verbal harassment
- ☐ Physical intimidation and threats
- ☐ Physical violence (e.g. being hit, kicked or punched)
- ☐ Sexual harassment (e.g. cat calling, being propositioned)
- ☐ Sexual assault (e.g. unwanted sexual touching or sexual activity)
- ☐ Committed suicide
- ☐ Been killed

N22. How would you describe your sense of belonging to your local community?

- ☐ Very strong
- ☐ Somewhat strong
- ☐ Somewhat weak
- ☐ Very weak

N23. How important is having a strong 'trans community' to you?

- ☐ Very Important
- ☐ Somewhat Important
- ☐ Neutral
- ☐ Not too important
- ☐ Not Important at all

N24. Are you a member of any voluntary organizations or associations?

	Trans or LGBT Organization	Other organization	No
School groups	☐	☐	☐
Religious social groups	☐	☐	☐

Community centers	☐	☐	☐
Support groups	☐	☐	☐
Ethnic or cultural associations	☐	☐	☐
Social, civic or fraternal clubs	☐	☐	☐
Other groups	☐	☐	☐

N25. How often did you participate in meetings or activities of these groups in the past 12 months? (If you belong to many, just think of the ones in which you are most active)

☐ At least once a week
☐ At least once a month
☐ At least 3 or 4 times a year
☐ At least once a year
☐ Not at all

The following questions relate to the sensitive issues of childhood sexual, physical and emotional abuse. If you need to speak to someone immediately regarding your childhood experiences, please contact the Abuse Victim Hotline at 1-877-448-8678.

These next questions are about <u>experiences before age 16</u>. If you've had any such experiences, they may be difficult to discuss and we appreciate your willingness to answer these questions.

N26. <u>Before age 16</u>, did you ever experience something sexual that you did not want, that felt inappropriate, or was at any time perceived as hurtful? Unwanted sexual experiences could include such things as watching someone having sex, touching someone or having them touch you sexually, or some other type of sexual activity including oral, anal, or vaginal intercourse or mutual masturbation.

☐ Yes
☐ No (Skip to question N27)
☐ Don't know (Skip to question N27)
☐ I'd rather not answer (Skip to question N27)

N26a. In the above experience(s), what was the relationship of the person(s) to you?

____

N26b. How old were you the *first* time this happened?

____ years old

N27. <u>Before age 16</u>, were you ever pushed, grabbed, shoved, kicked, punched or physically attacked in some other way?

☐ Yes
☐ No (Skip to N28)
☐ Don't know (Skip to N28)
☐ Refused (Skip to N28)

N27a. In the above experience(s), what was the relationship of the person(s) to you?

____

N27b. How old were you the *first* time this happened to you?

____ years old

N28. <u>Before age 16</u>, were you shamed, belittled, humiliated, or emotionally manipulated?

☐ Yes
☐ No (Skip to Section O)
☐ Don't know (Skip to Section O)
☐ Refused (Skip to Section O)

N28a. In the above experience(s), what was the relationship of the person(s) to you?

____

N28b. How old were you the *first* time this happened to you?

____ years old

P. Sexual Activity and Sexual Health

In this section, we'd like to ask you questions about sex, specifically, who you're having sex with, what types of sex you're having, if any, and how you feel about your sex life and sexuality. We understand that these can be sensitive topics but we wanted to include these questions because sex and relationships can be important parts of our lives and can have a big impact on how we feel about ourselves.

We're asking you to please recall your sexual experiences over the last year and your lifetime. By "sex partners," please include everyone you've had sexual contact with, even once, including anal, oral, or genital sex.

P1. Over your lifetime, how many sex partners have you had?

_______________ people

☐ I have not yet had sex (skip to section Q)

P2. In your lifetime, who have your sex partners been? (Please check all that apply)

☐ Trans men
☐ Non-trans men
☐ Trans women
☐ Non-trans women
☐ Genderqueer persons
☐ Unknown
☐ Other ______________

P3. In the past 12 months, how many sex partners have you had?

_______________ people

☐ I have not had sex in the past 12 months (skip to P13)

P4. In the past 12 months, who have your partners been? (Please check all that apply)

☐ Trans men
☐ Non-trans men
☐ Trans women
☐ Non-trans women
☐ Genderqueer persons
☐ Unknown
☐ Other ______________

We all have different ways we talk about our bodies, and different words to refer to our tender parts. The following questions ask about your sexual experiences in the past 12 months. We will use this information responsibly. Whatever you're doing, we hope you're having a good time!

Since we cannot make assumptions about body parts, we won't. As a result, questions ask specifically about body parts, fluids and behaviours. If you are unwilling to share this information, please skip to question P11.

P5. In the past 12 months, have you received oral sex from anyone?

☐ Yes
☐ No (skip to P6)

P5a. In the past 12 months, while receiving oral sex, how often did your partner(s) get your sex fluids or menstrual blood in their mouth(s)?

☐ Every time
☐ Most times
☐ About half the time
☐ Less than half the time
☐ Never

P5b. Who was your partner(s) in this activity? (Please check all that apply)

☐ Spouse/long-term lover
☐ Regular sex partner
☐ One time or occasional sex partner
☐ Regular partner who I pay (cash, drugs, shelter) for sex
☐ Regular partner who pays me (cash, drugs, shelter) for sex
☐ One time or occasional partner who I pay (cash, drugs, shelter) for sex
☐ One time or occasional partner who pays me (cash, drugs, shelter) for sex

P6. In the past 12 months, have you given anyone oral sex?

☐ Yes
☐ No (Skip to P7)

P6a. In the past 12 months, while performing oral sex, how often did you get sex fluids or menstrual blood in your mouth?

- ☐ Every time
- ☐ Most times
- ☐ About half the time
- ☐ Less than half the time
- ☐ Never

P6b. Who was your partner(s) in this activity? (check all that apply)

- ☐ Spouse/long-term lover
- ☐ Regular sex partner
- ☐ One time or occasional sex partner
- ☐ Regular partner who I pay (cash, drugs, shelter) for sex
- ☐ Regular partner who pays me (cash, drugs, shelter) for sex
- ☐ One time or occasional partner who I pay (cash, drugs, shelter) for sex
- ☐ One time or occasional partner who pays me (cash, drugs, shelter) for sex

P7. In the past 12 months, have you been the receptive partner in anal sex?

- ☐ Yes
- ☐ No (<u>Skip to P8</u>)

P7a. Which of the following did your partner(s) use for penetration? (Check all that apply)

- ☐ Flesh genitals
- ☐ Silicone or latex
- ☐ Fingers or hands

P7b. In the past 12 months, while receiving anal sex, how often did your partner(s) ejaculate inside you (without a condom)?

- ☐ Every time
- ☐ Most times
- ☐ About half the time
- ☐ Less than half the time
- ☐ Never

P7c. Who was your partner(s) in this activity? (Check all that apply)

- ☐ Spouse/long-term lover
- ☐ Regular sex partner
- ☐ One time or occasional sex partner
- ☐ Regular partner who I pay (cash, drugs, shelter) for sex
- ☐ Regular partner who pays me (cash, drugs, shelter) for sex
- ☐ One time or occasional partner who I pay (cash, drugs, shelter) for sex

- ☐ One time or occasional partner who pays me (cash, drugs, shelter) for sex

P8. In the past 12 months, have you been the insertive partner in anal sex?

- ☐ Yes
- ☐ No (skip to P9)

P8a. Which of the following did you use for penetration? (check all that apply)

- ☐ Flesh genitals
- ☐ Silicone or latex
- ☐ Fingers or hands

P8b. In the past 12 months, as the insertive partner in anal sex, how often did you ejaculate inside your partner's ass (without a condom)?

- ☐ Every time
- ☐ Most times
- ☐ About half the time
- ☐ Less than half the time
- ☐ Never

P8c. Who was your partner(s) in this activity? (please check all that apply)

- ☐ Spouse/long-term lover
- ☐ Regular sex partner
- ☐ One time or occasional sex partner
- ☐ Regular partner who I pay (cash, drugs, shelter) for sex
- ☐ Regular partner who pays me (cash, drugs, shelter) for sex
- ☐ One time or occasional partner who I pay (cash, drugs, shelter) for sex
- ☐ One time or occasional partner who pays me (cash, drugs, shelter) for sex

P9. In the past 12 months, have you been the <u>receptive</u> partner in genital sex (i.e. vaginal or front hole sex)?

- ☐ Yes
- ☐ No (skip to P10)

P9a. Which of the following did your partner(s) use for penetration? (check all that apply)

- ☐ Flesh genitals
- ☐ Silicone or latex
- ☐ Fingers or hands

P9b. In the past 12 months, while being the receptive partner in genital sex, how often did your partner ejaculate inside you (without a condom)?

- ☐ Every time
- ☐ Most times
- ☐ About half the time
- ☐ Less than half the time
- ☐ Never

P9c. Who was your partner(s) in this activity? (please check all that apply)

- ☐ Spouse/long-term lover
- ☐ Regular sex partner
- ☐ One time or occasional sex partner
- ☐ Regular partner who I pay (cash, drugs, shelter) for sex
- ☐ Regular partner who pays me (cash, drugs, shelter) for sex
- ☐ One time or occasional partner who I pay (cash, drugs, shelter) for sex
- ☐ One time or occasional partner who pays me (cash, drugs, shelter) for sex

P10. In the past 12 months, have you been the <u>insertive</u> partner in genital sex (i.e. vaginal or front hole sex)?

- ☐ Yes
- ☐ No (<u>Skip to P11</u>)

P10a. Which of the following did you use for penetration? (please check all that apply)

- ☐ Flesh genitals
- ☐ Silicone or latex
- ☐ Fingers or hands

P10b. In the past 12 months, while being the insertive partner in genital sex, how often did you ejaculate inside your partner (without a condom)?

- ☐ Every time
- ☐ Most times
- ☐ About half the time
- ☐ Less than half the time
- ☐ Never

P10c. Who was your partner(s) in this activity? (please check all that apply)

- ☐ Spouse/long-term lover

- ☐ Regular sex partner
- ☐ One time or occasional sex partner
- ☐ Regular partner who I pay (cash, drugs, shelter) for sex
- ☐ Regular partner who pays me (cash, drugs, shelter) for sex
- ☐ One time or occasional partner who I pay (cash, drugs, shelter) for sex
- ☐ One time or occasional partner who pays me (cash, drugs, shelter) for sex

P11. In the past 12 months, have you ever had sex while drunk or high?

- ☐ Yes
- ☐ No

P12. Do you have a spouse or long term sexual partner?

- ☐ Yes
- ☐ No (Skip to P13)

P12a. How often do you and your spouse or long-term sexual partner use condoms or other protective barriers (dental dam, latex glove, plastic wrap) during sex that involves sex fluids? Check ONE only:

- ☐ Always
- ☐ Most of the time
- ☐ Sometimes
- ☐ Rarely
- ☐ Never

P12b. Has your spouse or long-term sex partner been tested for HIV since their last risk activity?

- ☐ Yes
- ☐ No
- ☐ I'm not sure

P12c. If your spouse or long-term sex partner has been tested for HIV, they are:

- ☐ The same HIV status I am
- ☐ A different HIV status than I am
- ☐ I don't know as I don't know what the results of their test were
- ☐ I don't know as I haven't been tested
- ☐ I don't want to say
- ☐ Not applicable

P12d. Has your spouse or long-term sex partner been tested for other sexually transmitted infections (such as gonorrhea and chlamydia) since their last risk activity?

- ☐ Yes
- ☐ No
- ☐ I’m not sure

P13. When you think about using protection with a partner (for example, a condom, dental dam, glove, or plastic wrap), how certain are you that you could use protection in the following scenarios? A '7' means that you're absolutely certain you could do what the question asks; a '1' means you're absolutely certain that you couldn't do what the question asks.

	Not at all Certain 1	**2**	**3**	**4**	**5**	**6**	**Absolutely Certain 7**
I can ask a new partner to use a protective barrier	☐	☐	☐	☐	☐	☐	☐
I can ask a partner I haven't been using protective barriers with to start using them	☐	☐	☐	☐	☐	☐	☐
I can refuse sex when I don't have a protective barrier available	☐	☐	☐	☐	☐	☐	☐
I can get a partner to use a protective barrier, even if I'm drunk or high	☐	☐	☐	☐	☐	☐	☐
I can get a partner to use a protective barrier, even if they don't want to.	☐	☐	☐	☐	☐	☐	☐
I can ask a partner who truly sees me as the gender I know myself to be to use a protective barrier	☐	☐	☐	☐	☐	☐	☐
I can ask a non-trans partner to use a protective barrier	☐	☐	☐	☐	☐	☐	☐
I can ask a trans partner to use a protective barrier	☐	☐	☐	☐	☐	☐	☐

P14. Please read each item and decide to what extent it is characteristic of you. Give each item a rating of how much it applies to you by using the following scale:

	Not at all	Slightly	Somewhat	Moderately	Very
I feel anxious when I think about the sexual aspects of my life	☐	☐	☐	☐	☐
I worry about the sexual aspects of my life	☐	☐	☐	☐	☐
Thinking about the sexual aspects of my life often leaves me with an uneasy feeling	☐	☐	☐	☐	☐
I am satisfied with the status of my own sexual fulfillment	☐	☐	☐	☐	☐
The sexual aspects of my life are personally gratifying to me	☐	☐	☐	☐	☐
The sexual aspects of my life are satisfactory, compared to most people's	☐	☐	☐	☐	☐
I am satisfied with the sexual aspects of my life.	☐	☐	☐	☐	☐
I am satisfied with the way my sexual needs are currently being met.	☐	☐	☐	☐	☐
I am afraid of becoming sexually involved with another person	☐	☐	☐	☐	☐
I have a fear of sexual relationships	☐	☐	☐	☐	☐
I am fearful of engaging in sexual activity	☐	☐	☐	☐	☐
I don't have much fear about engaging in sex. (R)	☐	☐	☐	☐	☐

P15. When I think about having sex, I worry…

	Not at all	Slightly	Somewhat	Moderately	Very
That other people think my body is unattractive	☐	☐	☐	☐	☐
That there are very few people who would want to have sex with me	☐	☐	☐	☐	☐
About my physical safety	☐	☐	☐	☐	☐
About feeling ashamed about my body	☐	☐	☐	☐	☐
That once I'm naked, people will not see me as the gender I am	☐	☐	☐	☐	☐
That people only want to have sex with me because I'm trans	☐	☐	☐	☐	☐
That I can't have the sex I want until I have a(nother) surgery	☐	☐	☐	☐	☐

P16. If you have transitioned or come out as trans, has the quality of your sex life changed?

☐ Yes, for the better
☐ Yes, for the worse
☐ No, it has not changed
☐ Not applicable

Q. Emotional Well-being

Q1. In general, would you say your mental health is…?

- ☐ Excellent
- ☐ Very good
- ☐ Good
- ☐ Fair
- ☐ Poor
- ☐ I don't know

Q2. How satisfied are you with your life in general?

- ☐ Very satisfied
- ☐ Satisfied
- ☐ Neither satisfied nor dissatisfied
- ☐ Dissatisfied
- ☐ Very dissatisfied
- ☐ I don't know

Q3. Thinking about the amount of stress in your life, would you say that most days are…?

- ☐ Not at all stressful
- ☐ Not very stressful
- ☐ A bit stressful
- ☐ Quite a bit stressful
- ☐ Extremely stressful
- ☐ I don't know

Q4. Have you ever been diagnosed with any of the following:

- ☐ Anxiety disorders (e.g. panic attacks, post-traumatic stress disorder)
- ☐ Schizophrenia
- ☐ Bipolar disorder
- ☐ Major depression
- ☐ Dissociative identity disorders (multiple personality disorder)
- ☐ Borderline personality disorder
- ☐ Other major mental health disorder. Specify: ____________________________
- ☐ None of the above

Q5. Have you ever been diagnosed with any of the following:

☐ Anorexia nervosa
☐ Bulimia nervosa
☐ Exercise bulimia
☐ Binge eating disorder
☐ None of the above

Q6. Below is a list of the ways you might have felt or behaved. Please tell us how often you have felt this way <u>during the past week</u>. (CES-D)

	During the past week			
	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)
1. I was bothered by things that usually don't bother me.	☐	☐	☐	☐
2. I did not feel like eating; my appetite was poor.	☐	☐	☐	☐
3. I felt that I could not shake off the blues even with help from my family or friends.	☐	☐	☐	☐
4. I felt I was just as good as other people.	☐	☐	☐	☐
5. I had trouble keeping my mind on what I was doing.	☐	☐	☐	☐
6. I felt depressed.	☐	☐	☐	☐
7. I felt that everything I did was an effort.	☐	☐	☐	☐
8. I felt hopeful about the future.	☐	☐	☐	☐
9. I thought my life had been a failure.	☐	☐	☐	☐
10. I felt fearful.	☐	☐	☐	☐
11. My sleep was restless.	☐	☐	☐	☐
12. I was happy.	☐	☐	☐	☐
13. I talked less than usual.	☐	☐	☐	☐
14. I felt lonely.	☐	☐	☐	☐
15. People were unfriendly.	☐	☐	☐	☐
16. I enjoyed life.	☐	☐	☐	☐
17. I had crying spells.	☐	☐	☐	☐
18. I felt sad.	☐	☐	☐	☐
19. I felt that people dislike me.	☐	☐	☐	☐
20. I could not get "going."	☐	☐	☐	☐

Q7. How much do you agree with the following statements?

	Strongly Agree	Agree	Dis-Agree	Strongly Disagree
On the whole, I am satisfied with myself.	☐	☐	☐	☐
At times, I think I am no good at all.	☐	☐	☐	☐
I feel that I have a number of good qualities.	☐	☐	☐	☐
I am able to do things as well as most other people.	☐	☐	☐	☐
I feel I do not have much to be proud of.	☐	☐	☐	☐
I certainly feel useless at times.	☐	☐	☐	☐
I’m a person of worth, at least on an equal plane with others.	☐	☐	☐	☐
I wish I could have more respect for myself.	☐	☐	☐	☐
All in all, I am inclined to feel that I am a failure.	☐	☐	☐	☐
I take a positive attitude toward myself.	☐	☐	☐	☐

The following questions relate to the sensitive issue of suicide. If you need to speak to someone immediately regarding suicide, please contact the province-wide suicide line at 1-800-784-2433.

Q8. Have you ever seriously <u>considered</u> committing suicide or taking your own life?

☐ Yes
☐ No (<u>skip to Section R</u>)

Q8a. If yes, was this related to your being trans?

☐ Yes
☐ No

Q8b. If yes, has this happened in the past 12 months?

☐ Yes
☐ No

Q9. Have you ever <u>attempted</u> to commit suicide or tried taking your own life?

☐ Yes
☐ No (<u>skip to Section R</u>)

Q9a. If yes, did this happen in the past 12 months?

☐ Yes
☐ No

Q9b. Did you see or talk to a health professional following your attempt to commit suicide?

☐ Yes
☐ No

Q9c. How old were you when you first attempted suicide or tried taking your own life?

________ years old

<u>R. Cigarettes, Drugs and Alcohol</u>

R1. In your lifetime, have you smoked a total of 100 or more cigarettes (about 4 packs)?

☐ Yes
☐ No (skip to R5)

R2. At the present time, do you smoke cigarettes daily, occasionally or not at all?

☐ Daily
☐ Occasionally
☐ Not at all

R3. Over your life, how long have you smoked in total?
___________ years _________ months

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 1 ½ ounces of liquor.

R4. During the past 12 months, have you had a drink of beer, wine, liquor or any other alcoholic beverage?

☐ Yes
☐ No (skip to R12)

R5. During the past 12 months, how often did you drink alcoholic beverages?

☐ Never
☐ Less than once a month
☐ Once a month
☐ 2 to 3 times a month
☐ Once a week
☐ 2 to 3 times a week
☐ 4 to 6 times a week
☐ Every day

R6. How often in the past 12 months have you had 5 or more drinks on one occasion?

☐ Never
☐ Less than once a month
☐ Once a month
☐ 2 to 3 times a month
☐ Once a week
☐ More than once a week

R7. Have you ever felt you should cut down on your drinking?

☐ Yes
☐ No

R8. Have people annoyed you by criticizing your drinking?

☐ Yes
☐ No

R9. Have you ever felt bad or guilty about your drinking?

☐ Yes
☐ No

R10. Have you ever had a drink first thing in the morning to steady your nerves or get rid of a hangover?

☐ Yes
☐ No

R11. Is your current drinking a problem for you?

☐ Yes
☐ Sometimes
☐ No

R12. In the past 12 months, which of the following have you used? (Please check all that apply)

☐ Marijuana or hashish
☐ Poppers or nitrites, including ampules
☐ Crack
☐ Cocaine
☐ Crystal meth
☐ Other amphetamine
☐ PCP (angel dust)
☐ Special K
☐ GHB (G)
☐ LSD (acid)
☐ Opium
☐ Heroin
☐ Ecstasy
☐ Prescription narcotics, other than for medical use (Percocet, Oxycontin)
☐ Other, please specify: ________________________
☐ None of the above (skip to Section S)

R13. Is your current drug use a problem for you?

☐ Yes
☐ Sometimes
☐ No

R14. Overall, has this experience of using drugs been:

- ☐ Completely positive
- ☐ Mostly positive
- ☐ Equally positive and negative
- ☐ Mostly negative
- ☐ Completely negative
- ☐ None of the above. It's neither positive nor negative

R15. In the past 12 months, have you ever injected drugs for reasons other than medical use?

- ☐ Yes
- ☐ No

R16. If yes, in the past 12 months, have you ever been in a situation where you had to use needles or drug-using equipment that someone had used before?

- ☐ Yes
- ☐ No

S. General Health Concerns

Research on trans people has rarely been concerned with our general health. We'd like to ask you some questions about your health overall, to help us better understand our communities' health issues.

S1. To start, in general, would you say your health is…?

- ☐ Excellent
- ☐ Very good
- ☐ Good
- ☐ Fair
- ☐ Poor
- ☐ Don't know

S2. Compared to one year ago, how would you say your health is now?

- ☐ Much better now
- ☐ Somewhat better now
- ☐ About the same
- ☐ Somewhat worse now
- ☐ Much worse now
- ☐ Don't know

S3. Are you usually pain-free or physically comfortable?

☐ Yes (Skip to S6)
☐ No
☐ Don’t know

S4. How would you describe the usual intensity of your pain or discomfort?

☐ Mild
☐ Moderate
☐ Severe
☐ Don’t know

S5. How many activities does your pain or discomfort prevent?

☐ None
☐ A few
☐ Some
☐ Most
☐ Don’t know

S6. Have you been diagnosed with the following health conditions? If yes, please include the year of diagnosis.

	Yes	**Year of diagnosis:**
Allergies	☐	_______
Asthma	☐	_______
Breast cancer	☐	_______
Cervical cancer	☐	_______
Chronic fatigue syndrome	☐	_______
Diabetes	☐	_______
Elevated liver enzymes	☐	_______
Elevated prolactin levels	☐	_______
Endometrial cancer	☐	_______
Endometrial hyperplasia	☐	_______
Fibromyalgia	☐	
Gall stones	☐	_______
Heart attack	☐	_______
High blood pressure	☐	_______
High cholesterol	☐	_______
Pulmonary embolism (blood clot in the lung)	☐	_______
Osteoporosis	☐	_______
Ovarian cancer	☐	_______

Penile cancer	☐	_______
Polycystic ovary syndrome	☐	_______
Prostate cancer	☐	_______
Sleep apnea (stopped breathing during sleep)	☐	_______
Stroke	☐	_______
Testicular cancer	☐	_______
Thyroid condition	☐	_______
Uterine cancer	☐	_______
Vaginal cancer	☐	_______
Venous thrombosis (blood clot in the leg)	☐	_______

APPENDIX D: Appendix to Chapter 3

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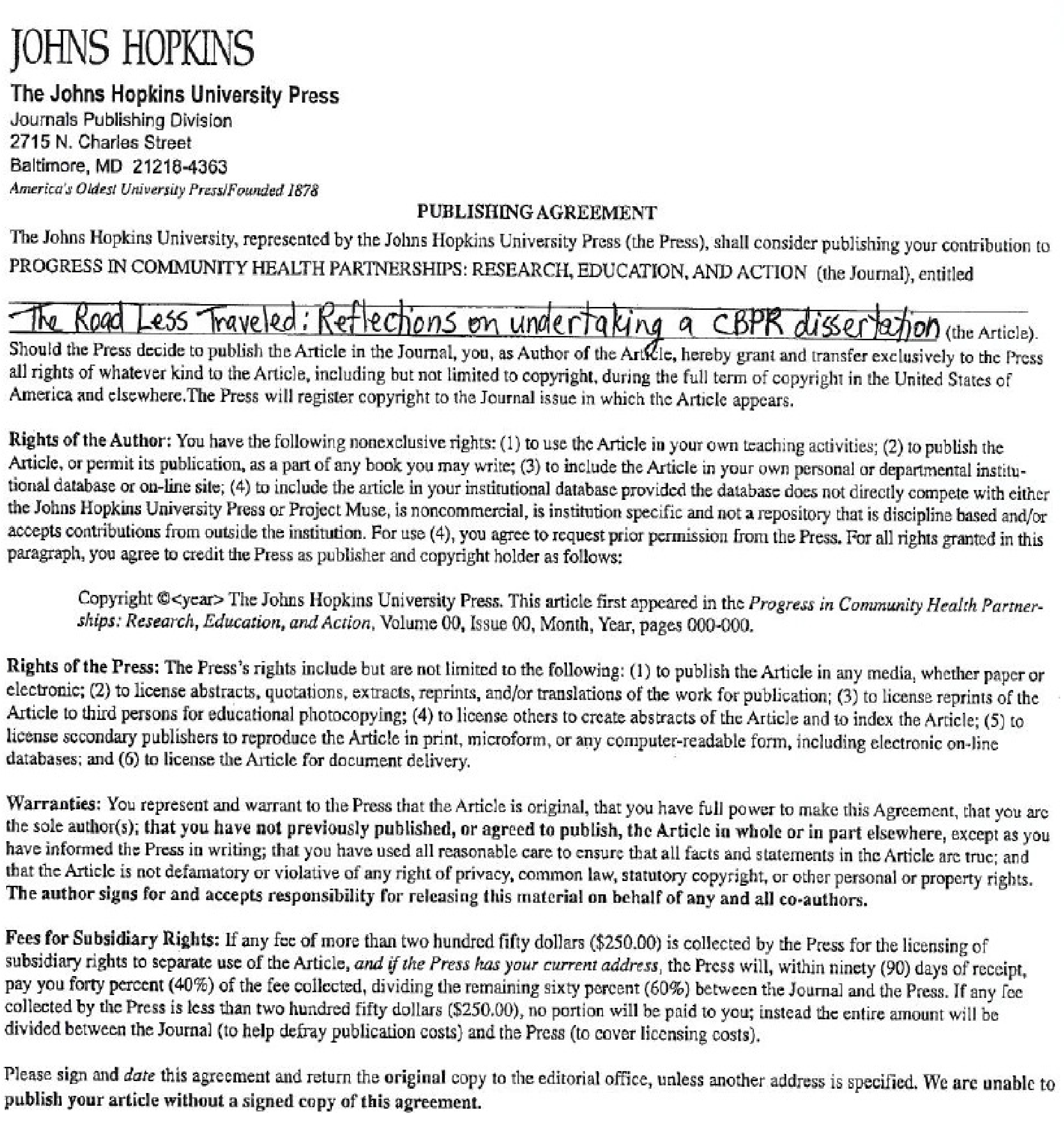

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D.2 Terms of Reference for Nooshin Khobzi

Decision-making

Decisions regarding project development (i.e. variable selection, topic selection) will be made in collaboration with the Investigators Committee (IC). Meetings will be held with a sub-committee of Trans PULSE who will serve as community mentors; these members will also be involved with data interpretation to ensure that results are framed in an acceptable manner. Final products, such as papers, presentations and reports will be provided to the IC for approval prior to submission or distribution. However, my thesis will be provided to the IC only for feedback and endorsement. As my supervisor, Greta Bauer is responsible in ensuring that my project is conducted ethically and responsibly, without harm or further stigmatization of the trans community. Greta Bauer will serve as my Primary Liaison to the IC.

KTE strategy commitments

I commit to making available my thesis findings in plain language formats relevant to community members, policy makers and other stakeholders. Short summary articles and stand-alone graphs will be available for use in organizational newsletters and websites and for incorporation into presentations, Fact Sheets and Resource Sheets. Manuscripts will be submitted to journals selected for their appropriateness to the policy-driven and capacity-building aims of this project. Open-source publication will be prioritized because it allows the authors to retain copyrights and to freely post findings on the Trans PULSE website. Recommendations provided by the Community Engagement Team (CET) regarding Knowledge Transfer and Exchange strategies will also be considered and implemented if appropriate.

Authorship and acknowledgement

The entire Trans PULSE Team will be credited in acknowledgements; funding agencies for the Trans PULSE Project will also be credited, along with any funders of my thesis. I will take primary responsibility in analyzing data and writing manuscripts as required for my thesis (i.e. I will be listed as first author). Greta Bauer will be listed as second author on all publications pertaining to my thesis. Reports will list all Trans PULSE members as authors; however, authorship for articles to be published in peer-reviewed journals (or for my thesis) will be based on extent of contribution, such as conceptualization and writing. From time to time (or when necessary), writing teams will be established for particular manuscripts, and team members will be given specific writing tasks. Teams will most likely be built with members from the sub-committee who would have been involved with the development of my project from the beginning.

Supervisory committee

The main role of my supervisory committee is to provide advice and guidance on the successful completion of my thesis. They are responsible for reviewing final products (i.e. thesis proposal, thesis) before submission for defence. More specifically, the supervisory committee provides advice regarding the use of sound epidemiological methods and their application to my project. The committee consists of Greta Bauer (Primary Supervisor); Sarah Flicker, professor at York University with experience in community-based research; and Neil Klar, professor of biostatistics at UWO.

APPENDIX E: Appendix to Chapter 4

E.1 Tests for interaction effects

In order to assess whether relationships were significantly different for MTFs and FTMs, tests for interaction effects were conducted for all trans-related variables by gender spectrum. Interactions that were statistically significant (p-value<0.05), or that were marginally significant ($p<0.10$) with large effect size, were considered important. A variety of methods were used to ensure the validity of tests for heterogeneity of effects:

1. Two-way interactions were examined in weighted logistic regression models only with their main effects. Gender spectrum was found to significantly modify the relationships between depression and current hormone use ($p=0.0011$), not planning to transition/concept does not apply ($p=0.0353$), and never had surgery ($p=0.0754$, OR=0.35).
2. Backward elimination was used on data from the entire sample (n=399) in order to limit the number of general population risk factors in the model. Retained variables (gender spectrum (forced in the model), education, employment, community involvement, childhood abuse, having major mental health conditions, social support, sexual satisfaction, and area of residence) were included in weighted multiple logistic regression models along with all trans-related variables. Interactions between gender spectrum and each trans-related variable were tested separately (i.e. one at a time) in the full model. Gender spectrum was found to significantly modify the relationships between depression and rarely or never pass ($p=0.0184$), sometimes/often pass ($p=0.0085$), living full-time in felt gender for ≤ 3 years ($p=0.0502$, OR=5.04), and current hormone use ($p=0.0609$, OR=0.28).
3. A global test of interaction ('Chunk test' by Kleinbaum and Klein[1]) was used to determine whether the observed interactions were strong enough to remain statistically significant even when considered en bloc. All two-way interactions were entered into the full weighted logistic model; the Chunk test was found to be significant (Wald $\chi^2=23.11$, degrees of freedom=13, $p=0.0404$).
4. Step 2 was repeated with adjustments for shared recruiter and recruitment tree clusters. Gender spectrum was found to significantly modify the relationships

between depression and rarely or never pass (p=0.0605, OR=0.16), and sometimes/often pass (p=0.0230).

5. Step 3 was repeated with adjustments for shared recruiter and recruitment tree clusters. The global test was not significant (Wald χ^2=13.55, degrees of freedom=13, p=0.4064).

Given the existence of several significant interaction effects in the above steps, the full model was tested separately among MTFs and FTMs. We found evidence of qualitative interaction by gender spectrum for the following: rarely or never pass, sometimes/often pass, living full-time in felt gender for ≤ 3 years, living in felt gender part-time or not at all, current hormone use, in the process of medically transitioning, not sure whether or not to medically transition, and recent surgery. Therefore, the decision was made to conduct all subsequent analyses separately for MTFs and FTMs; more specifically, subgroup (domain) analyses by gender spectrum were carried out using surveylogistic procedures in SAS version 9.2.

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[1] Kleinbaum DG, Klein M. Logistic regression: A self-learning text. 2nd ed. New York, NY: Springer; 2002.

E.2 Unweighted multiple logistic regression models

Table E.1 Multiple logistic regression models for depression regressed onto general population and trans-related risk factors

	Male-to-Females OR (95% CI)[a] (n=191)	**Female-to-Males OR (95% CI)[a] (n=207)**
Age (y)	0.96 (0.93, 0.99)**	0.99 (0.94, 1.04)
Employment status		
Full-time	1.00	--
Unemployed	3.48 (1.04, 11.67)*	--
Other	1.24 (0.54, 2.86)	--
Community involvement		
Moderate to high involvement	1.00	--
Little or no involvement	0.42 (0.19, 0.94)*	--
Childhood abuse		
Any abuse	2.50 (0.83, 7.56)	1.88 (0.73, 4.82)
No abuse	1.00	1.00
Don’t know/rather not answer	1.36 (0.17, 10.64)	0.63 (0.13, 3.16)
Social support	0.50 (0.31, 0.80)**	0.48 (0.30, 0.78)**
Area of residence		
MT	1.00	--
Outside MT	2.49 (1.04, 5.95)*	--
Passing		
Rarely or never	0.51 (0.19, 1.40)	1.74 (0.65, 4.66)
Half the time/often	0.41 (0.15, 1.14)	1.93 (0.80, 4.62)
(Almost) always	1.00	1.00
Transphobia	1.10 (1.02, 1.18)**	1.10 (1.02, 1.19)*
Perceived identity support	0.47 (0.20, 1.10)	1.10 (0.49, 2.50)
Current hormone use		
Yes	1.00	--
No	0.70 (0.19, 2.55)	--
Sexual satisfaction	--	0.65 (0.48, 0.87)**

	Male-to-Female OR (95% CI)[a]	**Female-to-Male OR (95% CI)**[a]
Stage of medical transition		
Medically transitioned	1.00	1.00
In the process	2.27 (0.89, 5.79)	0.75 (0.29, 1.96)
Planning, but not begun	11.03 (1.74, 69.82)*	4.72 (1.23, 18.15)*
Not planning/concept does not apply	0.86 (0.13, 5.50)	0.77 (0.14, 4.17)
Not sure	3.62 (0.59, 22.21)	0.85 (0.18, 3.91)
Education		
High school or less	--	1.05 (0.34, 3.27)
Some college or university	--	1.24 (0.49, 3.18)
Postsecondary graduate	--	1.00
Living in felt gender		
Full-time ≤ 3 yrs	--	0.77 (0.31, 1.90)
Full-time > 3 yrs	--	1.00
Part-time or not at all	--	2.55 (0.74, 8.73)
Major mental health issues		
Yes	--	3.30 (1.57, 6.97)**
No	--	1.00

Note. OR, odds ratio; CI, confidence interval; y, years; MT, Metropolitan Toronto.

[a] Standard errors were *not* adjusted for recruitment tree and shared recruiter clusters.

**p*<.05; ** *p*<.01

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