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ABSTRACT

A Comparative Analysis of Oral Health Disparities Among Caucasians and African Americans with Intellectual Disabilities

By

Darylsha Alexandria Williams

Date: November 29, 2023

INTRODUCTION: Oral disease, often categorized as a silent epidemic, can affect several vulnerable population groups in the United States. An often-overlooked demographic in the US when it comes to poor oral health, oral disease, and oral health disparities are people with intellectual or physical disabilities and some racial groups. Despite current programs and interventions established, inequalities still exist for individuals with intellectual or developmental disabilities (IDD).

AIM: The purpose of the study was to conduct a comparative analysis of oral health issues among Caucasians and African Americans with IDD in the US, focusing on identifying disparities and interventions in place to address the disparities. The study will help to provide a better understanding of the disparities in dental care among Caucasians and African Americans with IDD, address any research gaps, and provide recommendations for future studies and research.

METHODS: A preliminary search of the databases (PubMed, CINAHL Plus, and ProQuest) was conducted based on the PICO framework utilizing the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) framework. The study sought available literature that describes oral health disparities among people with IDD and identifies interventions in place to address the disparities, and how this affects their oral health. The preliminary search of the databases yielded 294 articles. After the removal of duplicates, only 214 articles remained. Inclusion and exclusion criteria were utilized for this analysis of relevant articles. Fifteen articles met all the criteria and were included in this systematic review.

RESULTS: Overall, twelve articles were included in this systemic review. Seven publications reported on barriers and disparities to oral health describing the social determinants that can impact oral health outcomes in individuals with IDD, especially in minorities with IDD. These barriers can include social, personal, lifestyle, and environmental factors. Lastly, five articles reported on recommendations and interventions for oral health outcomes in individuals with IDD and identified potential interventions such as educational modules, mobile dental clinics, at-home dental services, and guidelines for the inclusion of individuals with IDD in research.

Conclusion: Despite the limited research comparing African Americans and Caucasians with IDD, this review shows that minority groups often face undue disparities and barriers to optimal dental care. As a result of social determinants and a lack of intervention programs catered to this population at various levels, racial and ethnic minorities still experience poor oral health outcomes. Results from this systematic review can contribute to improving the oral health outcomes of individuals with IDD, especially minorities with IDD. Awareness of potential recommendations and interventions to decrease the disparities could improve the overall oral health of this vulnerable population.

A Comparative Analysis of Oral Health Disparities Among Caucasians and African Americans
with Intellectual Disabilities

by

Darylsha A. Williams
B.S., GEORGIA STATE UNIVERSITY

A Thesis Submitted to the Graduate Faculty
of Georgia State University in Partial Fulfillment
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ATLANTA, GEORGIA
30303

APPROVAL PAGE

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by

Darylsha A. Williams
B.S., GEORGIA STATE UNIVERSITY

Approved:

Dr. Adrienne King, Ph. D

Dr. Elizabeth Armstrong-Mensah, Ph.D.

Date

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Author's Statement Page

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Darylsha A. Williams, BSPH

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Chapter I – Introduction

1.1 Background

Oral disease, often categorized as a silent epidemic, can affect several vulnerable population groups in the United States (US) (Como et al., 2019). The burden of poor oral health and oral disease has become a significant public health issue that negatively impacts an individual's health and well-being (Como et al., 2019; WHO, 2022). According to the World Health Organization (WHO), oral disease affects an estimated 3.5 billion people with 3 out of 4 people currently living in middle- and low-income countries (WHO, 2022). Oral health is the health of an individual's teeth, gums, and entire oral-facial system that allows us to smile, speak, and chew (Oral Health Conditions, 2022).

Oral health disparities can disproportionately impact the health outcomes of communities from different social, economic, and environmental backgrounds which can result in the increased burden of oral health issues (Northridge et al., 2020). As a result, individuals with Intellectual or Developmental disabilities (IDD) often face an increased risk of experiencing oral health problems if left untreated, especially racial, and ethnic minorities with IDD. Research has found that individuals with IDD are an often-overlooked demographic impacted by poor oral health, oral disease, and oral health disparities (WHO, 2022). In 2021, the United States (US) Census Bureau reported that an estimated 42.5 million Americans are living with a disability, which includes hearing, vision, cognitive, or independent living difficulties (U.S. Census Bureau, 2022)—based on this data, further emphasizing the impact of poor oral health outcomes on individuals with IDD.

Intellectual or Developmental (IDD) refers to a health condition that can cause significant limitations in communication skills, adaptive skills, and self-care that can be caused by disease,

injury, or other health problems (Fosse et al., 2021). Individuals with IDD often experience accessing adequate dental care and preventative services for dental care (Wilson et al., 2019). According to the Centers for Disease Control and Prevention Disability and Health Data System, individuals with IDD and poor dental health are more likely to experience health issues because of suboptimal oral health (CDC, 2023). Individuals with IDD have higher rates of heart disease or barriers to accessing healthcare due to not having a regular healthcare provider compared to those without a disability (CDC, 2023).

Historically, there has been a call to action to better address the oral health of people with IDD (Anderson et al., 2013). Within the last couple of decades, disability rights have been at the forefront of the healthcare needs, accessibility, and health outcomes of people with disabilities (Ervin et al., 2014). The Americans with Disability Act (ADA) has taken great strides to implement policies that better address the disparities and discrimination among individuals with IDD (Iezzoni et al., 2022). An aspect of health that still needs improvement for people with IDD is oral health, particularly in accessibility and preventative measures to improve oral health conditions. Individuals with IDD will face several health disparities due to inequities associated with the Social Determinants of Health (SDoH).

SDoHs refers to the non-health factors that can influence an individual's health (Friedman, 2021). Because of this, Health equity is vital to decreasing the inequities that are associated with social determinants. Health equity is defined as the fair and equal opportunity of full health potential regardless of race, age, or disability status (CDC, 2022). People living with IDD often face many challenges such as high unemployment rates, low socioeconomic status, increased medical expenses, strict income limits to qualify for benefits, and lack of insurance

coverage (Queirós et al., 2015). These challenges can contribute to not having access to adequate dental care, services, or preventative measures for their oral health.

According to extant literature, people with IDD have a greater risk of oral diseases such as periodontal diseases and dental decay showing the need to eliminate disparities and the development of interventions that target this population (Wilson et al., 2018). Oral diseases can be prevented but have increasingly shown to have a higher prevalence, especially among low-income communities, marginalized groups, and inadequate access to health professionals. Researchers recently conducted a review on oral health and concluded that having untreated oral diseases can lead to a severe impact on quality of life, unremitting pain, and decreased work productivity (Peres et al., 2019). Populations that are often impacted by poor oral health outcomes are individuals who are in low-income or middle-income communities (Northridge et al., 2020). People with IDD are often categorized as being a part of low socioeconomic status which can increase the likelihood of accessible care for preventative oral health care or dental care (Fosse et al., 2021).

Furthermore, researchers have found that the rate of disability in the US varies by racial and ethnic background (Goyat et al., 2016). In 2010, it was reported that the disability rate for non-Hispanic whites was 17.4% compared to African Americans with a 22.2% disability rate (Goyat et al., 2016). African Americans with IDD are more likely to have higher disability rates leading to an increase in health disparities occurring within the vulnerable population (Mitra et al., 2022). The various factors that impact the overall health outcomes of individuals with IDD need to be further identified.

Social determinants and oral health disparities can impact the dental health outcomes of minorities with IDD (Courtney-Long et al., 2017; Northridge et al., 2020). Consequently, racial, and ethnic minorities with IDD often have limited access to adequate healthcare services, especially dental services (Courtney-Long et al., 2017). Based on previous studies on the impact of race and health outcomes, most of the focus is on healthcare services compared to dental services for individuals with IDD. Thus, there is a lack of research that focuses on the oral health issues between African Americans and Caucasians with IDD in the US, particularly focusing on the disparities, barriers, and interventions established to address the disparities.

1.2 Purpose of study

The purpose of the study was to conduct a comparative analysis of oral health issues among Caucasians and African Americans with IDD in the US, focusing on identifying disparities and interventions in place to address oral health issues. Results from this systematic review will provide recommendations for future studies and research on improving oral health outcomes for individuals with IDD, especially minorities with IDD, and address any research gaps.

1.3 Methods

This study reviewed available literature on oral health disparities among people with IDD and how this affects their oral health. Information was obtained from peer-reviewed scientific articles published between 2013-2023. Specifically, information will be gathered on disparities in oral health among the target population, barriers to dental care, and current programs or interventions available. Findings from this study will be utilized to provide recommendations for reducing disparities and promoting the oral health of Caucasians and African Americans with IDD in the US.

1.4 Research questions

To have a finer understanding of the oral health issues between African Americans and Caucasians with IDD in the US, this comparative analysis sought to answer the following questions:

- 1) What are the disparities associated with the overall oral health of Caucasians and African Americans with IDD in the US?
- 2) What intervention programs are available to address oral health disparities among Caucasians and African Americans with IDD in the US?

Chapter II – Review of the Literature

According to the CDC, oral health and oral disease have increasingly been associated with chronic diseases such as diabetes, stroke, and heart disease (CDC, 2022). Oral health issues often disproportionately affect individuals with IDD who are living in low-income communities or minority communities (Northridge et al., 2020). Unfortunately, there has been a lack of comprehensive research on oral health issues conducted comparing Caucasians and Africans with IDD, particularly minorities with IDD.

2.1 Oral health status among Caucasians and African Americans with IDD in the US

Research has revealed that people with IDD have a higher incidence of poor oral health (Ward et al., 2019). Individuals in this population often experience poor oral health outcomes and require additional support to achieve optimal oral health (Wilson et al., 2019). Previous research has found that minorities with IDD experience higher rates of health inequities that can prevent them from having optimal oral health outcomes (Wilson et al., 2019). As a result, several health issues can develop in individuals with IDD because of a lack of preventative dental care and limited access to oral health facilities. Some of the oral health issues that can occur are tooth loss, tooth decay, and gum disease (Healthy People 2030, n.d.).

Malecki et al. (2015) utilized oral health screening and survey data to review individual, community, and psychosocial predictors that can affect oral health status among adults in Wisconsin. The researchers recruited 1453 adults in Wisconsin utilizing data from the health survey of the Wisconsin Oral Health Screening project. The implementers of the survey concluded that 22.6% of minorities had untreated dental cavities and 32.8% of the participants did not have health insurance (Malecki et al., 2015). Previous research often does not include

social determinants of health or modifiable risk factors that contribute to poor oral health outcomes resulting in gaps in information for oral health (Malecki et al., 2015). This study highlighted the importance of assessing the many complex social determinants of health to provide targeted intervention and educational programs to communities with disparities in oral health. (Malecki et al., 2015). While the participants of the study did not identify with having a disability, it is worth noting the impact of health inequities on dental care.

Comparably, additional research was conducted on risk factors and oral health outcomes among individuals with IDD utilizing clinical and demographic data from dental records (Morgan et al., 2015). Overall, the vulnerable population had a higher burden of oral disease with 32.2% having gum disease and 80.3% having edentulism (toothless) (Morgan et al., 2015). The researchers underscored the lack of available information on oral health issues and the impact on quality of life for individuals with IDD in the United States (Morgan et al., 2015).

2.2 Racial inequities and disparities in oral health in people with IDD in the US

In the United States, racial and ethnic minorities are more likely to experience poor oral health due to the unequal distribution of dental care and their socioeconomic status due to their insurance status, low income, and racial/ethnic background (Northridge et al., 2020). One racial group disproportionately impacted by inequities in oral health outcomes in the United States is African Americans with IDD (Liu et al., 2022). This population accounts for 34.9% of the 85 million Americans who have any form of disability (Schulz et al., 2022). Northridge et al. (2020) found that African Americans with IDD are less likely to seek preventative care or treatment for oral health issues because of their socioeconomic status compared with Caucasians with IDD. Additionally, data analyzed from the National Health and Nutrition Examination Survey (NHANES) found that African Americans were more likely to self-report having poor overall

oral health and have fewer dental visits compared to other ethnic groups (Northridge et al., 2020).

In 2018, research based on data obtained from the National Health Interview Survey assessing the unmet healthcare needs of individuals with IDD found that racial minorities with IDD are more likely to face discrimination in healthcare and dental care (Dorsey Holliman et al., 2023). Minorities with IDD have experienced greater disparities in accessing healthcare or foregoing services due to their racial background and disability status (Dorsey Holliman et al., 2023). Overall, future research and policies are needed to decrease the systematic and economic barriers to adequate dental care and healthcare services for this vulnerable population (Dorsey Holliman et al., 2023; Lee et al., 2021). Additionally, previous research highlighted oral health issues can occur in minority groups of various age levels in the United States because of the transition from the Children's Health Insurance Program (CHIP) to Medicaid coverage or loss of dental insurance due to retirement (Fellows et al., 2022). Overall, the available data shows that the various age levels in individuals with IDD often face inequities in dental care access and services, but there is a lack of available research that assesses oral health issues at different age levels.

2.2.1 Children with IDD (Ages 1-17 years)

Poor oral health status can cause a loss of productivity for children (Como et al., 2019). Research has found that poor oral health can result in low academic performance, pain, loss of appetite, and low self-esteem (Guarnizo-Herreño et al., 2019). Some evidence-based interventions and policies primarily target the oral health of children, especially at the community and individual levels (de Silva et al., 2016). Even though these interventions are in

place, disparities are occurring especially in minority children compared to Caucasian children (Como et al., 2019).

Some of the major disparities in oral health occurring for minority children are lack of medical insurance, access to quality health care, access to transportation, healthy food options, and poor social problems such as systematic racism (Smitherman et al., 2021). Researchers found that inequities and barriers persist among children with IDD in the US (Como et al., 2019). It was further stated that structural factors such as stigma, and sociocultural and familial elements continue to impact African American families, especially families that contain children with IDD (Almri et al., 2022; Como et al.2019).

2.2.2 Adults with IDD (Ages 18 – 64 years)

Adults from different racial/ethnic backgrounds were more likely to face a higher prevalence of health disparities occurring because of their race and disability status (Goyat et al., 2015). Based on a recent study, it was estimated that 26% of adults in the United States will experience some form of disability, with higher rates of disabilities occurring in racial and minority groups (Dorsey Holliman et al., 2023). Hispanic and African American Adults with IDD are more likely to forego or delay dental care compared to African American and Hispanic adults without disabilities because of educational background, dental insurance access, and socioeconomic status (Dorsey Holliman et al., 2023; Seirawan, 2008). Researchers found that 45% of young adults reported having been to a dentist at least once a year compared to 58% of individuals without IDD (Kancherla et al., 2013).

2.2.3 Older Adults with IDD (65+ years)

Older adults in the United States are more likely to experience a disability or poor physical function (Kotronia et al., 2019). Currently, older adults with IDD lack consistent dental care benefits, resulting in two-thirds of this population not having proper dental or preventative coverage (Huang et al., 2021). As a result, the lack of proper dental coverage can prevent older adults from accessing dental care services increasing oral diseases in this population (Huang et al., 2021). Further research has found that older adults in the United States most often face other health and medical comorbidities that can affect oral health outcomes, such as dementia, hypertension, and heart disease (Fellows et al., 2022). Older adults with IDD have a higher prevalence of untreated oral disease resulting in more out-of-pocket expenses and impact on overall quality of life (Huang et al., 2021).

2.3 Barriers to dental care for people with IDD in the US

Various barriers such as the determinants of health hinder people with IDD from getting adequate dental care. Social determinants of Health (SDoH) are comprised of five domains: economic stability, access to education, healthcare access and quality, the built environment, and social and community context (as illustrated in **Figure 1**). These five domains can have a pivotal impact on the burden of oral health issues in minority and marginalized populations (Peres et al., 2019). A systematic review was conducted to identify barriers to dental services for individuals with IDD, particularly racial and ethnic minorities with IDD (da Rosa et al., 2020). The review highlighted that individuals with IDD often face many barriers and disparities to optimal oral health such as structural, behavioral, and professional (da Rosa et al., 2020). The following barriers are discussed in detail in this study: the financial burden of dental care, insurance utilization, and healthcare access and quality.

Figure 1

Social Determinants of Health

Social Determinants of Health



Source: (*Social Determinants of Health, health equity, and Vision Loss, 2023*)

2.3.1 Financial Burden and Insurance Utilization

Research has found that individuals with IDD are often impacted by the economic burden of health and dental care services (Huang et al., 2021). Dental care and coverage expenses are significantly higher in the United States compared to other countries (Huang et al., 2021). As a result of complex health issues individuals with IDD require an increased usage of healthcare services for their needs (Shady et al., 2022). Previous research estimates that individuals with IDD are four times as likely to incur higher annual healthcare costs compared to individuals without IDD resulting in limited access to dental and healthcare services (Lunskey et al., 2019; Shady et al., 2022).

Additionally, adults with IDD are more likely to rely on state-funded Medicaid for their dental and medical care needs. Further research has found that individuals with IDD had lower uninsurance rates and higher rates of Medicaid coverage (Stimpson et al., 2019). The National Health Interview Survey found that insurance coverage can vary in different states and that some dental providers do not always participate in Medicaid programs (Chavis et al., 2022). Consequently, states are not required to provide dental benefits for adults resulting in a growing trend in the need for expansions of dental coverage to include restorative and preventative services (Lipton et al., 2022).

2.3.2 Healthcare Access and Quality

Williams et al. (2015) surveyed students between 3 to 6 years of age who attended developmental centers and special educational schools. The researchers found that dental health professionals are less willing to treat adults or children with IDD compared to people without

IDD (Williams et al., 2015). As a result, there is a lack of general dental professionals who are not able to or willing to treat adults with IDD (Indiran et al., 2020).

Furthermore, previous research has highlighted the many barriers that impact oral healthcare for individuals with IDD (Wilson et al., 2019). Some of the barriers mentioned are the lack of proper definition for oral healthcare, lack of adequate services, delivery and quality of dental care, and caregiver dependence (Alamri et al., 2022). Additionally, limited access to adequate healthcare and dental care can be hindered by a lack of access to health facilities and a lack of sociocultural factors such as low health literacy or negative attitudes towards individuals with IDD (Lagu et al., 2016; Matin et al., 2021). Despite the Americans with Disabilities Act, healthcare access and quality are still lacking for individuals with disabilities (Lagu et al., 2016). Researchers have found that individuals with IDD continue to face obstacles to quality healthcare and health outcomes (Shady et al., 2022).

2.4 Current Programs or Interventions to Address Oral Health Disparities

In an annual report conducted by the Surgeon General, it was highlighted that collaborative efforts are needed to improve oral health outcomes, decrease disparities in underserved communities, and development of dental intervention programs (Benjamin, 2010). The improvement of oral health issues has continuously been a pivotal focus of Healthy People 2030 goals whereby increasing access to oral health care and providing preventative care services to communities (Healthy People 2030, n.d.). As a result, several intervention and preventative programs are available in the United States to address the oral health disparities (Kancherla et al., 2013). Each state has its own state-funded oral health intervention programs to improve the oral health outcomes of vulnerable communities (Hoffman et al., 2017). The programs focus on fluoride in drinking water and educational programs on correct dental care

(Kancherla et al., 2013). In addition, local health departments collaborate with the Centers for Disease Control and Prevention to implement infrastructure and evidence-based interventions to improve oral health in communities (CDC - Implementation of evidence-based preventive interventions, 2020).

Research has emphasized the need for robust policies and intervention programs for the improvement of oral health outcomes for minorities with IDD (Binkley et al., 2014). Intervention strategies established for oral health promotion are vital, especially in school systems, and dental clinics, and for continued surveillance of oral health data (CDC, 2019). The targeted promotion of oral health in communities with a higher prevalence of poor oral health outcomes is vital to decreasing the disparities in oral health (Binkley et al., 2014). Thus, strategies include utilizing community partnerships to collaborate with health departments, dental associations, and dental offices to provide dental treatment and prevention services to low-income or rural communities, especially geared toward individuals with IDD (Hoffman et al., 2017).

Kangutkar et al. (2022) conducted a systematic review to assess the available educational and training intervention programs geared toward adults with IDD. The researchers concluded that individuals with IDD commonly face dental anxiety and perceive dental care to be inaccessible to them (Kangutkar et al., 2022; Reynolds et al., 2022). There is a lack of currently available literature that suggests a positive relationship between educational and training intervention programs for dental care in this population. Thus, reinforcing the need for additional research and training geared toward more stakeholders such as dentists, healthcare facilities, and non-dental health professionals for individuals with IDD (Khokhar et al., 2016). Currently, there is very little research that assesses the current interventions or evidence-based strategies that target minorities with IDD (Shelton et al., 2018). Further research has underscored awareness of

disparities in oral health is needed to decrease the barriers in racial and ethnic minorities, especially in the African American community and African Americans with IDD (Como et al., 2019).

Overall, barriers persist despite intervention efforts to lessen the disparities for individuals with disabilities in health and dental care (da Rosa et al., 2020). Based on research, some of the recommendations include the need for more robust dental education that is geared toward minority groups, destigmatizing biases towards individuals with IDD, promotion of more evidence-based interventions, and additional training for non-dental health professionals, caregivers, and dental health professionals (Como et al., 2019; Ervin et al., 2014; Lagu et al., 2016).

Chapter III – Methods and Procedure

A systematic review of three scientific databases was conducted based on the PICO framework established by Richardson et al. (1995) to identify existing literature on oral health issues and disparities among Caucasians and Africans with IDD in the United States. Furthermore, this review utilized the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) guidelines to narrow down the existing research. Additionally, this review will also assess any current literature that discusses interventions and recommendations to decrease the disparities in oral health among individuals with IDD.

3.1 Research Question

The following questions were used to guide this review:

- 1) What are the disparities associated with the overall oral health of Caucasians and African Americans with intellectual disabilities in the US?
- 2) What intervention programs are available to address oral health disparities among Caucasians and African Americans with intellectual disabilities in the US?

3.2 Relevant Studies

This review assessed the disparities that occur in the oral health of Caucasians and African Americans with IDD while also examining the current intervention programs that address the inequities in dental care. Only relevant literature on the topics published between January 2013 and October 2023 was considered in this review. Three databases (PubMed, CINAHL Plus, and ProQuest) were searched using the following terms “African American, Black American, Caucasian, “and White American, disparities and “Health Care Disparities,

United States, disabilities, health barrier, special needs, intellectual disability, oral health, dental care, oral disease, and oral conditions” (see Appendix for search logs).

3.2.1 Inclusion and Exclusion Criteria

Only research articles published between January 2023 and October 2023 for a current review of the literature focused on oral health disparities and oral health interventions among individuals with IDD in the United States were included in this systematic review. Additionally, relevant articles that described health disparities, dental insurance, specialized dental care, Medicaid, Social Determinants of Health, various age groups with IDD, and research written in English were also included in this review.

Based on the exclusion criteria, articles were excluded in this review if they met the following criteria: (1) research conducted before 2013, (2) research conducted outside of the United States, (3) research did not include individuals with IDD or any forms of disability, (4) none of the study participants were Caucasians or African Americans, or (5) none of the research discussed oral health or oral health disparities as demonstrated in **Table 1**.

Table 1*Inclusion and Exclusion Criteria*

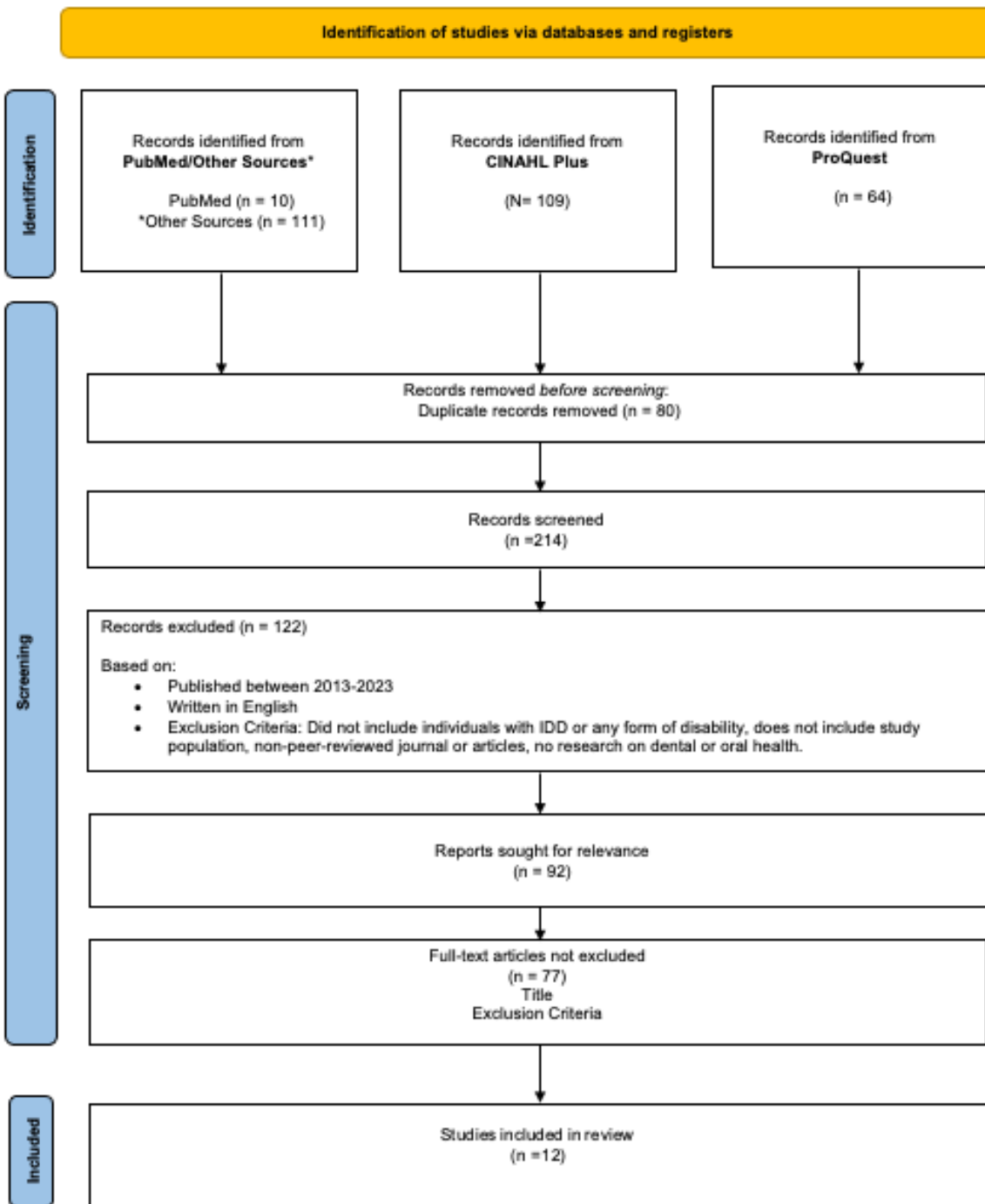
Inclusion	Exclusion
Population with intellectual or developmental disabilities (IDD)	Does not include individuals with IDD or any form of disability
African Americans	Does not include the study population
Caucasians	Research conducted outside of the United States
Specialized dental care	Not peer-reviewed journal or article
Dental interventions or recommendations	Research that does not discuss dental or oral health
English Language	Research conducted prior to 2013

3.3 Study Selection

The preliminary search of the three databases yielded 294 articles. After review and removal of duplicates, 214 articles remained. All the articles and abstracts were reviewed for relevance. Based on the inclusion and exclusion criteria established, only articles published in English between January 2013 and October 2023 were selected. Particularly, articles that reported on oral health issues and disparities in oral health outcomes were included as well. For a comprehensive overview of the study population, individuals with developmental disabilities, learning disabilities, intellectual disabilities, and IDD were included in the eligibility criteria. An overview of the eligibility using the PRISMA flowchart is illustrated in **Figure 2**. Overall, twelve relevant articles were identified, and their reference list was reviewed for additional relevant papers to the research questions.

Figure 2

PRISMA Chart for source selection



Chapter IV – Results

Only twelve papers were included in this systematic review. To provide a comprehensive overview of the available literature, key information regarding the authors, publication year, study purpose, study methods, intervention description, key barriers/disparities, study outcomes, and study population were extracted from the selected literature. The selected literature was grouped into two categories based on subject matter: Category 1: Disparities in Oral Health and Barriers in Individuals with IDD (as shown in Table 2) and Category 2: Intervention programs and oral health recommendations (as shown in Table 3). Table 2: Research on Disparities and Barriers to Oral Health for Individuals with IDD has seven articles that summarize research articles that describe oral health barriers and disparities for individuals with IDD. Table 3: Research on Intervention Programs and Recommendations for Oral Health for Individuals with IDD has five articles that summarize research articles on intervention programs and oral health recommendations in individuals with IDD. Based on the selected literature, the following section will discuss the findings of the systematic review and address the following research questions:

1. What are the disparities associated with the overall oral health of Caucasians and African Americans with IDD in the US?
2. What intervention programs are available to address oral health disparities among Caucasians and African Americans with IDD in the US?

4.1 Barriers and Disparities of Oral Health in Individuals with IDD

The “Barriers and Disparities of Oral Health for Individuals with IDD” category centers on factors that can affect an individual’s oral health outcomes. Seven of the articles selected

specifically assessed the perceived barriers and disparities in oral health outcomes for this vulnerable population. The seven papers consisted of one systematic review, one prospective research study, one interview study, and four secondary data analyses. Of the seven studies, three of the studies discussed some key barriers to oral health outcomes. Four of the studies discussed the disparities in oral health issues and oral health outcomes in individuals with IDD. Despite the lack of relevant and current literature on the topic, the selected studies provided an overview of the key barriers and factors that can influence the oral health outcomes of individuals with IDD.

Disparities in oral health and barriers to oral health can negatively impact oral health outcomes for individuals with IDD (Northridge et al., 2020). Poor oral health outcomes can lead to a decrease in quality of life and health outcomes (Wilson et al., 2019). Adults with IDD are more prone to poor oral health outcomes and inequalities due to barriers to accessing quality oral health care (Indiran et al., 2020). Ultimately, further reinforcing the need to reduce barriers and disparities in oral health for individuals with IDD.

Survey data gathered from adults with IDD and their caregivers by Chadwick et al. (2018) assessed the perceived barriers and facilitators of oral health. Chadwick et al. (2018) cited influences such as “Personal and Lifestyle” and factors “Social and Environmental” can affect the likelihood of optimal oral health outcomes and increase disparities in oral health. The study concluded that physical, cognitive, caregiver support, and specialized dental care are some of the key barriers and disparities to oral health issues in individuals with IDD (Chadwick et al., 2018).

Building on the theme of barriers and disparities in this population, Cruz et al. (2016) emphasizes that individuals with IDD often rely on community-based organizations for their oral and healthcare needs. Adults with IDD utilize community-based organizations to supplement the lack of dental insurance coverage (Cruz et al., 2016). Unfortunately, the community-based

organizations face barriers such as limited funding, low demand from parents and caregivers, and restrictions on administrative and system-level policies resulting in disparities still occurring in communities (Cruz et al., 2016).

Aloufi et al. (2023) conducted a systematic review between June 2022 and July 2023 utilizing MEDLINE and EMBASE search databases to examine the available literature on the key barriers to the transition from pediatric dental services to adult dental services. For a comprehensive review, other electronic searchers were scanned such as the Cochrane database, gray literature, and Google Scholar. Relevant articles were obtained by using specific strategy keywords and then evaluated using the British Medical Journal quality assessment tool. The findings from this study concluded that the transition from pediatric dental care to adult healthcare and dental services is quite challenging due to inability to obtain healthcare and dental services in adulthood for this population (Aloufi et al., 2023). Overall, individuals with IDD face many complex medical and oral health conditions making it harder to provide adequate dental and health care services (Aloufi et al., 2023).

Comparably, a study was conducted by Chavis et al. (2022) using secondary data analysis utilizing information from the 2018 National Health Interview Survey to assess the association between disability status and dental care. The researchers found that adults with IDD had higher crude rates of going two or more years without a dental visit (Odds Ratio [OR], 2.29; 95% CI, 1.96 to 2.67). Overall, the findings suggest that there is a strong association between disability status and dental care usage based on the ability to afford necessary oral health care services (OR, 1.73; 95% CI, 1.47 to 2.14) (Chavis et al., 2022). This research further emphasizes the impact of not having comprehensive dental coverage and the unaffordability of dental services for individuals with IDD (Aloufi et al., 2023; Chavis et al., 2022).

Fosse et al. (2021) utilized secondary data from the 2017 Medical Expenditure Panel Survey (MEPS) to assess dental access, dental utilization, dental expenditures, and sources of payment in three groups of adults based on their disability status (Fosse et al., 2021). The analysis concluded that adults with IDD are unable to get the necessary dental care (OR, 2.70, 95% CI, 2.03 to 3.61) and are more likely to delay dental care services (OR, 2.88, 95% CI, 2.11 to 3.94) when compared to adults without an IDD (Fosse et al., 2021). Findings from this study suggest that adults with IDD relied heavily on Medicaid to pay for dental services, compared to adults without IDD who have private insurance (Fosse et al., 2021).

Additionally, Gim & Ipsen (2022) assessed the differences in perceived needs and unmet needs of adults with IDD living in rural and urban communities in the United States. Secondary analysis of the National Survey on Health and Disability was assessed to determine the unmet and perceived healthcare needs for acute and preventive services (Gim & Ipsen, 2022). Findings suggest that there are no major differences in the unmet healthcare needs of rural and urban participants. Notably, researchers also found that participants in urban communities were twice as likely to report not needing dental care (Gim & Ipsen, 2022).

Using multivariable logistic regression, Horner-Johnson et al. (2015) conducted a cross-sectional analysis using data obtained from the Medical Expenditure Panel Survey between 2002 to 2012 to examine the association between disability and race. (Horner-Johnson et al., 2015). Findings from this analysis suggest that minorities with IDD were less likely to have annual dental examinations (Horner-Johnson et al., 2015). Additionally, disability status and racial background were associated with greater disparities in oral health. Some of the disparities mentioned were delays in dental examinations and the inability to obtain the needed care (Horner et al., 2015).

Table 2

Research articles that describe oral health barriers and disparities for individuals with IDD

Authors, Year	Purpose	Methods	Key Barriers/Disparities
1) Aloufi et al. (2023)	Aimed to conduct a systematic review to evaluate the oral characteristics of individuals with IDD from pediatric dental services to adults' dental services.	Utilized scientific databases (MEDLINE AND EMBASE) to obtain relevant literature on the transition from pediatric dental services to adult dental services.	A significant percentage of individuals with IDD have a higher prevalence of gingivitis, and periodontal and dental caries compared to adults without IDD.
2) Chadwick et al. (2018)	Aimed to assess the oral health care for adults with IDD and identify the factors that influence dental and oral health care.	Utilized data conducted via a survey surrounding barriers and facilitators of having oral health and hygiene for individuals with IDD and caregivers.	"Personal and Lifestyle influences" are barriers to oral care (physical, behavioral, and cognitive factors). "Social and Environmental factors" (caregiver support, adaptations for oral care, and specialized equipment).
3) Chavis et al. (2022)	Assessed the association between disability status and dental care.	Utilized data collected from the 2018 National Health Interview Survey to review the association between dental care use and disability status in individuals with IDD.	Adults with IADD were less likely to go two years or more without dental visits compared to individuals without IDD. Decreased access to oral health care and not being able to afford oral health care services.
4) Cruz et al. (2016)	Assess the types of oral health services offered by community-based organizations to children with special care needs.	Conducted key interviews with representatives from intervention agencies, advocate groups, and oral health programs that service children with special needs.	Barriers to services can include limited agency resources, low demand from parents, and restrictions at the administrative and system-level policies; Oral services are limited in children with IDD and often as a response to oral health issues.

Table 2

Research articles that describe oral health barriers and disparities for individuals with IDD (Cont.)

Authors, Year	Purpose	Methods	Key Barriers/Disparities
5) Fosse et al. (2021)	Aimed to assess the dental access, expenditures, utilization, and source of payment for adults with IDD	Utilized secondary data from the 2017 Medical Expenditure Panel Survey (MEPS) to review dental access, utilization, expenditures, and payment for adults with intellectual disabilities, other disabilities and without disabilities.	<p>Adults with ID had higher rates of delaying dental care.</p> <p>No significant differences in dental utilization between the three groups.</p> <p>Adults with ID had a greater share of dental care being paid by Medicaid versus adults without disabilities with private insurance.</p>
6) Gim & Ipsen. (2022)	Aimed to assess the differences in unmet need and perceived need for healthcare services in adults with disabilities in urban and rural communities.	Utilized data from the National Survey on Health Disability to examine the perceived healthcare needs and unmet needs of adults with IDD for preventive and acute services.	<p>No significant differences in unmet needs in rural and urban participants.</p> <p>Additional research is needed to perceive healthcare needs and preventative services, especially in rural communities.</p>
7) Horner-Johnson et al. (2015)	Aimed to assess the relationship between disability status and race with dental examinations, delayed dental care and inability to obtain necessary dental care.	Cross-sectional analysis of the Medical Expenditure Panel survey between 2002 – 2012 to examine the association between race and disability.	<p>Racial groups less likely to received annual dental examinations.</p> <p>Disparities in examinations, delays in care and the inability to obtain the needed care.</p>

4.2 Interventions and Recommendations for Individuals with IDD

The “Interventions and Recommendations for Oral Health in Individuals with IDD” category summarizes the available literature that examines interventions and recommendations to improve the oral health of individuals with IDD. Five articles were examined to review recommendations and interventions for dental care in individuals with IDD. Three of the articles were prospective studies and two of the papers were systematic reviews of available literature. Unfortunately, there is a lack of relevant research that primarily examines oral health outcomes and that addresses any intervention and recommendations to decrease the oral health disparities.

Jones & Miller (2015) conducted a study to provide educational modules to dental hygiene students to assess any changes in attitudes, bias, and capacity toward individuals with IDD. Dental students were provided with pre-and post-assessments to assess attitudes and comfort of patients with IDD by using measures such as the Attitude Toward Disabled Persons and Patient Advocacy Microsocial (AMIA) scale (Jones & Miller, 2015). Overall, the findings from this study suggest that the addition of education modules in dental school curriculum can improve attitudes and decrease bias towards patients with IDD (Jones & Miller, 2015).

Following the interventions for oral health outcomes, Selbera et al. (2021) conducted a study to measure the impact of oral health education on the improvement of caregiver attitudes, behaviors, self-efficacy, and knowledge for patients with IDD. The researchers used sample data from new hire caregivers in intermediate care facilities to explore the effectiveness of oral health education programs (Selbera et al., 2021). Findings from this study noted that there was an overall improvement in knowledge surrounding dental care while there is no difference in changes in behaviors or attitudes. Overall, researchers found that educational modules or training alone is not an adequate measure of positive oral health behavior change, especially in new hire

caregivers (Selbera et al., 2021). It is worth noting that further studies in long-term caregivers and long-term support staff to assess the outcome of these education programs is needed. Moreover, further findings suggest that providing educational modules and training to dental students and caregivers can improve the health outcomes of individuals with IDD (Jones & Miller, 2015; Selbera et al., 2021).

Minihan et al. (2014) looked to assess the impact of at-home dental care for patients with IDD. 808 caregivers were recruited for an at-home dental care program for the caregivers who oversaw adults with IDD to healthcare and dental appointments (Minihan et al., 2014). Data obtained from this study was used to investigate the at-home dental care experience of caregivers and assess the differences in care for paid caregivers and family members (Minihan et al., 2014). Findings from this study suggest that providing at-home dental care can be challenging for adults with IDD. Overall, the lack of adherence to regular dental care was very high. It was reported that 85% of adults with IDD required assistance with tooth cleaning and 79% did not adhere to regular tooth cleaning (Minihan et al., 2014). Conversely, 85% of caregivers reported feeling an increased confidence in assisting with brushing the teeth of adults with IDD (Minihan et al., 2014).

Two of the papers assess the available literature for interventions and the development of recommendations to improve oral health outcomes in individuals with IDD. First, Osugo & Cooper. (2016) conducted a systematic review to examine pharmacological, psychological, and electroconvulsive therapy (ECT) interventions in adults with IDD. The researchers utilized four scientific databases and PRISMA guidelines to select relevant papers to be included in the systematic review (Osugo & Cooper, 2016). Findings suggested there is extraordinarily little evidence-based interventions for individuals with IDD, relevant research was limited on

evidence-based interventions, and further research is needed to provide a comprehensive overview of the available research (Osugo & Cooper, 2016).

Similarly, St. John et al. (2022) also conducted a systematic review on the development of recommendations to increase the accessibility of health research and inclusion of adults with IDD. Three databases (PubMed, CINAHL, and Google Scholar) were used to identify relevant peer-review journal articles that focused on addressing the participation of adults with IDD in research (St. John et al., 2022). Findings from this review focused on some of the key barriers to inclusion of adults with IDD in research such as gaps in researcher knowledge, lack of accessibility, communication issues, systematic exclusion, and distrust in researchers (St. John et al., 2022). According to St. John et al. (2022) recommendations to increase the participation of adults with IDD included community partnerships, simplification of consent forms, plain language usage on forms, and accessible accommodations (St. John et al., 2022).

Table 3

Research articles that describe intervention programs and recommendations for oral health in individuals with IDD

Authors, Year	Purpose	Intervention Description	Outcomes)
1) Jones & Miller. (2018)	<p>Purpose: To review the perceived gaps in healthcare providers' understanding of individuals with disabilities and the reasons why there may be delays or not seeking health care compared to individuals without disabilities.</p> <p>Study Population: Individuals with IDD or a disability.</p>	Investigated if offering an education module about individuals with disabilities can change the attitudes dental hygiene students and capacity for patients with disabilities.	The addition of educational modules included in the curriculum for dental hygiene students can improve the attitudes and bias toward patients with IDD.
2) Minihan et al. (2014)	<p>Purpose: To review the effectiveness of at-home oral care methods for people with developmental disabilities who cannot perform personal preventive dental care on themselves or need their caregivers.</p> <p>Study population: People with developmental disabilities.</p>	Provided a survey to caregivers who accompany adults with developmental disabilities and assess at-home oral care experiences and the differences in caregivers who are family or paid.	<p>At-home dental care programs were challenging for adults with developmental disabilities and caregivers.</p> <p>Interventions and solutions need to be addressed so they are tailored to the different experiences and needs of family members and paid caregivers.</p>
3) Osugo & Cooper. (2016)	<p>Purpose: To review the interventions for adults with mild intellectual disability and mental ill-health.</p> <p>Study Population: Adults with mild intellectual disability and mental ill-health.</p>	Conducted a systematic review of papers to see the effectiveness of psychosocial interventions.	<p>Very few evidence-based interventions for people with IDD.</p> <p>Existing literature is limited to oral health issues in individuals with IDD. Overall, further research and evidence are needed for larger sample sizes.</p>

Table 3*Research articles that describe intervention programs and recommendations for oral health in individuals with IDD (Cont.)*

Authors, Year	Purpose/Study Population	Intervention Description	Outcome(s)
4) Selbera et al. (2021)	<p>Purpose: To measure the impact of oral health education on caregiver's knowledge, aptitudes, behavior, and self-efficacy in oral health to clients with IDD.</p> <p>Study Population: Children with IDD and Caregivers.</p>	Conducted a study on new hire caregivers in intermediate care facilities and examine the effectiveness of health education programs.	<p>Increased knowledge is not adequate for maintaining optimal oral health or oral health behavior changes.</p> <p>Long-term caregivers for individuals with IDD need to be evaluated to determine the reduction of oral disease in the population.</p>
5) St. John et al. (2022)	<p>Purpose: To develop and provide recommendations for researchers in increasing accessibility of health research and the inclusion of adults with IDD in health research.</p> <p>Study population: Adults with IDD.</p>	Conducted a literature review to identify barriers to research participation for adults with IDD and increase the accessibility of university research for adults with IDD.	<p>Key findings about barriers include gaps in researchers' knowledge, accessibility and communication challenges, systematic exclusion, and lack of trust.</p> <p>Recommendations include addressing the research gap, building community partnerships, simplifying consent forms, usage of plain language, universal support and accommodations and practice accessible dissemination.</p>

Chapter V – Discussion and Conclusion

5.1 Discussion and Review of Research Questions

Overall, seven of the articles included in this review found that individuals with IDD have undue barriers and inequities to optimal oral health outcomes. One paper (Horner-Johnson et al., 2015) showed the effect of disability status and racial background on oral health outcomes in adults with IDD. Many of the articles showed numerous amounts of individuals rely on Medicaid and community-based programs to supplement the lack of comprehensive healthcare and dental coverage. The results do show a paucity of published evidence on oral health and interventions to decrease disparities in oral health. Comparably, four of the articles addressed the possible oral health interventions in individuals with IDD. One of the articles (Jones & Miller, 2015) did not specifically address oral health interventions but discussed healthcare interventions for individuals with mild IDD and mental health issues.

The papers included in this review did not have a large breadth of participants or currently available research related to oral health in individuals with IDD. This review has a smaller number of studies examining the disparities, barriers, interventions, and recommendations for oral health outcomes. However, this systematic analysis did examine disparities and barriers to adequate dental care in Caucasians and African Americans with IDD. Overall, this analysis highlighted some key factors that contribute to disparities in oral health care in this vulnerable population. Additionally, this review reinforced the need for further research and data on intervention programs, policies, and robust recommendations that target dental care.

Despite the lack of research comparing the two racial groups and dental care, the research supports that barriers occur for dental and healthcare for individuals with IDD. Overall, the research found that social determinants of health, provider attitudes, insurance coverage, and health education are some of the major barriers to dental health outcomes for this vulnerable population.

5.2 Limitations of Study

This review had multiple limitations. First, much of the research was primarily conducted on insurance utilization and healthcare services in individuals with IDD resulting in a lack of comprehensive research on oral health in this population. Currently, there is a lack of recent research or data conducted within the last decade on dental health care in the United States. Second, there was limited research that compared the different racial groups with IDD. Third, current research on interventions and recommendations primarily targets adolescents with IDD and not adults or older adults with IDD. Fourth, recent research on dental health was conducted in countries outside of the United States. Fifth, research primarily focused on the caregivers of individuals with IDD and did not include dental health professionals. Lastly, a singular person conducted the search and selection process of this systematic review, which can result in selection bias. Despite the limitations, this systematic study does provide an overview of the barriers faced by individuals with IDD to optimal oral health outcomes.

5.3 Study Implications

This comparative analysis highlights the impact of health education, policies, interventions, and social determinants of health, particularly focusing on minorities with IDD. Based on the research, it is evident that poor oral health can affect minorities with IDD's health and well-being thus leading to a decrease in quality of life and issues with chronic diseases (Northridge et al., 2020; Wilson et al., 2019). The identification of the key barriers for individuals with IDD can provide a context as to why oral health outcomes are drastically worse in this population. Overall, oral health disparities can be viewed by assessing the framework at the community and individual levels (Tiwari et al., 2020).

Though the research does not explicitly compare the different racial groups it does show racial disparities and barriers persist in individuals with IDD. Addressing the racial division in oral health outcomes in individuals with IDD is needed to better understand the differences in health outcomes. This analysis can provide an understanding of some of the factors that can impact oral health in this population and identify recommendations. This review raises a call to action for advocacy of more robust intervention programs, comprehensive policies, Medicaid coverage, specialized dental services, and health education for individuals with IDD.

5.4 Recommendations and Conclusion

Overall, this systematic analysis underscores the need for further research that compares the oral health issues in the two racial groups to determine the disparities in oral health and identify evidence-based intervention programs. To provide a better understanding of oral health issues in different racial groups with IDD, further research is needed. However, the scarcity of

available research does not allow for a full assessment of interventions at the different levels such as individual, community, Medicaid expansion and policy advocacy.

5.4.1 Individual/family and community-level interventions

Individual/family interventions are defined as the changes in beliefs, behaviors, attitudes, or knowledge in a target population (Sepinwall, 2002). Wilson et al. (2019) found that adolescents, adults, and older adults with IDD often depend on paid caregivers or family members to take care of their health care and personal needs. Interventions that target individuals and families can be beneficial to improving health behaviors and knowledge surrounding oral health care (de Silva et al., 2016). Additionally, research has shown that providing educational interventions for caregivers would be an effective means for people with IDD to obtain optimal oral health outcomes (Wilson et al., 2019).

Oral health education and individualized oral health programs are beneficial to targeting individuals with IDD, especially caregivers and family members (Kangutkar et al., 2022). Further research has shown that individuals living in supported housing with oral health education and individualized oral health programs were more likely to see changes in oral care routines impacting oral health (Rojo et al., 2023). Community-level interventions are defined as the behaviors, attitudes, community norms, and community awareness in a target population (McLeroy et al., 2003). Social and community intervention programs are beneficial for individuals with IDD as individuals with IDD can often rely on community programs for health, income, and navigation for resources (Jansen & Aldersey, 2020).

Community-based programs and services can increase the participation of the different population groups in the United States (Giummarra et al., 2022).

Jansen & Aldersey. (2020) noted that the development of interventions that promote community, belonging, and diversity is major in improving programs for individuals with IDD. The increase in community-based interventions and services can help to decrease the factors or barriers associated with poor oral health outcomes. In conclusion, understanding the community needs assessments and community outreach programs at the community level can provide a framework for the major needs of the targeted community (Umeasiegbu et al., 2022; Wilson et al., 2019).

5.4.2 Medicaid Expansion and Policy Advocacy

Medicaid expansion and policy advocacy is needed for effective changes to oral health outcomes in individuals with IDD. Recently, the Affordable Care Act (ACA) and Patient Protection were implemented to help increase the healthcare access of individuals with and without an IDD (Vaitsiakhovich & Landes, 2023). Unfortunately, the policies implemented have not improved the health of individuals with IDD despite the improvements in services targeting this community.

Furthermore, each state has its instructions on defining dental benefits and coverage for adults with IDD (Kancherla et al., 2013). Numerous individuals with IDD are often underinsured for dental care in the United States. According to a report by the National Council on Disability (NCD), around 4.5 million individuals in the United States rely on Medicaid for health coverage and numerous individuals with IDD have unequal dental care coverage (*Medicaid oral health coverage for adults with Intellectual & Developmental Disabilities – a fiscal analysis*, 2023). Policies that address the lack of comprehensive dental services under Medicaid programs need to be enacted to ensure equal healthcare coverage. Research has found that expanding the insurance and health services for adults with IDD can improve health outcomes by providing primary care, preventive care and decreasing the out-of-pocket spending cost (Creedon et al., 2022). Overall,

improving upon previous policies and system changes can decrease structural barriers in this community that play a role in oral health disparities occurring in individuals with IDD (Brown et al., 2019)

Moreover, physicians' attitudes and dental education can impact the access to quality health care in individuals with IDD. The Americans with Disabilities Act (ADA) and Patient Protections provided individuals with IDD the right to reasonable accommodations, protections, and quality healthcare. However, this resulted in physicians feeling overwhelmed and inadequately reimbursed by the required demands of the policy and act (Lagu et al., 2022). The ability to maintain the balance between effective policies for the target population and physician attitudes is pivotal in the quality and accessibility of healthcare services.

5.4.3 Conclusions

Public health agencies regularly provide dental services or programs to vulnerable communities, such as dental sealant programs, fluoride-in-water systems, and mobile dental clinics to address oral health disparities (Como et al., 2019). However, with available programs and services inequities still exist in individuals with IDD, especially in minorities with IDD. This review essentially highlights the lack of current research on oral health issues in the different racial groups with IDD. Current research suggests disparities persist in this community. Despite the lack of available research that addresses oral health issues in African Americans and Caucasians with IDD, this systematic review highlighted that there is a correlation in oral health outcomes, racial status, and disability status. While the available research did not directly compare the two racial groups and their oral health outcomes, it does imply that there is a greater need for intervention programs and services for minorities with IDD. Through population-based

intervention and strategies, many of the oral health disparities can be improved for this vulnerable population.

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Appendix A - Search Number/ Search Terms by Databases and Number of Hits (ProQuest)

Search Number/ Search Terms	Database	Number of hits
Search # 1: (((("African American" OR "Black American" OR Caucasian OR "White American") OR (Disparities AND "Health Care Disparities") AND (United States) AND (60isability* OR health barrier OR special needs OR Intellectual Disabili* OR developmental disabilities) AND ("oral health" OR "oral hygiene" OR "dental health" OR "dental care" OR "oral care") PD(2013-2023)) AND (Dental interventions) PD(2013-2023)) AND (Intellectual AND Developmental Disabilities) AND (United States)	ProQuest Central	8.348
Search # 2: (((("African American" OR "Black American" OR Caucasian OR "White American") OR (Disparities AND "Health Care Disparities") AND (United States) AND (60isability* OR health barrier OR special needs OR Intellectual Disabili* OR developmental disabilities) AND ("oral health" OR "oral hygiene" OR "dental health" OR "dental care" OR "oral care") PD(2013-2023)) AND (Dental interventions) PD(2013-2023)) AND (Intellectual AND Developmental Disabilities) AND (United States)) AND (location.exact("United States—US") AND la.exact("ENG"))	ProQuest Central	3.364
Search # 3: (((("African American" OR "Black American" OR Caucasian OR "White American") OR (Disparities AND "Health Care Disparities") AND (United States) AND (60isability* OR health barrier OR special needs OR Intellectual Disabili* OR developmental disabilities) AND ("oral health" OR "oral hygiene" OR "dental health" OR "dental care" OR "oral care") PD(2013-2023)) AND (Dental interventions) PD(2013-2023)) AND (Intellectual AND Developmental Disabilities) AND (United States)) AND PEER(yes)	ProQuest Central	412
Search # 4: (((("African American" OR "Black American" OR Caucasian OR "White American") OR (Disparities AND "Health Care Disparities") AND (United States) AND (60isability* OR health barrier OR special needs OR Intellectual Disabili* OR developmental disabilities) AND ("oral health" OR "oral hygiene" OR "dental health" OR "dental care" OR "oral care") PD(2013-2023)) AND (Dental interventions) PD(2013-2023)) AND (Intellectual AND Developmental Disabilities) AND (United States)) AND (oral heath) AND (health care outcomes) AND PEER(yes)	ProQuest Central	107
Search #5: (((("African American" OR "Black American" OR Caucasian OR "White American") OR (Disparities AND "Health Care Disparities") AND (United States) AND (60isability* OR health barrier OR	ProQuest Central	64

special needs OR Intellectual Disabili* OR developmental disabilities) AND (“oral health” OR “oral hygiene” OR “dental health” OR “dental care” OR “oral care”) PD(2013-2023)) AND (Dental interventions) PD(2013-2023)) AND (Intellectual AND Developmental Disabilities) AND (United States)) AND (location.exact(“United States—US”) AND stype.exact(“Scholarly Journals”) AND la.exact(“ENG”) AND PEER(yes))

Appendix B - Search Number/ Search Terms by Databases and Number of Hits (CINAHL)

Search Number/ Search Terms	Database	Number of hits
Search # 1: ("African American" OR "Black American" OR Caucasian OR "White American") OR (Disparities and “Health Care Disparities”) AND (United States) AND (disabilit* OR health barrier OR special needs OR Intellectual Disabili*)) AND AB ("oral health" or "oral hygiene" or "dental health" or "dental care" or "oral care")	CINAHL	33,305
Search #2: ("African American" OR "Black American" OR Caucasian OR "White American") OR (Disparities and “Health Care Disparities”) AND (United States) AND (disabilit* OR health barrier OR special needs OR Intellectual Disabili*)) AND AB ("oral health" or "oral hygiene" or "dental health" or "dental care" or "oral care")	CINAHL	20,763
Search # 3: AB(("African American” OR “Black American” OR Caucasian OR “White American”) (Disparities OR “Health Care Disparities”) AND (United States) AND (disabilit* OR health barrier OR special needs OR Intellectual Disabili*)) AND AB ("oral health" or "oral hygiene" or "dental health" or "dental care" or "oral care"	CINAHL	14,421
Search # 4: "African American" OR "Black American" OR Caucasian OR "White American") OR (Disparities and “Health Care Disparities”) AND (United States) AND (disabilit* OR health barrier OR special needs OR Intellectual Disabili*)) AND AB ("oral health" or "oral hygiene" or "dental health" or "dental care" or "oral care") Limiters - Linked Full Text; Published Date: 20130101-20231231 Expanders - Apply equivalent subjects Narrow by SubjectGeographic: - usa Search modes - Boolean/Phrase	CINAHL	12,021
Search #5: AB (("African American" OR "Black American" OR Caucasian OR "White American") OR (Disparities OR “Health Care Disparities”) AND (United States) AND (disabilit* OR health barrier OR special needs OR Intellectual Disabili*)) AND AB ("oral health" or "oral hygiene" or "dental health" or "dental care" or "oral care"	CINAHL	8,739
Search #6: AB (("African American" OR "Black American" OR Caucasian OR "White American") OR (Disparities OR “Health Care Disparities”) AND (United States) AND (disabilit* OR health barrier OR special needs OR Intellectual Disabili*)) AND AB ("oral health" or "oral hygiene" or "dental health" or "dental care" or "oral care"	CINAHL	3,117

Search # 7: (AB (("African American" OR "Black American" OR Caucasian OR "White American") OR (Disparities OR CINAHL 525

“Health Care Disparities”) AND (United States) AND (disabilit* OR health barrier OR special needs OR Intellectual

Disabili*) AND AB ("oral health" or "oral hygiene" or "dental health" or "dental care" or "oral care") AND oral health

AND ((special education or special needs or disabilities) AND (disabled or disability or disabilities)

Search # 8: (AB (("African American" OR "Black American" OR Caucasian OR "White American") OR (Disparities OR CINAHL 224

“Health Care Disparities”) AND (United States) AND (disabilit* OR health barrier OR special needs OR Intellectual

Disabili*)) AND AB ("oral health" or "oral hygiene" or "dental health" or "dental care" or "oral care") AND oral health

AND (special education or special needs or disabilities) AND (disabled or disability or disabilities)

Search # 9: (("African American" OR "Black American" OR Caucasian OR "White American") OR (Disparities and CINAHL 131

“Health Care Disparities”) AND (United States) AND (disabilit* OR health barrier OR special needs OR Intellectual

Disabili*)) AND AB ("oral health" or "oral hygiene" or "dental health" or "dental care" or "oral care")

Search # 10: (AB (("African American" OR "Black American" OR Caucasian OR "White American") OR (Disparities OR CINAHL 109

“Health Care Disparities”) AND (United States) AND (disabilit* OR health barrier OR special needs OR Intellectual

Disabili*)) AND AB ("oral health" or "oral hygiene" or "dental health" or "dental care" or "oral care") AND oral health

AND (special education or special needs or disabilities) AND (disabled or disability or disabilities)

Appendix C - Search Number/ Search Terms by Databases and Number of Hits (PubMed)

Search Number/ Search Terms	Database	Number of hits
Search # 1: (((("African American"[Title/Abstract] OR "Black American"[Title/Abstract] OR "Caucasian"[Title/Abstract] OR "White American"[Title/Abstract] OR "Disparities"[Title/Abstract] OR "Health Care Disparities"[Title/Abstract]) AND "united states"[Title/Abstract] AND "disabilit*"[Title/Abstract]) OR "health barrier"[Title/Abstract] OR "special needs"[Title/Abstract] OR "intellectual disabili*"[Title/Abstract]) AND "oral health"[Title/Abstract] OR "oral hygiene"[Title/Abstract] OR "dental health"[Title/Abstract] OR "dental care"[Title/Abstract] OR "oral care"[Title/Abstract]	PubMed	41,073
Search # 2: (("African American"[Title/Abstract] OR "Black American"[Title/Abstract] OR "Caucasian"[Title/Abstract] OR "White American"[Title/Abstract] OR ("Disparities"[Title/Abstract] OR "Health Care Disparities"[Title/Abstract])) AND "united states"[Title/Abstract] AND ("disabilit*"[Title/Abstract] OR "health barrier"[Title/Abstract] OR "special needs"[Title/Abstract] OR "intellectual disabili*"[Title/Abstract]) AND "oral health"[Title/Abstract] OR "oral hygiene"[Title/Abstract] OR "dental health"[Title/Abstract] OR "dental care"[Title/Abstract] OR "oral care"[Title/Abstract]	PubMed	40,887
Search # 3: (((("African American"[Title/Abstract] OR "Black American"[Title/Abstract] OR "Caucasian"[Title/Abstract] OR "White American"[Title/Abstract] OR "Disparities"[Title/Abstract] OR "Health Care Disparities"[Title/Abstract]) AND "united states"[Title/Abstract] AND "disabilit*"[Title/Abstract]) OR "health barrier"[Title/Abstract] OR "special needs"[Title/Abstract] OR "intellectual disabili*"[Title/Abstract]) AND "oral health"[Title/Abstract] OR "oral hygiene"[Title/Abstract] OR "dental health"[Title/Abstract] OR "dental care"[Title/Abstract] OR "oral care"[Title/Abstract]) AND (y_10[Filter])	PubMed	17,644
Search # 4: (((("African American"[Title/Abstract] OR "Black American"[Title/Abstract] OR "Caucasian"[Title/Abstract] OR "White American"[Title/Abstract] OR "Disparities"[Title/Abstract] OR "Health Care Disparities"[Title/Abstract]) AND "united states"[Title/Abstract] AND "disabilit*"[Title/Abstract]) OR "health barrier"[Title/Abstract] OR "special needs"[Title/Abstract] OR "intellectual disabili*"[Title/Abstract]) AND "oral health"[Title/Abstract] OR "oral hygiene"[Title/Abstract] OR "dental health"[Title/Abstract] OR "dental care"[Title/Abstract] OR "oral care"[Title/Abstract]) AND ((y_10[Filter]) AND (fha[Filter]) AND (english[Filter]))	PubMed	16,873

Search # 5: (("black or african american"[MeSH Terms] OR ("black"[All Fields] AND "or"[All Fields] AND "african"[All Fields] AND "american"[All Fields]) OR "black or african american"[All Fields] OR ("african"[All Fields] AND "american"[All Fields]) OR "african american"[All Fields] OR ("black or african american"[MeSH Terms] OR ("black"[All Fields] AND "or"[All Fields] AND "african"[All Fields] AND "american"[All Fields]) OR "black or african american"[All Fields] OR ("black"[All Fields] AND "american"[All Fields]) OR "black american"[All Fields] OR ("white people"[MeSH Terms] OR ("white"[All Fields] AND "people"[All Fields]) OR "white people"[All Fields] OR "caucasian"[All Fields] OR "caucasians"[All Fields]) OR (("white"[MeSH Terms] OR "white"[All Fields] OR "white people"[MeSH Terms] OR ("white"[All Fields] AND "people"[All Fields]) OR "white people"[All Fields] OR "whites"[All Fields]) AND ("american"[All Fields] OR "american s"[All Fields] OR "americanization"[All Fields] OR "americanized"[All Fields] OR "americans"[All Fields]))) AND ("united states"[MeSH Terms] OR ("united"[All Fields] AND "states"[All Fields]) OR "united states"[All Fields]) AND ("disabilit*" [All Fields] OR (("health"[MeSH Terms] OR "health"[All Fields] OR "health s"[All Fields] OR "healthful"[All Fields] OR "healthfulness"[All Fields] OR "healths"[All Fields]) AND ("barrier"[All Fields] OR "barrier s"[All Fields] OR "barriers"[All Fields])) OR (("medicine"[MeSH Terms] OR "medicine"[All Fields] OR "specialty"[All Fields] OR "special"[All Fields] OR "specialisations"[All Fields] OR "specialise"[All Fields] OR "specialised"[All Fields] OR "specialises"[All Fields] OR "specialising"[All Fields] OR "specialisms"[All Fields] OR "specialities"[All Fields] OR "speciality"[All Fields] OR "specialization"[MeSH Terms] OR "specialization"[All Fields] OR "specialisation"[All Fields] OR "specialism"[All Fields] OR "specializations"[All Fields] OR "specialize"[All Fields] OR "specialized"[All Fields] OR "specializes"[All Fields] OR "specializing"[All Fields] OR "specially"[All Fields] OR "specials"[All Fields] OR "specialties"[All Fields] OR "specialty s"[All Fields]) AND ("health services needs and demand"[MeSH Terms] OR ("health"[All Fields] AND "services"[All Fields] AND "needs"[All Fields] AND "demand"[All Fields]) OR "health services needs and demand"[All Fields] OR "needed"[All Fields] OR "needs"[All Fields] OR "needing"[All Fields])) AND ("oral health"[MeSH Terms] OR ("oral"[All Fields] AND "health"[All Fields]) OR "oral health"[All Fields] OR ("dental care"[MeSH Terms] OR ("dental"[All Fields] AND "care"[All Fields]) OR "dental care"[All Fields])) AND ((english[Filter]) AND (2013:2023[pdat]))

PubMed 191

<p>Search #6: ("African American"[Title/Abstract] OR "Black American"[Title/Abstract] OR "Caucasian"[Title/Abstract] OR "White American"[Title/Abstract] OR ("Disparities"[Title/Abstract] OR "Health Care Disparities"[Title/Abstract])) AND "united states"[Title/Abstract] AND ("disabilit*"[Title/Abstract] OR "health barrier"[Title/Abstract] OR "special needs"[Title/Abstract] OR "intellectual disabili*"[Title/Abstract]) AND ("oral health"[Title/Abstract] OR "oral hygiene"[Title/Abstract] OR "dental health"[Title/Abstract] OR "dental care"[Title/Abstract] OR "oral care"[Title/Abstract])</p>	<p>PubMed 165</p>
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<p>Search # 7: (("African American"[Title/Abstract] OR "Black American"[Title/Abstract] OR "Caucasian"[Title/Abstract] OR "White American"[Title/Abstract] OR ("Disparities"[Title/Abstract] OR "Health Care Disparities"[Title/Abstract])) AND "united states"[Title/Abstract] AND ("disabilit*"[Title/Abstract] OR "health barrier"[Title/Abstract] OR "special needs"[Title/Abstract] OR "intellectual disabili*"[Title/Abstract]) AND ("oral health"[Title/Abstract] OR "oral hygiene"[Title/Abstract] OR "dental health"[Title/Abstract] OR "dental care"[Title/Abstract] OR "oral care"[Title/Abstract])) AND (2013:2023[pdat])</p>	<p>PubMed 21</p>
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Search # 8: ("African American"[Title/Abstract] OR "Black American"[Title/Abstract] OR "Caucasian"[Title/Abstract] OR "White American"[Title/Abstract] OR ("Disparities"[Title/Abstract] OR "Health Care Disparities"[Title/Abstract])) AND "united states"[Title/Abstract] AND ("disabilit*"[Title/Abstract] OR "health barrier"[Title/Abstract] OR "special needs"[Title/Abstract] OR "intellectual disabili*"[Title/Abstract]) AND ("oral health"[Title/Abstract] OR "oral hygiene"[Title/Abstract] OR "dental health"[Title/Abstract] OR "dental care"[Title/Abstract] OR "oral care"[Title/Abstract])) AND (2013:2023[pdat])	PubMed	10
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