

**HEALTH DISPARITIES ASSOCIATED WITH DISORDERED EATING AND
ANOREXIA NERVOSA IN TRANSGENDER AND GENDER-DIVERSE INDIVIDUALS**

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Abstract

Introduction: Transgender and gender-diverse (TGD) individuals are people whose gender identity does not align with their sex assigned at birth. These individuals are at increased risk for eating disorders (EDs) such as anorexia nervosa (AN). Engaging in these behaviors may impact epigenetic regulation of genes and long-term metabolic health outcomes.

Data and Methods: The 2021 Behavioral Risk Factor Surveillance Survey (BRFSS) data was downloaded from https://www.cdc.gov/brfss/annual_data/annual_2021.html. Stata/SE 17.0 was used for all data analysis. A sample of survey variables was used to address research questions about TGD individuals' health-related experiences.

Results: For the 2021 BRFSS data, 97.9% (n=240,516) of the sample identified themselves as cisgender while 0.6% (n=1,513) identified themselves as TGD. 24.6% of TGD respondents reported having worse general health, compared to 16.8% of cisgender respondents. 65.2% of the TGD respondents reported experiencing poor health days in the past 30 days, compared to 45.3% of cisgender respondents. Cisgender respondents were more likely than TGD respondents to have a diagnosed health condition (19.5% vs. 15.4%). Compared to TGD respondents, cisgender respondents were more likely to have had a checkup in the last year (77.9% vs. 62.6%), less likely to have experienced a cost barrier to seeking healthcare (10.9% vs. 23.4%), more likely to have a primary source of insurance (94.6% vs. 91.6%), and more likely to have a primary health care

provider (PHCP; 89.1% vs. 83.3). TGD respondents were less likely than cisgender respondents to report daily fruit (51.8% vs. 58.9%) and vegetable (74.6% vs. 90.8%) consumption.

Conclusion: The number of TGD individuals in the BRFSS sample was low, but the proportion was greater than the estimated proportion of TGD adults living in the U.S. The results indicate that TGD individuals may have worse general health, more poor health days, fewer diagnosed health conditions, more barriers to care, and a lower tendency to eat fruits and vegetables. The BRFSS did not assess disordered eating, but ED/DEB presence may exacerbate health inequities. The public health relevance of this project is the evidence of disproportionate health burdens in the TGD population, as it pertains to ED/DEBs and long-term health outcomes.

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List of Acronyms

ADHD – attention deficit hyperactivity disorder

AN – anorexia nervosa

ASD – autism spectrum disorder

BRFSS – Behavioral Risk Factor Surveillance Survey

COPD – chronic obstructive pulmonary disease

DEB – disordered eating behaviors

DSM-5 – The Diagnostic Statistical Manual of Mental Disorders – Fifth Edition

ED – eating disorder

FEDUP – Fighting Eating Disorders in Underserved Populations

FHA - functional hypothalamic amenorrhea

GI – gastrointestinal

GM – gender minority

IGF-1 - insulin growth factor 1

IRB – institutional review board

PHCP – personal health care provider

POTS - positional orthostatic tachycardia syndrome

SEM – social ecological model

SGM – sexual and gender minority

SI – suicidal ideation

SIB – self-injurious behavior

SM – sexual minority

TGD – transgender and gender diverse

WBC – white blood cell

Preface

I would like to express my sincerest gratitude to my essay advisor, Oliver Tripp, for their invaluable guidance on recruitment strategies and resources in the LGBTQ+ eating disorder field. I greatly appreciate their willingness to contribute to this project while completing their own PhD coursework, a feat I deeply admire.

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1.0 Introduction

Transgender and gender-diverse (TGD) individuals, defined as those whose gender identity does not align with their sex assigned at birth (i.e., non-cisgender individuals), are at increased risk for eating disorders (EDs) such as anorexia nervosa (AN).¹⁻¹¹ This increased risk is in part due to the self-management of secondary sex characteristic development during adolescence^{1-4,6} and the experience of body dissatisfaction and gender incongruence throughout life.¹⁻¹¹ Engaging in these behaviors over time may impact epigenetic regulation of genes and long-term metabolic health outcomes.^{12,13} The *Diagnostic Statistical Manual of Mental Disorders – Fifth Edition (DSM-5)* defines AN diagnostic criterion as:

- A. Restriction of energy intake relative to requirements, leading to a significantly low body weight in the context of age, sex, developmental trajectory, and physical health. Significantly low weight is defined as a weight that is less than minimally normal or, for children and adolescents, less than that minimally expected.
- B. Intense fear of gaining weight or of becoming fat, or persistent behavior that interferes with weight gain, even though at a significantly low weight.
- C. Disturbance in the way in which one's body weight or shape is experienced, undue influence of body weight or shape on self-evaluation, or persistent lack of recognition of the seriousness of the current low body weight.¹⁴

AN carries a death toll approximately 5-16 times higher than that of the general population, the second highest of all DSM-5 conditions.¹⁵ Transgender individuals report the highest prevalence of diet pill, laxative, and fasting utilization to control body weight and shape,⁷ which is the key rationale for this study's focus on AN. Most AN research focuses on cisgender (i.e., those

whose gender identity aligns with their sex assigned at birth) female subjects, as historically that has been the AN-impacted population of focus.¹ This belief leads to the erasure of TGD individuals from the field, despite a disproportionate risk of developing both disordered eating behaviors (DEBs) and experiencing related health disparities.¹⁶

Misuse of the term “gender majority” to reference cisgender women further complicates the field; it has led to the use of the term “gender minority” to reference cisgender men.¹⁷ This use of language creates a muddled understanding of findings in eating disorder research. The term “gender minority” (GM) is an umbrella term often used in queer communities and/or research to designate an individual whose gender identify does not align with their sex assigned at birth. Additionally, tools have been historically built to assess individuals based on societal beliefs centered on the binary gender system. For example, the development of eating disorder assessment tools utilizes gendered beauty and body perceptions, as exhibited by differential results between cisgender males and females on two assessments: the Eating Disorder Inventory and the Eating Disorder Assessment for Males.¹⁷ However, no assessment tools have been validated in TGD populations yet. Omitting TGD individuals from research and evaluation of assessment tools has led to a gap in ED diagnosis and treatment in this vulnerable population. Despite this gap, research shows that TGD individuals tend to engage in disordered eating more often to suppress pubertal changes and achieve greater body congruence with their gender identity.^{1,3,10,18}

The objectives for this project are to:

1. assess health disparities and health complications experienced by the TGD population in the U.S. and their association to AN
2. promote the need for effective early health interventions for TGD individuals

3. increase understanding of the TGD experience in the U.S., especially as it pertains to AN and metabolic health complications that may arise out of disordered eating.

The proposed qualitative interviews will provide context for future research and allow researchers to utilize the Social Ecological Model (SEM) to understand stressors and supports throughout individuals' lives that may impact health outcomes. Public health efforts, such as early intervention and prevention, help lessen the risk of disproportionately poor health outcomes.¹⁹ Stigma, discrimination, or the fear of such, can push TGD individuals away from seeking health care.²⁰ Despite there being laws preventing discrimination²¹ in healthcare today, in healthcare settings 28% of TGD individuals report harassment, 19% report being refused care, and 2% report violence against them.²⁰ While some of these experiences may not be intentionally harmful by the healthcare provider, inadequate training for medical providers on TGD healthcare leads to the use of outdated terminology, lack of knowledge, and harm, which may cause individuals to avoid seeking necessary care.²⁰ Understanding the experience of TGD individuals regarding eating disorder treatment and other health side effects is vital to creating systems that provide effective, proactive care.

This project's *working hypothesis* is that TGD adults experience a greater health burden compared to their cisgender peers. The *approach* for this project is to complete quantitative analysis of the Behavioral Risk Factor Surveillance Survey (BRFSS) data from 2021. The *rationale* for this method is to develop a representative analysis of the TGD health experience in the United States. The *expected outcome* from this project is to identify trends in health disparities between TGD and cisgender adults in the United States. This data will likely support the need for greater research and funding for effective early health intervention practices for TGD individuals.

1.1 Project Progression

1.1.1 Initial Plan

At the onset of this project, the plan focused on a qualitative analysis in the form of semi-structured interviews, further described in Sections 3.2, 3.3, and 3.4. The rationale for this method was to provide TGD individuals a confidential space where they could share their experiences living with an ED and pursuing treatment – to inform the creation of specific, relevant interventions. Institutional Review Board (IRB) approval (Appendix A) was obtained for this study and recruitment began, as described in the data and methods section below. However, recruitment failed to procure subjects for the research project within the time constraint. Therefore, the focus of the project was adjusted, and the prepared interview script (Appendix D) and interview guide (Appendix E) were not utilized.

1.1.2 Completed Project

The materials and preparation for a qualitative research study were produced, and the recruitment process was started for the study. However, due to the time constraint of the author's graduation, recruitment efforts were ended.

The focus of the project was adjusted to analyze secondary data from the 2021 BRFSS, as described below in Sections 3.1, 4.1 and 5.1. As a large nationwide survey, the BRFSS provided an opportunity to compare health experiences between TGD and cisgender adults.

1.1.3 Suggested Next Steps

The prepared qualitative study has the potential to provide critical information to the field about the health experiences of TGD individuals living with or in recovery from AN or related DEBs. The current lack of understanding maintains a gap between the health of TGD people and the research and medical fields. The author encourages the field to continue work in this space.

1.2 Specific Aims

The BRFSS collects annual data via telephone surveys nationwide from over 400,000 adults, including questions about health-related risk behaviors, chronic health conditions, and use of preventative services.²² Analyzing this data can provide context about the current experience of transgender adults in the United States. Using the BRFSS, this project sought to meet its objectives by answering four questions:

4. Are adults that identify as transgender more likely than cisgender individuals to have poor health?
5. Are adults that identify as transgender more likely than cisgender individuals to have a diagnosed health condition?
6. Are adults that identify as transgender less likely than cisgender individuals to have health care access?
7. Do adults that identify as transgender report different trends in fruit and vegetable consumption than cisgender individuals?

The aims of the planned qualitative interview project were twofold. The first aim was to explore the long-term health concerns of TGD individuals with a history of disordered eating. The plan to meet this aim was to conduct five to seven in-depth qualitative interviews, using an Interview Guide adapted from Bowman (2018), available in Appendix E.¹⁶ The interviews would collect information about TGD experiences with AN and DEBs as well as the individuals' concerns about their long-term health while recovering from disordered eating.

The second aim was to identify trends in health-related data collected during the interviews. The plan was for the researcher to transcribe interviews and two individuals to independently code the data to ensure consistency and create more robust results. This analysis would identify what health concerns are most relevant to TGD individuals recovering from AN. Data collected from these interviews would inform future research in this field and guide intervention methods for this vulnerable group. The qualitative aspect of the research was beyond the scope of this project. However, a screening survey, informational script, and interview guide for such a study were developed and are available in Appendices C, D, and E, respectively.

2.0 Literature Review

2.1 Introduction

A recent analysis estimated that approximately 390 adults out of every 100,000 in the United States identify as TGD.²³ Based on the current population size of 331,893,745 from the most recent census data²⁴ and assuming the estimate of TGD individuals extends to all age ranges, there are approximately 1,294,386 TGD individuals living in the United States today. The following literature review discusses disproportionate risk, drivers of behavior, comorbidities, and access to care and support for these individuals, as it pertains to disordered eating. A majority of the literature focuses on youth. However, the impact of disordered eating on TGD youth, like many health concerns, can be extrapolated to TGD adults on the basis of adverse childhood experiences.²⁵ TGD adults previously lived as TGD youth who were at risk of experiencing the negative childhood experiences described below and developing the associated health concerns. While full data does not yet exist on all age ranges of TGD individuals, we can look at youth-focused data to start creating a better understanding of long-term health outcomes of disordered eating.

2.2 Risk of Disordered Eating

Sexual and gender minority (SGM) youth experience elevated risk of disordered eating and unsafe weight management techniques.¹⁻¹¹ In particular, SGM youth have higher odds than their cisgender counterparts of utilizing diet pills, laxatives, and/or fasting for the purpose of weight

management,^{1,3,5,7,26} with transgender individuals reporting highest prevalence.⁷ These DEBs are characteristic of AN. A previous review by Miller et al⁵ highlighted the differences between sexual minority (SM) boys/men and SM girls/women: SM boys/men show consistently increased risk for DEBs across adolescence and young adulthood while SM girls/women show more mixed results with greatest risk during adolescence.

Self-reported results yielded higher prevalence of ED symptoms compared to official ED diagnoses noted in medical charts, causing a wide range of reported prevalence values from 2% to approximately 18% of transgender youth.³ This finding was supported by other studies that found that SGM populations have high instances of subclinical EDs that often are not documented in medical charts⁶ and that there is not increased engagement with ED medical or mental health services among SGM populations despite increased risk.⁸

2.3 Underlying Drivers Toward Disordered Eating

Understanding the underlying mechanisms driving SGM youth toward disordered eating is a key focus of research, which ensures that SGM-specific risk factors are adequately identified and addressed. Studies found that transgender youth, defined as individuals whose gender does not align with their assigned sex at birth, tend to practice DEBs to suppress pubertal changes and the development of secondary sex characteristics.^{1,3,10,18} One study found that greater congruence between gender identity, presentation, and perception was associated with decreased engagement with DEBs.¹⁰

Goldhammer et al⁴ reported that GM youth may engage in fasting behavior more commonly as a means to avoid use of public restrooms, particularly at school, for fear of harassment.

Additionally, Lessard et al²⁷ found that SGM individuals who feel safe at school have healthier relationships with weight management and eating behaviors. These findings highlight the importance of determining the underlying drivers of DEBs in SGM youth and adults.

Additionally, cultural norms within SGM communities may also drive differential DEBs in subpopulations. Miller et al⁵ found that SM males tend to view themselves as overweight despite being healthy or underweight while SM females tend to view themselves as healthy or underweight despite being overweight. These perceptions may stem from lesbian communities tending to prioritize body positivity and gay communities tending to put more emphasis on body image/appearance.^{4,5} Sociocultural aspects of SGM identities add complexity to the prevalence of disordered eating in SGM communities, highlighting the need for an intersectional framework within this research.²⁸

Many TGD individuals experience gender dysphoria, or a feeling of “discontent with the physical or social aspects of one’s own sex,” according to the American Psychological Association.²⁹ Holt et al. found puberty to be a pivotal time period for individuals experiencing gender dysphoria, during which they saw an increase in associated difficulties. These difficulties included relationship difficulties with peers and family, depression or low mood, social phobia, anxiety disorders, mood disorders, disruptive disorders, autism spectrum disorders (ASD), attention deficit hyperactivity disorder (ADHD), eating difficulties, SI, and SIBs.³⁰ The researchers found 14.6% of participants aged 5-11 years old reported feeling suicidal compared to 39.5% of participants aged 12-18 years old. Depression and SIBs showed similar results across age groups. This finding points to the importance of studying how pubertal changes impact TGD individuals. Distress increases for TGD individuals at the onset of puberty and can lead to a variety of concerning

comorbidities. The intersection of gender identity, puberty, distress, and eating behaviors needs to be more thoroughly studied to understand how these experiences interact.

2.4 Comorbidities Associated with Disordered Eating

Studies have found numerous comorbidities within communities displaying DEBs, which can be broken down into two main categories: psychiatric and physiologic conditions. The case series by Donaldson et al³¹ highlighted the psychiatric risk factors that co-occur with EDs in SGM youth. SGM youth are at increased risk for suicidal ideation (SI), self-injurious behaviors (SIB), and suicide in addition to disordered eating.^{3,31,32} Severe/prolonged instances of EDs can also lead to complex medical concerns, leading up to and including organ failure.³¹ The presence of these medical concerns can serve as indicators of poor health status for TGD adults and indicators that effective early intervention methods in gender-affirming healthcare settings are necessary to increase the quality of life for the TGD population.

2.4.1 Psychiatric Comorbidities

Risk for psychiatric conditions increases in populations that engage in disordered eating. Despite being a diagnosable psychiatric condition itself, the presence of AN increases the suicide rate in affected groups, with up to 20% of premature deaths of individuals with AN attributable to suicide.^{3,15} Individuals with AN are 18% more likely to die by suicide, when compared to age and gender matched peers.¹⁵ In particular, approximately three out of every four TGD youths with an

eating disorder has experienced SI, SIB, and/or a suicide attempt in the last year.³ This makes TGD individuals with eating disorders a particularly vulnerable group.

AN has also been associated with numerous mood and anxiety disorders, major depressive disorders, obsessive compulsive disorders, and developmental disorders, including ASD and ADHD.³³⁻³⁵ Individuals diagnosed with AN may also exhibit borderline traits and personality disorders.^{33,34} The psychiatric comorbidities of AN are complex due to the psychiatric nature of AN itself and the widespread systematic impacts of AN symptomology. It is also important for healthcare professionals to understand and acknowledge the nuances of coexisting conditions for treatment decisions. For example, patients with anxiety and depressive disorders may not respond to typical medications due to the alteration of serotonin receptors in starved bodies.^{33,34} For effective AN treatment in the TGD population, healthcare providers must also understand these nuances layered with the multidimensional experience of the TGD individual's life.

2.4.2 Physiologic Comorbidities

Complications due to disordered eating extend to nearly all bodily functions, including the reproductive function, bone formation, ocular function, auditory function, the gastrointestinal (GI) function, cardiac function, endocrine function, and immune function. Each is discussed in more detail below.

Functional hypothalamic amenorrhea (FHA) presents as the absence of menses for more than three consecutive months without an alternative endocrine explanation.^{12,36} When under high stress, the body suppresses reproductive functions, assuming the physical conditions of life are unfit to sustain a pregnancy and/or child.¹² Athletes with female reproductive systems often experience amenorrhea due to high levels of physical activity and low body fat.³⁷ Similarly, individuals

engaging in AN-like disordered eating deplete their fat stores beyond the 10% decreases necessary to impede normal menstruation, causing amenorrhea.³⁷ Specifically, the body recognizes stressors, such as fat loss due to disordered eating, and suppresses the hypothalamic-pituitary-gonadal axis leading to FHA.¹²

Studies found individuals who engaged in disordered eating are at increased risk over their lifetime for osteoporosis and bone fractures.³⁶⁻³⁸ Bone density does not seem to ever fully recover from loss during early stages of disordered eating, despite ED recovery and weight regain.^{36,37} Loss of bone mass in young people with AN outpaces that of older individuals due to the timing of maximal peak bone mass.³⁶⁻³⁸ The age range for maximal peak bone mass differs between published studies but varies between 13 and 22 years of age. This range correlates with a period of high risk for AN onset, especially within TGD populations.³⁶⁻³⁸ Hormonal changes associated with disordered eating contribute to reduced bone density, including reduced estrogen, progesterone, and insulin growth factor (IGF-1) and increased cortisol.³⁷ Bone formation stagnates due to low IGF-1 levels, and one study³⁷ found that estrogen-deficiency leads to 3-5% decrease in bone mass per year in young women. However, women are not the only group at risk. Males lose bone density as well, possibly losing bone mineral density at a faster rate than females.³⁷ This binary assessment requires greater study to determine how TGD are impacted by osteoporosis and EDs, an important focus since approximately 40% of AN patients have osteoporosis.³⁷ Even more concerning, 92% of women with AN show evidence of osteopenia, a milder precursory form of bone density loss.³⁷ Due to the inability to reverse bone loss, prevention, early diagnosis and prompt treatment must be vital.

Individuals seeking AN treatment have reported ocular discomfort, including dry, itchy eyes, photophobia, and blurry vision.^{39,40} Upon examination, clinicians have found enophthalmos,

pseudoptosis, and lagophthalmos to be the three primary concerns for AN patients. Enophthalmos describes the sunken look to patients eyes, largely attributed to the loss of fat in AN patients and exaggerated by dehydration.⁴⁰ Pseudoptosis explains the way the eyelids appear to droop while lagophthalmos defines the inability of the eyelids to fully close.⁴⁰ The latter is often associated with paralysis of cranial nerve VII; however, in AN patients, low body fat content may hinder the mechanical ability of the orbital socket, leading to lagophthalmos.³⁹ The combination of these complications puts AN patients at risk of corneal damage, if not properly addressed.³⁹ Treatment with eye drops and eye ointment coupled with AN treatment to address dehydration and low body fat can reverse these ocular issues within several days.³⁹

Autophony, or autophonia, - interchangeable terms for the same phenomenon – describes the sensation of hearing one’s own voice and/or breath to an abnormal degree.^{40,41} Autophony may affect nearly half of all patients with a severe eating disorder that results in extensive weight loss.⁴¹ Hollis et al. hypothesized that this aural issue in ED patients results from the lack of adipose tissue surrounding the eustachian tube in the middle ear, causing it to remain chronically open.⁴¹ Remaining open creates a resonance chamber connecting the middle ear to the nasopharynx, amplifying the sound of the voice and breath.⁴¹ The research team conducted a survey of 101 individuals with severe weight loss seeking ED treatment and found that 42.6% experienced autophony symptoms. This study suggests that eustachian tube dysfunction may be a common issue associated with severe weight loss resulting from disordered eating that may often be overlooked during symptom management.⁴¹

AN patients complain of various GI issues, with varying frequency. Trouble and/or failure to swallow liquids and solids normally, called dysphagia, arises for a portion of AN patients.^{40,42} Dysphagia has several different etiologies. One type results from a psychological fear of choking,

or phagophobia, that causes patients to avoid swallowing solids, liquids, and medications.⁴³ However, oropharyngeal dysphagia impacts AN patients often, as it relates to the ability to move food (or liquid) from the oral cavity to the pharyngeal space properly without aspiration.⁴² Due to starvation, AN patients often experience loss of muscle tone, which impedes their ability to swallow without aspiration. This can lead to aspiration pneumonia, wherein bacteria gets introduced into the lungs via food particles and causes bacterial pneumonia.^{40,42} Other complications of oropharyngeal dysphagia include dehydration, decreased quality of life and death, if aspiration pneumonia progresses without treatment.⁴² Holmes et al. conducted a chart review of 206 AN patients to find that 20% experienced symptoms associated with oropharyngeal dysphagia.

Continuing down the GI tract, AN patients experience a variety of symptoms and conditions that affect their ability to digest and eliminate food naturally. These include involuntary emesis, nausea, gastric pain, acute gastric dilation, and constipation. The first three typically denote a more complex underlying issue. Acute gastric dilation may explain symptoms in some cases and requires attention to avoid gastric rupture.⁴⁰ AN patients likely experience acute gastric dilation due to two main etiologies: gastroparesis and superior mesenteric artery syndrome. Gastroparesis occurs when the body tries to conserve energy by restricting peristalsis; this occurs in AN as a reaction to extreme weight loss.⁴⁰ This causes a mass of consumed foods to form in the stomach, often leading to nausea and vomiting, and restricting the patient's calorie intake.⁴⁰ The second etiology, superior mesenteric artery syndrome, also occurs in response to the loss of body fat. A fat pad typically holds the superior mesenteric artery away from the aorta, leaving space for the duodenum to pass between the two arteries.⁴⁰ The loss of this fat pad causes the duodenum to be compressed between the arteries instead, partially or fully obstructing the GI system.

The final GI condition left to discuss in this review is constipation. Similar to gastroparesis, constipation occurs in AN patients due to the body's need to conserve energy. By slowing digestion, the body increases transport time spent in the colon, subsequently causing increased water reabsorption.⁴⁰ This worsens constipation symptoms. Related to constipation, some AN patients abuse laxatives. For some patients, this abuse begins with a diagnosis of irritable bowel syndrome and a prescription for laxatives.⁴⁰ However, the nerve cells in the colon can be permanently damaged from prolonged use of stimulant laxatives, leading to decreased motility of the colon and worsened constipation symptoms.⁴⁰

An additional compensatory behavior presents in the cardiac system. AN patients often experience bradycardia, a reduced heart rate less than 60 beats per minute, as the body tries to stay alive despite minimal caloric intake.⁴⁰ This also translates to large increases in heart rate with any physical activity, such as standing up or walking across a room. As such, AN patients may develop a condition called Positional Orthostatic Tachycardia Syndrome (POTS), due to the combined psychologic and physiologic stressors of AN⁴⁰. Patients with POTS experience chronic fatigue, dizziness in upright positions, and increases in heart rate of greater than 40 beats per minute when moving from a laying position.⁴⁰

The endocrine system of AN patients no longer produces typical levels of estrogen, progesterone, IGF-1 or cortisol, as mentioned above. In addition, the body's ability to regulate blood sugar can fail, due to starvation leaving the liver without the supplies to build glucose.⁴⁰ Inadequate sugar supplies leads to hypoglycemia. If left untreated, hypoglycemia can cause cardiac arrest and death.⁴⁰ However, it causes two distinct abnormal blood test results: elevated liver function tests and reduced serum prealbumin levels. Identifying these markers can diagnose hypoglycemia before severe side effects develop.⁴⁰

Lastly, the immune system of AN patients does not respond as well as an individual without an ED. Patients with severe AN experience gelatinous marrow transformation, in which there is loss of hematopoietic cells and atrophy of adipose cells in the bone marrow.⁴⁴ The cause is not fully known but relates to starvation, and it results in a low white blood cell (WBC) count.^{40,44} In addition, AN patients may not experience an elevated temperature in response to illness that normally indicates a healthy immune system. Healthcare providers should understand these aspects of AN symptomology so they can adequately identify if and when complications fall into unexpected categories.

2.4.3 Epigenetics

Epigenetic modifications to DNA and histones play an important role in the expression of genes. Some of these modifications change throughout life in response to environmental circumstances.¹³ A study by Steiger et al. (2019) set an important groundwork for epigenetic research in AN research by completing comparisons across different groups of women – those with active AN, those showing stable remission of AN, and those with no eating disorder.¹³ Their approach showed strong analyses, utilizing combined prospective and cross-sectional design that allowed them to distinguish between disease-related methylation changes and stable epigenetic traits. In addition, the study adequately addressed issues of tissue specificity for DNA methylation. The use of whole blood samples for the analysis of epigenetic marks is widely accepted throughout the field of AN research due to the adequacy of gene markers in peripheral tissues and the inaccessibility of brain tissue in living subjects. The study found relevant epigenetic modifications in genes associated with mental status, physical status, metabolic function, and immunity, and the findings

indicated that the modifications may be reversible with remission of disease, as individuals in remission tended to have lower methylation levels than individuals with active disease.¹³

The study did have several limitations, however, such as the sample including only women, the sample not reporting demographic information pertaining to race/ethnicity, inclusion of individuals on various medications and/or with substance use, and the utilization of two different epigenetic assays. First, the inclusion of only women in the sample is limiting as it perpetuates the societal belief that cisgender women are the primary population impacted by AN. Secondly, the lack of reporting on the race/ethnicity of participants limits understanding of potential complexities within epigenetic data. Racial/ethnic diversity in research samples is important to ensure validity of measures and applicability to diverse populations, as well as to understand possible confounding factors. Third, the inclusion of individuals who take various psychoactive medications and/or who engage in substance use adds an additional layer of possible confounding and variation between groups that complicates this study. Lastly, the use of two different epigenetic assays has the potential to impact results. This was due to the initial assay being discontinued part way through the study. The authors noted that the manufacturer data implied that the secondary assay could be comparably utilized. Most of these limitations are due to the small, preliminary nature of this study.

2.5 Access to Affirming Healthcare and Social Support

Supportive social systems and availability of affirming healthcare and mental health services have noteworthy impacts on DEB and ED outcomes in SGM youth. Rezeppa et al⁹ reported an association between positive familial relationships and body esteem factors, which in turn are associated with decreased DEBs. On the other hand, parental refusal to accept SGM youth identity

and to consent to affirming care can lead to negative outcomes, including increased DEBs and SIBs.³¹ Barriers to affirming care are vastly prevalent in the U.S., emphasized by the necessity of parental consent for minors. However, this research highlights the importance of early detection and treatment of DEBs within SGM youth populations.^{1,6} One way to begin to make a dent in the disparity toward EDs in SGM youth is to examine behaviors outside of the clinical diagnostic criteria, since subclinical presentations are often indicative of future ED diagnosis.^{1,6}

Access to affirming healthcare may not seem like a necessity for successful treatment of an individual engaging in disordered eating. However, research shows psychological distress, body dissatisfaction, and ED symptoms can decrease for youth who receive access to gender-affirming care, such as hormone therapy or pubertal suppression.³ Without adequate screening measures for gender concerns, TGD individuals can experience unnecessary prolonged distress, which can manifest as physical or psychological symptoms.

Caregivers and loved ones play an important role in ED care for TGD individuals. Especially for youth, parental rejection of the child's gender identity can lead to an escalation of symptoms, complicating treatment.³¹ Alternatively, parental acceptance of the child's gender identity can assist in case management, leading to a cooperative care plan. Caregivers that are accepting need to ensure they care for themselves to prevent frustration and burnout, due to the high level of stress that may be placed on them.³¹

All available evidence on the physical and psychological harms caused by delayed intervention for disordered eating in TGD populations points toward a need for better early intervention opportunities. TGD individuals often resort to DEBs when their bodies do not align with their gender identity and when affirming care is absent.³¹ This project aims to add to the existing body of evidence that supports early, accessible, and affirming healthcare for all. This work is especially

important in the face of policy proposals across the nation that seek to restrict TGD individuals' access to safe, affirming healthcare, housing, employment, and public spaces.^{20,21}

3.0 Data and Methods

3.1 BRFSS Analysis

The BRFSS is a national survey conducted over the telephone each year in all 50 states, the District of Columbia, and three U.S. territories.²² In 2014, cell phones were added to the sample pool, expanding beyond households with landlines. The BRFSS collects data from over 400,000 adults annually on topics concerning health-related risk behaviors, chronic health conditions, and use of preventive services. The inclusion criteria for this survey are being at least 18 years old and living in the United States or one of the included territories. The survey does exclude institutionalized individuals and anyone without access to a telephone.⁴⁵

The survey includes three parts: core questions, optional modules, and state-added questions. The core module is further broken down into three components: the fixed core, the rotating core, and the emerging core.²² The fixed core denotes an unchanging group of questions posed to all respondents. The rotating core includes two sets of questions that are asked in alternating years; each year, the unused group of questions is offered as an optional module. The last core component, the emerging core, asks about current breaking health issues.²² Individual states decide whether to include each optional module in their data collection. If the state makes any modification to the module, they are considered state-added questions.⁴⁶ Table 1 shows the variables used for this analysis, what research question they apply to, and which part of the survey they originate from.

Table 1. BRFSS Variables of Interest By Research Question and Survey Module

Question	Variable	Question text	Core	Optional	State
1	GENHLTH	Would you say that in general your health is-	X		
	POORHLTH	During the past 30 days, for about how many days did poor physical or mental health keep you from doing your usual activities, such as self-care, work, or recreation?	X		
2	CVDINFR4	Has a doctor, nurse, or other professional ever told you that you had a heart attack also called a myocardial infarction?	X		
	CVDCRHD4	Has a doctor, nurse, or other professional ever told you that you had angina or coronary heart disease?	X		
	CVDSTRK3	Has a doctor, nurse, or other professional ever told you that you had a stroke?	X		
	HAVARTH5	Has a doctor, nurse, or other professional ever told you that you had some form of arthritis, rheumatoid arthritis, gout, lupus, or fibromyalgia?	X		
	ASTHMA3	Has a doctor, nurse, or other professional ever told you that you had asthma?	X		
	BPHIGH6	Have you ever been told by a doctor, nurse, or other health professional that you have high blood pressure?	X		
	TOLDHI3	Have you ever been told by a doctor, nurse, or other health professional that your cholesterol is high?	X		
	CHCSCNCR	Has a doctor, nurse, or other professional ever told you that you had skin cancer?	X		
	CHCOCNCR	Has a doctor, nurse, or other professional ever told you that you had any other types of cancer?	X		
	CHCCOPD3	Has a doctor, nurse, or other professional ever told you that you had C.O.P.D. (chronic obstructive pulmonary disease), emphysema or chronic bronchitis?	X		
	ADDEPEV3	Has a doctor, nurse, or other professional ever told you that you had a	X		

		depressive disorder (including depression, major depression, dysthymia, or minor depression)?			
	CHCKDNY2	Not including kidney stones, bladder infection or incontinence, were you ever told you had kidney disease?	X		
	DIABETE4	Has a doctor, nurse, or other professional ever told you that you had diabetes?	X		
	HAVEHEPB	Has a doctor, nurse, or other health professional ever told you that you had hepatitis B?		X*	
3	PRIMINSR	What is the current primary source of your health insurance?	X		
	PERSDOC3	Do you have one person or a group of doctors that you think of as your personal health care provider?	X		
	MEDCOST1	Was there a time in the past 12 months when you needed to see a doctor but could not because you could not afford it?	X		
	CHECKUP1	About how long has it been since you last visited a doctor for a routine checkup?	X		
4	FRUIT2	Now think about the foods you ate or drank during the past month, that is, the past 30 days, including meals and snacks. Not including juices, how often did you eat fruit?	X		
	_FRTL1A	[calculated variable] Consume fruit 1 or more times per day			
	FVGREEN1	How often did you eat a green leafy or lettuce salad, with or without other vegetables?	X		
	VEGETAB2	Not including lettuce salads and potatoes, how often did you eat other vegetables?	X		
	_VEGLT1A	[calculated variable] Consume vegetables 1 or more times per day			
1,2,3,4	TRNSGNDR	Do you consider yourself to be transgender?		X**	

*States opting to include optional module on Hepatitis Treatment: Georgia, Louisiana (n=2)

** States opting to include optional module on Sexual Orientation and Gender Identity (SOGI): Alaska, Arkansas, Colorado, Connecticut, Georgia, Hawaii, Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Montana, Nevada, New Jersey, New Mexico, North Carolina,

Stata/SE 17.0 was used for all data analysis. The 2021 BRFSS data was downloaded, along with the corresponding questionnaire and codebook (Available for download at https://www.cdc.gov/brfss/annual_data/annual_2021.html). The “TRNSGNDR” variable was recoded to collapse all affirmative responses (i.e., male to female, female to male, and gender non-conforming) into a single “TGD” group. Descriptive statistics were completed on demographic aspects of the data, including race, ethnicity, state residency, urbanicity, education level, and income level and each were compared between TGD and cisgender respondents.

As indicated in Table 1, a sample of survey variables was used to address each of the four research questions. For question 1, the researcher examined the distribution of responses to one question assessing general health status and a second question assessing the number of poor health days per month. For general health status, respondents were asked to rate their health on a five-point scale from excellent (1) to poor (5). The data also includes codes for “don’t know” responses (7) and refusal responses (9). The researcher recoded this variable into dichotomous “Better Health” (1-3) and “Worse Health” (4-5) responses for comparison between TGD and cisgender respondents using a chi-squared test. The researcher assessed the number of poor health days in two separate ways. First, the researcher dichotomized the responses between those who responded saying they had any number of poor health days versus those who responded saying they had no poor health days. Second, the researcher dichotomized the responses between those who responded saying they had 7 or fewer poor health days (i.e., few) versus those who responded saying they had greater than 7 poor health days (i.e., many). The researcher then compared responses between the TGD and cisgender participants using chi-squared tests. It is important to note a high number

of missing values at this level of analysis. In the TGD sample, 31.8% of the sample had missing values (n=481), and in the cisgender sample, 47.1% of the sample had missing values (n=113,402).

For question 2, the researcher utilized 14 BRFSS questions for analysis based on literature describing DEB complications and TGD health disparities. As described in the Section 2.0, many organ systems can be impacted by prolonged disordered eating. Patients may experience cardiac complications (myocardial infarction, angina/coronary heart disease, stroke, high blood pressure), respiratory complications (asthma, COPD/emphysema/chronic bronchitis), bone disease (arthritis), psychiatric complications (depressive disorders), and glucose inadequacies (myocardial infarction, diabetes). They may also experience complications related to dehydration (stroke, kidney disease) and poor nutrition (high cholesterol). In addition, due to the intersectional experience of being a TGD individual with an eating disorders, patients may be at an increased risk of contracting hepatitis B, as a combined result of a depressed immune system and discriminatory factors that may lead them to engage in higher risk behaviors, such as sex work, injection drug use, or the use of street hormones (i.e., non-prescribed transitional hormones obtained from friends or other sources).^{20,47} The researcher created a dummy variable in Stata to assess whether participants responded affirmatively to any of 14 health condition questions, outlined in Table 1. This new dummy variable was then used to compare the proportion of respondents with diagnosed health conditions assessed by the BRFSS, using a chi-squared test. Again, the data has a large proportion of missing values (described above).

For question 3, the researcher assessed four survey questions (Table 1). For time since last routine checkup (CHECKUP1), the researcher recoded the variable to dichotomize between respondents who had a checkup within the last year and respondents who did not have a checkup

within the last year. The researcher analyzed all four variables with chi-squared tests to compare between the TGD and cisgender participants.

For question 4, the researcher analyzed two calculated variables, `_FRTL1A` and `_VEGL1A`, provided in the BRFSS data, that were calculated from other variables, listed in Table 1. The researcher used chi-square tests to compare fruit and vegetable intake between TGD and cisgender survey respondents.

3.2 Qualitative Study: Inclusion Criteria and Recruitment

For the proposed qualitative study, participants must:

- Be 18 years or older
- Identify as transgender and/or gender diverse
- Have a history of disordered eating, characteristic of Anorexia Nervosa*
- Be in recovery** from disordered eating

**Anorexia Nervosa* disordered eating behaviors include fasting, diet pills use, laxative use, bingeing followed by self-induced vomiting, and excessive exercise.

**An individual in recovery is defined as someone who previously engaged in disordered eating behaviors (DEB) to manage weight but presently does not engage in such behaviors and maintains a healthy weight for their body type.

A screening and demographics survey was published on Qualtrics and disseminated via eating disorder treatment facilities. Treatment facilities were identified using FEDUP's Accessible ED Treatment Scorecard (Appendix F). Facilities that scored >90% were contacted and asked to

disseminate the study flyer (Appendix B) to their patients, support groups, and staff. In the timeframe available, no eligible individuals were identified to participate in the study.

3.3 Qualitative Study: Interview Procedure

For the qualitative study, written scripts and guides were developed to ensure consistency between interviews. No formal informed consent process was required by the IRB due to the exempt status of this study (see Appendix A for IRB documentation). Instead, an informational script was to be read at the beginning of each interview (Appendix D). The script describes important information for participants, including confidentiality, risk, and who to contact with questions and/or concerns. The script includes a reminder that participation is voluntary and describes reimbursement for participating in the interview. Once the participant indicates that they would like to participate, the interviewer begins the interview, following the interview guide (Appendix E). The guide includes example questions, but the interviewer should allow participants to guide the conversation, within context.

3.4 Qualitative Study Analysis

Individual interviews should be voice-recorded, transcribed, and analyzed utilizing content analysis.⁴⁸ Two independent coders would read through transcripts once to familiarize themselves with the data and then re-read while coding according to theme. Researchers should create a codebook utilizing QSR NVivo, or comparable, software.

4.0 Results

4.1 BRFSS Analysis

Condensing the “TRNSGNDR” variable created a TGD group that made up 0.6% of the sample, a cisgender group that made up 97.9% of the sample, and 1.5% of the sample falling into either the “Don’t know/Not sure” or “Refused” group (Figure 1). The sample size of TGD individuals was 1,513 (Table 2), compared to 240, 516 cisgender individuals.

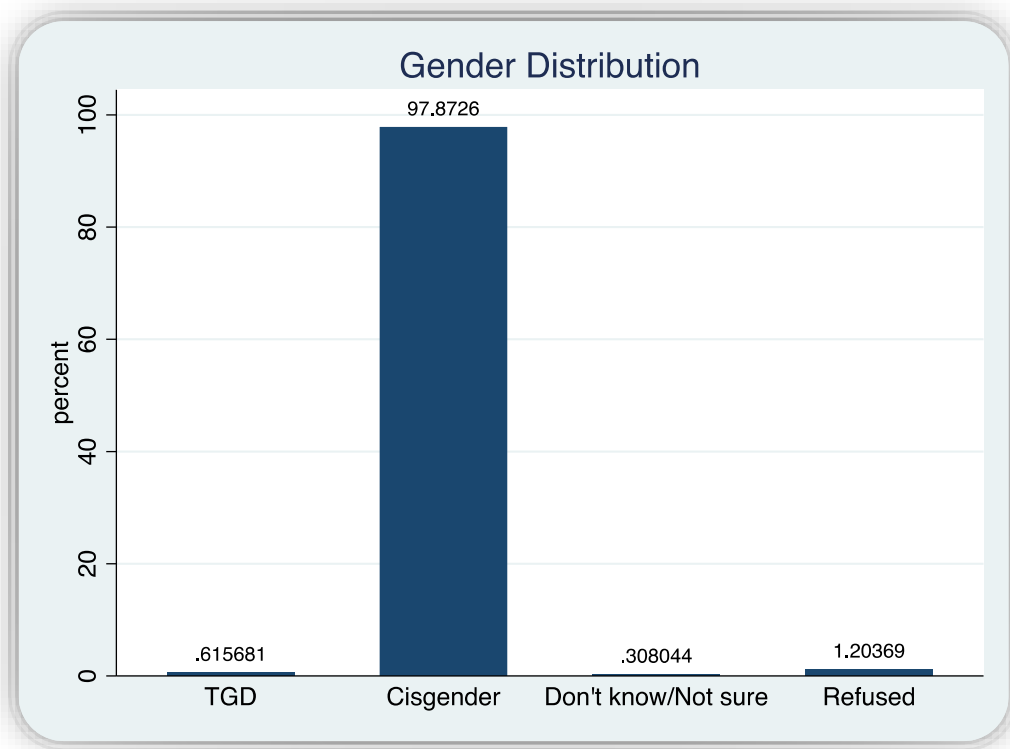


Figure 1. Gender Distribution of 2021 BRFSS Respondents

Table 2. Transgender Sample Size Based on Recode of "TRNSGNDR" Variable

Do you consider yourself to be transgender?	
Yes	1,513
No	240,516
Don't know	757
Refused to answer	2,958
Total	245,744

The TGD sample size is small, compared to the overall BRFSS sample. Demographic comparisons revealed no significant difference between TGD and cisgender respondents.

4.1.1 Question 1: Are Adults That Identify as Transgender More Likely to Have Poor Health?

The distribution of responses to the survey question assessing general health status appears different between TGD and cisgender respondents (Figure 2). The computed chi-squared value equaled 63.6199, corresponding to a p-value < 0.0001 (Table 3). The analysis of poor health days revealed over 54% of cisgender respondents indicating no poor health days in the past 30 days, compared to approximately 35% of TGD respondents (Figure 3; Table 4). This variable was recoded two separate ways to analyze different trends in health differences between gender groups (Tables 4 and 5). This analysis showed 36% of TGD respondents indicating many (>7) poor health days in the past 30 days, compared to approximately 21% of cisgender respondents (Table 5). Table 4 reveals a chi-squared value of 164.3333 and a corresponding p-value < 0.0001 for the comparison of respondents that reported having no poor health days versus respondents that reported having any number of poor health days. Table 5 shows a chi-squared value of 130.0741 and a corresponding p-value < 0.0001 for the comparison of respondents that reported having few (i.e.,

7 or less) poor health days versus respondents that reported having many (i.e., more than 7) poor health days in the last 30 days.

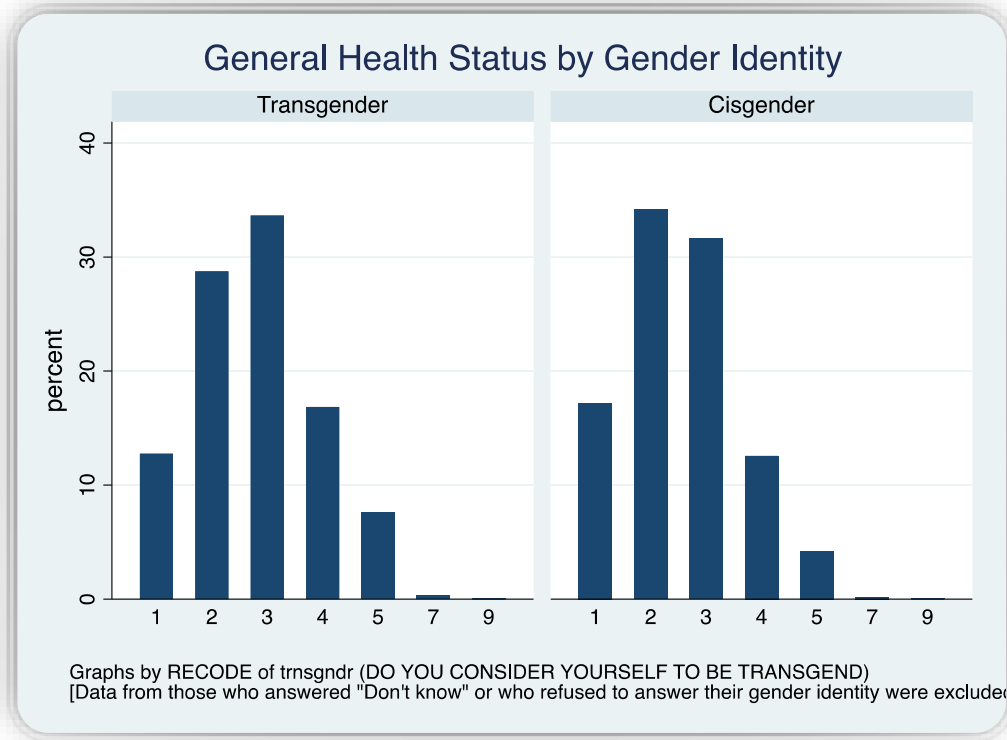


Figure 2. Distribution of General Health Status by Gender Identity

Table 3. Analysis of General Health Status by Gender Identity

	General Health		Total
	Better Health (1-3)	Worse Health (4-5)	
Transgender	1,137 (75.4%)	370 (24.6%)	1,507
Cisgender	199,529 (83.2%)	40,381 (16.8%)	239,910
Total	200,666	40,751	241,417
Chi ² = 63.6199		P-value < 0.0001	

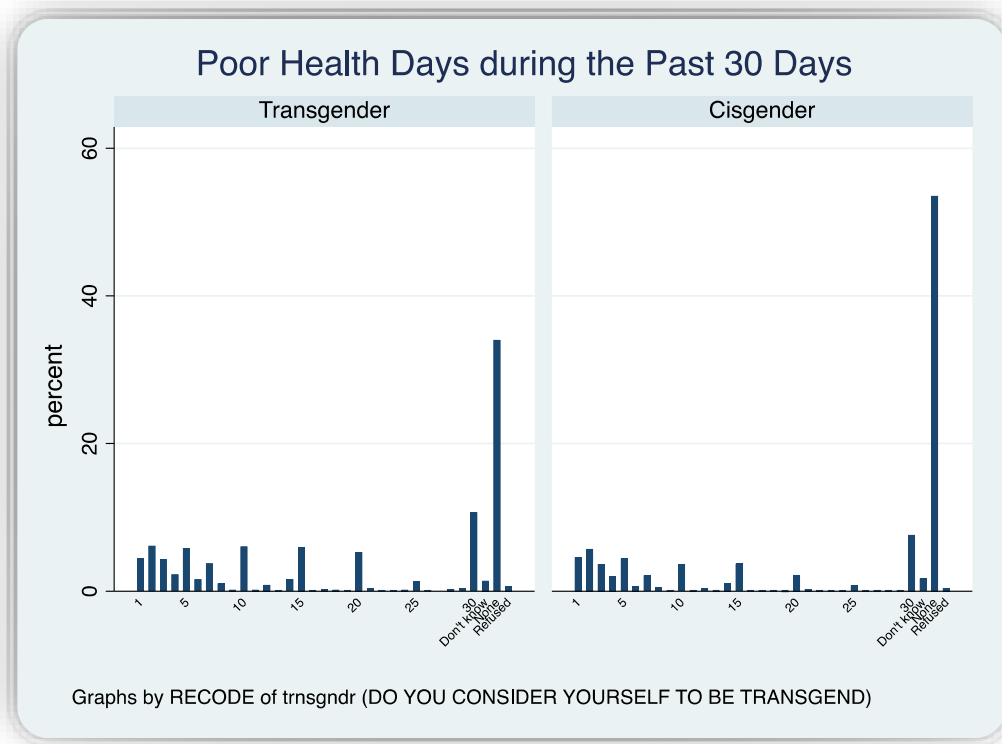


Figure 3. Number of Poor Health Days Reported by Gender Identity

Table 4. Poor Health Days Reported by Gender Identity, Dichotomized as None vs. Any

	Poor Health		Total
	None	Any	
Transgender	359 (34.8%)	673 (65.2%)	1,032
Cisgender	69,577 (54.7%)	57,537 (45.3%)	127,114
Total	69,936	58,210	128,146
Chi ² = 164.3333		P-value < 0.0001	

Table 5. Poor Health Days Reported by Gender Identity, Dichotomized by Few vs. Many

	Poor Health		Total
	Few (7 or less)	Many (> 7)	
Transgender	659 (63.9%)	373 (36.1%)	1,032
Cisgender	99,815 (78.5%)	27,299 (21.5%)	127,114
Total	100,474	27,672	128,146

Chi ² = 130.0741	P-value < 0.0001
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4.1.2 Question 2: Are Adults That Identify as Transgender More Likely to Have a Diagnosed Health Condition?

The following health conditions were included in the BRFSS survey and included in the analysis:

- Heart attack
- Angina/Coronary Heart Disease
- Stroke
- Arthritis
- Asthma
- High Blood Pressure
- High Cholesterol
- Skin Cancer
- Other cancers
- COPD, emphysema, chronic bronchitis
- Depressive disorder
- Kidney disease
- Diabetes
- Hepatitis B

A chi-squared analysis was completed using the dummy variable created to include the survey questions that addressed diagnosis of the above conditions. Out of the TGD respondents, 15.4% reported a diagnosed health condition compared to 19.5% of cisgender respondents. Table 6 shows a chi-square value of 10.8764, corresponding to a p-value of 0.001 for the presence of diagnosed health condition between TGD and cisgender BRFSS respondents.

Table 6. Frequency of a Diagnosed Health Condition by Gender Identity

	Diagnosed Condition		Total
	Yes	No	
Transgender	159 (15.4%)	873 (84.6%)	1,032
Cisgender	24,771 (19.5%)	102,343 (80.5%)	127,114
Total	24,930	103,216	128,146
Chi ² = 10.8764		P-value = 0.001	

4.1.3 Question 3: Are Adults That Identify as Transgender Less Likely to Have Health Care Access?

The distribution of responses to the question assessing time since last routine checkup varies between TGD and cisgender respondents, with almost 80% of cisgender respondents indicating that they have had a routine checkup within the last 12 months compared to approximately 60% of TGD respondents (Figure 4). Dichotomizing this variable to assess the proportion of individuals who received a routine checkup within the last year versus those who received a routine checkup more than a year ago between TGD and cisgender respondents revealed a chi-squared value of 134.8258, corresponding to a p-value < 0.0001 (Table 7).

The proportion of individuals who indicated experiencing a cost barrier to receiving healthcare differed between TGD and cisgender respondents (Figure 5). Nearly 20% of TGD

individuals experienced a cost barrier to care in the last twelve months compared to less than 10% of cisgender participants, corresponding to a chi-squared value of 158.7642 and a p-value < 0.001 (Table 8).

The primary source of health insurance reported between TGD and cisgender participants differed as well. For cisgender respondents, almost 40% receive employer or union health care, nearly 30% receive Medicare coverage, and only 5.4% reported having no insurance coverage (Figure 6). Alternatively, of the TGD respondents, approximately 33% reported employer or union insurance coverage, 20% reported Medicare coverage, and 8.4% reported having no insurance coverage (Figure 6). A chi-square analysis comparing all sources of insurance versus no insurance coverage between TGD and cisgender respondents revealed a chi-squared value of 16.0700 and corresponding p-value < 0.001 (Table 9).

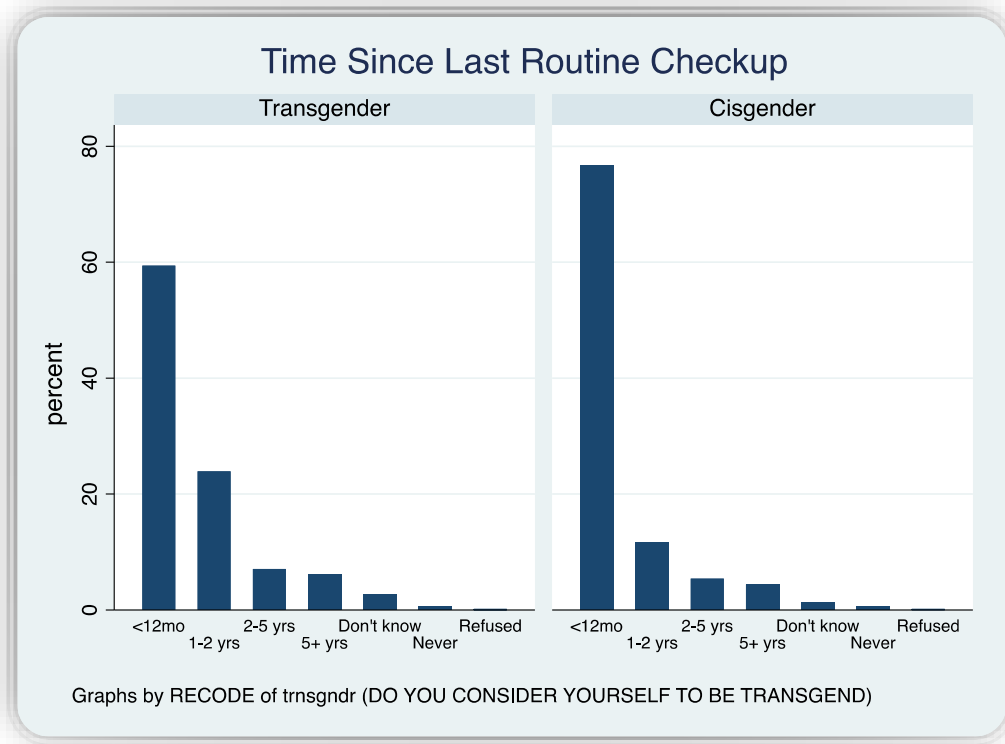


Figure 4. Reported Time Since Last Routine Checkup by Gender Identity

Table 7. Dichotimized Time Since Last Routine Checkup by Gender Identity

	Time Since Last Checkup		Total
	Less than 1 year	Greater than 1 year	
Transgender	629 (62.6%)	375 (37.4%)	1,004
Cisgender	97,408 (77.9%)	27,576 (22.1%)	124,984
Total	98,037	27,951	125,988
Chi ² = 134.8258		P-value < 0.0001	

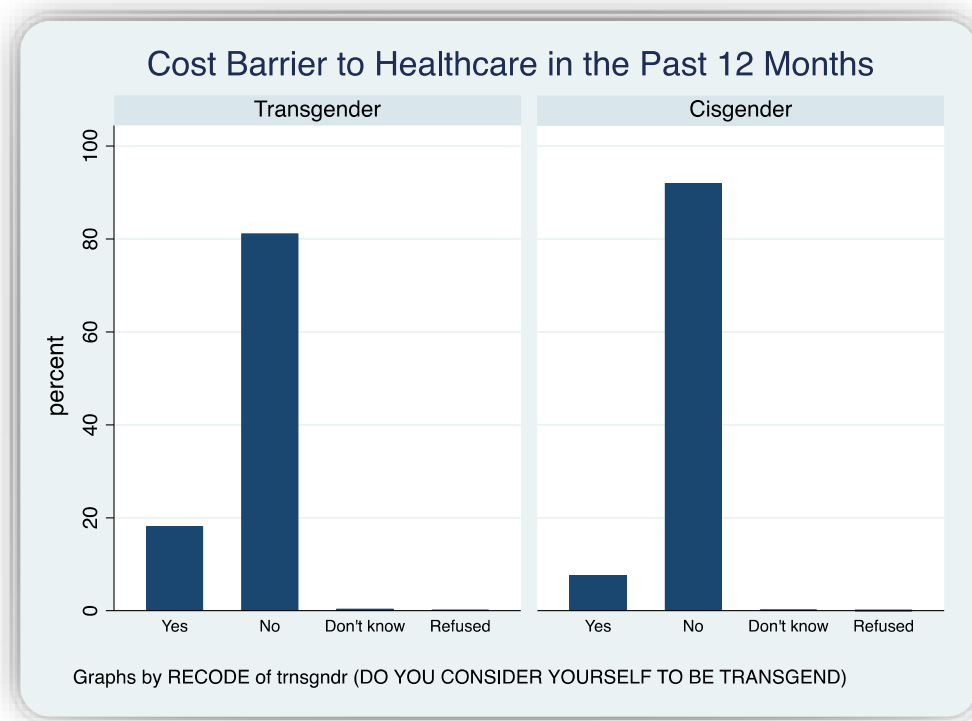


Figure 5. Reported Cost Barrier to Healthcare by Gender Identity

Table 8. Indicated Cost Barrier to Healthcare in the Last 12 Months, by Gender Identity

	Cost Barrier to Healthcare in Past 12 months		Total
	Yes	No	
Transgender	234 (23.4%)	764 (76.6%)	998
Cisgender	13,605 (10.9%)	111,077 (89.1%)	124,680
Total	13,839	111,841	125,680
Chi ² = 158.7642		P-value < 0.0001	

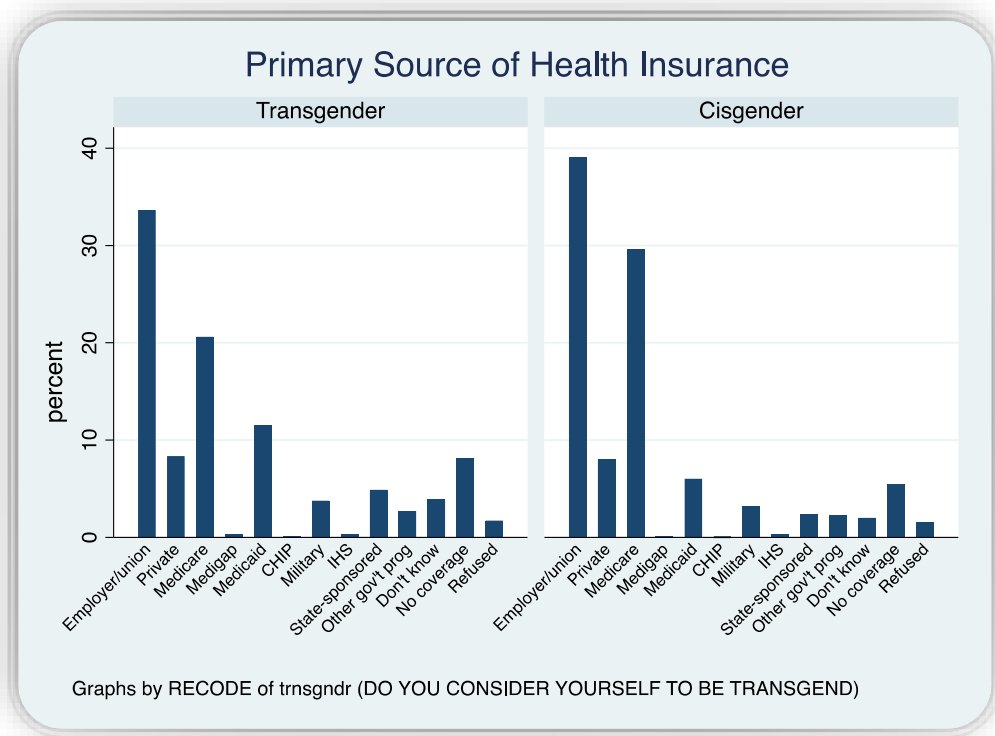


Figure 6. Reported Source of Health Insurance by Gender Identity

Table 9. Report of Having a Primary Source of Health Insurance by Gender Identity

	Possess Source of Health Insurance		Total
	Yes	No	
Transgender	860 (91.6%)	79 (8.4%)	939
Cisgender	113,377 (94.6%)	6,511 (5.4%)	119,888
Total	114,237	6,590	120,827
Chi ² = 16.0700		P-value < 0.001	

The last survey question used to assess health care access related to the identification of a personal health care provider (PHCP). Nearly 20% of TGD respondents indicated they did not have a PHCP, almost double the proportion of cisgender respondents indicating the same (Figure

7). This difference equated to a chi-squared value of 34.1138, corresponding to a p-value < 0.001 (Table 10).

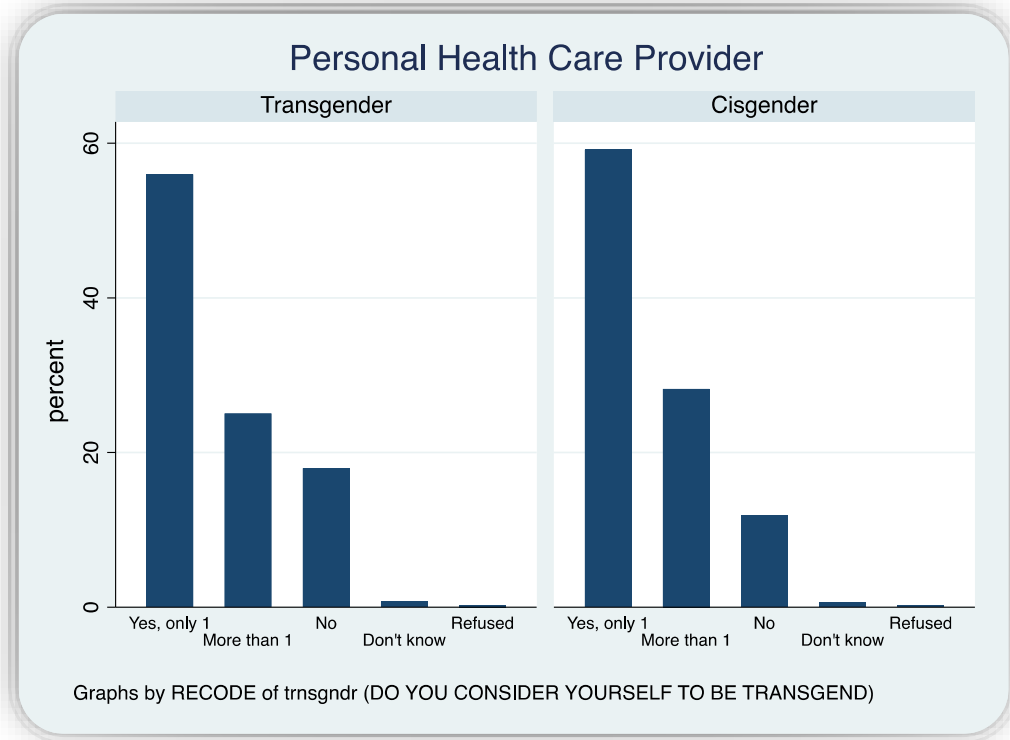


Figure 7. Report of Having a Personal Health Care Provider by Gender Identity

Table 10. Report of Having a Personal Health Care Provider by Gender Identity

	Personal Health Care Provider		Total
	Yes	No	
Transgender	824 (83.3%)	165 (16.7%)	989
Cisgender	110,427 (89.1%)	13,466 (10.9%)	123,893
Total	111,251	13,631	124,882
Chi ² = 34.1138		P-value < 0.001	

4.1.4 Question 4: Do Adults That Identify as Transgender Report Different Trends in Fruit and Vegetable Consumption Than Cisgender Individuals?

Two variables from the BRFSS data were used to analyze the dietary habits of participants: daily fruit intake and daily vegetable intake (Table 1). The distributions of both these variables show similar trends in TGD and cisgender respondents (Figures 8 and 9). However, statistical analysis revealed differences between the groups. The chi-square statistic for whether individuals ate fruit one or more times per day between gender groups was equal to 17.0462 with a corresponding p-value < 0.001 (Table 11). Likewise, the chi-square statistic for whether individuals ate vegetables one or more times per day between gender groups was equal to 20.2658 with a corresponding p-value < 0.001 (Table 12).

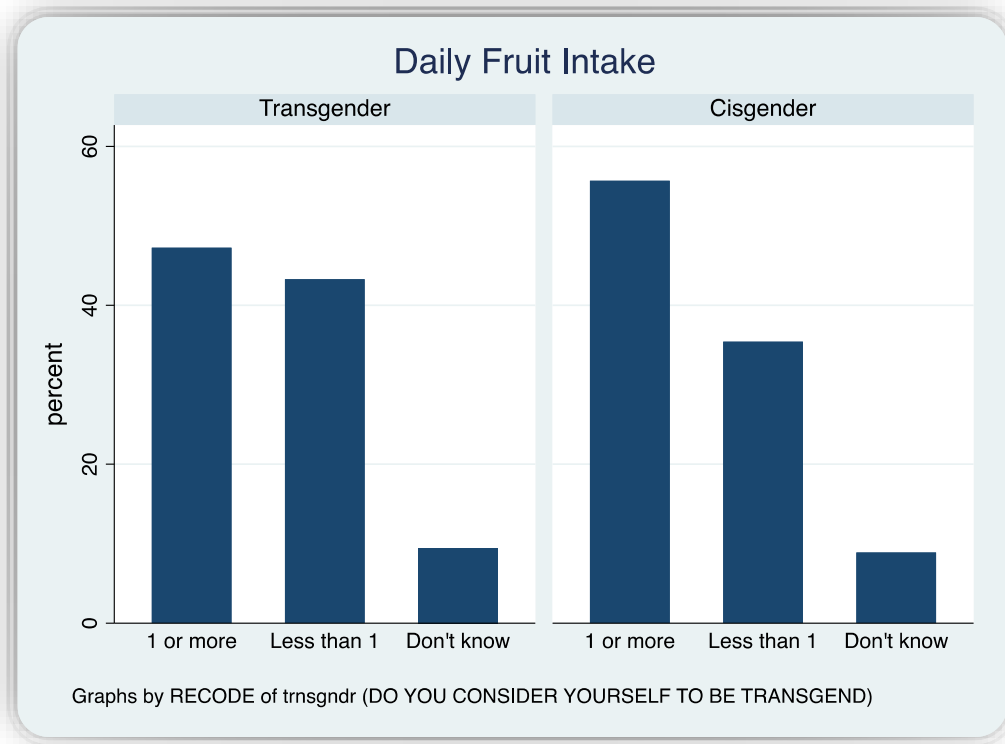


Figure 8. Reported Daily Fruit Intake by Gender Identity

Table 11. Fruit Consumption by Gender Identity

	Consume Fruit >1 time daily		Total
	Yes	No	
Transgender	426 (51.8%)	396 (48.2%)	822
Cisgender	63,081 (58.9%)	43,949 (41.1%)	107,030
Total	63,507	44,345	107,852
Chi ² = 17.0462		P-value < 0.001	

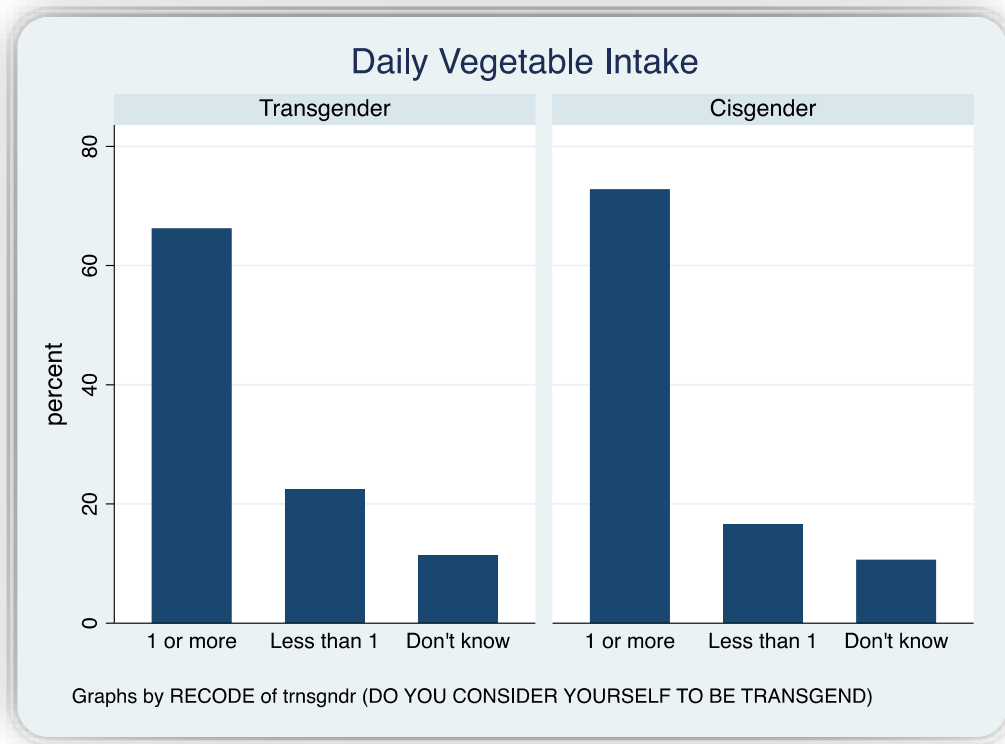


Figure 9. Reported Daily Vegetable Intake by Gender Identity

Table 12. Reported Vegetable Consumption by Gender Identity

	Consume Vegetables >1 time daily		Total
	Yes	No	
Transgender	613 (74.6%)	209 (25.4%)	822
Cisgender	86,469 (90.8%)	20,561 (19.2%)	107,030
Total	87,082	20,770	107,852
Chi ² = 20.2658		P-value < 0.001	

5.0 Conclusions and Implications

5.1 BRFSS Analysis

The number of TGD individuals in the BRFSS sample was low (n=1,513) and made up only 0.62% of the total BRFSS sample (Figure 1). However, the estimate that approximately 390 adults out of every 100,000 in the United States identify as TGD translates to roughly 0.39% of U.S. adults.²³ Therefore, the proportion of TGD individuals in the BRFSS data is greater than the estimated proportion of TGD adults living in the U.S.

5.1.1 Question 1: Are Adults That Identify as Transgender More Likely to Have Poor Health?

There is a statistically significant difference in reported general health between TGD and cisgender BRFSS respondents, whereas a greater proportion of TGD respondents have worse health. Secondly, there is a statistically significant difference in reported poor health days between TGD and cisgender BRFSS respondents. The results show that a greater proportion of TGD respondents report having any poor health days and reporting having many (i.e., greater than seven) poor health days, compared to cisgender respondents.

5.1.2 Question 2: Are Adults That Identify as Transgender More Likely to Have a Diagnosed Health Condition?

Statistical analysis revealed a statistically significant difference in the proportion of TGD and cisgender BRFSS respondents diagnosed with a health condition. The directionality indicated that a greater proportion of cisgender respondents reported a diagnosed health condition, compared to TGD respondents. It is important to consider whether this is a true result or due to confounding factors. It is probable that TGD individuals experience lower rates of diagnosed health conditions due to limited access to care, underinsurance, and missed diagnoses. Research shows that TGD individuals experience increased health disparities, for both physical and mental illnesses.⁴⁹ It is also possible that TGD individuals experience more health concerns in areas not adequately assessed by the BRFSS.

5.1.3 Question 3: Are Adults That Identify as Transgender Less Likely to Have Health Care Access?

Analysis of survey questions pertaining to health care access revealed that TGD respondents, compared to cisgender respondents, are less likely to have checkup with the last year, more likely to have a cost barrier to healthcare, more likely to have no insurance coverage, and more likely to have no PHCP. Stigma and discrimination impact if, where, and when TGD individuals seek care.⁵⁰ Many extant healthcare systems lack adequate knowledge and/or acceptance of affirming medicine for TGD individuals, especially in more remote locations. Removing barriers to care can improve the quality of life for many TGD individuals.

5.1.4 Question 4: Do Adults That Identify as Transgender Report Different Trends in Fruit and Vegetable Consumption Than Cisgender Individuals?

Assessment of the calculated daily fruit and vegetable intake for BRFSS respondents revealed that TGD respondents are more likely to eat no fruit per day and more likely to eat no vegetables per day than their cisgender counterparts. While daily fruit and vegetable intake are not the best indicators, the differential data between TGD and cisgender individuals may provide some insight into eating patterns. The BRFSS does not currently assess disordered eating behaviors, eating disorder diagnosis, or dietary habits beyond fruit and vegetable intake, which limited this analysis.

5.2 Limitations

Several limitations arise from the use of the BRFSS data. Since the BRFSS is a cross-sectional, telephone survey, there is probability that non-response, recall, and/or reporting biases impact the data. Random digit dialing attempts to capture a representative sample. However, the survey is voluntary and numerous individuals may refuse to participate. It is possible that a particular type of individual often chooses not to participate, introducing non-response bias. During data collection, recall and/or reporting bias may be introduced by participant responses. Participants may not accurately remember information (i.e., recall bias), or they may purposely alter their answers to fit a desirable response (i.e., reporting bias).

Outside of bias, the data is limited due to the transgender sample size being small and the amount of missing data being large. The exclusion of institutionalized (e.g., hospitalized,

incarcerated, etc.) individuals and individuals without telephone access may have contributed to the small sample of TGD individuals due to the mental and physical risk factors described above. Additionally, the BRFSS data did not include information on disordered eating and/or eating disorder diagnosis. The absence of this data is consistent with the status of the field. Eating disorder research is underdeveloped, particularly as it pertains to TGD individuals. Relatedly, the use of fruit and vegetable consumption as the only marker of dietary habits per the BRFSS is another limitation recognized by this study.

5.3 Summary of Findings

Overall, these results indicate that TGD adults seem to have:

- Worse general health
- More poor health days
- Fewer diagnosed health conditions
- Greater time since having a routine check-up
- Greater cost barriers to medical care
- Higher rates of uninsurance
- Greater chance of not having a PHCP
- Greater tendency to eat no fruits and/or vegetables per day

The findings of this preliminary project support the fact that TGD individuals experience a greater burden of health concerns, which are likely elevated by the coexistence of disordered eating. Particularly, there appears to be a gap in understanding the needs of this group of individuals. Qualitative research in this area will increase understanding and help guide future research toward appropriate interventions. The public health relevance of this project is the evidence of disproportionate health burdens in the TGD population, as it pertains to ED/DEBs and long-term health outcomes. The recommendations for continued research maintain a public health lens, with a goal to better understand the TGD experience with health and healthcare in order to implement more effective preventative interventions.

Appendix A IRB Approval



EXEMPT DETERMINATION

Date:	December 21, 2022
IRB:	STUDY22090152
PI:	Amanda Jimcosky
Title:	Qualitative Exploration of the Health Implications of Anorexia Nervosa in Transgender and Gender-Diverse Individuals
Funding:	None

The Institutional Review Board reviewed and determined the above referenced study meets the regulatory requirements for exempt research under 45 CFR 46.104(d).

Determination Documentation

Determination Date:	12/21/2022
Exempt Category:	(2)(iii) Tests, surveys, interviews, or observation (identifiable); and for which limited IRB review was conducted via expedited review
Determinations:	
Approved Documents:	<ul style="list-style-type: none"> • Screening and Demographic Qualtrics Survey, Category: Data Collection; • Interview Guide.docx, Category: Data Collection; • HRP-721 - WORKSHEET - Exemption_Tests Surveys Public Behavior_Version_0.01.docx, Category: IRB Protocol; • Informational Script.docx, Category: Recruitment Materials; • Qualtrics Survey: Recruitment and Demographics, Category: Recruitment Materials; • Recruitment_flyer.docx, Category: Recruitment Materials;

If you have any questions, please contact the University of Pittsburgh IRB Coordinator, [Amy Fuhrman](#).

NOTE: Modifications are only required if they will affect the exempt determination. It is important to **close your study when finished** by submitting a Continuing Review.

Please take a moment to complete our [Satisfaction Survey](#) as we appreciate your feedback.



EXEMPT MODIFICATION

Date:	January 25, 2023
IRB:	MOD22090152-001
PI:	Amanda Jimcosky
Title:	Qualitative Exploration of the Health Implications of Anorexia Nervosa in Transgender and Gender-Diverse Individuals
Funding:	None

The Institutional Review Board reviewed the above referenced modification and determined the study continues to meet the regulatory requirements for exempt research under 45 CFR 46.104(d).

Determination Documentation

Determination Date:	1/25/2023
Exempt Category:	(2)(iii) Tests, surveys, interviews, or observation (identifiable); and for which limited IRB review was conducted via expedited review
Approved Documents:	<ul style="list-style-type: none"> FEDUP Accessible ED Treatment Scorecard, Category: Recruitment Materials;

If you have any questions, please contact the University of Pittsburgh IRB Coordinator, [Amy Fuhrman](#).

NOTE: Modifications are only required if they will affect the exempt determination. It is important to **close your study when finished** by submitting a Continuing Review.

Please take a moment to complete our [Satisfaction Survey](#) as we appreciate your feedback.

Appendix B Recruitment Flyer

We want to learn from you!

The University of Pittsburgh is doing a research study to learn about health experiences for people who identify as transgender or gender diverse and have engaged in disordered eating.

You can be included if you:

- Are at least 18 years old
- Identify as transgender and/or gender diverse
- Engaged in disordered eating during adolescence
- Are currently in recovery from disordered eating

Interviews will be done over Zoom. Interviews will take about one hour. You will be given a \$50 gift card to thank you for your time.

Your feedback is strictly confidential.

For more information or to take the screening survey:

- Scan the QR code with your phone camera
- Email ahj14@pitt.edu
- Or visit this link:
[Interview Screening Link](https://tinyurl.com/bdejyy4x)
(<https://tinyurl.com/bdejyy4x>)



Thesis Screening Demographics

Start of Block: Demographics

Thank you for your interest in this study! This brief survey will collect information to determine if you are eligible. It will also collect some basic demographic **information**.

The purpose of this research study is to learn how disordered eating affects health over time. The study will focus on transgender and gender diverse (TGD) individuals.

Are you 18 years old or older?

Yes (1)

No (2)

Skip To: End of Survey If Are you 18 years old or older? = No

What is your age?

18 - 24 (1)

25 - 34 (2)

35 - 44 (3)

45 - 54 (4)

55 - 64 (5)

65 - 74 (6)

75 - 84 (7)

85 or older (8)

Page

Break

What is your sex assigned at birth?

- Male (1)
 - Female (2)
 - Intersex (3)
-

Do you identify as transgender and/or gender diverse?

- Yes (1)
- No (2)
- Prefer not to say (3)

Skip To: End of Survey If Do you identify as transgender and/or gender diverse? != Yes

What is your gender identity?

Man (1)

Woman (2)

Trans-man (3)

Trans-woman (4)

Non-binary (5)

Gender non-conforming (6)

Other (please specify) (7) _____

Page _____

Break

Trigger Warning: The next set of questions ask about disordered eating.

Page _____

Break

Did you engage in disordered eating during your adolescence?

Disordered eating behaviors include, but are not limited to, the following:

- fasting (not eating for long periods of time)
- purging (making yourself throw up)
- bingeing (eating a lot of food at once)
- using laxatives
- using diet pills
- exercising excessively

Yes (1)

No (2)

Prefer not to answer (3)

Skip To: End of Survey If Did you engage in disordered eating during your adolescence? Disordered eating behaviors include,... != Yes

Do you still engage in disordered eating?

- Yes (1)
- No (2)
- Sometimes (3)
- Prefer not to answer (4)

Skip To: End of Survey If Do you still engage in disordered eating? != No

Do you consider yourself to be in recovery from disordered eating?

- Yes (1)
 - No (2)
 - Maybe (3)
 - Prefer not to answer (4)
-

Have you ever been diagnosed with Anorexia Nervosa?

- Yes (1)
- No (2)
- Don't know (3)
- Prefer not to answer (4)

Page _____

Break

Are you interested in participating in a 1-hour interview? During the interview, we would discuss your experience as a transgender and/or gender-diverse individual recovering from disordered eating?

- Yes (1)
- No (2)
- Maybe (3)

If yes, please provide your contact information for follow-up.

Page

Break

The following questions ask about current body composition. Please answer these if you feel comfortable.

What is your approximate current weight? (in pounds)

What is your current height? (in feet and inches)

How would you describe yourself?

Underweight (1)

Healthy weight (2)

Overweight (3)

Obese (4)

Don't know (5)

Prefer not to answer (6)

Page _____

Break

Are you of Hispanic, Latino, or Spanish origin?

Yes (1)

No (2)

How would you describe yourself? Please select all that apply.

White (1)

Black or African American (2)

American Indian or Alaska Native (3)

Asian (4)

Native Hawaiian or Pacific Islander (5)

Other (6)

Page _____

Break

What is your current employment status?

- Employed full time (40 or more hours per week) (1)
 - Employed part time (up to 39 hours per week) (2)
 - Unemployed and currently looking for work (3)
 - Unemployed not currently looking for work (4)
 - Student (5)
 - Retired (6)
 - Homemaker (7)
 - Self-employed (8)
 - Unable to work (9)
-

What is the highest degree or level of school you have completed?

- Less than a high school diploma (1)
 - High school degree or equivalent (e.g. GED) (2)
 - Some college, no degree (3)
 - Associate degree (e.g. AA, AS) (4)
 - Bachelor's degree (e.g. BA, BS) (5)
 - Master's degree (e.g. MA, MS, MEd) (6)
 - Doctorate or professional degree (e.g. MD, DDS, PhD) (7)
-

What U.S. state/territory do you live in?

▼ Alabama (1) ... Virgin Islands (56)

End of Block: Demographics

Appendix D Informational Script

The purpose of this research study is to learn how disordered eating affects health over time. The study will focus on transgender and gender diverse (TGD) individuals.

We will ask 5-7 TGD adults recovering from disordered eating to talk about their health experience and concerns. We will audio record these interviews. We will not document any personal identifiable information (PII) with this data.

We will take every reasonable effort to avoid breach of confidentiality. However, we cannot guarantee privacy during Internet communication. It is possible that others, not associated with this study, will capture information unrelated to research purposes.

In unusual cases, the investigators may be required to release PII related to your participation in this research study. The investigators will need to inform the appropriate agencies if they learn that you, or someone you are involved with, is in serious danger or potential harm. This will only be done as required by Pennsylvania law.

Risks of this study include potential for breach of privacy and discomfort answering questions. To minimize these risks, we will deidentify all data. This means that we will remove any information that could link the data to an individual. There are no direct benefits to you from this research study.

Participants will receive a \$50 gift card at the start of the interview, as a token of our appreciation for their time. All participants will receive \$50, regardless of whether they answer every question.

Your participation is voluntary. You can withdraw from this study at any time. To do so, please contact the Principal Investigator by email (ahj14@pitt.edu).

If you choose not to participate, or you do not complete the study, there will be no effect on your relationship with the University of Pittsburgh or UPMC.

Amanda Jimcosky is conducting this study. You can reach her at ahj14@pitt.edu if you have any questions. If you have concerns about this study, you may contact the Human Subjects Protection Advocate of the Human Research Protection office of the University of Pittsburgh (1-866-212-2668).

Would you like to participate?

Appendix E Interview Guide

The interviewer uses the guide to conduct semi-structured interviews with participants. The example questions provided are initially followed, but the interviewer should allow participants to guide the conversation, within context. This will lead to collection of data that may not have been anticipated but is pertinent to the study.

Appendix Table 1. Interview Guide

Construct	Description	Example Questions
Identity	Individual gender identity	Do you identify as transgender? How do you identify specifically? (e.g. non-binary, gender non-conforming, trans woman, trans man, woman, man, etc.) What was your sex assignment at birth? (e.g. female, male, intersex)
Eating Disorder (ED) Status	History of formal ED diagnosis, attitudes toward diagnosis	Have you ever been diagnosed with an eating disorder? If so, when? (year/age) What was your diagnosis? Do you agree with that diagnosis? Do you think you have an ED but have not received a diagnosis?
Experience with ED	Individual experience of living as a transgender individual with an eating disorder	What has been your experience as a transgender person with an eating disorder? Do you see gender and eating behaviors as connected? If so, how? What has been your experience with healthcare for your gender identity, your eating disorder or both? Was anything helpful? If so, what? Was anything harmful? If so, what? Looking back on those experiences, what do you think <i>would have</i> been helpful?

<p>Connection to metabolic health</p>	<p>Experience with other metabolic health concerns</p>	<p>Have you been diagnosed with any metabolic health condition? (i.e. a condition related to blood pressure, blood sugar, cholesterol/triglyceride levels, kidney function, liver function, etc.)</p> <p>Has your doctor ever recommended any intervention?</p> <p style="padding-left: 40px;">If so, what?</p> <p>Are you now or have you ever been on hormone replacement therapy (HRT)?</p> <p style="padding-left: 40px;">If so, what was your experience?</p> <p>What health-related issues concern you most for you personally?</p>
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Appendix F FEDUP Accessible ED Treatment Scorecard

Accessible ED Treatment Scorecard



This document scores the largest eating disorder treatment programs in the United States on the following accessibility criteria:

This document scores the largest eating disorder treatment programs in the United States on the following accessibility criteria:

TRANS CARE TRAINING/ 15 pts:	Yes
HAES APPROACH/ 15 pts:	Yes
NEUTRAL BATHROOMS/ 15 pts:	Yes
ROOMING POLICY/ 15 pts:	Yes
ACCESSIBILITY/ 15 pts:	Yes
STAFF IDENTITIES/ 15 pts:	Yes
INSURANCE & SCHOLARSHIPS/ 10 pts:	Yes
FINAL GRADE:	A

This document scores the largest eating disorder treatment programs in the United States on the following accessibility criteria:

FACILITY NAME	FINAL GRADE	TRANS TRAINING	HAES APPROACH	NEUTRAL BATHROOM	ROOMING POLICY	ACCESSIBILITY	STAFF IDENTITIES	PUBLIC INSURANCE AND/OR SCHOLARSHIPS	ADDITIONAL NOTES
Alsana	57.5	Some	Yes	Yes	Yes	Some	Unknown	Unknown	Only some areas have wheelchair access. Some ASL access. No stimming space.
Balance NYC	70	Some	Yes	Yes	N/A	Some	Some	Some scholarship + Project Heal	*Not very experienced with autistic people.* Does not accept insurance. No ASL, no info on chair access, yes to stimming.
Carolina House	70	Yes	Yes	Yes	Yes	No	No	Scholarships Available	Did not provide info for any explicit steps they take, no info on stimming space or staff identities provided.
Center for Change	82.5	Yes	Yes	Yes	Yes	Some	Some	Medicaid depending on state; Project Heal partner	Known to have BIPOC and disabled staff, have never had a client who needed ASL but able to provide translators
Center for Discovery	82.5	Yes	Yes	Some	Yes	Yes	Yes	No public insurance, limited scholarships.	Currently, adult residential facilities treat *female-identifying and non-binary identifying* clients; there are no requirements for social or medical transition. Only certain spaces are wheelchair accessible.
Eating Recovery Center	92.5	Yes	Yes	Some	Yes	Yes	Yes	Managed Medicaid Organizations (MC) on the West Coast. Project HEAL partner.	At the start of the assessment process, we ask every patient what their gender & pronouns are and make all on the treatment team aware. It is our priority to avoid retraumatizing patients and making sure everything from their door name tag to their ERC records include their identified name and gender. We will always help patients find expert outpatient providers if they need the support, and we offer a free LGBTQ+ virtual support group.
EDCare	80	Yes	No	Yes	Yes	Some	Yes	Accepts Medicaid	No info provided about HAES-informed approach; BIPOC, QTBIPOC, fat staff. No ASL services.
Equip Health	100	Yes	Yes	N/A	N/A	Yes	Yes	Project Heal partner & sliding-scale spots	Currently treating through age 24 with plans to expand. Virtually held treatment that utilizes FBT.
Laureate Eating Disorders Program	62.5	Some	Yes	No	Yes	Some	Yes	No clear answer provided.	Bottom/top surgery; insurance must recognize they are female; legal documents must say female. Weekly relationship cultural theory group. *One faculty in each age-based program whose population focus are queer folks.* Have single or double rooms, and mostly based on client preference. So, it is the same rules for trans folks. No ASL.
McCallum Place	60	Yes	No	No	N/A	Yes	Yes	No clear answer provided.	Non-binary/gender awareness in language-use in treatment and body image sessions/sexuality group. Frequent training provided by trans people.
Melrose Center	62.5	Some	Yes	No	Unclear	Yes	Yes	Medicare & Medicaid for OP, Patient special needs fund for living expenses.	Diversity training, pronoun "preference", language education. Special clinic within system lead by a lesbian doctor. Annual diversity training as an organization. Didactic and interactive role play.
Monte Nido & Affiliates	95	Yes	Yes	Yes	Yes	Yes	Yes	Some scholarship options	Changed language around gender in paperwork to make it more inclusive (pronouns), changed casual greetings to include more inclusive language (e.g. y'all, everybody, etc.). If there are any issues with staff not being gender-inclusive, they need to be communicated to the Clinical Director, who will then decide the course of action - typically additional training. Extensive (2-week) staff training by partnering with LGBTQIA+ communities in the local area when they are hired initially. Ongoing presentations for staff every month. Learning education modules online must be completed by the staff. Webinars about gender-affirmative care nationally across all Monte Nido locations. Masks available that have a see-through mouth opening for people who need to read lips or need to read facial expressions for communication purposes. Arduous admission process.

FACILITY NAME	FINAL GRADE	TRANS TRAINING	HAES APPROACH	NEUTRAL BATHROOM	ROOMING POLICY	ACCESSIBILITY	STAFF IDENTITIES	PUBLIC INSURANCE AND/OR SCHOLARSHIPS	ADDITIONAL NOTES
Princeton Center for Eating Disorders	72.5	No	Yes	Yes	Yes	Yes	Some	Medicare, Medicaid depending on state. No scholarships.	Almost all clients have their own room assignment.
Reasons	77.5	Yes	Yes	Yes	Yes	Some	Some	Accepts some Medicare, in-state Medicaid, TriCare. No scholarships. Some SCAs are possible when initiated by the client.	PHP and IOP are virtual and for CA residents only. Being a clinician, staff is already versed in gender-specific lingo. Most Reasons licensed therapists will have some knowledge of that because it's required for licensure. Not sure on ASL interpretation or stimming/decompression policies. Reasons will have residential beds for patients of all genders beginning 2/1/22, and officially be treating all genders at all of our levels of care.
Renfrew	65	Yes	No	No	Yes	Yes	Yes	Scholarships for need.	Counselors obtain CEUs in LGBTQIA training
River Oaks	45	No	No	Yes	Yes	Some	No	Medicare, some Medicaid	ASL is limited to certain hours.
Rosewood Center for Eating Disorders	55	Yes	No	No	Unclear	Some	Yes	Limited scholarships based on need.	Staff are trained in competencies in PD and encouraged to receive CEUs. Currently owned by Monte Nido. Has chair access, no answer to other accessibility questions. Says they have BIPOC & LGBTQ staff.
The Body Image Therapy Center	32.5	No	No	Yes	No	Some	Yes	Unknown	Some chair access, no ASL, does have stimming space.
The Emily Program	95	Yes	Yes	Yes	Yes	Yes	Yes	Medicare and Medicaid within Minnesota.	Same parent company as Veritas as of 2020. We recommend reading the answers Veritas supplied below. Did not give detailed answers about accessibility.
The Lotus Collaborative	97.5	Yes	Yes	Yes	N/A	Some	Yes	If referred by Kaiser, covered. One scholarship per year with Project Heal. Offers sliding scale scholarship funds.	From inquiry to assessment we ask open ended questions and we have to fill in the blank paperwork for self-identification. We have set up the EHR so the only thing that shows up for the client is name and pronouns. All signage is gender inclusive, including restrooms. Mirrors are covered. Yes, we have staff that identify as nonbinary and genderqueer, as people of color, neurodivergent, queer and fat. Nobody identifies as disabled or QTBIPOC that has been disclosed. Some chair access, ASL & Spanish by request, has stimming space.
Timberline Knolls	25	No	No	No	No	Some	No	Private insurance only.	Cannot be an adolescent boy who says they are female. Leaning more to present as female. Accommodate those who identify as female. Did not specify accessibility answers aside from ramp provided.
Veritas Collaborative	20	No	No	Yes	Unclear	Unclear	No	Possible SCA with Medicaid	No answer to "What specific practices do you or your organization have in place to support LGBTQIA+ folks?" All staff are required to provide training to all staff members. This is done a few times a year.
Walden Behavioral Health Rainbow Road IOP	100	Yes	Yes	N/A	N/A	Yes	Yes	All commercial, Medicaid, part of Project HEAL healer circle and work with families case by case.	Recently acquired by Monte Nido.

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