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# Unmet Oral Health Needs and Barriers to Dental Care Utilization Among Marginalized Youth

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## Abstract

Oral health is integral to overall well-being, yet marginalized youth experience disproportionate barriers to accessing dental care, contributing to unmet oral health needs and poorer outcomes. This thesis examined oral health inequities among marginalized youth through two studies. First, a scoping review was conducted to synthesize evidence on unmet oral health needs and barriers to care. Findings identified persistent unmet needs and financial, structural, and psychosocial barriers that limited access to dental services. The second was an exploratory cross-sectional study that assessed the association between dental anxiety and self-reported oral health among youth affiliated with Youth Opportunities Unlimited. Although no statistically significant association was observed, the direction of estimates was consistent with prior research, suggesting the plausibility of an underlying association. Future research should further examine how systemic, financial, and psychosocial barriers interact to shape oral health outcomes, and inform interventions to enhance oral health awareness and improve access to dental care among marginalized youth.

## Keywords

Dental care, dental visits, access, unmet needs, barriers, marginalized, youth

## Summary for Lay Audience

Oral health plays a pivotal role in overall well-being, especially in youth, who undergo substantial physical, psychological, and social development. However, marginalized youth such as those experiencing homelessness, immigrants, individuals from racial and ethnic minority groups, Indigenous peoples, those with low socioeconomic status, and sexual minorities often experience poor oral health outcomes due to limited access to dental care. The objective of this thesis was to examine the unmet oral health needs of this population and identify the barriers that restrict their access to oral health services.

The first study reviewed existing research on unmet oral health needs and barriers to dental care among marginalized youth. A total of seven studies were identified and analyzed, highlighting a complex interplay of financial, structural, and psychosocial barriers. Factors such as high treatment costs, lack of dental insurance, limited transportation, long wait times, negative experiences with dental professionals, and discrimination frequently restricted access to care. These findings demonstrate the need for more comprehensive and representative research to better understand oral health inequities affecting marginalized youth. Future efforts by oral health advocates should focus on ensuring that marginalized youth populations can both access and benefit from oral health care services.

The second study investigated whether dental anxiety, fear or apprehension related to dental visits, was associated with how youth perceive their oral health. Participants were recruited from Youth Opportunities Unlimited, an organization supporting the personal and professional development of youth. Although no statistically significant association was

found, the direction of results was consistent with previous studies, suggesting that fear and anxiety may play a role in how youth perceive their oral health.

Overall, the findings indicate that oral health inequities among marginalized youth arise from the combined effects of financial, structural, and psychosocial factors. They underscore the importance of equity-oriented strategies in research, policy, and practice to reduce oral health disparities and promote better outcomes among marginalized youth.

## Co-Authorship Statement

This thesis includes one manuscript presented in Chapter 2, representing the version submitted for publication.

Chapter 2: Vaishampayan P, Beniwal Singh J, McLean S, Wilk P, Jessani A. Unmet Oral Health Needs and Barriers to Dental Care Services among Socially Marginalized Youth: A Scoping Review.

Pranav Vaishampayan contributed to the conceptualization and design of the study, development of the search strategy, title and full-text screening, data extraction, quality assessment, data interpretation, and drafting the original manuscript. Jaskaran Singh Beniwal contributed to title and full-text screening, data extraction, and quality assessment. Dr Piotr Wilk and Dr. Sarah McLean contributed to study conceptualization and design, data interpretation, manuscript review, and critical revisions. Dr. Abbas Jessani contributed to study conceptualization and design, data interpretation, manuscript review, and critical revisions.

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## Chapter 1

### 1 Introduction

Extensive research has been conducted to explore outcomes within oral health systems, encompassing parameters such as oral health conditions and frequency of dental visits. The subsequent discussion briefly outlines the significance of expanding this research, particularly considering marginalized youth, to gain a more comprehensive understanding of the barriers restricting access to oral health services, the patterns of utilization of services, and the potential implications of poor oral health on overall well-being.

#### 1.1 Oral health of youth

Oral health serves as a critical indicator of overall health, as it is significantly associated with systemic diseases, including cardiovascular disease, diabetes, and respiratory illness (Kane, 2017). Data from the oral health component of the Canadian Health Measurement Survey (CHMS) indicate that oral health among Canadians has significantly improved over recent decades (Canada and Health Canada, 2010). Nevertheless, the severity of oral health conditions, such as dental caries, remain prevalent among young adults (Hagman et al., 2021). Hagman et al. (2021) reported a substantial burden of dental caries among youth, with numerous dental surfaces exhibiting visible carious lesions. Similarly, periodontal diseases, including gingivitis and dental calculus, remain common (Peeran et al., 2013). For example, Peeran et al. (2013) reported that dental calculus was detected in 44.3% of youth.

Multiple factors contribute to poor oral health outcomes in youth. Prior research has identified socioeconomic and demographic characteristics, frequency of toothbrushing,

and dental anxiety as significant risk factors for caries experience (Hagman et al., 2021; Ditmyer et al., 2010). Juli et al. (2006) further demonstrated that gingival inflammation and consumption of sweet beverages were significantly associated with high caries experience. In addition, smoking has been identified as a major risk factor for periodontitis among youth (Peeran et al., 2013).

Challenges pertaining to access to oral health services and affordability also play a central role, resulting in suboptimal oral health conditions and unmet needs (Canada and Health Canada, 2010). In Canada, most dental expenditures are financed through private or employer-sponsored insurance or paid out-of-pocket, with public funding representing only approximately 5% of total expenditures (CIHI, 2005). Consequently, the cost of dental care represents a primary factor for disparities in access to dental care services (Baldota & Leake, 2004; CIHI, 2005). Uninsured young adults are 2.5 times less likely to receive dental care and three times more likely to have unmet needs compared to insured young adults (Ditmyer et al., 2010).

In addition to economic barriers, physical and psychological barriers further impede access to oral healthcare services. Determinants such as transportation availability, flexible work schedules, wait times, scheduling of appointments, discrimination, and dental anxiety are significantly associated with access to oral care services (Heima et al., 2017; Rowden et al. 2011). These barriers are worse for a subpopulation of youth, known as marginalized youth. Youth belonging to Indigenous communities, homeless youth, immigrant youth, and transgender youth encounter compounded barriers due to their marginalized status (Pitcher et al., 2019; Robards et al., 2018).

Despite a growing body of literature examining access to oral healthcare among marginalized populations, limited research has specifically focused on marginalized youth. This gap highlights the necessity of strengthening efforts to enhance access to dental care and address widening oral health disparities among youth, particularly those from marginalized communities. Equity-oriented policies and interventions, such as expanding public dental coverage, promoting awareness of preventive oral health practices, and ensuring a sufficient and well-trained dental workforce, are essential to mitigate these disparities and improve long-term oral health outcomes.

## 1.2 Thesis objectives

Research in Canada examining access to dental care and the barriers that limit utilization of services among youth is notably limited. This thesis aims to address this research gap by investigating the unmet oral health needs and patterns of dental service utilization among marginalized youth, while also exploring the barriers that impede their access to care. To accomplish this objective, a comprehensive approach involving a scoping review and an exploratory cross-sectional study was undertaken.

The objectives of the scoping review were to:

- Explore the extent of available literature on the unmet oral health needs of marginalized youth globally
- Investigate the breadth of literature available on barriers to accessing oral healthcare among marginalized youth globally.

The objectives of the exploratory cross-sectional study were to:

- Investigate the association between dental anxiety and self-reported oral health status among a sample of marginalized youth affiliated with Youth Opportunities Unlimited.
- Examine this association after accounting for age and sex, included as confounders.

This study addresses a critical gap in existing literature and provides baseline information to inform oral health policy and practice. Generating such evidence is essential for guiding the development of preventive and equity-oriented strategies, integrating oral health promotion within existing youth services, and strengthening oral health literacy among both youth and primary healthcare providers. Enhanced understanding of prevalent oral health issues within this population will help identify areas for future clinical and policy interventions.

### 1.3 Thesis format

This thesis follows an integrated article format and consists of four chapters. The first chapter presents an overview and outlines the introduction, rationale, and objectives of the thesis. Chapter 2 presents the findings of the scoping review that maps existing evidence on unmet oral health needs and barriers to accessing dental care among marginalized youth. The chapter describes the search strategy, inclusion and exclusion criteria, data extraction process, and synthesis of findings. In chapter 3, findings of an exploratory cross-sectional study is presented. The chapter outlines the study design, data collection methods, and analytical approach used. It investigates the association between dental anxiety and self-reported oral health, with age and sex considered as potential

confounders. Finally, chapter 4 presents an integrated discussion of the findings from both studies. It discusses implications for dental public health research, policy, and practice, and concludes with recommendations for future research and evidence-informed strategies aimed at improving access to oral healthcare and reducing disparities among marginalized youth.

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## Chapter 2

# 2 Unmet Oral Health Needs and Barriers to Dental Care Services among Marginalized Youth: A Scoping Review

### 2.1 Abstract

**Objectives:** Barriers limiting access to oral health significantly impact dental service utilization among marginalized youth, often resulting in unmet needs and poor oral health outcomes. Identifying and understanding these barriers is critical to inform the development of strategies to enhance oral healthcare access for this vulnerable population. This review aimed to assess the scope of existing literature on barriers to oral healthcare access and the unmet dental needs of marginalized youth on a global scale.

**Methods:** A comprehensive search was performed across electronic databases, including PubMed, MEDLINE (Ovid), Scopus, and the Cochrane Library. Two independent reviewers screened all primary studies, irrespective of publication year, to identify relevant research on barriers to care and unmet oral health needs among marginalized youth. The CLARITY tool was utilized to evaluate the risk of bias in the included studies.

**Results:** Of the 484 studies identified, 7 studies met the inclusion criteria. Three studies were conducted in the United States, two in Australia, and one each in the United Kingdom and Kenya. The primary barriers reported included high treatment costs (n=4), long traveling distances to dental clinics (n=2), limited appointment availability (n=1), and insufficient transportation (n=1). Additionally, unmet dental needs reported among

participants included dental caries (n=3), missing teeth (n=2), periodontal diseases (n=1), tooth pain (n=1), and dental infections (n=1). However, small sample sizes limit the findings' generalizability, emphasizing the need for more, diverse studies on oral health outcomes in marginalized youth.

**Conclusion:** The review identified significant unmet oral health needs and key challenges related to accessing dental care among marginalized youth. These barriers limit access to dental services, resulting in an underutilization of oral health care. The findings emphasize a critical gap in research, highlighting the necessity for a targeted approach that addresses the specific barriers encountered by this population. Developing such an approach is essential for understanding how marginalization affects marginalized youth and impacts their access to oral healthcare.

## Keywords

dental health services; dental care; marginalized; youth; unmet needs; barriers

## 2.2 Introduction

The progression from adolescence to adulthood, also known as 'youth', is characterized by numerous changes that may significantly influence individuals' health and overall welfare. These changes encompass personal, psychological, and social development, including academic achievement, employment acquisition, attaining financial independence, and avoiding involvement with the criminal justice system (Goodland and Dawe, 2020).

Youth can be described as the transitional phase between childhood and adulthood, characterized by a continuum of developmental changes rather than rigid age-based boundaries or specific milestones—for example, engagement in employment or sexual activity initiation (Furlong, 2012). The United Nations Department of Economic and Social Affairs (UNESDA) defines youth as individuals typically aged between 15 and 24 years, yet acknowledges the variability of this classification across member states (Heritage C, 2021). Alternative age brackets, such as 18-30, have also been proposed by institutions such as Statistics Canada, highlighting the diverse perspectives on what age group classifies as youth (Heritage C, 2021).

A distinct subgroup of youth, identified as marginalized youth, experiences additional obstacles in their progression to adulthood. These impediments include but are not limited to lower family income, enduring struggles with substance abuse, and the inability to complete their education (Goodland and Dawe, 2020). Additionally, these impediments also cause a significant burden on their health, including oral health. This subgroup could be disproportionately comprised of recent immigrants, Indigenous people, individuals experiencing homelessness, people living with HIV, sexual minorities, and those with low socioeconomic status.

Some common oral health conditions reported by marginalized youth are tooth pain, gingivitis, dental caries, periodontal diseases, and dental erosion (Fleming and Afful, 2018; Rowan et al., 2013). Furthermore, Johansson et al. (2015) highlighted that poor oral health among marginalized youth is often due to negative past experiences, dental anxiety, dental trauma, and pain associated with dental treatments. Consequently, there exists a notable underutilization of dental care services in this vulnerable population,

underscoring the importance of addressing the barriers that impede access to oral care services.

Studies indicate that various socio-economic characteristics including financial limitations, lack of insurance, cultural and language differences, geographical constraints, and psychological factors, function as barriers that restrict the accessibility of marginalized youth to essential oral healthcare services. For instance, Sharma et al. (2020) reported that youth with low socioeconomic status exhibited lower utilization of dental care services. Furthermore, cost and geographical proximity are also reported as a significant determinant of dental care utilization. Approximately 25% of individuals aged 18 and above reported not visiting a dentist due to the inability to afford services (Chattopadhyay et al., 2003; Williams et al., 2011). For example, Wiener (2023) highlighted the limited access to dental care services among Indigenous youth due to extended travel times and reliance on external assistance for transportation. Additionally, Hill et al. (2023) reported that participants identifying themselves as Alaska Native, American Indian, Native Hawaiian, or other Pacific Islander were 1.6 times less likely to receive preventive services, such as dental cleaning, compared to their Caucasian counterparts despite having dental insurance. This disparity underscores an inadequate awareness regarding oral care practices among marginalized youth.

Furthermore, the literature identifies gender discrimination particularly among minority genders as a significant barrier to the utilization of dental care services by marginalized youth which inhibits their likelihood of receiving preventive dental services in comparison to their heterosexual counterparts (Raisin et al., 2023; Heima et al. (2017).

The presence of such barriers impeding access contributes to suboptimal utilization of oral healthcare services among marginalized youth, resulting in unmet oral health needs and poor oral health status. Broadly, unmet oral health needs are referred to as oral diseases or conditions that remain unaddressed, representing a discrepancy between the need for professional dental care and the care actually received. When left untreated, such unmet needs may progress to more severe and complex oral health conditions in later life stages. Within the context of this review, unmet needs denote conditions that require professional attention or assessment but remain untreated, including but not limited to dental caries, periodontal diseases, or oral infections.

Despite these concerning findings, there is a lack of comprehensive evidence for individual and societal barriers to accessing dental care and oral health service utilization among marginalized youth. Therefore, this scoping review aims to analyze the extent of available literature on the unmet oral health needs of marginalized youth globally and investigate the breadth of literature available on barriers to accessing oral healthcare among them.

## 2.3 Methodology

The Joanna Briggs Institute (JBI) Reviewers Manual was utilized to conduct this scoping review (Aromataris and Munn 2020). This manual offers detailed instructions for authors to adhere to, covering distinct sections dedicated to synthesizing various kinds of evidence pertinent to different types of review inquiries (Aromataris and Munn 2020). The manual was utilized as a reference resource to address queries concerning the scoping review procedure. Based on the suggestion provided in the JBI Manual, the scoping review protocol was registered with the Open Science Framework, as

PROSPERO has specified that scoping reviews do not qualify for registration in their database (Aromataris and Munn 2020). We adhered to the reporting guidelines outlined in the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) for this review (Tricco et al. 2018; Page et al. 2021). A completed PRISMA-ScR checklist has been provided as Appendix 1. Before commencing study screening, a protocol for this scoping review was registered on the Open Science Framework ([doi.org/10.17605/OSF.IO/T82D3](https://doi.org/10.17605/OSF.IO/T82D3)). The pre-registered protocol contains essential details concerning selection criteria and the extraction of data from the included publications. This step was taken to ensure maximum transparency in the scoping review process and to affirm that our original objectives aligned with our methodology.

### 2.3.1 Inclusion Criteria

This review aimed to identify research articles examining unmet oral health needs, the accessibility of oral health care services among marginalized youth, and the barriers preventing their utilization of these services. Studies were eligible for inclusion if they identified or quantified the presence of oral diseases or conditions, such as dental caries, or if they assessed self-reported unmet treatment needs.

The target population encompassed marginalized youth aged 18-30 years, irrespective of their oral health status or outcomes related to oral health care. Within the context of this review, marginalized youth were defined as individuals experiencing social or structural disadvantage or exclusion due to factors such as gender, race, ethnicity, socioeconomic status, and immigration status. English-language publications from diverse geographic regions were considered, without imposing any limitations based on publication dates. A

comprehensive range of methodologies, comprising qualitative, quantitative, and mixed methods approaches, were included in this review.

### 2.3.2 Exclusion Criteria

The following criteria were used to exclude studies while reviewing publications during screening: studies that do not examine the accessibility of oral health services for marginalized youth and the factors impeding access to services; studies that document results not related to oral health or oral health care; studies published in a language other than English; and studies for which the full text was unavailable.

### 2.3.3 Search Strategy

P.V. and J.B., in collaboration with a research librarian, formulated the search strategy aimed at identifying relevant literature concerning the accessibility of oral health care services for marginalized youth and elucidating the barriers associated with such accessibility. The databases explored were Medline, Embase, Scopus, and Cochrane Library. For an in-depth understanding of our search methodology, refer to Table 2.1.

### 2.3.4 Reference Management

All the citations extracted from every database search were transferred to Covidence (2023) for the elimination of duplicate findings. While the majority of publications' full texts were accessible online, any unavailable texts were excluded.

### 2.3.5 Study Screening

Two phases of screening were employed to identify pertinent studies. During the initial stage, only the titles and abstracts were assessed, while the subsequent stage involved a thorough review of the full texts. Both screening stages were carried out independently

by two reviewers (P.V. and J.B.). Any discrepancies between reviewers were resolved through discussions.

### 2.3.6 Data Extraction

A standardized tool for data extraction (Appendix 2) was formulated to facilitate the extraction and comparison of pertinent information across the encompassed studies. Initially, the data extraction tool underwent a pilot phase involving 25% of included studies, following which adjustments were made to ensure comprehensive extraction of all pertinent data. All revisions made have been incorporated into the final version of the data extraction tool (Appendix 3). The data extraction process was carried out and validated by both reviewers P.V. and J.B.

### 2.3.7 Risk of Bias Assessment

While scoping reviews typically do not evaluate the risk of bias in the included studies, we considered it essential for our objectives due to the absence of robust study designs. This assessment aimed to ascertain the quality of evidence presented by the included studies. We employed the CLARITY Group's Risk of Bias Instrument for Cross-Sectional Surveys of Attitudes and Practices (CLARITY Group at McMaster University 2021) to evaluate the risk of bias. This instrument was selected for its ease of understanding and ability to provide a comprehensive overview based on five domains (Representativeness of the sample, Adequacy of the response rate, Missing data within completed questionnaires, Conduct of Pilot testing, and established validity of survey instrument). Each criterion is addressed through a question format with 4 response options: definitely yes (low risk of bias), probably yes (low risk of bias), probably no (high risk of bias), and definitely no (high risk of bias). This instrument was employed

because it facilitates the reporting of risk of bias on a domain-specific basis rather than providing an overall single rating.

## 2.4 Results

### 2.4.1 Search Results

The outcomes of the search and screening process are illustrated in figure 2.1. Following the implementation of the search strategy, a total of 484 studies were identified across various databases: Medline (n = 152), Embase (n = 105), Scopus (n = 219), and Cochrane Library (n = 8). Subsequently, 234 duplicate studies were removed, leaving 250 studies eligible for title and abstract screening. From these, 167 studies were excluded, resulting in 83 studies selected for full-text review. The full-text review excluded an additional 76 studies for various reasons, primarily due to the lack of identified youth populations. Finally, 7 studies were included in our review that underwent data extraction.

### 2.4.2 Descriptive Characteristics

Table 2.2. summarizes the data extracted from the included studies. The studies were conducted in the United States (n = 3; Aday and Forthofer, 1992; Chattopadhyay et al., 2003; Cohen et al., 2011), Australia (n = 2; Stormon et al., 2019; Smith and Szuster, 2000), United Kingdom (n = 1; Croucher and Sohanpal, 2006), and Kenya (n = 1; Manji et al., 1989). All included studies were published in or after 1989 and employed observational designs (n = 7; Aday and Forthofer, 1992; Chattopadhyay et al., 2003; Cohen et al., 2011; Stormon et al., 2019; Smith and Szuster, 2000; Croucher and Sohanpal, 2006; Manji et al., 1989). Sampling methods comprised random sampling (n = 4; Chattopadhyay et al., 2003; Cohen et al., 2011; Smith and Szuster, 2000; Manji et al.,

1989), probability sampling (n = 1; Aday and Forthofer, 1992), convenience sampling (n = 1; Stormon et al., 2019), and snowball sampling (n = 1; Croucher and Sohanpal, 2006).

The sources of samples were diverse across studies. Three studies utilized data from surveys, namely the National Health Interview Survey (n = 1; Aday and Forthofer, 1992), the Minority Health Survey (n = 1; Chattopadhyay et al., 2003), and Maryland household data from the 2000 U.S. Census (n = 1; Cohen et al., 2011). One study recruited participants from East London (n = 1; Croucher and Sohanpal, 2006), while another was conducted in a rural area in the Northern Machakos district in Kenya (n = 1; Manji et al., 1989). The remaining two studies recruited participants from institutional settings, including the United Dental Hospital (n = 1; Smith and Szuster, 2000) and the Brisbane Youth Service community organization (n = 1; Stormon et al., 2019).

Sample sizes varied, with two studies having less than 100 participants (Croucher and Sohanpal, 2006; Smith and Szuster, 2000), two having between 100 and 500 participants (Cohen et al., 2011a; Stormon et al., 2019), and three studies having more than 500 participants (Aday and Forthofer, 1992, Chattopadhyay et al., 2003; Manji et al., 1989). Additionally, marginalization factors reported include racial and ethnic minorities (n=4; Aday and Forthofer, 1992; Chattopadhyay et al., 2003; Croucher and Sohanpal, 2006; Cohen et al., 2011), low-income (n=1; Cohen et al., 2011), homelessness (n=1; Stormon et al., 2019), residence in a rural area (n=1; Manji et al., 1989), and refugee status (n=1; Smith and Szuster, 2000).

### 2.4.3 Objective 1: Unmet Oral health Needs and Patterns of Dental Service Utilization

Table 2.2 presents the findings reported by each study regarding unmet needs and oral health services utilization. Six out of seven studies reported findings pertaining to this objective (Aday and Forthofer, 1992; Chattopadhyay et al., 2003; Cohen et al., 2011; Stormon et al., 2019; Smith and Szuster, 2000; Manji et al., 1989). Out of the six studies, four studies reported on the unmet dental needs of participants (Manji et al., 1989; Smith and Szuster, 2000; Stormon et al., 2019; Cohen et al., 2011) whereas four reported information regarding patterns of utilization of oral health services (Aday and Forthofer, 1992; Chattopadhyay et al., 2003; Cohen et al., 2011; Stormon et al., 2019).

Studies reported that unmet needs such as decayed and untreated teeth, periodontal conditions, and xerostomia were observed to be prevalent among the participants (Manji et al., 1989; Smith and Szuster, 2000). In a study examining rural populations, Manji et al. (1989) reported an age-associated increase in the prevalence of dental caries.

Participants aged 15-24 (48.8%) and 25-34 (82.4%) exhibited lower rates of dental caries compared to individuals aged 35-44 (86.8%), 45-54 (84.2%), and 55-65 (92.9%).

Similarly, Stormon et al. (2019) found that among individuals experiencing homelessness, those aged 15-25 had a lower percentage of decayed teeth when compared to homeless participants aged 23-61. However, Smith and Szuster (2000), in a study focusing on refugees, reported that the number of decayed teeth was higher in individuals aged 15-24 ( $4.3 \pm 3.9$ ) and 25-34 (5.0) compared to people aged 35-44.

Smith and Szuster (2000) reported that the number of missing teeth was lower in individuals aged 25-34 ( $11 \pm 6.2$ ) than in participants aged 35-44 ( $11.5 \pm 6.0$ ). Similarly,

Stormon et al. (2019) also reported a lower rate of missing teeth in participants aged 15-25 when compared to those aged 23-61. Additionally, the DMFT (Decayed, Missing, and Filled Teeth) score was less for participants aged 15-24 ( $12.6 \pm 6.4$ ) compared to the DMFT score for participants aged 35-44 ( $19.9 \pm 7.6$ ). Nevertheless, the DMFT score for participants aged 25-34 ( $21.9 \pm 7.2$ ) was more than for participants aged 35-44 ( $19.9 \pm 7.6$ ) (Smith and Szuster, 2000).

Furthermore, Cohen et al. (2011), in a study investigating low-income individuals, reported that participants aged 21-34 were less likely to report concerns with tooth pain (10.6%), broken teeth or restorations (2.4%), and infections (17%) compared to the 35-49 age group (40.4%, 16.7% and 27%, respectively). This study also reported that participants aged 21-34 were more likely to report periodontal problems (34.6%) and oral conditions such as sores, ulcers, bad taste, and burning sensation (32.3%) when compared to participants aged 35-49 (6.1%, 0.2%).

Regarding patterns of oral health service utilization, Chattopadhyay et al. (2003), examining racial and ethnic minorities, reported that dental visits were more frequent in participants aged 18-25 (67%) compared to participants aged 25-39 (59%) and 40+ (37.4%). A similar pattern was observed in the study by Stormon et al. (2019) where 25% of participants aged 16-25 visited the dentist in the past 12 months compared to 24% of individuals aged 23-61. Furthermore, certain studies only reported the likelihood of dental visits among participants. For example, in a study focusing on racial and ethnic minorities, Aday and Forthofer (1992) reported that males, members of larger families, and individuals without employment were less likely to visit a dentist. Specifically, males older than 18 were less likely to visit a dentist compared to males aged 2-17 years old.

Further, unemployed participants and those living in non-metropolitan areas who were 18 years and older were less likely to visit a dentist compared to participants aged 2-17 years who were unemployed and those living in non-metropolitan areas (Aday and Forthofer, 1992). However, participants aged 18 years and older with private insurance and those who perceived their oral health as good exhibited a greater likelihood of a dental visit compared to participants aged 2-17 years with private insurance and those who perceived their oral health as good (Aday and Forthofer, 1992).

#### 2.4.4 Objective 2: Barriers restricting access to oral healthcare

Barriers restricting access to oral care services are also presented in Table 2.2. All seven studies (Aday and Forthofer, 1992; Chattopadhyay et al., 2003, Cohen et al., 2011, Croucher and Sohanpal, 2006, Stormon et al., 2019, Smith and Szuster, 2000, Manji et al., 1989) identified the barriers experienced by participants while accessing oral care.

Among reported barriers, cost was determined to be the most commonly reported factor for participants who avoided dental care (n=4; Chattopadhyay et al., 2003, Croucher and Sohanpal, 2003, Stormon et al., 2019, Cohen et al., 2011). Approximately 63% of individuals reported an inability to afford dental care services (Stormon et al., 2019). Moreover, not having any type of insurance also significantly impacted the decision of participants to visit a dentist (Aday and Forthofer, 1992). For instance, 35% of individuals without dental insurance reported not visiting a dentist due to high treatment costs (Chattopadhyay et al., 2003). Furthermore, distance was also observed to be a significant barrier (n=2; Croucher and Sohanpal, 2006, Manji et al., 1989) along with anxiety related to cost and dental visits (n=1; Croucher and Sohanpal, 2006), lack of appointments (n=1; Croucher and Sohanpal, 2006), long waiting periods to schedule

appointments (n=1; Croucher and Sohanpal, 2006), availability of dental clinics (n=1; Stormon et al., 2019), and transportation availability (n=1; Stormon et al., 2019).

According to Croucher and Sohanpal (2006), distance as a factor influenced dental visits, with participants only attending the nearest dental facilities. The lack of adequate transportation further restricted participants' access to oral care services (Stormon et al., 2019). For example, 20% of respondents reported a lack of transportation to access dental care facilities (Stormon et al., 2019). Additionally, dental anxiety or fear was also a significant factor influencing respondents' decisions to accept treatment. Croucher and Sohanpal (2006) observed that participants reported anxiety associated with treatment costs which was heightened by the lack of transparency and consistency in fee structures across different dental practices. Moreover, anxiety related to the acceptance of treatment from a dentist of the opposite gender was also reported as a concern among participants (Croucher and Sohanpal, 2006). Consequently, there was a reduced likelihood of accessing dental care.

Furthermore, the availability of appointments also significantly influenced the access to dental care facilities. Croucher and Sohanpal (2006) reported that participants expressed concerns about extended wait times while scheduling routine appointments. Although emergency appointments were accessible, participants reported waiting for approximately two months for routine checkups, exacerbating their unmet oral health needs.

Additionally, the limited number of dental clinics further contributed to reduced access to dental care. Stormon et al. (2019) reported that 25% of participants avoided dental visits due to a lack of facilities in their neighbourhood.

### 2.4.5 Risk of Bias Assessment

The risk of bias assessment, utilizing the CLARITY Group's Risk of Bias Instrument for Cross-Sectional Surveys of Attitudes and Practices (2021), elucidated significant variability in the reliability of reported outcomes. Among the seven studies evaluated, four (Aday and Forthofer, 1992; Chattopadhyay et al., 2003; Cohen et al., 2011; Croucher and Sohanpal, 2006) demonstrated a high risk of bias in one or more of the domains of the instrument. Conversely, three studies (Stormon et al., 2019; Smith and Szuster, 2000; Manji et al., 1989) were determined to have an overall moderate to low risk of bias. A summary of the risk of bias assessment is presented in Table 2.3., which employs colour coding where green denotes a low risk of bias and red indicates a high risk of bias.

## 2.5 Discussion

This review sought to assess the breadth and scope of literature addressing the barriers to oral health care access and the utilization of oral health services among marginalized youth on a global scale. Despite the increased developments in research and efforts directed toward promoting the health of marginalized populations, substantial effort is still required to attain health equity for marginalized youth. This vulnerable population has limited access to oral healthcare and insurance coverage which exacerbates adverse health outcomes, including mental illnesses such as depression and anxiety, as well as chronic diseases like diabetes (Myers-Wright, 2015). To our knowledge, this is the first scoping review that examines the literature on oral health care across multiple marginalized youth groups, and it found that oral health research particular to this vulnerable population is limited.

Our results highlight poor oral health outcomes among marginalized youth due to unmet oral health needs. In four of seven studies, participants reported conditions such as decayed and missing teeth, infections, and periodontal issues (Smith and Szuster, 2000; Stormon et al., 2019; Cohen et al., 2011; Manji et al., 1989). These adverse outcomes may stem from limited awareness of preventive oral health measures and available services (Goswami et al., 2023; Dodd et al., 2014). Consequently, there is a need for the development of targeted educational interventions aimed at improving the oral health of marginalized youth. Public health interventions tailored to this group could enhance awareness about the importance of oral health. Our results highlighted that unmet dental treatment needs were strongly associated with access to dental care facilities, with socioeconomic factors such as cost and insurance coverage, significantly influencing service utilization. Therefore, it is imperative for policymakers to prioritize the mitigation of these social determinants to improve access to dental services. Interventions such as income-based subsidies could play a critical role in improving both the affordability and accessibility of dental care services (Etemadi et al., 2022).

Among marginalized youth, our studies identified groups such as refugees and other ethnic minorities with severe dental problems and unmet needs when compared to their counterparts. This highlights the intersectionality of various social determinants of health with unmet oral health needs and dental service utilization. According to Crenshaw (1991), intersectionality is described as the interaction of an individual's social attributes such as race, ethnicity, age, gender, education, socioeconomic status, and sexual orientation or gender identity which collectively determine their social identity. However, limited knowledge exists regarding the interaction of these social determinants and their

cumulative impact on oral health and access to care particularly in this population (Anticono et al., 2023). Consequently, it is imperative to investigate the intersectional experiences of individuals in dental care, considering factors such as ethnicity, socioeconomic status, and religious beliefs (Muirhead et al., 2020). Adopting an intersectionality framework could enhance our comprehension of health inequities. This approach could facilitate the identification of populations that are most susceptible to barriers in utilizing dental services causing these populations to disengage from care.

Our review also highlighted the low utilization rates of dental care services in this population (Aday and Forthofer, 1992; Chattopadhyay et al., 2003; Stormon et al., 2019). This low utilization of services can be attributed to a lack of insurance, as unemployed individuals do not have access to employer-sponsored private insurance (Abdelrehim et al., 2023). Furthermore, inadequate education among low-income individuals may lead to a lack of awareness and knowledge about preventive health services, thereby limiting access to dental care (Lazar and Davenport, 2018). Other factors such as age, gender, education, and occupation can be associated with low dental service utilization. For example, Rahman (2023) reported that individuals with lower educational levels had a reduced likelihood of utilizing dental care compared to those with higher educational levels. Similarly, Kim et al. (2017) reported that individuals with only an elementary-level education or lower were less likely to utilize dental services, resulting in unmet needs, compared to individuals with university-level education or higher. These findings underscore the barriers marginalized youth experience while accessing oral health services. In addition to these social barriers, Griner et al. (2023) also identified various psychological barriers restricting accessibility to oral care among marginalized youth.

Our findings underscore that anxiety and fear experienced by participants substantially influenced their willingness to seek dental care (Croucher and Sohanpal, 2003). A significant factor contributing to this anxiety was identified as discomfort with receiving treatment from practitioners of the opposite gender than that of the patient (Croucher and Sohanpal, 2003). Additionally, Griner et al. (2023) indicate that discrimination based on gender, race, or ethnicity may further heighten anxiety and fear among youth, thereby restricting their access to dental care services.

Our findings corroborate that cost is a significant factor for youth in avoiding dental care services (Chattopadhyay et al., 2003; Croucher and Sohanpal, 2003; Stormon et al., 2019; Cohen et al., 2011). This issue is heightened by factors such as the lack of insurance and homelessness (Chattopadhyay et al., 2003; Stormon et al., 2019). For instance, Stormon et al. (2019) reported that approximately 64% of homeless youth avoided visiting dental care facilities due to high costs. Consequently, our review indicated that participants often accessed dental care services for emergency purposes rather than preventive measures (Cohen et al., 2011). Additionally, distance and lack of transportation present significant barriers to accessing care (Croucher and Sohanpal, 2006; Manji et al., 1989; Stormon et al., 2019). The lack of adequate transportation increases inaccessibility issues among marginalized youth who live far from dental care facilities. Therefore, to mitigate barriers to oral health services, policymakers should consider implementing subsidies that facilitate dental care access for marginalized communities. This approach is particularly crucial in regions where oral health services are predominantly privately administered, such as in Canada and the United States (Chari et al., 2022).

Regarding study designs, most of the studies exhibited limited sample sizes, raising concerns regarding the generalizability of their findings. However, recruitment challenges within marginalized populations may have contributed to these sample sizes (Faber and Fonseca, 2014; Gatlin and Johnson, 2017; Bonevski et al., 2014). Gatlin and Johnson (2017) highlight the difficulties in data collection among marginalized communities such as immigrants, Indigenous individuals, transgender individuals, and racial and ethnic minorities. Researchers often encounter issues such as mistrust toward health-related research, challenges in conveying the benefits of participation, time constraints, fear of public exposure, cultural beliefs that discourage participation, and low literacy levels (Gatlin and Johnson, 2017). Additionally, few of the identified studies used a binary form of gender expression and lacked inclusion of gender and sexual minorities (Stormon et al., 2019; Smith and Szuster, 2000; Croucher and Sohanpal, 2006). Significant gaps exist in understanding the oral health of LGBT+ youth, with very limited to no evidence on unmet oral health needs and patterns of dental service utilization within this population. Therefore, to address these challenges and enhance recruitment, strategies such as engaging community navigators or providing financial compensation and gift vouchers could be implemented to achieve a representative sample population (Schwab et al., 2024; Gupta et al., 2023; Bonevski et al., 2014).

This review has several limitations. A notable limitation of this review is the variability in the age ranges reported across the included studies. The literature suggests that youth cannot be accurately defined by specific age brackets. Therefore, achieving consistency in age ranges among the included studies proved challenging. Although most of the included studies stratified participants by age, two of the seven studies did not implement

age-based stratification (Aday and Forthofer, 1992; Croucher and Sohanpal, 2006). Consequently, the findings reported are not age-specific but rather generalizable to the wider age spectrum (>18 years, and 18-40 years respectively). Nonetheless, despite this broad age spectrum, the findings of the two studies provide crucial insight into the target population. Furthermore, the limited number of studies included in this review highlights a critical research gap, underscoring the need for a more tailored approach that specifically addresses the oral health needs of marginalized youth. Developing such an approach is crucial for understanding the impact of marginalization on this demographic and its effects on access to oral healthcare.

Additional limitations of this review are the restricted geographic scope of the included studies, which may limit the generalizability of the findings to other global contexts. Also, the search strategy was limited to English-language papers, thereby excluding research published in other languages. However, the extent of relevant studies in languages other than English remains unclear.

## 2.6 Conclusion

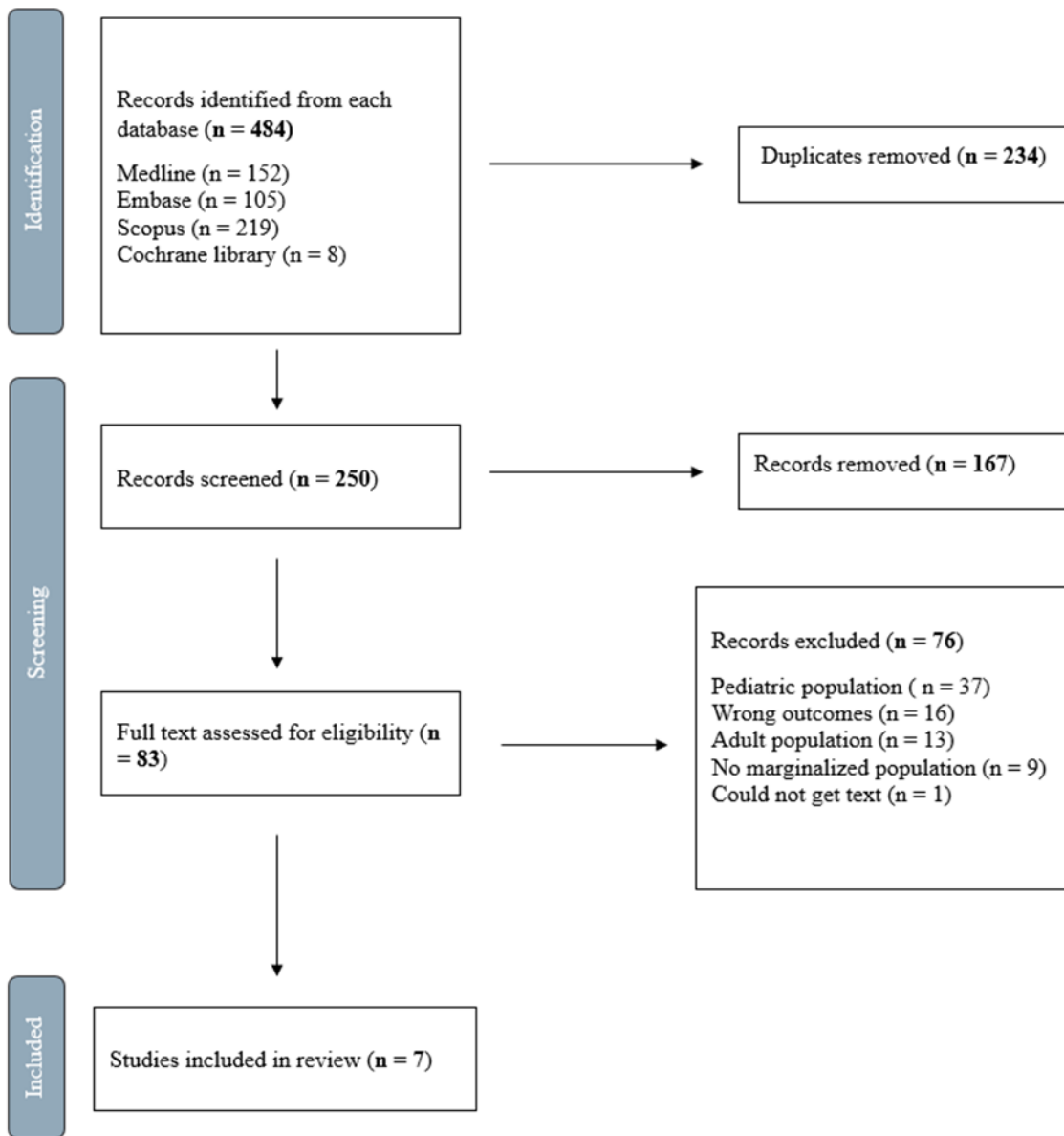
Our review identified a significant research gap concerning the unmet oral health needs and barriers to accessing dental services among marginalized youth. However, limited available evidence highlights poor oral health outcomes within this population, with a high prevalence of unmet needs, including dental caries and periodontal diseases. Furthermore, the barriers experienced by these individuals significantly restrict their utilization of dental care services. Although some studies utilized validated measures (e.g. the DMFT index) to assess oral health, our findings highlight significant limitations, including small sample sizes and lack of varied study designs. Despite these limitations,

this review provides a comprehensive overview of the available evidence concerning the barriers to oral health services for marginalized youth, identifies gaps in the literature, and suggests directions for future research. Notably, more robust and representative research is required to gain a deeper understanding of the oral health status of marginalized youth. Future efforts by oral health advocates should focus on ensuring that marginalized youth populations can both access and benefit from oral health care services.

## 2.7 Acknowledgement

We extend our gratitude to Christy Sich from Western University Libraries for her invaluable assistance in developing the search strategy for this scoping review.

## 2.8 Figures and Tables



**Figure 2.1: PRISMA flow diagram of study selection. Adapted from Tricco et al. (2018).**

**Table 2.1:** Search strategies for MEDLINE, Embase, Scopus, and Cochrane Library keyword searches.

	<b>Database</b>			
<b>Concept</b>	<b>MEDLINE (Ovid)</b>	<b>Embase</b>	<b>Scopus</b>	<b>Cochrane Library</b>
<b>Oral Health / Dental Health</b>	“oral health”.tw,kf. or “oral care”.tw,kf. or dental.tw,kf. or oral health/ or exp dental care/ or [exp delivery of health care/ and (dentistry or dental).tw,kf.]	“oral health”.tw,kf. or “oral care”.tw,kf. or dental.tw,kf. or dental health/ or [health care delivery/ and (dentistry or dental).tw,kf.]	(( title-abs-key ( "oral health" )) or ( title-abs-key ( "oral care" )) or ( title-abs-key ( dental )) or (( title-abs-key ( "dental care" )) or (( title-abs-key ( "delivery of health care" )) and ( title-abs-key ( ( dentistry or dental ) ) ) ) ) )	(“oral health”):ti,ab,kw or (“oral care”):ti,ab,kw or (“dental care”):ti,ab,kw or [oral health] or [dental care](exploded) or {[delivery of health care] (exploded) and (dentistry or dental):ti,ab,kf}
<b>Youth</b>	“young adult”.tw,kf. or youth.tw,kf. or “young individual*”.tw,kf. or “young people”.tw,kf. or “young person*”.tw,kf. or teen*.tw,kf. or adolescen*.tw,kf. or young adult/ or adolescent/	“young adult”.tw,kf. or youth.tw,kf. or “young individual*”.tw,kf. or “young people”.tw,kf. or “young person*”.tw,kf. or teen*.tw,kf. or adolescen*.tw,kf. or young adult/ or adolescent/	( title-abs-key ( "young adult" )) or ( title-abs-key ( youth )) or ( title-abs-key ( "young individual*" )) or ( title-abs-key ( "young people" )) or ( title-abs-key ( "young person" )) or ( title-abs-key ( "young person" )) or ( title-abs-key ( teen* )) or ( title-abs-key ( adolescen* ))	(“young adult”):ti,ab,kw or (youth):ti,ab,kw or (“young individual”):ti,ab,kw or (“young person”):ti,ab,kw or (teen*):ti,ab,kw or (adolescen*):ti,ab,kw or [young adult] or [adolescent]

<b>Marginalization</b>	Marginali*.tw,kf. or “socially disadvantage*”.tw,kf. or disadvantaged.tw,kf. or homeless*.tw,kf. or immigra*.tw,kf. or minorit*.tw,kf. or minority groups/ or ethnic minorities/ or “sexual and gender minorities”/ or social marginalization/	Marginali*.tw,kf. or “socially disadvantage*”.tw,kf. or disadvantaged.tw,kf. or homeless*.tw,kf. or immigra*.tw,kf. or minorit*.tw,kf. or social exclusion/ or minority group/ or “sexual and gender minority”/	( title-abs-key ( marginali* ) ) or ( title-abs-key ( ( "socially disadvantag*" ) ) ) or ( title-abs-key ( disadvantaged ) ) or ( title-abs-key ( homeless* ) ) ) or ( title-abs-key ( ( immigra* ) ) ) or ( title-abs-key ( ( minorit* ) ) ) or ( title-abs-key ( ( "social marginalization" ) ) ) or ( title-abs-key ( ( "minority groups" ) ) ) )	(marginali*):ti,ab,kw or (socially disadvantaged):ti,ab,kw or (disadvantaged):ti,ab,kw or (homeless*):ti,ab,kw or (immigra*):ti,ab,kw or (minorit*):ti,ab,kw or [social marginalization] or [minority groups] or [ethnic and racial minorities] or [sexual and gender minorities]
<b>Barriers to care</b>	Barrier*.tw,kf. or (access adj3 care).tw,kf. or (access adj health).tw,kf. or Health services accessibility/	Barrier*.tw,kf. or (access adj3 care).tw,kf. or (access adj health).tw,kf. or Health care access/	( title-abs-key ( barrier* ) ) or ( title-abs-key ( access* ) )	(barrier*):ti,ab,kw or (access to care):ti,ab,kw or [health services accessibility]
<b>Linking Concepts</b>	1 AND 2 AND 3 AND 4 N = 152	1 AND 2 AND 3 AND 4 N = 105	1 AND 2 AND 3 AND 4 N = 219	1 AND 2 AND 3 AND 4 N = 8

**Table 2.2:** Data extraction table.

<b>Author(s),Year</b>	<b>Country</b>	<b>Type of Study</b>	<b>Sample Size</b>	<b>Sample Source</b>	<b>Sampling Method</b>	<b>Age Range</b>	<b>Marginalization Factor</b>	<b>Barriers to Care</b>	<b>Patterns of Dental Visits; unmet needs</b>
Aday and Forthofer, 1992	USA	Cross-sectional	58,435	1986 National Health Interview Survey	Probability Sampling	>18 years vs 2-17 years	Racial and ethnic minority	No insurance	Individuals residing in metropolitan areas (OR = 1.145), people with private insurance (OR = 1.711), and people who perceived their health as good or very good (OR = 1.260) were more likely to visit a dentist
Chattopadhyay et al., 2003	USA	Cross-sectional	1,836	Minority Health	Random Sampling	18-25 years	Racial and ethnic minority	Cost	<b>Dental Visit (% , age):</b>

				Survey, New York		vs 25-39 and 40+ years			<p>67% (18-25), 59%(25-39),37.4%(40+)</p> <p>People with dental insurance (OR = 2.5) and married individuals (OR = 1.7) were more likely to visit a dentist</p> <p>People with low educational backgrounds were less likely to visit a dentist (OR = 0.6)</p>
Cohen et al., 2011	USA	Cross-sectional	401	Mayland households	Stratified Random Sampling	21-34 years vs 35-	Low-income Racial and ethnic minority	Cost	<b>Dental Visits:</b> 87.9%

				(2000 U.S. Census data)		49, 50-64, and 65+ years			12% did not visit the dentist within the last two years.
Croucher and Sohanpal, 2006	UK	Cross-sectional	68	Community volunteers from East London	Snowball sampling	18-40 years	Racial and ethnic minority	High Cost Distance Lack of Appointments Long wait time (2 months)(Except emergency cases) Dental Anxiety: Discomfort in visiting/accepting treatment	Not Reported

								from a dentist of the opposite gender.	
Manji et al., 1989	Kenya	Cross-sectional	1131	Rural area of Northern Machakos district	Random Sampling	15-24 and 25-34 years vs 35-44, 45-54, and 55-65 years	Rural Area	Distance	<p><b>Lesions involving Enamel:</b> 25-34 years old (9.13 ± 8.97)</p> <p><b>Dental Caries:</b> 15-24 years old (48.8%), 25-34 years old (82.4%)</p>
Smith and Szuster, 2000	Australia	Cross-sectional	Control =850 Refugee = 86	United Dental Hospital	Simple random sampling for control	15-24 and 25-34 years vs 35-44 years	Refugee Status	Location	<p><b>Dental Visits</b> No dental visits were observed among 15-24 Iraqi refugees whereas one-third of 25-34 Iraqi refugees</p>

									<p>visited the dentist.</p> <p><b>Decayed, missing, filled teeth (DMFT) index (mean <math>\pm</math> SD)</b></p> <p>Decayed: 15-24 years old (4.3 <math>\pm</math> 3.9), 25-34 years old (5.0)</p> <p>Missing: 25-34 years old (11 <math>\pm</math> 6.2)</p> <p>Filled: 15-24 years old (5.8 <math>\pm</math> 5.1)</p>
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									DMFT: 15-24 years old (12.6 ± 6.4), 25-34 years old (21.9 ± 7.2)
Stormon et al., 2019	Australia	Cross-sectional	116	Brisbane Youth Service community organization	Convenience Sampling	16-25 years vs 23-61 years	Homelessness	Cost  Lack of Dental Clinics  Transportation	<b>Self-Reported Oral Health (%)</b> Excellent/Very good (11%), Good (28%), Fair (32%), Poor (30%).  <b>Unmet needs (%)</b> 77%

**Table 2.3:** Ratings of Included Cross-Sectional studies using CLARITY Group’s Risk of Bias Instrument for Cross-sectional surveys of Attitudes and Practices.

Author(s), Year	Is the Source Population Representative of the Population of Interest?	Is the Response Rate Adequate?	Are There Little Missing Data?	Is the Survey Clinically Sensible?	Is There Any Evidence for the Reliability and Validity of the Survey Instrument?
Aday and Forthofer, 1992	Probably yes	Definitely yes	Definitely no	Probably yes	Probably no
Chattopadhyay et al., 2003	Probably yes	Probably no	Definitely yes	Definitely yes	Probably yes
Cohen et al., 2011	Probably yes	Definitely yes	Definitely yes	Probably no	Definitely yes
Croucher and Sohanpal, 2006	Definitely no	Definitely yes	Definitely yes	Probably yes	Probably yes
Manji et al., 1989	Probably yes	Definitely yes	Probably yes	Probably yes	Probably yes
Smith and Szuster, 2000	Probably yes	Definitely yes	Probably yes	Definitely yes	Definitely yes
Stormon et al., 2019	Probably yes	Definitely yes	Definitely yes	Definitely yes	Probably yes

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## Chapter 3

### 3 Dental anxiety and self-reported oral health among marginalized youth: An exploratory cross-sectional study.

#### 3.1 Abstract

**Objectives:** To examine the association between dental anxiety and self-reported oral health among marginalized youth, and to assess this association after adjusting for age and sex as potential confounders.

**Methods:** An exploratory cross-sectional study was conducted among 50 participants aged 18-30 years affiliated with Youth Opportunities Unlimited (YOU). Data were collected using a questionnaire adapted from the Canadian Health Measures Survey (CHMS). Descriptive statistics were computed to summarize sample characteristics. Logistic regression analyses were performed to estimate both crude and adjusted odds ratios for the association between dental anxiety and self-reported oral health, controlling for age and sex.

**Results:** Nearly half of participants (46%) reported experiencing anxiety related to dental care, and 38% rated their oral health as fair or poor. No statistically significant crude association was identified between dental anxiety and self-reported oral health (OR = 1.54, 95% CI = 0.49 to 4.85). The association remained non-significant after adjusting for age and sex (OR = 1.66, 95% CI = 0.51 to 5.43).

**Conclusion:** The elevated prevalence of both dental anxiety and self-reported oral health in this sample underscores their significance as public health concerns. Although no statistically significant associations were identified, the direction of estimates was consistent with prior research, suggesting the plausibility of an underlying association. These findings emphasize the need for larger, adequately powered studies to further examine the impact of psychosocial determinants on oral health outcomes on marginalized youth.

## 3.2 Background and rationale

### 3.2.1 Self-reported oral health

Self-reported oral health is commonly utilized in epidemiological research as a valid and informative measure for overall oral health status (Blizniuk et al., 2017). It directly influences individual well-being and plays a critical role in shaping health-related behaviors. Perceptions of oral health significantly affect the likelihood of seeking dental care and the effectiveness of oral health promotion initiatives, thereby affecting actual oral health outcomes. Individuals who perceive their oral health to be poor are more inclined to seek care or advice compared to those who do not recognize the presence of oral health issues (Kojima et al., 2013).

Self-reported oral health is influenced by both clinical and subjective factors. Clinical factors include the presence of dental caries, tooth loss, and gingival bleeding, whereas subjective determinants encompass self-rated general health, dental appearance, and the presence of oral pain (Kojima et al., 2017; Patussi et al., 2007). Furthermore, sociodemographic characteristics such as age, sex, education, and socioeconomic status have also been shown to be associated with self-reported oral health (Hussain et al., 2021;

Patussi et al., 2007). For example, age-related trends indicate that older individuals perceive their oral health status as poorer compared to younger individuals (Fagundes et al., 2022; Fahim et al., 2022). However, evidence regarding sex differences is inconsistent. Some studies report a higher prevalence of poor self-reported oral health among females (Patussi et al., 2007; Blizniuk et al., 2017), while others suggest that males are more likely to report poor oral health (Hussain et al., 2021).

### 3.2.2 Oral health disparities

Evidence highlights a disproportionate burden of oral diseases among youth from marginalized populations. Among marginalized youth, this developmental stage is characterized by heightened susceptibility to oral diseases including, but not limited to dental caries, infections, and periodontal diseases, attributable to suboptimal oral hygiene practices (Griner et al., 2023; Hagman et al., 2021; Peeran et al., 2013). For instance, Donald and Milgrom (2008) reported that 15% of youth experiencing homelessness rated their oral health as poor, frequently reporting broken or sensitive teeth and untreated abscesses. Similar patterns have also been reported among other marginalized populations. Among Indigenous youth, studies have reported that nearly one in three individuals experience untreated dental caries, along with high prevalence of persistent toothache, bleeding gums, and halitosis (Hussain et al., 2021; Jamieson et al., 2010). Similarly, transgender and gender nonconforming (TGNC) youth exhibit significantly poorer oral health outcomes compared to their cisgender counterparts. Manpreet et al. (2021) reported that TGNC participants exhibited a higher mean DMFT score ( $8.4 \pm 0.9$ ) compared to their cisgender control group ( $3.6 \pm 1.5$ ). These findings underscore that oral health inequalities are widespread across diverse marginalized youth populations.

Preventive interventions are therefore critical to reducing disparities in oral health outcomes among marginalized youth. However, access to oral healthcare services remains limited within this population due to numerous structural, socio-economic, and psychosocial barriers, thereby exacerbating existing disparities in oral health outcomes (Northridge et al., 2020; Raisin et al., 2023).

Financial barriers, particularly high treatment costs and lack of insurance represent a primary obstacle to dental care. For example, Stormon et al. (2019) reported that 63% of youth experiencing homelessness did not access dental care services due to high treatment costs. Structural barriers such as geographic distance, limited appointment availability, transportation difficulties, and getting time off work similarly restrict access to dental services (Bhoopathi et al., 2020; Levesque et al., 2013; Croucher and Sohanpal, 2006). Beyond economic and structural challenges, psychosocial determinants also contribute to restricting access to care. Fakhrajahani and Jessani (2023) reported that individuals identifying as LGBTQ+ frequently encounter stigma and discrimination related to their gender identity. Similarly, Griner et al. (2022) observed that sexual minority youth often avoided accessing dental care facilities due to anticipated or experienced gender-based discrimination. Experiences of racial discrimination have also been linked to reduced access to dental care. Sabbah et al. (2021) demonstrated that youth reporting experiences of racial discrimination were less likely to utilize dental services compared to those who did not. These barriers contribute to persistent disparities in oral health outcomes and result in underutilization of dental services among marginalized youth. Understanding these factors that affect oral health and inhibit regular utilization of dental care services is essential for the development of targeted health policy interventions aimed at reducing

oral health inequities (Jönsson et al., 2020). Among the various psychosocial determinants, dental anxiety is particularly significant given its direct impact on limiting access to dental care and influencing both care-seeking behaviour and oral health outcomes (Galicia-Diez Barroso et al., 2023).

### 3.2.3 Dental anxiety

Dental anxiety is referred to as an intense fear or apprehension associated with dental treatment (Mutluay & Mutluay, 2022; Seligman et al., 2017). It represents a prominent psychosocial barrier to utilization of care, often leading to avoidance of dental care and increasing the risk and severity of oral diseases. Individuals experiencing dental anxiety frequently delay or forego dental care, which can exacerbate existing oral health issues and necessitate more invasive and complex treatment procedures (Seligman et al., 2017). These procedures often involve pain and discomfort, thereby reinforcing the individual's anxiety and creating a cyclical pattern of avoidance and deteriorating oral health. Emerging evidence further suggests that the implications of dental anxiety extend beyond oral health, potentially influencing broader systemic health conditions (Bano et al., 2021; Armfield et al., 2009).

While dental anxiety often originates in childhood and tends to peak during adolescence or early adulthood, some studies have identified onset occurring in young adulthood. Notably, individuals with adolescent-or-adult-onset dental anxiety often exhibit lower levels of trust towards dental professionals. Sex-based differences have also been documented, with females reporting higher levels of dental anxiety compared to males (Bano et al., 2021; Armfield et al., 2009; Oktay et al., 2009). This disparity may be explained by lower pain tolerance among females, as well as heightened tendency to

recall painful experiences following treatment. Given that both age and sex are associated with dental anxiety and self-reported oral health, they may act as potential confounders and distort the association between dental anxiety and self-reported oral health.

Therefore, controlling for age and sex is critical to accurately interpret the relationship between dental anxiety and self-reported oral health.

Despite being prevalent among youth, dental anxiety remains an underexplored phenomenon within this population (Yap & Lee, 2022). Furthermore, findings from our scoping review (Vaishampayan et al., 2025) highlight a critical gap in the literature regarding the impact of dental anxiety on oral health outcomes among youth from marginalized communities, underscoring the need to investigate this association within this demographic. To address this research gap, this exploratory cross-sectional study aims to investigate the association between dental anxiety and self-reported oral health status among marginalized youth affiliated with Youth Opportunities Unlimited, while controlling for age and sex as potential confounders.

### 3.3 Research Objectives

This study aims to explore how dental anxiety is associated with self-reported oral health status among marginalized youth, while controlling for potential confounding by age and sex. Specifically:

1. To investigate the association between dental anxiety and self-reported oral health status among a sample of marginalized youth affiliated with Youth Opportunities Unlimited.

2. To examine this association after accounting for age and sex, included as confounders.

## 3.4 Methodology

### 3.4.1 Data and sample

This study is an exploratory cross-sectional observational study. Participants for this study were recruited from Youth Opportunities Unlimited (YOU), a non-profit organization based in London and Middlesex County that is dedicated to supporting the personal and professional development of youth. The organization offers a wide array of programs tailored to address the diverse and evolving needs of youth, including educational support, skills training, employment services, mentorship, and leadership development programs. In response to the multifaceted challenges encountered by youth, YOU has expanded its services to include housing support and access to healthcare including physical, mental, and oral health services (Ionson et al., 2022). Annually, YOU supports approximately 3600 youth aged 16 to 30 years. The majority of these individuals come from disadvantaged backgrounds and frequently experience intersecting challenges related to poverty, family instability, homelessness, substance abuse, anxiety, and other mental health concerns.

Ethical approval for this study was obtained from the Western University Health Science Research Ethics Board (HSREB). Eligibility criteria were that individuals: (1) were between 18-30 years of age; (2) demonstrated the capacity to provide informed consent and voluntarily agree to participate in the study; and (3) possessed the ability to effectively provide responses to the survey in English. The decision to focus on individuals aged 18-30 was informed by findings from our scoping review (Vaishampayan et al., 2025), which

identified a substantial gap in research on oral health and barriers to care among marginalized youth in this age range. Setting the lower limit at 18 years also ensured that participants could legally provide informed consent, thereby facilitating recruitment and avoiding ethical complexities.

Recruitment was conducted in collaboration with the YOU staff. A designated staff member informed potential participants about the study, provided the consent form (Appendix 4), and addressed any questions participants had. Upon obtaining informed consent, participants were asked to complete a questionnaire. Identifiers such as name, date of birth, etc. were not collected to protect participant confidentiality.

The survey questionnaire (Appendix 5) utilized in this study was adapted from the Canadian Health Measures Survey (CHMS), a nationally representative health survey designed to collect detailed information on oral health indicators among the Canadian population. The development of the final version of the questionnaire for this study was further informed by its research objective.

Data collection occurred from January 2025 to February 2025. Completed questionnaires were collected by a graduate student and securely entered in a locked storage area. The data was subsequently entered into a password-protected Excel file on a secure laptop. Access to data was restricted to the principal investigator (AJ) and the graduate student. A total of 50 participants completed the questionnaire and were included in the analysis.

## 3.4.2 Measurement Instruments

### 3.4.2.1 Outcome variable

The outcome (dependent) variable in this study was self-reported oral health status, measured through the question “In general how do you rate the health of your mouth?” with response options of excellent, very good, good, fair, and poor. For analytical purposes, the variable was dichotomized as 0 = excellent/very good/good and 1 = fair/poor.

The decision to dichotomize the outcome variable was guided by two primary considerations. First, the relatively small sample size ( $N = 50$ ) meant that retaining the original categories would have produced sparse cell counts and unstable estimates, thereby compromising the robustness of the findings. Second, the chosen cut-points for dichotomization were informed by prior literature and widely used in public health research, distinguishing participants who perceived their oral health as good from those who perceived it as poor (Zaitso et al., 2024; Csikar et al., 2016; Liu, 2014). Following dichotomization, 31 participants reported good, very good, or excellent oral health, while 19 participants reported fair or poor oral health.

### 3.4.2.2 Exposure variable

The exposure (independent) variable in this study was dental anxiety, assessed by the question “If you went to a dentist for treatment tomorrow, how would you feel?” with response options of not anxious, slightly anxious, fairly anxious, very anxious, and extremely anxious. For analytical purposes, the variable was dichotomized as 0 = not anxious/slightly anxious and 1 = fairly anxious/very anxious/extremely anxious.

Consistent with the rationale outlined for the outcome variable, the exposure variable was dichotomized to enhance the stability of estimates and maintain comparability with existing literature. The relatively small sample size ( $N = 50$ ) limited the feasibility of the retaining original categories, as doing so would have resulted in small cell counts and unstable estimates. The selected cut-points also reflected prior research, distinguishing participants with low anxiety levels from those with moderate to high anxiety levels, which prior studies have identified to be strongly associated with poor oral health and dental care avoidance (Seligman et al., 2017; Crego et al., 2014; Pohjola et al., 2007). Following dichotomization, 27 participants were classified as not anxious or slightly anxious, and 23 participants were classified as fairly, very, or extremely anxious.

### 3.4.2.3 Confounders

A confounder is defined as a variable that is associated with both the exposure and the outcome, but does not lie on the causal pathway, thereby distorting the observed association between the exposure and outcome ( Szklo and Nieto, 2019). A variable is considered as a confounder if it meets the following three criteria: (1) it is associated with the exposure; (2) it is independently associated with the outcome; and (3) it is not an intermediate step in the causal pathway between the exposure and the outcome.

In this study, age and sex were identified as potential confounders based on these a priori criteria. Both factors have demonstrated associations with dental anxiety, with evidence indicating higher anxiety levels among females than males and that anxiety tends to decline with age. Additionally, age and sex have been associated with self-reported oral health status. Older individuals are more likely to report poorer oral health compared to younger individuals, and although findings regarding sex differences are inconsistent,

some studies suggest that females tend to be more likely to report their oral health as good compared to males. Lastly, neither age nor sex lies on the causal pathway between dental anxiety and oral health status.

In the survey, age was measured using the question “How old were you on your last birthday?” For descriptive analyses, age was categorized, whereas in both unadjusted and adjusted regression models it was analyzed as a continuous variable. Sex was assessed using the question “What sex were you assigned at birth” with response options of male and female. For analysis, sex was treated as a binary variable (male = 0 and female = 1).

### 3.4.3 Analysis

#### 3.4.3.1 Descriptives

All analyses were performed using SAS (Version 9.4). Descriptive statistics were initially computed to summarize the distribution of study variables, including self-reported oral health status, dental anxiety, age, and sex, presented as frequencies and percentages. As there were no missing data for the variables included in the analysis, procedures for handling missing data were not required.

#### 3.4.3.2 Research objectives

After describing the sample characteristics, logistic regression analysis was employed to examine the association between dental anxiety and self-reported oral health status (i.e., to investigate the association between dental anxiety and self-reported oral health status) and then adjusting for potential confounding by age and sex (i.e., to examine the association after accounting for age and sex, included as confounders). Logistic regression is a widely used method for examining the effect of predictor variables on a

binary outcome. Models with a single predictor are termed univariable logistic regression models, whereas those including multiple predictors, whether categorical or continuous, are referred to as multivariable logistic regression models (Hosmer et al., 2013; Nick et al., 2007). This approach was appropriate for the present study, as the outcome variable (self-reported oral health status) was dichotomized into two categories (good/very good/excellent vs. fair/poor oral health) with dental anxiety as the primary exposure and age and sex included as covariates.

A fundamental application of logistic regression is to estimate the association between a primary exposure and the outcome while accounting for confounding by additional variables. This may be accomplished by comparing results from crude (unadjusted) and adjusted models (Vittinghoff et al., 2012). An univariable logistic model provides a crude odds ratio, reflecting the association between the outcome and the primary exposure without controlling for other factors. A multivariable logistic model estimates the adjusted odds ratio that accounts for potential confounding by including additional covariates. When the magnitude of the crude odds ratio substantially differs from the magnitude of the adjusted odds ratio, it suggests the presence of confounding, with the adjusted ratio representing a more accurate estimate of the association. In our study, both unadjusted and adjusted models were estimated. The unadjusted model provided a crude estimate of the association between dental anxiety and self-reported oral health status, without accounting for potential confounding by age and sex, allowing comparison with the adjusted model to examine the potential influence of confounding by age and sex.

A key feature of logistic regression is that regression coefficients are expressed on the log-odds scale, which can be exponentiated to yield odds ratios (Vittinghoff E, 2012).

Odds ratios quantify the association between an outcome and an exposure. They are commonly used as a measure of association between two binary variables (Bland and Altman, 2000). In logistic regression, however, this principle is extended to allow inclusion of categorical and continuous covariates as well (Hosmer et al., 2013). In our study, regression coefficients were exponentiated to derive odds ratios and corresponding 95% confidence intervals, which quantified the association between dental anxiety and self-reported oral health status.

In addition to odds ratios, p-values and 95% confidence intervals were reported for both models and statistical significance was defined as p-value less than 0.05. A p-value represents the probability of obtaining results as extreme as those observed, under the assumption that the null hypothesis is true. Conventionally, a p-value smaller than 0.05 is interpreted as evidence against the null-hypothesis, implying that the observed association is unlikely to have occurred due to chance alone (Sterne and Smith, 2001; Goodman, 1999). However, p-values do not convey information regarding the magnitude of an effect or the precision of its estimate.

Confidence intervals, by contrast, provide a range of plausible values within which the true parameter is likely to lie, thereby quantifying both the magnitude of the effect and the degree of uncertainty (Altman, 2005). Unlike p-values, confidence intervals illustrate not only whether an effect exists but also the range of effect sizes consistent with the data, thus reflecting both the direction and precision of the association (Altman, 2005). Narrow intervals indicate greater precision, whereas wide intervals reflect higher uncertainty. Confidence intervals also indicate statistical significance; for example, in logistic

regression, a 95% CI for an odds ratio that excludes 1 suggests that the observed association is unlikely to be due to chance (Vittinghoff et al., 2012).

P-values and confidence intervals thus provide distinct but complementary perspectives on statistical inference (Altman, 2005). In logistic regression, a statistically significant p-value (e.g.  $p < 0.05$ ) corresponds to a 95% CI for the odds ratio that excludes the null value of 1. Nevertheless, both the 0.05 significance threshold and the convention of 95% confidence are arbitrary, and alternative cutoffs (e.g., 90% or 99%) may also be applied (Altman, 2005). While a small p-value reflects the strength of evidence against the null hypothesis, confidence intervals uniquely illustrate the range of plausible parameter values consistent with the data (Vittinghoff et al., 2012). Used together, they facilitate a more comprehensive interpretation of study findings, shifting the focus from a binary assessment of ‘significant versus non-significant’ towards a more nuanced understanding of both the strength of evidence and the precision of the effect estimate. Notably, this complementarity between p-values and confidence intervals extends across a broad range of statistical models, including logistic regression (Vittinghoff et al., 2012). However, the interpretability of these measures is influenced by sample size, which affects the reliability of estimates.

Adequate sample size is a critical consideration in logistic regression analysis. Small sample sizes can lead to unstable regression coefficients and wide confidence intervals, thereby compromising the reliability of effect estimates (Sullivan et al., 2006). Sample size is intrinsically linked to statistical power, defined as the probability of detecting a true effect when one exists (Mascha et al., 2018). Reduced power increases the risk of a type-II error, that is failing to reject the null hypothesis despite it not being true. Within

the context of this study, low power implies that non-significant findings cannot be interpreted as strong evidence of no association, as they may simply reflect an inability to detect effects of plausible magnitude. Conversely, statistically significant findings derived from small samples must also be interpreted cautiously, as effect sizes are prone to overestimation and confidence intervals may remain wide, reflecting imprecision (Sullivan et al., 2006).

Prior research underscores these challenges associated with small sample sizes. Button et al. (2013) demonstrated that inadequate sample sizes compromise the reliability and stability of effect estimates, heighten variability across studies, and restrict generalizability. Similarly, Ioannidis (2005) reported that studies with limited statistical power are more prone to false-negative findings and substantially contribute to the problem of irreproducibility. In logistic regression, these issues are compounded by the inclusion of additional covariates, as each additional variable further reduces statistical power.

In this study, the relatively small sample size ( $N = 50$ ) necessitates cautious interpretation of the results. The limited sample size is expected to reduce power, increase the likelihood of type-II error, and yield wide confidence intervals. Accordingly, the findings should be regarded as exploratory, underscoring the need for replication in larger samples with sufficient statistical power.

## 3.5 Results

### 3.5.1 Sample Characteristics

Table 3.1 presents the sample characteristics. The mean age of participants was 21.6 years (SD = 2.3), with nearly half of the sample falling within the 18-21 age group. Females constituted the majority of the sample, representing approximately two-thirds (66%) of participants. Nearly half of the participants (46%) reported experiencing anxiety related to dental care. Regarding self-reported oral health, 38% of the participants rated their oral health as fair or poor.

### 3.5.2 Dental Anxiety and Self-reported Oral Health

The first objective of this study was to assess whether there was an association between dental anxiety and self-reported oral health status before adjustment for confounders. As shown in Table 3.2, no statistically significant crude association was identified (OR = 1.54, 95% CI = 0.49 to 4.85).

The second objective was to assess the association between dental anxiety and self-reported oral health status after adjustment for age and sex. As shown in Table 3.2, the adjusted association remained non-significant (OR = 1.66, 95% CI = 0.51 to 5.43). With respect to covariates, no statistically significant association was identified for age (OR = 1.05, 95% CI = 0.81 to 1.37) or for sex (OR = 1.40, 95% CI = 0.38 to 5.12).

## 3.6 Discussion

Marginalized youth remain underrepresented despite experiencing a disproportionate burden of oral diseases. Disparities in oral health within this demographic arise from the interplay of multiple barriers that restrict access to oral healthcare and contribute to the

high prevalence of untreated oral diseases (Northridge et al., 2020; Sabbah et al., 2021).

These barriers include financial constraints, lack of insurance, socioeconomic status, cultural disparities, inadequate transportation, and stigma or discrimination. Such challenges emerge during a developmental stage when preventive oral health behaviours and care-seeking patterns are being established, rendering this population particularly susceptible to long-term consequences of unmet oral health needs (Peres et al., 2019).

Among the identified barriers, dental anxiety represents a salient psychosocial factor that may further discourage dental care utilization and intensify existing inequities (Crego et al., 2014; Armfield et al., 2007). Although a substantial body of research has investigated dental anxiety and oral health status independently, very few studies have analyzed the association between them, particularly within marginalized youth populations.

Accordingly, this exploratory study examined the association between dental anxiety and self-reported oral health status.

Our findings indicated that 38% of participants reported their oral health as fair or poor.

This estimate is higher than data from the Canadian Community Health Survey 2013-14, which indicate approximately 15% of the general population reported fair or poor oral health (Fang et al., 2021). Although these data are relatively older, they remain among the most recent Canadian estimates using self-reported oral health as an outcome measure.

The observed disparity likely reflects the structural, socioeconomic, and psychosocial challenges that limit access to preventive services and contribute to poor oral health. Prior research further suggests that limited oral health literacy may contribute to poorer self-care practices and hinder effective communication with dental providers, thereby influencing both perceived and actual oral health outcomes (Tadin et al., 2022). The

prevalence of dental anxiety in our study was also high, reported by 46% of participants. This estimate is substantially higher compared to the general Canadian population, where data suggest approximately 10-15% of individuals experience dental anxiety (Chanpong et al., 2005). Together, these estimates highlight the disproportionate oral health outcomes and psychosocial burden faced by marginalized youth.

In the present study, no statistically significant association was identified between dental anxiety and self-reported oral health status, which may reflect insufficient statistical power due to small sample size. Nonetheless, prior studies have documented significant associations between dental anxiety and oral health status (Schuller et al., 2003; Armfield et al., 2007; Meng et al., 2007; Carrillo-Diaz et al., 2012). For example, Meng et al. (2007), in a study of 1,365 participants, demonstrated that individuals reporting high dental anxiety were more likely to rate their oral health as poor. Likewise, Schuller et al. (2003), in a study of 504 participants, reported that participants with high dental anxiety exhibited a greater number of decayed and missing teeth, but fewer filled teeth, compared to those with low anxiety.

After adjusting for age and sex, the association between dental anxiety and self-reported oral health remained non-significant ( $p = 0.403$ ). While the adjusted odds ratio of 1.66 was not statistically significant, estimates of this magnitude would typically be interpreted as a weak association if significant. The similarity in point estimates of the crude and adjusted models suggests that adjustment for age and sex did not substantially change the observed association. Nevertheless, the wide confidence interval (95% CI = 0.51 to 5.43), which reflects considerable imprecision, along with the small sample size, limit the ability to determine whether confounding was truly absent. This underscores the possibility that

non-significant findings in low-powered studies may reflect type II error rather than the absence of an association. Furthermore, the consistency in the direction of the estimates with findings from prior studies underscores the plausibility of an underlying association (Stouthard et al., 1990; Meng et al., 2007; Schuller et al., 2007; Armfield et al., 2009).

Prior research has also demonstrated that dental anxiety is associated with poor oral health, primarily through delayed or avoided dental visits and reduced utilization of dental services (Skaret et al., 2000; Meng et al., 2007; Schuller et al., 2007). Schuller et al. (2007) reported that individuals experiencing dental anxiety are significantly more likely to avoid dental visits compared to those without dental anxiety. Negative past experiences and fear of pain have been identified as significant contributors in the development of dental anxiety (Meng et al., 2007). Additionally, painful or traumatic dental procedures, as well as unpleasant interactions with dental professionals, have been highlighted as key determinants of dental fear. Furthermore, a reciprocal relationship has been documented between fear of pain and dental anxiety (Meng et al., 2007; van Wijk and Hoogstraten, 2005). Fear of pain contributed to heightened dental anxiety, while dental anxiety, in turn, amplifies the anticipation and perception of pain during treatment. Collectively, these mechanisms provide insight into how dental anxiety contributes to underutilization of dental services, thereby leading to poor oral health outcomes (Crego et al., 2014; Armfield et al., 2007; Pohjola et al., 2007). Interventions such as patient centered communication and strategies to minimize treatment related discomfort may help reduce dental anxiety and therefore play a role in improving dental care utilization and oral health outcomes (Klingberg and Broberg, 2007; Meng et al., 2007).

## **Limitations**

The relatively small sample size ( $N = 50$ ) limited the study's statistical power and increased the likelihood of type II error. This was reflected in the wide confidence intervals, which encompassed both the null value and values suggesting a possible association. Furthermore, the reliance on convenience sampling restricts the representativeness of the sample, thereby limiting the generalizability of the findings to the broader population of the marginalized youth.

In this study, the outcome and exposure variables were dichotomized to enhance precision and stability. Although dichotomization is frequently applied in research, it poses methodological limitations in both analysis and interpretation (Royston et al., 2006). This approach of dividing continuous or ordinal variables into two groups results in information loss, thereby reducing the statistical power to detect associations between exposure and outcome. For example, in the context of our study, collapsing fairly, very, and extremely anxious categories into a single category eliminated the ability to assess whether the risk of reporting poor oral health status increases with higher anxiety levels. Dichotomization may also increase the likelihood of misclassification bias due to measurement error (Naggara et al., 2011). For example, minor differences in participants' interpretation of adjacent categories (e.g. slightly versus fairly anxious) can result in incorrect classification relative to the cut-point. Furthermore, dichotomization also obscures potential non-linear associations between variables and impede comparability across studies due to variability in cut-point selection (Naggara et al., 2011; Altman and Royston, 2006).

Furthermore, potential sources of bias should also be considered. The reliance on self-reported measures introduces the potential for information bias. Self-reported data are

susceptible to social desirability bias, whereby participants may underreport negatively perceived behaviours or conditions and overreport those viewed more positively (Althubaiti, 2016). In the context of this study, participants may have underreported dental anxiety or negative oral health status in an effort to align with socially acceptable norms. Additionally, self-reported measures are also prone to misclassification bias, as participants may have difficulty distinguishing between response categories (e.g. slightly anxious vs fairly anxious). Such measurement error may reduce the accuracy of exposure and outcome classification, which should be considered while interpreting the findings.

These biases have the potential to influence observed associations and contribute to uncertainty in effect estimates. Although such biases cannot be completely eliminated, their recognition is essential for contextualizing the study's findings. The use of standardized survey questions and reliance on cut-points informed by prior literature were intended to reduce these limitations.

### 3.7 Conclusion

This exploratory study examined the association between dental anxiety and self-reported oral health status among marginalized youth. Although no statistically significant associations were identified and the wide confidence intervals indicate imprecision of the estimates, the observed direction of effect was in alignment with prior research, reinforcing the need for larger, adequately powered studies. The elevated prevalence of both dental anxiety and self-reported oral health in this sample underscores their significance as public health concerns and highlights the importance of incorporating psychosocial determinants in strategies for reducing oral health disparities. The findings contribute to the growing recognition of the unique oral health challenges faced by

marginalized youth and emphasize the need for further investigation to inform interventions that promote oral health equity.

## 3.8 Tables

**Table 3.1:** Demographic and oral health characteristics of a sample of marginalized youth ( $N = 50$ )

<b>Demographic characteristics</b>	<b>Number of respondents n (%)</b>
Sample total	50 (100)
Age	
18-21	24 (48)
22-25	23 (46)
26-30	3 (6)
Sex	
Male	17 (34)
Female	33 (66)
Self-reported oral health status	
Good/Very good/Excellent	31 (62)
Fair/Poor	19 (38)
Dental anxiety	
Not anxious/Slightly anxious	27 (54)
Fairly anxious/Very anxious/Extremely anxious	23 (46)

**Table 3.2:** Logistic regression model for odds of reporting fair/poor oral health ( $N = 50$ )

<b>Model</b>	<b>Crude odds ratio (95% CI)</b>	<b>p-value</b>	<b>Adjusted odds ratio (95%CI)</b>	<b>p-value</b>
Dental anxiety	1.54 (0.49-4.85)	0.462	1.66 (0.51-5.43)	0.403
Age	1.03 (0.80-1.32)	0.815	1.05 (0.81-1.37)	0.695
Sex	1.19 (0.35-4.02)	0.777	1.40 (0.38-5.12)	0.609

### 3.9 References

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## Chapter 4

### 4 Discussion and Conclusion

This chapter provides a synthesis of the findings from Chapters 3 and 4. It highlights the contributions of both studies to understanding oral health inequities among marginalized youth, outlines the strengths and limitations of the research, and discusses the implications for dental public health policy and practice. The chapter concludes by outlining recommendations for future research to address oral health inequities and enhance access to dental care services within this population.

This thesis examined oral health inequities among marginalized youth through two approaches. The first component was a scoping review (Chapter 3), which mapped the breadth of existing evidence on unmet oral health needs and barriers that restrict access to dental care within this population. Building on the findings of the scoping review, the second component of this thesis focused more narrowly on a specific psychosocial determinant, dental anxiety. The rationale for selecting dental anxiety derives from its frequent identification in the literature as a barrier to care, yet one that remains underexplored in youth populations (Seligman et al., 2017). The exploratory cross-sectional study (Chapter 4) investigated the association between dental anxiety and self-reported oral health status among marginalized youth, while also considering age and sex as potential confounders.

By focusing on marginalized youth, this thesis underscores the significance of promoting effective oral health practices during a critical developmental stage. Oral health in adolescence and young adulthood is a strong predictor of future oral health outcomes,

with unmet needs during this period increasing the risk of long-term conditions such as dental caries, periodontal disease, and other chronic oral health problems (Tadin et al., 2022; Peres et al., 2019). Moreover, research has demonstrated associations between oral health and systemic conditions, including cardiovascular and metabolic disorders (Meurman and Bascones-Martinez, 2021). Addressing oral health inequities during this phase thus holds potential to improve both immediate and long-term outcomes. Examining the unique challenges and determinants of oral health within marginalized youth populations is therefore essential for developing targeted interventions and equity-oriented policies that can promote oral health and reduce disparities.

## 4.1 Synthesis of findings

### 4.1.1 Unmet Oral health needs and barriers to dental services among marginalized youth: A scoping review

The scoping review aimed to investigate the extent of available literature on the unmet oral health needs and barriers to accessing oral healthcare among marginalized youth globally. A comprehensive search was conducted across four major databases (MEDLINE, Embase, Scopus, and Cochrane library), focusing on individuals aged 18-30 years, with no restrictions on publication date. The inclusion criteria encompassed empirical studies that investigated unmet oral health needs and barriers to accessing dental care. Non-English studies were excluded. A total of seven studies met the inclusion criteria, consisting of six quantitative and one qualitative study, all employing cross-sectional designs.

The primary oral health outcome examined was unmet dental need, which was consistently reported across diverse groups of marginalized youth, including racial and

ethnic minorities, individuals of low socio-economic status, residents of rural areas, refugees, and those experiencing homelessness. Participants frequently reported conditions such as dental caries, missing teeth, periodontal disease, oral ulcers, and infections. These findings underscore the persistent burden of oral disease in marginalized youth, often attributed to limited awareness of preventive practices, insufficient access to services, and restricted utilization of dental care.

Beyond documenting the prevalence of unmet treatment needs, the review synthesized the diverse range of barriers that marginalized youth experience. These barriers fall into distinct domains. Financial barriers, such as high treatment costs and lack of insurance coverage were consistently identified as primary obstacles to care. Structural barriers, including geographic inaccessibility, long wait times, transportation difficulties, and appointment scheduling challenges, further restricted the ability of marginalized youth to obtain timely care. Psychosocial barriers, such as stigma, discrimination, negative prior experiences with practitioners, fear or mistrust of dental professionals, compounded these challenges. The review therefore demonstrated that inequities in oral health among marginalized youth are not attributable to a single determinant but rather emerge from the cumulative effect of intersecting structural, socioeconomic, and psychosocial factors. Additionally, it highlighted both the magnitude and complexity of the barriers faced by marginalized youth, while also identifying gaps in research that should be addressed in order to enhance the development of targeted, evidence-informed interventions.

A key strength of the review is its broad scope, as it was not limited to a specific country, region, or publication period. This inclusivity allows for the identification of persistent unmet needs and barriers across different context and time periods. Our scoping review

may be the first to comprehensively explore unmet dental needs, patterns of dental service utilization, and barriers to accessing care among marginalized youth.

However, the review also has certain limitations. Some studies had not implemented age-based stratification and hence the findings reported were not age-specific but rather generalizable to the broader age spectrum. Additionally, most studies predominantly focus on binary gender expressions, which limits the relevance of the findings to LGBTQ+ youth and further heightens their marginalized status. Furthermore, the majority of the studies involved small sample sizes, raising concerns regarding the generalizability of the results. Also, the limited number of studies included in this review indicates a critical research gap, emphasizing the need for a more tailored approach to better understand and address the oral health needs of marginalized youth. Such approaches are essential to elucidate the impact of marginalization on oral health outcomes and access to dental care. In conclusion, the scoping review underscores the persistent oral health inequities faced by marginalized youth, which are driven by the cumulative effects of financial, structural, and psychosocial factors.

#### **4.1.2 Dental anxiety and self-reported oral health among marginalized youth: An exploratory cross-sectional study.**

The exploratory cross-sectional study aimed to investigate the association between dental anxiety and self-reported oral health among marginalized youth, while accounting for demographic factors age and sex. Participants were recruited from Youth Opportunities Unlimited, a non-profit organization based in London and Middlesex County, that supports youth experiencing socioeconomic disadvantage, housing insecurity, substance abuse, and unemployment. Data were collected using a survey questionnaire that was

adapted from the Canadian Health Measures Survey (CHMS). Descriptive statistics were initially computed to summarize the distribution of study variables, presented as frequencies and percentages. Logistic regression analysis was conducted to examine the association between dental anxiety and self-reported oral health status, with both crude and adjusted models estimated to assess potential confounding by age and sex.

Although the study did not identify statistically significant associations, likely reflecting the small sample size and limited statistical power, the high prevalence of dental anxiety observed aligns with global estimates and highlights its importance as a public health concern. Both crude and adjusted odds ratios exceeded the value of 1 in magnitude, but the wide confidence intervals reflect substantial imprecision, thereby limiting the strength of evidence. The similarity in point estimates suggests that adjustment for age and sex did not substantially change the observed association. However, the small sample size limits the ability to determine whether confounding was truly absent, underscoring the possibility that non-significant findings in low-powered studies may reflect Type II error rather than the absence of an association. Nonetheless, the direction of observed effects was consistent with prior research, suggesting the plausibility of an underlying association.

The study also has several limitations. The relatively small sample size ( $n=50$ ) limited the statistical power and increased the risk of Type II error. The use of convenience sampling further restricts the representativeness of the sample, thereby limiting the external validity. Additionally, both exposure and outcome variables were dichotomized to enhance stability and precision; however, this approach may have introduced misclassification bias, resulted in information loss, and reduced comparability with other

studies due to variability in cut-point selection. Finally, reliance on self-reported measures introduces the possibility of information bias, including social desirability and misclassification bias. Participants may have underreported dental anxiety or poor oral health status and may have experienced difficulty distinguishing between adjacent response categories, thereby reducing the accuracy of exposure and outcome classification. Nonetheless, the use of standardized survey questions and reliance on cut-points informed by prior literature were intended to reduce these limitations.

Overall, these findings provide preliminary insights about the influence of psychosocial determinants on oral health perceptions. Although this study did not identify a statistically significant association, the small sample size underscores the need for larger, adequately powered studies to elucidate the role of psychosocial barriers, such as dental anxiety, alongside structural and financial barriers in understanding oral health disparities among marginalized youth.

## 4.2 Policy implications

The transition from youth to adulthood represents a critical developmental phase, during which oral health behaviours are established, and inequities can become entrenched. Policy interventions targeting this age group should therefore be designed to address the distinctive challenges experienced by marginalized youth, who face disproportionate barriers to accessing oral healthcare.

Addressing the financial determinants of oral health is particularly important. High treatment costs, limited household income, and lack of dental insurance continue to act as major obstacles to dental care utilization, as highlighted in the scoping review. Measures

such as income-based subsidies, sliding-scale fee structures, and expanded public health coverage have the potential to improve affordability and enhance access to care among youth with limited financial resources (Etemadi and Hajizadeh, 2022). Beyond financial reforms, educational and outreach initiatives may contribute to reducing inequities. Public health campaigns tailored to marginalized youth can increase awareness of oral health, reduce stigma, and encourage preventive behaviours. Integrating oral health promotion strategies into schools, youth-serving organizations, and community programs could further strengthen the reach and effectiveness of these initiatives.

The cross-sectional study findings also draw attention to the potential impact of psychosocial factors, particularly dental anxiety, on oral health outcomes. Dental anxiety is documented as a barrier to regular dental care utilization (Chidley and Burns-Nader, 2024; Croucher and Sohanpal, 2006), and its high prevalence among youth indicates the importance of addressing psychosocial as well as structural determinants (Yap and Lee, 2022). Policy responses could include training dental professionals in trauma- and anxiety-informed practices, integrating mental health support into dental settings, and fostering clinical environments that are inclusive and responsive to the needs of the youth.

Technological innovations such as tele-dentistry may also provide support in reducing inequities. Remote consultations can improve access to preventive and diagnostic oral health services for youth in rural and underserved regions (Haleem et al., 2021).

Furthermore, digital platforms may also provide a less intimidating point of entry for individuals with dental anxiety, thereby facilitating engagement with care.

Overall, the findings of this thesis underscore the need for equity-oriented strategies that address the oral health challenges of marginalized youth. The scoping review demonstrated the role of systemic and financial barriers, whereas the cross-sectional study did not identify a statistically significant association. Nevertheless, the direction of estimates was consistent with prior research, supporting the plausibility of an association between psychosocial barriers and oral health outcomes. The findings suggest that inequities may be driven by the intersection of systemic barriers and psychosocial determinants, highlighting the importance of multi-level strategies that extend beyond individual behaviour change.

### 4.3 Future directions

The findings of the thesis highlight several opportunities for future research aimed at reducing oral health inequities among marginalized youth. Both studies underscored the need for stronger evidence that reflects the complex interplay of financial, structural, and psychosocial barriers. Future research should therefore focus beyond documenting disparities to developing a more nuanced understanding of how these determinants shape oral health outcomes during the transition from youth to adulthood. While the exploratory cross-sectional study provided preliminary evidence that dental anxiety may influence self-reported oral health, larger and more representative samples of marginalized youth are needed to generate more precise and reliable estimates. Refinement of measurement approaches, including the use of validated anxiety scales, could further enhance validity and precision. Mixed methods designs that integrate quantitative assessment with qualitative exploration of youth experiences would provide a more comprehensive understanding of how psychosocial and structural barriers intersect to shape oral health

behaviours and outcomes. The application of intersectional frameworks that account for overlapping effects of gender identity, ethnicity, socio-economic status, and immigration status would also strengthen future research. Longitudinal studies following youth over time could provide additional insight into the cumulative and interactive effects of these determinants on oral health outcomes.

Future research should also evaluate the effectiveness of interventions aimed at reducing inequities. For example, studies could assess the impact of income-based subsidy models on service utilization, investigate whether trauma-and anxiety-informed practices improve care-seeking among youth with dental anxiety, or explore the role of teledentistry in reducing geographic barriers and facilitating engagement.

#### 4.4 Conclusion

This thesis underscored the importance of addressing oral health inequalities in marginalized youth. The scoping review mapped the breadth of existing literature on unmet oral health needs and barriers to accessing care, highlighting the primary role of financial, structural, and psychosocial determinants in restricting access. The exploratory cross-sectional study, although limited by its small sample size and non-significant findings, provided preliminary evidence on the association between dental anxiety and self-reported oral health status, adding depth to the psychosocial dimension of the barriers identified in the review.

Overall, the findings suggest that oral health inequities cannot be attributed to a single cause but reflect the overlapping influence of multiple determinants. This integrated perspective highlights the need for policies and interventions that simultaneously enhance

affordability, accessibility, and acceptability of oral health services for marginalized youth.

In conclusion, the thesis contributes to the field of oral public health by documenting the scope of unmet needs, identifying barriers, and generating preliminary evidence on psychosocial determinants. The insights gained emphasize the importance of equity-oriented strategies in research, policy, and practice to reduce oral health disparities and promote healthier outcomes among marginalized youth.

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## Appendices

### Appendix 1: PRISMA checklist

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
<b>TITLE</b>			
Title	1	Identify the report as a scoping review.	Page 8
<b>ABSTRACT</b>			
Structured summary	2	Provide a structured summary that includes (as applicable): background, objectives, eligibility criteria, sources of evidence, charting methods, results, and conclusions that relate to the review questions and objectives.	Page 8-9
<b>INTRODUCTION</b>			
Rationale	3	Describe the rationale for the review in the context of what is already known. Explain why the review questions/objectives lend themselves to a scoping review approach.	Page 9-12
Objectives	4	Provide an explicit statement of the questions and objectives being addressed with reference to their key elements (e.g., population or participants, concepts, and context)	Page 12

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
		or other relevant key elements used to conceptualize the review questions and/or objectives.	
<b>METHODS</b>			
Protocol and registration	5	Indicate whether a review protocol exists; state if and where it can be accessed (e.g., a Web address); and if available, provide registration information, including the registration number.	Page 13
Eligibility criteria	6	Specify characteristics of the sources of evidence used as eligibility criteria (e.g., years considered, language, and publication status), and provide a rationale.	Page 13
Information sources*	7	Describe all information sources in the search (e.g., databases with dates of coverage and contact with authors to identify additional sources), as well as the date the most recent search was executed.	Page 14, Table 2.1.
Search	8	Present the full electronic search strategy for at least 1 database, including any limits used, such that it could be repeated.	Table 2.1.
Selection of sources of evidence†	9	State the process for selecting sources of evidence (i.e., screening and eligibility) included in the scoping review.	Page 14

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
Data charting process‡	10	Describe the methods of charting data from the included sources of evidence (e.g., calibrated forms or forms that have been tested by the team before their use, and whether data charting was done independently or in duplicate) and any processes for obtaining and confirming data from investigators.	Page 14. Appendix 2 and 3
Data items	11	List and define all variables for which data were sought and any assumptions and simplifications made.	Appendix 2 and 3
Critical appraisal of individual sources of evidence§	12	If done, provide a rationale for conducting a critical appraisal of included sources of evidence; describe the methods used and how this information was used in any data synthesis (if appropriate).	Page 15
Synthesis of results	13	Describe the methods of handling and summarizing the data that were charted.	Page 14
<b>RESULTS</b>			
Selection of sources of evidence	14	Give numbers of sources of evidence screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally using a flow diagram.	Page 15-16, Figure 2.1.
Characteristics of sources of evidence	15	For each source of evidence, present characteristics for which data were charted and provide the citations.	Table 2.2.

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
Critical appraisal within sources of evidence	16	If done, present data on critical appraisal of included sources of evidence (see item 12).	Page 21
Results of individual sources of evidence	17	For each included source of evidence, present the relevant data that were charted that relate to the review questions and objectives.	Table 2.2.
Synthesis of results	18	Summarize and/or present the charting results as they relate to the review questions and objectives.	Page 15-21
<b>DISCUSSION</b>			
Summary of evidence	19	Summarize the main results (including an overview of concepts, themes, and types of evidence available), link to the review questions and objectives, and consider the relevance to key groups.	Page 21-26
Limitations	20	Discuss the limitations of the scoping review process.	Page 25-26
Conclusions	21	Provide a general interpretation of the results with respect to the review questions and objectives, as well as potential implications and/or next steps.	Page 26-27

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
<b>FUNDING</b>			
Funding	22	Describe sources of funding for the included sources of evidence, as well as sources of funding for the scoping review. Describe the role of the funders of the scoping review.	N/A

*From:* Tricco, A. C., Lillie, E., Zarin, W., O'Brien, K. K., Colquhoun, H., Levac, D., Moher, D., Peters, M. D. J., Horsley, T., Weeks, L., Hempel, S., Akl, E. A., Chang, C., McGowan, J., Stewart, L., Hartling, L., Aldcroft, A., Wilson, M. G., Garrity, C., ... Straus, S. E. (2018). PRISMA Extension for Scoping Reviews (PRISMA-ScR): Checklist and Explanation. *Annals of Internal Medicine*, 169(7), 467–473.

**Appendix 2:** Data extraction tool

<b>Data Extraction Tool</b>										
Title	Author	Year	Country /Region	Sampling Method	Study Design	Sample Size	Age Range	Marginalization Factor	Barriers to Oral Care	Oral Health Status

**Appendix 3: Data extraction tool (final)**

<b>Data Extraction Tool</b>									
Author(s), Year	Country	Type of study	Sample size	Sample source	Sampling Method	Age range	Marginalization factor	Barriers to care	Pattern of dental visits; unmet needs

**Appendix 4: Consent form****Letter of Information and Consent for Survey**

**Project Title:** Dental anxiety and self-reported oral health among marginalized youth in London, Ontario.

**Document Title:** Letter of Information and Consent for research participants

**Principal Investigator:** Dr. Abbas Jessani

**Co-investigator:** Dr. Piotr Wilk

**Research Student:** Pranav Mahesh Vaishampayan

**1. Invitation to Participate**

You are invited to participate in a research study about your oral and dental health and your use of dental services. You are being approached because you are a member of Youth Opportunities Unlimited (YOU).

**2. Purpose of this Letter**

The purpose of this letter is to provide you with information about the study and to allow you to make an informed decision regarding whether you are willing to participate in this research.

**3. Purpose of this Study**

The main purpose of this study is to identify the oral health status and dental visit patterns among youth who access various services with YOU in London Ontario. In particular, we are interested in knowing more about the individual and societal factors that impacts your oral health, dental visits, and unmet oral health treatment needs.

**4. Inclusion Criteria**

Adults aged 19 and above, hold a membership at the YOU in Ontario, and consents to participate in the study, while also being capable of completing the survey in English, are eligible to participate in the study.

**5. Exclusion Criteria**

Youth who do not or cannot give consent to participate in the survey in English are excluded from the study.

**6. Study Procedures**

Participants will complete a questionnaire provided at the front desk of YOU in English. Completing the questionnaire takes 10-15 minutes of your time. You will be asked to answer various questions about yourself, your general health, your oral health, and your use of dental services in the past.

### **7. Possible Risks and Harms**

There is no risk of harm to the participants beyond the inconvenience of completing the questionnaire. Participants will be asked to complete the questionnaire once and are free to withdraw from the study at any time for any reason, without penalty. You will not be able to withdraw from the study once the survey is submitted and collected for the analysis.

### **8. Possible Benefits**

Although there are no direct benefits to the participants of this study, the results of this study will provide insights into the oral health problems and the barriers they might face in using dental care services. Such information will be beneficial for planning preventive programs to enhance the knowledge of oral health and dental care among youth at risk. Also, it is possible that barriers to getting dental care will be revealed and can be addressed in the future. Additionally, if possible, the most common oral health problems of youth at-risk can be identified and addressed by providing clinical interventions.

### **9. Voluntary Participation**

Participation in this study is voluntary and anonymous. If you choose to participate, you can leave any question unanswered, should you choose to do so, and still complete the remainder of the questionnaire. By completing this questionnaire, it will be assumed that you give consent for the use and possible publication of the anonymous data and information provided. Please keep this cover page for your records. You do not waive any legal rights by consenting to this study.

### **10. Withdrawal**

You can withdraw at any point from this study by not answering the remainder of the questionnaire. Once the completed questionnaires are received by the research student, they cannot be withdrawn due to the anonymous nature of the collection.

### **11. Confidentiality**

Identifiers such as name, date of birth etc. will not be included as part of data collection. To avoid re-approaching the participants, a logbook containing the study ID numbers matching the registration numbers of the participants will be prepared and kept at the London office of the organization. No direct identifier information from the organization file will be stored or used. Study results will only be published or presented as anonymous summaries. Data collected from this study will be accessible by the investigators and will be safeguarded on password-protected devices, which will be destroyed after 7 years. Representatives of Western University's Health Sciences

Research Ethics Board may require access to your study-related records to monitor the conduct of the research.

## **12. Contacts for Further Information**

If you have any questions and/or require further information about participating in this study, you are welcome to contact the Principal Investigator, Dr. Abbas Jessani.

If you have any questions about the conduct of the study or your rights as a research participant, you may contact the Office of Human Research Ethics at the University of Western Ontario at their toll-free long-distance number, or by email. The REB is a group of people who oversee the ethical conduct of research studies. The HSREB is not part of the study team. Everything that you discuss will be kept confidential.

This is a student research project

Submission of this questionnaire will be taken as your consent to participate.

**This letter is yours to keep for future reference.**

## Appendix 5: Questionnaire

For multiple-choice questions, kindly cross the box so that it looks like this:

### Part I: Demographic Information

*This section includes questions about your demographics such as age, gender, ethnicity, immigration status, education level, place of birth, etc. For the following questions, please select the answer that you most closely identify with.*

**1. How old were you on your last birthday?**

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**2. What sex were you assigned at birth?**

- Male
- Female

**3. Are you happy with the gender you were assigned with at birth?**

- No
- Yes

**4. How would you specify your gender identity?**

- Man
- Woman
- Genderqueer
- Transgender MTF
- Transgender FTM
- Two-spirit
- Queer
- Questioning
- Intersex
- Non-binary
- Prefer not to answer

**5. How would you identify your sexual orientation?**

- Heterosexual
- Lesbian
- Gay
- Bisexual
- Asexual
- Pansexual

- My sexual orientation is not represented on this list. My sexual orientation is \_\_\_\_\_
- Prefer not to answer

**6. From the following list, which racial or cultural groups do you belong to? (You may choose more than one option).**

- White
- South Asian (e.g., East Indian, Pakistani, Sri Lankan)
- Chinese
- Black
- Filipino
- Latin American
- Arab
- Southeast Asian (e.g., Vietnamese, Cambodian, Malaysian, Laotian)
- West Asian (e.g., Iranian, Afghan)
- Korean
- Japanese
- Indigenous (First Nations, Metis, or Inuk (Inuit))
- Other \_\_\_\_\_

**7. What is your born immigration status in Canada?**

- Born in Canada
- Immigrated to Canada
- Immigrated as a refugee

**8. If you immigrated to Canada, how long have you been living in Canada?**

- Less than 5 years
- 5 to 10 years
- More than 10 years
- Not applicable

**9. What is the highest certificate, diploma, or degree that you have completed?**

- Less than high school diploma or its equivalent
- High school diploma or equivalency certificate
- Trade certificate or diploma
- College, CEGEP or other non-university certificate or diploma
- University certificate or diploma below the bachelor's level
- Bachelor's degree
- University certificate, diploma, or degree above the bachelor's level
- Other \_\_\_\_\_

**10. What is your current employment status?**

- Employed (part-time)
- Employed (full-time)
- Un-employed
- Welfare insurance
- Disability insurance
- Student
- Other: \_\_\_\_\_

**11. What best describes your current living situation?**

- Permanent residence
- Temporarily staying with family or friends
- Shelter
- Non-permanent housing situation
- Other: \_\_\_\_\_

**12. How often do you access healthcare services?**

- Very often
- Often
- Not often
- Not at all

**13. In general, how would you rate your general health?**

- Excellent
- Very good
- Good
- Fair
- Poor

**14. In general, how would rate your mental health?**

- Excellent
- Very good
- Good
- Fair
- Poor

**15. Which of the following services do you access frequently?**

- Medical services
- Dental services
- Allied health professionals
- Housing services
- Addiction services
- None

- Other

## Section II: Social Support

*This section includes statements about the support you receive from people in your life, such as family members, friends, or others who are important to you. For each statement, please indicate the extent to which you agree or disagree using the scale below, where 1 represents “very strongly disagree” and 7 represents “very strongly agree”. Please answer each item based on your own experiences.*

*Scale:*

*1 = very strongly disagree*

*2 = strongly disagree*

*3 = disagree*

*4 = neutral*

*5 = agree*

*6 = strongly agree*

*7 = very strongly agree*

**16. It helps to turn to people in times of need: \_\_\_\_\_**

**17. I usually discussed my problems and concerns with others: \_\_\_\_\_**

**18. I talk things over with people: \_\_\_\_\_**

**19. I find it easy to depend on others: \_\_\_\_\_**

**20. I don't feel comfortable opening up to others: \_\_\_\_\_**

**21. I prefer not to show other deep down: \_\_\_\_\_**

**22. I often worry that other people do not really care for me: \_\_\_\_\_**

**23. I am afraid that other people may abandon me: \_\_\_\_\_**

**24. I worry that others wont care about me as much as I care about them: \_\_\_\_\_**

## Section III: Oral Health

*The following section includes questions regarding your perceptions of your oral health. This will help us identify the self-reported dental health status, common self-perceived dental conditions, self-reported treatment needs and frequency of dental visit along with reasons*

*why you have/haven't visited a dentist. From the following questions, please select the answer that best represents your current situation.*

**25. In general, how do you rate the health of your mouth?**

- Excellent
- Very good
- Good
- Fair
- Poor

**26. How important do you think the health of your mouth is?**

- Very important
- Somewhat important
- Not important
- Not at all important
- I don't know

**27. Do you have a regular dentist? (Kindly choose one)**

- Yes
- No

**28. If you went to a dentist for treatment tomorrow, how would you feel?**

- Not anxious
- Slightly anxious
- Fairly anxious
- Very anxious
- Extremely anxious

**29. When was the last time you saw a dental professional?**

- Less than 1 year ago
- 1 to 2 years ago
- 2 to 3 years ago
- 3 to 4 years ago
- 4 to 5 years ago
- More than 5 years ago
- Never

**30. How often do you see a dental professional?**

- More than once a year
- About once a year
- Less than once a year

- Only for emergency
- Never

**31. Have you ever felt discriminated against by a dental professional because of your gender identity?**

- Yes
- No

**32. When you visit a dentist professional do you feel comfortable disclosing your gender identity?**

- No
- Yes

**33. In the past 6 months, have you avoided having some or all the dental treatment that was recommended because of the cost?**

- Yes
- No
- Other

**34. Do you presently experience one or more of the following conditions (You may choose more than one answer).**

- Toothache
- Sensitivity in your teeth when consuming something hot or cold
- Pain around your jaw joints
- Bleeding gums while brushing your teeth
- Persistent dry mouth
- Persistent bad breath
- White patch on your tongue
- Hole in teeth (decay)
- Persistent ulcers
- Excessive bleeding gums
- Loosening of teeth
- Swelling around neck
- Severe mouth pain at night
- Severe tooth pain at night
- Other

Thank you for taking the time to complete this questionnaire. Your participation is greatly appreciated, and your responses will remain confidential.

## Curriculum Vitae

**Name:** Pranav Vaishampayan

**Post-secondary Education and Degrees:** Dr. D.Y. Patil Biotechnology and Bioinformatics Institute  
Pune, Maharashtra, India  
2018-2022 B.Tech.

The University of Western Ontario  
London, Ontario, Canada  
2022-current M.Sc.

**Honours and Awards:** Western Graduate Research Scholarship  
2022-2024

**Publications:**

Vaishampayan, P., Beniwal, J. S., Wilk, P., McLean, S., & Jessani, A. (2025). Unmet oral health needs and barriers to dental services among socially marginalized youth: a scoping review. *Frontiers in Oral Health*, 6, 1521753.