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Implicit Racial Preferences Among Dental Hygienists

by

Olivia Morzenti

A thesis

submitted in partial fulfillment

of the requirements for the degree of

Master of Science in Department of Dental Hygiene

Idaho State University

Fall 2022

Committee Approval

To the Graduate Faculty:

The members of the committee appointed to examine the thesis of OLIVIA MORZENTI find it satisfactory and recommend that it be accepted.

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Human Subjects Committee Approval

January 13, 2022

Olivia Morzenti
Dental Hygiene
MS 8048

RE: Study Number IRB-FY2021-250: Implicit Racial Preferences Among Dental Hygienists

Dear Ms. Morzenti:

Thank you for your responses to a previous review of the study listed above. I agree that this study qualifies as exempt from review under the following guideline: Category 2.(i). Research that only includes interactions involving educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures, or observation of public behavior (including visual or auditory recording).
The information obtained is recorded by the investigator in such a manner that the identity of the human subjects cannot readily be ascertained, directly or through identifiers linked to the subjects.
This letter is your approval, please, keep this document in a safe place.

Notify the HSC of any adverse events. Serious, unexpected adverse events must be reported in writing within 10 business days.

You are granted permission to conduct your study effective immediately. The study is not subject to renewal.

Please note that any changes to the study as approved must be promptly reported and approved. Some changes may be approved by expedited review; others require full board review. Contact Tom Bailey (208-282-2179; fax 208-282-4723; email: humsubj@isu.edu) if you have any questions or require further information.

Sincerely,

Ralph Baergen, PhD, MPH, CIP
Human Subjects Chair

Dedication

We all have implicit bias, the first step is acknowledging that bias, so thank you to those who admitted their wrongs and have begun the journey to fix their mistakes. I have dedicated this thesis to those who have lost their lives to police violence and to those affected by racism, discrimination, and stereotyping. I see you. We see you.

#SayTheirNames

Christopher Kelley	Matthew "Zadok" Williams	Rayshard Brooks
Ruth Whitfield	Daunte Wright	Priscilla Slater
Pearl Young	James Lionel Johnson	Robert Forbes
Katherine Massey	Dominique Williams	Kamal Flowers
Heyward Patterson	Donovon Lynch	Jamel Floyd
Celestine Chaney	Marvin Scott III	David McAtee
Geraldine Talley	Jenoah Donald	James Scurlock
Aaron Salter Jr.	Patrick Warren	Calvin Horton Jr.
Andre Mackniel	Xzavier Hill	Tony McDade
Margus Morrison	Robert Howard	Dion Johnson
Roberta Drury	Vincent Belmonte	George Floyd
Patrick Lyoya	Monica Goods	Maurice Gordon
Donnell Rochester	Bennie Edwards	Cornelius Fredericks
Amir Locke	Casey Goodson Jr.	Steven Taylor
Isaiah Tyree Williams	Aiden Ellison	Daniel Prude
Jason Walker	Quawan Charles	Breonna Taylor
James Williams	Kevin Peterson Jr.	Barry Gedeus
Michael Wayne Jackson	Walter Wallace Jr.	Manuel Ellis
Arnell "AJ" Stewart	Jonathan Price	Reginald "Reggie" Payne
Fanta Bility	Kurt Reinhold	Ahmaud Arbery
Alvin Motley Jr.	Dijon Kizzee	Lionel Morris
Ryan Leroux	Damian Daniels	Jaquyn O'Neill Light
Winston Smith	Anthony McClain	William Green
Latoya Denise James	Julian Lewis	Darius Tarver
Andrew Brown Jr.	Maurice Abisdid-Wagner	Miciah Lee
Ma'Khia Bryant	Brayla Stone	John Neville
Cameron Lamb	Dorian Harris	Antronie Scott
Michael Dean	Danny Ray Thomas	Bettie Jones
Atatiana Jefferson	Stephon Clark	Quintonio LeGrier
Byron Williams	Ronell Foster	Corey Jones
Elijah McClain	Damon Grimes	Samuel DuBose
Jaleel Medlock	James Lacy	Darrius Stewart
Titi "Tete" Gulley	Charleena Lyles	Sandra Bland
Dominique Clayton	Mikel McIntyre	Susie Jackson
Pamela Turner	Jordan Edwards	Daniel Simmons

#SayTheirNames

Ronald Greene
Sterling Higgins
Bradley Blackshire
Jassmine McBride
Aleah Jenkins
Emantic Bradford Jr.
Jemel Roberson
Charles Roundtree Jr.
Botham Jean
Harith Augustus
Jason Washington
Antwon Rose Jr.
Robert White
Earl McNeil
Marcus-David Peters
Tamir Rice
Akai Gurley
Tanisha Anderson
Laquan McDonald
Cameron Tillman
Darrien Hunt
Kajieme Powell
Michelle Cusseaux
Dante Parker
Ezell Ford
Michael Brown
Amir Brooks
John Crawford III
Eric Garner
Jerry Dwight Brown
Victor White III
Marquise Jones
Yvette Smith
Renisha McBride
Jonathan Ferrell
Deion Fludd
Gabriel Winzer
Wayne A. Jones
Kimani Gray
Kayla Moore
Will Brown
Timothy Caughman
Alteria Woods
Desmond Phillips
Deborah Danner
Alfred Olango
Terence Crutcher
Christian Taylor
Jamarion Robinson
Donnell Thompson Jr.
Joseph Mann
Philando Castile
Alton Sterling
Jay Anderson Jr.
Che Taylor
David Joseph
Corey Stingley
Darnesha Harris
Jordan Davis
Mohamed Bah
Sgt. James Brown
Darius Simmons
Rekia Boyd
Trayvon Martin
Willie Ray Banks
Kenneth Chamberlain Sr.
Cletis Williams
Robert Ricks
Eugene Ellison
Danroy "DJ" Henry Jr.
Aiyana Stanley-Jones
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Clementa Pinckney
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Nicholas Heyward Jr.
Mary Mitchell
Sharon Walker
Eleanor Bumpurs
Edward Gardner
Elton Hayes
Fred Hampton
Martin Luther King Jr.
Alberta Odell Jones
Jimmie Lee Jackson
Malcolm X
James Earl Chaney
Louis Allen
Medgar Evers
Herbert Lee
John Earl Reese
Emmett Till
William McDuffie
Della McDuffie
Malcolm Wright
George Stinney Jr.
Dr. Andrew C. Jackson

Social justice and health equality will never be achieved unless structural racism ends.

Awareness about racial prejudice and discrimination in our society is everyone's responsibility.

Acknowledgement

It is impossible to extend enough thanks to my family, especially my parents, who raised me to have a voice. I could not have completed this work without my chair, Kristin Calley, and committee member Colleen Stephenson. I would like to offer a special thanks to Stephanie Brennhofer from the University of Virginia; without her statistical assistance my thesis would not exist. I'd also like to thank my graduate faculty representative, Omotayo Omotowa as well as Nicole Frost and Lauren Simon from Project Implicit, Inc.

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Implicit Racial Preferences Among Dental Hygienists

Thesis Abstract – Idaho State University (2022)

The purpose of this study is to investigate implicit racial preferences among dental hygienists. This study used a two-part web-based survey to obtain demographic data and implicit racial preference scores via the Race Implicit Association Test. A total of 603 licensed dental hygienists in the United States participated in this study, and 404 surveys were used for analysis. Results revealed that just over two-thirds (67.8%) of participants showed a preference for White or European American. A significant difference was found between implicit racial preference scores and participant age (0.01), years worked (-0.19), and race (-0.17). No difference was found with task order, previous Race IAT experience, or previous implicit bias training or education. Findings underscore the need for more research to better understand the context and content of implicit bias training, as well as further examining implicit and explicit racial bias with a more generalizable dental hygiene population.

Key Words: implicit racial bias, implicit racial preferences, Race Implicit Association Test (IAT), dental hygienists, implicit bias education

Chapter 1 Introduction

Introduction

The United States (U.S.) has shown increasing racial and ethnic diversity. Approximately 40 percent of the U.S. population belongs to a racial or ethnic group (U.S. Census Bureau, 2021). The National Institutes of Health [NIH] (2021) claimed by 2050 there will be no majority race/ethnicity in the United States. Despite increasing levels of diversity in the general population, approximately three out of every four dentists identify as White, emphasizing the need for a more diverse workforce. The underrepresentation of minorities entering the dental profession may contribute to disparities in healthcare delivery and access to care for minority groups (CDC, 2013; NIH, 2021).

According to the NHANES 2009-2010 (n=3,743), non-Hispanic Blacks (65.5) age <75 years of age had higher rates of premature death from coronary heart disease than non-Hispanic Whites (43.2%) (CDC, 2013). The CDC (2013) also reported the age-standardized death rate per 100,000 of the U.S. population from stroke was higher among non-Hispanic Blacks (55.7) than among non-Hispanic Whites (37.8%). Similarly, the age-adjusted prevalence of medically diagnosed diabetes among adults in the U.S. showed significant differences among racial and ethnic groups including non-Hispanic White (6.8%), non-Hispanic Black (11.3%), Hispanic (11.5%), and mixed race (14.0%) (CDC, 2013). Although health status indicators such as life expectancy and mortality have improved for some Americans, many racial and ethnic populations are disproportionately affected by preventable diseases, disabilities, and death compared to their White counterparts (CDC, 2013).

Oral health disparities in the U.S. such as the prevalence of periodontal disease, which is significantly higher in Mexican-American populations (59.7%) and non-Hispanic Blacks

(58.6%) compared with non-Hispanic Whites (42.6%), indicate how Black, Indigenous, and People of Color (BIPOC) face obstacles in access to oral healthcare, quality of care, and oral health outcomes (CDC, 2013). According to the NHANES 2011-2016 (n=25,566), Mexican-American and poor children aged 2-5 years have the highest dental caries prevalence (more than 30%) in the United States and a 10% untreated tooth decay prevalence rate (CDC, 2019). Non-Hispanic Black (40.2%) and Mexican-American (37.1%) adults aged 20-64 years have higher rates of untreated tooth decay than non-Hispanic Whites (22.2%) (CDC, 2019).

Research on BIPOC has shown that complex multifarious factors exist between health, health services, health outcomes, socioeconomic status, discrimination, racism, and legislative policies (Williams & Cooper, 2019; National Academies of Sciences, Engineering, and Medicine [NASEM], 2017). Structurally racist systems are generated through policies and programs at the local, state, and federal levels, playing an important role in influencing health inequalities (Aspen Institute, 2008; Gee & Ford, 2011; Williams & Cooper, 2019). Other systemic factors that influence health inequalities include institutional practices and cultural representations (Aspen Institute, 2008; Gee & Ford, 2011; Williams & Cooper, 2019). Institutional practices are norms, standards, and regulations agreed upon and implemented by society. Racialized institutional practices result in discrimination or bias based on race/ethnicity (Aspen Institute, 2008; Evans & Smith, 2021; Gee & Ford, 2011; Williams & Cooper, 2019): for example, aggressive policing in communities of color and the over-represented African American prison population (NASEM, 2017). Cultural representations standardize white privilege and racial disparities (Aspen Institute, 2008; Williams & Cooper, 2019). Cultural representations are those seen in the media portraying communities of color as menacing. Besides images and stories from the media, cultural representation in politics includes language, cognitive cues, and framing of communities of color

(Aspen Institute, 2008; Williams & Cooper, 2019). The way in which politicians or the media frame issues influences the way society perceives, interprets, and acts (i.e., voting in political elections or policy proposals). Researchers suggest social, economic, and political policy agendas can affect racial equity and healthcare outcomes (NASEM, 2017).

Legislative policies and interventions have attempted to address these inadequacies, but research has shown a decline in public support for government interventions. By contrast, implicit bias is internally driven by interactions within the healthcare system (Williams & Cooper, 2019). Williams and Cooper (2019) suggest that addressing the role of implicit bias in oral health disparities requires identifying and dismantling policies and practices on the institutional and individual levels. Furthermore, these researchers state that the issue of race and bias in the healthcare system must be acknowledged by healthcare professionals and social institutions (NASEM, 2017; Williams & Cooper, 2019).

The role of implicit bias in the delivery of health care has potentially led to health disparities among BIPOC (Blair et al., 2011; FitzGerald & Hurst, 2017; Hagiwara et al., 2020; Hall et al., 2015; Williams & Cooper, 2019). Healthcare disparities adversely affect BIPOC who have continually faced systemic and institutionalized racism, historical discrimination, and exclusion based on race or ethnicity (Evans & Smith, 2021; Gee & Ford, 2011; Williams & Cooper, 2019). Research has shown that BIPOC face disparities in access to healthcare, quality of care, and poorer health outcomes (CDC, 2013; Gee & Ford, 2011; NASEM, 2017). In the U.S., BIPOC are disproportionately affected by diseases including COVID-19, diabetes, and cardiovascular disease (Laurencin & McClinton, 2020). Disparities in oral health are also a critical factor when considering overall health. According to the CDC (2019), non-Hispanic

Blacks, Hispanics, and American Indians or Alaska Natives have poorer oral health compared with other racial and ethnic groups in the U.S.

Researchers have continued to express a need to further investigate bias among healthcare providers but have acknowledged the difficulty of adequately measuring the extent of implicit bias (Hagiwara et al., 2020). Hagiwara and colleagues (2020) state further research is required to determine how these biases may contribute to health disparities for BIPOC and impact the patient-provider relationship, shared decisions and treatment goals, patient adherence, interpersonal communication, and trust.

Statement of the Problem

Bias, prejudice, stereotypes, and uncertainty of dental hygienists can affect the patient-provider relationship including shared decisions and treatment goals, patient adherence, interpersonal communication, and trust. Implicit bias is the unconscious association of perceptions, attitudes, and stereotypes that affect our decisions and behaviors and can be based on characteristics such as race, ethnicity, age, gender, gender identity, and sexual orientation (Maryfield, 2018; Staats et al., 2017). Investigations focused on implicit racial bias have shown that racial and ethnic disparities are common in healthcare and that healthcare provider bias is a contributing factor to healthcare disparities (Blair et al., 2011; FitzGerald & Hurst, 2017; Hagiwara et al., 2020; Hall et al., 2015).

While extensive literature exists on implicit bias among healthcare professionals, there is a dearth of research on implicit racial bias among dental hygienists. Increased awareness of racial preferences and the potential these preferences have on implicit racial bias may influence health disparity outcomes for BIPOC. Dental hygienists who are trained to be aware of their racial preferences can be sensitized to their potential for implicit biases. Integrating recognition

and management of racial preferences in the dental hygiene curriculum may create early awareness and active prevention of implicit biases.

Purpose of the Study

The purpose of this study was to investigate implicit racial preferences among dental hygienists.

Significance

This study may contribute to the existing scientific body of knowledge and assist dental professionals in identifying racial preferences that may lead to implicit racial bias in the dental setting. Evaluating the racial preferences and implicit biases of dental hygienists will enable the dental and dental hygiene professions to examine issues related to racial oral health disparities. This study relates to the American Dental Hygienists' Association (ADHA) National Dental Hygiene Research Agenda (NDHRA), the National Institute of Dental and Craniofacial Research (NIDCR), Healthy People 2020 and 2030, American Dental Education Association (ADEA), and the National Academy of Medicine (NAM), formerly the Institute of Medicine (IOM).

One of the primary objectives of the NDHRA (ADHA, 2016) is "to stimulate progress toward meeting national health objectives" (p. 3). This study pertains to the NDHRA conceptual research model, specifically focusing on the population level area of research, and the subcategory access to care. The NDHRA (ADHA, 2016) has encouraged research to discover possible barriers to care that impact vulnerable populations. Through recognized and unrecognized barriers, vulnerable populations are challenged to achieve health equity including good oral health outcomes. Recognized barriers include explicit bias, institutional racism, and systemic racism. Unrecognized barriers are implicit bias and intrapersonal racism.

The NIDCR (2020) has supported research on how to address social determinants of health (SDOH) such as discrimination/racism as a barrier to preventive oral health care for vulnerable and underserved populations. Applying systems science and systems theories methodologies to understand the influence of SDOH on oral disease and oral health disparities in identified population groups is relevant to generating scientific evidence for policy reform and equitable practices. Focusing research on factors that impact health beyond an individual's demographic can provide an opportunity to build upon NIDCR (NIDCR, 2020).

Additionally, this study supported the Healthy People 2020 and 2030 oral health research objective of reducing disparities in access to dental services for people affected by SDOH such as low levels of education, income, and race/ethnicity (Secretary's Advisory Committee [SAC], 2010; Office of Disease Prevention and Health Promotion [ODPHP], n.d.-a). Through the identification of implicit racial preferences among dental hygienists, the potential of implicit biases may be hindered with the implementation of discrimination interventions and cultural competence training. Furthermore, health policy reforms can be evaluated as effective avenues for reducing oral health disparities.

The ADEA's 2018 *Access, Diversity, and Inclusion (ADI) Strategic Framework 1-1* is a resource of information on diversity and inclusion. The framework serves as a reference to promote access, inclusive environments, cultural competency, and intersectionality among dental team members (ADEA, 2018). This study supports the ADEA's belief in creating a culture of inclusiveness.

Finally, this study supports the NAM (IOM, 2001) report *Crossing the Quality Chasm: A New Health System for the 21st Century*. Implementing an oral healthcare system that delivers

equitable care, not varying in quality because of age, gender, race/ethnicity, or socioeconomic status is one of the six domains of healthcare quality (IOM, 2001).

The existence of racial and ethnic bias among healthcare providers has been studied and illustrates a causation of ongoing healthcare disparities (IOM, 2003). Healthcare provider bias, prejudice, stereotyping, and uncertainty all play a role in persistent healthcare disparities among BIPOC. Implicit bias may influence clinical decision-making, affecting patient care and healthcare outcomes (IOM, 2003). Implicit bias may be expressed in subtle and indirect ways such as non-verbal behavior, anxiety, avoidance, and aversion when interacting with BIPOC (Hall et al., 2015; IOM, 2003; Sabin et al., 2009; Williams & Cooper, 2019). The awareness of racial preferences among dental hygienists can inhibit the expression of implicit racial bias among dental hygienists, leading to a multi-faceted and integrative approach to improve quality healthcare for BIPOC. Cultural competence education can lead to culturally and linguistically appropriate service delivery, diversity of health and dental professions, and understanding of patient cultural health beliefs (IOM, 2003).

Furthermore, the dental and dental hygiene professions may benefit from this study by recognizing how dental hygienists' racial preferences could influence implicit racial bias, affecting the patient-provider relationship, clinician decision-making, and oral health disparities. Implicit bias may affect dental hygienists' perceptions, attitudes, and decisions in oral health treatment. The oral healthcare delivery system can be modified, improved, and evaluated to recognize implicit racial bias and the impact on dental decisions, treatment, and the patient-provider relationship. Appropriate policy and education interventions can be designed to increase self-awareness, reflection, and mindfulness of how implicit bias influences others.

Research Questions and Hypothesis

The following research questions guided the conduct of this study.

1. What are the implicit racial preferences among dental hygienists as measured by the Race IAT?
2. Is there a difference in the implicit racial preferences among dental hygienists as measured by the Race IAT?

Null Hypothesis

1. There is no statistically significant difference in the implicit racial preferences among dental hygienists.

Definitions

Implicit racial preferences: Individual unconscious awareness of choosing or favoring a group or individual over another based on race (Project Implicit, n.d.). For the purpose of this study, racial preferences were measured using the Race Implicit Association Test (IAT). In this study the Race IAT was used to measure the strength of dental hygienist associations between concepts and evaluations. The results are labeled as an automatic preference toward European American, African American or White people and Black people.

Implicit racial bias: Unconscious associations made by individuals through learned experiences and perceptions resulting in biased thoughts and actions (Maryfield, 2018). For the purpose of this study, the terms "implicit bias," "implicit racial preference," and "racial preference" are used interchangeably following the practice of previous research studies.

Race IAT Instrument: The Race Implicit Association Test is an instrument intended to detect the strength of associations between concepts (i.e., Black people, White people) and evaluations (i.e., good, bad). The Race IAT requires the ability to categorize pictures (e.g., European American, African American, or Black people and White people) and words (e.g., good, bad)

into groups as quickly as possible (Project Implicit, n.d.). For the purposes of this study, the Race IAT was used to measure dental hygienists' implicit racial preferences.

Automatic preference: The results of the Race IAT are described as an automatic preference of "slight, moderate, strong," or "no preference" toward European American, African American, or Black people and White people. This indicates the *strength* of the automatic preference (Project Implicit, n.d.). For the purpose of this study, implicit racial preferences were measured using the Race IAT automatic preference descriptions.

Dental hygienist: A licensed dental professional who provides clinical, educational, or consulting services in a variety of roles and settings (ADHA, n.d.). For the purpose of this study licensed dental hygienists will include any variation of this role.

Social determinants of health (SDOH): Economic and social conditions in the environments where people are "born, live, learn, work, play, worship, and age" that impact health, well-being, and quality of life (ODPHP, n.d.-b). For the purpose of this study, SDOH includes socioeconomic status, education, healthcare access and quality, neighborhood and supporting infrastructure, social support, and community resources.

BIPOC: Black, Indigenous, and People of Color. This term is used to acknowledge the inequalities and injustices that are faced by people of color (Merriam-Webster, n.d.). For the purposes of this study, BIPOC was used to recognize that Black, Indigenous, and people of color are severely impacted by institutionalized and systemic racism.

Intersectionality: A term created by professor Kimberlé Crenshaw in 1989 to explain how race, gender, class, and other characteristics of an individual's social and political identity overlap to produce modes of discrimination and privilege (Cho, Crenshaw & McCall, 2013). For the

purposes of this study, intersectionality theory was used to identify intersecting characteristics that can cause implicit bias in the dental setting.

Systemic Racism: Policies, practices, and statutes disseminated by a sovereign government, a society, or an organization, and that such statutes support one ethnic group's rights and privileges while denying other races and ethnic groups these same rights and privileges based on sociohistorical prejudices held by the dominant ethnic group (Cambridge University, n.d.-a). Systemic racism is synonymous with structural racism (Cambridge University, n.d.-a). An example of how systemic racism affects our society is the outdated practice of "redlining", which denied housing loans to people of color; side effects are present in society through housing segregation, concentrated areas of poverty, and the inability of families of color to accumulate wealth at the same rate as White people (Evans & Smith, 2021).

Institutional Racism: The attitudes, beliefs, opinions, and stereotypes of a dominant ethnic group over other races and ethnic groups. The continued unfair or harmful treatment of the subordinate races and ethnic groups is practiced, accepted, and sustained as "normal" social behavior in government, politics, education, and everyday society (Cambridge University, n.d.-b). An example of institutional racism is the justified use of force and abuse by police officers in communities of color (Evans & Smith, 2021).

Summary of Chapter 1

BIPOC face disparities in oral health care and are disproportionately affected by oral diseases. Implicit bias among dental professionals may impact access to care, delivery of care, and quality of oral health care received by BIPOC. Further research among dental hygienists is needed to better understand the impact implicit racial bias has on the patient-provider relationship and oral health disparities.

Chapter 2 Literature Review

Introduction

As negative attitudes towards BIPOC evolved throughout society in the U.S., implicit racial bias and stereotypes have affected and shaped the delivery of health care (FitzGerald & Hurst, 2017; Gee & Ford, 2011; Hagiwara et al., 2020; Hall et al., 2015; Williams & Cooper, 2019). This literature review identified research focused on implicit bias with healthcare providers, health care environments, and provision of care. Research studies focused on oral health disparities, implicit bias among healthcare professionals, and implicit bias surveys were reviewed for this study. Research related to implicit bias among oral healthcare providers is minimal; therefore, literature from other healthcare professions contributed to this review.

Databases used for this literature review included Clinical Key, CINAHL Complete, EBSCO Host, Cochran Library, PubMed, Google Scholar, and ProQuest Dissertations and Theses. MeSH terms used in various combinations were: implicit bias, implicit stereotypes, racial bias, implicit racial bias, unconscious bias, systemic and institutional racism, healthcare providers, dental professionals, dental hygienists, black, indigenous, people of color, communities of color, racial inequalities, oral healthcare disparities, structural inequalities, treatment outcomes, oral health, patient-provider relationship, clinical decisions and treatment plan, interpersonal communication, sociohistorical discrimination, perceived racism, perceived discrimination, and implicit bias measuring instruments/tools.

This literature review includes (1) an overview of oral health disparities among BIPOC, (2) relevant research on the effect implicit racial bias in the healthcare system has on access to care, quality of care, and healthcare outcomes, and (3) implicit racial bias among dental professionals and the extent this bias has on oral health disparities.

Oral Health Disparities Among BIPOC

The NIH (2021) publication, *Oral Health in America: Advances and Challenges*, describes how people in the U.S. experience oral health differently based on their age, race, ethnicity, socioeconomic status and other social determinants, with oral health disparities and inequality of oral health care at the forefront of the epidemic (NIH, 2021). Despite progress in improving oral health equality, individuals and families living below the poverty level experience more dental disease than nonpoor people (NIH, 2021; SAC, 2010). In addition to poverty level, proportion of dental diseases varies by race and ethnicity. According to the National Health and Nutrition Examination Survey 2009-2014 [NHANES] (n=10,683), Hispanic, non-Hispanic Black, and non-Hispanic Asian children aged 2-19 years have higher prevalence of dental caries and untreated caries compared to non-Hispanic Whites (Eke et al., 2018; NIH, 2021).

Finances continue to be the greatest barrier to accessing dental care (Eke et al., 2018; NIH, 2021). Oral health disparities widen with income: 93% of individuals living in poverty have unmet dental needs, compared to 58% of those in higher-income groups. Additionally, higher rates of periodontal disease are seen in adults 30 years and older among non-Hispanic Blacks (57%) and Mexican Americans (60%) compared with non-Hispanic Whites (37%), with Blacks (15%) being twice as likely to have severe periodontitis compared to Whites (6%) (Eke et al., 2018; NIH, 2021). Although historical trends of oral cancer incidence rates for Black men and women have improved, disparities in survival rates persist, with Black men and women experiencing more than 10% lower survival rates than their White counterparts (Eke et al., 2018; NIH, 2021). Untreated oral diseases and urgent dental visits account for 92.4 million hours of lost work productivity as well as 51 million school hours lost each year (Eke et al., 2018; NIH,

2021). American Indian or Alaska Native children ages 3-5 are almost three times more likely to have early childhood caries than non-Hispanic White children. Non-Hispanic Blacks, Hispanics, and American Indians or Alaska Natives have poorer oral health than any other racial and ethnic group in the U.S. (Eke et al., 2018; NIH, 2021).

The NHANES was also used by the CDC as a cross-sectional survey designed to monitor the overall health and nutritional status of U.S. citizens (CDC, 2013; CDC, 2019). NHANES used a multistage probability sampling design with two-year (2009-2010) data cycles to represent a national sample of the U.S. population. NHANES examined racial and ethnic disparities of adults aged ≥30 years with periodontitis (CDC, 2013). A sample size of 3,743 participants was used to represent 137.1 million of the U.S. weighted population (CDC, 2013). Race and ethnicity were self-reported while periodontal status was confirmed by registered dental hygienists who used periodontal measurements to classify participants as having mild, moderate, or severe periodontal disease (CDC, 2013). The results of this survey showed that the prevalence of periodontal disease is significantly higher among Mexican-Americans (59.7%) and non-Hispanic Blacks (58.6%) compared with non-Hispanic Whites (42.6%) (CDC, 2013).

Despite objectives aimed at oral health equality (ODPHP, n.d.-a), significant disparities continue to exist among BIPOC as seen in NHANES 2011-2016 (n=25,566) (CDC, 2019). According to NHANES 2011-2016, Mexican-American, non-Hispanic Black, and poor children have 1-2 times higher prevalence of dental caries or untreated tooth decay than non-poor and non-Hispanic White counterparts (CDC, 2019). Non-Hispanic Black (40.2%) and Mexican-American (37.1%) adults aged 20-64 years have higher rates of untreated tooth decay than non-Hispanic White adults (22.2%) (CDC, 2019). Statistics show greater disparities in oral health among those of ethnic and racial minorities and of low socioeconomic status (SES). The

prevalence of caries and untreated tooth decay was highest among Mexican-American (73%, 20%), non-Hispanic Black (54%, 22%), and low SES (62%, 22%) children aged 6-8 years than non-Hispanic White (44%, 13%) and higher SES (40%, 11%) children aged 6-8 years respectively (CDC, 2019). Additionally, Mexican-American, non-Hispanic Black, and low SES children aged 2-5 years, 6-11, and 12-19 years also have higher rates of dental caries and untreated decay than non-Hispanic White and higher SES children of the same age groups. For adults aged 20-64 years the prevalence of untreated decay was about 30-40% for non-Hispanic Black, Mexican-American, and low SES. This is double the prevalence of untreated decay of non-Hispanic White and higher SES of the same age group. The prevalence of untreated decay among adults aged 65 years and older for Mexican-American, non-Hispanic Black, and low SES combined were 29-36%, while their non-Hispanic White and higher SES counterparts had prevalence rates of 10-14%. Disparities in oral health continue to be impacted by race, ethnicity, and poverty. Untreated tooth decay can affect all aspects of life including eating, sleeping, work productivity, and performance at school (CDC, 2019).

Healthy People 2020 and 2030 take their research a step further by distinguishing the complex factors that affect health disparities while understanding the determinants of oral health and oral disease (SAC, 2010; ODPHP, n.d.-a). Disparities in health arise from SDOH including education and income level, occupation, and health insurance status. Besides SDOH, disparities in health come from healthcare delivery, distribution of resources (social justice), and cultural competence among healthcare providers (SAC, 2010; ODPHP, n.d.-b). The Healthy People 2020 and 2030 national health agenda recommends policy change, community intervention, and public health system reform to improve SDOH that are interrelated to disparities in health for communities of color (SAC, 2010; ODPHP, n.d.-b).

A systematic review by Como et al. (2019) included 23 relevant articles highlighting oral health disparities among African American families who reported oral health problems. This review of literature found that there are several factors that affect oral health disparities among racial and ethnic minorities including structural, sociocultural, and familial. Sociocultural mechanisms included in some studies stated poor patient-provider interactions and dissatisfaction with previous oral care experiences as reasons for not seeking further dental treatment (Flores & Lin, 2013). African American parents/caregivers reported dental providers did not spend enough time with their patients of color which led to unmet oral health needs (Fisher-Owens et al., 2013; Flores & Lin, 2013). From the provider perspective, dental students related increasing negative attitudes when working with underserved populations, perhaps influenced by the complex social factors that affect this patient population (Habibian et al., 2011). Structural mechanisms such as institutional rules, regulations, and public policies have a significant impact on decreasing barriers to access care, allocation of resources, delivery of dental care, and dental health outcomes (Como et al., 2019). It is likely that sociocultural factors including fear and mistrust, and structural mechanisms including local, state, and federal laws, institutional policies, and regulations have the potential to prevent BIPOC from accessing and utilizing dental care. With evidence of persisting oral health disparities, future research needs to use a transactional approach, moving from an individual focus to a structural and sociocultural perspective involving SDOH, rules, regulations, and policies. (Como et al., 2019).

The National Healthcare Quality and Disparities Report (NHQDR) (2018) revealed that significant health disparities continue to exist for racial and ethnic minorities and those of lower socioeconomic status. The NHQDR is mandated by Congress to assess the performance of the U.S. healthcare system and identify disparities in health care experienced by different racial,

ethnic, and socioeconomic groups (Agency of Healthcare Research and Quality [AHRQ], 2021). The AHRQ collects data from multiple federal, state, and private resources including databases and surveys. The report is based on six priority measurements of quality care including care affordability, care coordination, effective treatment, healthy living, patient safety, and person-centered care. The latest report revealed that Black adults were 33.21% less likely than White adults to have had a dental visit in the calendar year, while Black children ages 2-17 were 23.36% less likely than White children to have had a dental visit in the calendar year (AHRQ, 2021). Other oral health disparities include Black children ages 5-17 have a 36.84% higher prevalence rate of untreated dental caries than White children of this same age group. Besides oral health disparities, the 2021 NHQDR revealed a 94.37% greater incidence of live-born infants with low birth weight (less than 2,500 g) among Black patients compared to White patients, and 38.14% variance between Black and White adults aged 65 and over who received pneumococcal immunizations (AHRQ, 2021). One of the many things these statistics have in common is the growing divide in health disparities between BIPOC and White people.

Implicit Racial Bias in the Healthcare System

Numerous studies have indicated that racial bias can lead to poorer health among BIPOC (Cooper et al., 2012; Johnson et al., 2017; Penner et al., 2014; Sabin & Greenwald, 2012; Shavers et al., 2012); specifically, how physicians' implicit racial bias can negatively impact patient-provider interactions, healthcare delivery, treatment recommendations and adherence, and medical treatment outcomes (Hall et al., 2015; Penner et al., 2014). Penner and colleagues (2014) reviewed research on health care disparities for Black patients and bias among physicians in the U.S., concluding physician implicit racial bias on medical judgments and treatment decisions can directly affect Black patients' health. Implicit bias indirectly affects the patient-

provider relationship leading to mistrust and lack of patient treatment adherence. Black patients evaluated physicians with high implicit racial bias as being cold, unfriendly, and deficient in shared decision-making, leading to dissatisfied treatment (Penner et al., 2014).

Evidence suggests that non-Black physicians more frequently relate qualities such as cooperativeness and intelligence with White patients than Black patients (Penner et al., 2014). As a result, greater physician implicit racial bias was associated with different diagnoses and treatment recommendations for Black patients. These associations or stereotypes led to lower quality healthcare for Black patients compared to White patients (Penner et al., 2014). Physicians' time constraints, fatigue, and cognitive overload may influence their beliefs, assumptions, and behaviors leading to implicit racial bias. Physician behaviors affected by implicit racial bias can be represented by miscommunication, mistrust, and dissatisfaction with Black patients. Physicians who demonstrate implicit racial bias tend to speak quickly, using anxiety-related words, while avoiding patient-centered care. The authors of this review concluded that additional research on implicit racial bias among all BIPOC is necessary to increase awareness of racial healthcare disparities and reduce physician implicit racial bias (Penner et al., 2014).

A systematic review of literature found that implicit bias was significantly related to patient-provider interactions, treatment decisions, treatment adherence, and patient health outcomes (Hall et al., 2015). Of the 15 studies used, 12 sampled practicing healthcare professionals such as physicians, nurse practitioners and nurses. Areas such as emergency medicine, internal medicine pediatrics, and primary care were included. Six of the 15 studies also collected data from patients, and three of the studies used nursing, medical, and pharmacy students. While most of these studies examined bias of Black versus White people, three studies

examined Black and Hispanic versus White, one examined Hispanic versus White, one examined darker versus lighter skin tones, and one examined Black, Hispanic, and dark-skin tones versus White and light-skin tones. The IAT was used to measure implicit bias in all but one study, which used sequential priming. Only one study found no evidence of implicit bias against people of color, the other 14 studies reported healthcare professionals to have low to moderate levels of implicit bias against people of color. Of these 14 studies, 13 found healthcare professionals to associate negative words with Black people compared to White people (Hall et al., 2015).

Additionally, four studies showed evidence that healthcare professionals associate patient lack of cooperation, lack of compliance, and lack of responsibility in medical care with Black people (Hall et al., 2015). Evidence from four of the studies suggests that healthcare professionals hold similar implicit bias toward Hispanic individuals as Black people. Finally, two studies reported healthcare professionals to have moderate amounts of implicit bias against darker-skinned compared to lighter-skinned people, which are comparable to findings regarding Hispanic and Black individuals. Future research should focus on understanding how implicit bias affects health care and healthcare outcomes as well as expanding the assessment of implicit bias against other people of color and intersecting identities such as age, gender, and ethnicity (Hall et al., 2015).

In a qualitative study of 40 primary care physicians and 269 patients, Cooper et al. (2012) found a link between IAT-measured physician pro-White bias and clinical decision-making, Black patients' perceptions of poorer communication, and lower quality care. Physician implicit pro-White bias was directly associated with physicians' perceptions of cooperativeness of White patients. Increased physician implicit bias is correlated with physician verbal dominance including slower speech and longer visits, resulting in a decrease in patient centeredness and

patient engagement. In addition to controlling the conversation, physicians with pro-White bias were more likely to exhibit race and non-compliance stereotyping with Black patients leading to poorer ratings of interpersonal care. The researchers found the negative impact of implicit stereotyping of Black patients is associated with lower levels of trust and confidence in the physician (Cooper et al., 2012), which can result in poor adherence to treatment, underutilization of healthcare services, and ultimately affecting health outcomes. Patient positive effect was assessed by patient engagement or responsiveness and physician positive effect was evaluated by friendliness and shared decision-making. The researchers concluded that Black patients felt physicians with pro-White bias were coupled with a lack of perceived respect from physicians, lower rate of "liking" the physician themselves, and decrease in physician recommendation to others. The researchers suggested that future studies are needed to create health professional interventions which may increase physician understanding and awareness of implicit bias, patient-centered communication, patient-provider relationship building, development of cultural competency, and reduce healthcare disparities (Cooper et al., 2012).

A comprehensive literature search revealed evidence on the role of provider implicit bias in healthcare disparities (Maina et al., 2018). Of the 37 qualifying studies, 31 reported evidence of pro-White or light-skinned/anti-Black or dark-skinned bias among healthcare professionals. Most of these studies included providers in endocrinology, emergency medicine, family medicine, internal medicine, pediatrics, obstetrics/gynecology, oncology, and trauma surgery. Other studies assessed implicit bias among counseling, nursing, medicine, and pharmacy students, as well as physician assistants and psychology students. Other providers assessed were nurses, mental health counselors, occupational therapists, and genetic counselors. The most widely used IAT was the Race IAT, used in 35 studies, of which, 26 reported slight to strong

implicit pro-White/anti-black bias (Maina et al., 2018). Using provider demographic information and IAT scores, similar trends found that Black providers or Black students had less bias than White providers or White students. Few studies found differences in bias between female and male providers or students. Four vignette-based studies found associations between provider implicit bias and disparities in care. Of the studies that found an association between provider implicit pro-White bias and patient-provider communication, providers used more anxiety-related words and had higher verbal dominance, meaning they controlled the conversation during medical interactions (Maina et al., 2018). Additionally, Black patients rated their provider interactions as less supportive and lacking patient centeredness as well as lower satisfaction and confidence in treatment recommendations, including difficulty adhering to treatment. The researchers suggest future research agendas examine the impact provider implicit bias has on healthcare outcomes and identifying strategies to reduce provider bias (Maina et al., 2018).

Another review of literature evaluates the contribution of implicit bias studies among healthcare professionals (Hagiwara et al., 2020). This review evaluated the use of the IAT to measure implicit bias as well as the effect biases have on health disparities. Hagiwara and colleagues (2020) identified two potential pathways in which healthcare providers' implicit bias can contribute to healthcare disparities among people of color. One pathway is provider-to-patient communication, including providers' behaviors during medical interactions and patients' perception and reaction of these behaviors. Findings revealed that poor provider-to-patient communication, or subtle biases led to low levels of patient satisfaction and lack of trust from the patient. These factors can contribute to patient health behaviors including treatment adherence, maintenance healthcare visits, and healthcare utilization. Additionally, Hagiwara and colleagues (2020) investigated provider implicit bias and treatment recommendations. Healthcare provider

implicit bias can lead to worse treatment recommendations for people of color, ultimately resulting in poor health status. Findings suggest that both pathways can contribute to healthcare disparities among people of color. Although some evidence is lacking when comparing provider implicit bias and treatment recommendations, there is extensive evidence that provider implicit bias does predict poorer provider-to-patient communication (Hagiwara et al., 2020).

Few studies have examined the association between pediatricians' attitudes about race and their treatment recommendations for patients of color. Sabin and Greenwald (2012) conducted an online survey to identify implicit bias attitudes and stereotypes of 95 pediatricians from a research university. Researchers used case vignettes as part of the IAT to measure the implicit attitudes and stereotypes of physicians. The case vignettes consisted of four pediatric scenarios that pediatricians would likely encounter in clinical practice including asthma, urinary tract infection, attention deficit hyperactivity disorder, and pain. The results showed that physician implicit racial bias (pro-White bias) had a statistically significant effect (P=.001) on prescribing narcotic medications post-surgery. The pain management vignette reported physicians' association of African Americans with opioid misuse with a significant negative correlation between physician willingness to prescribe narcotic pain medication for White patients, but not for African American patients (Sabin & Greenwald, 2012). Researchers concluded that physician awareness of implicit bias and the influence on clinical practice can be beneficial in managing situations in which implicit bias, attitudes, and stereotypes may be activated. The investigators further suggest that adhering to clinical guidelines, using objective tools, emphasizing shared decision-making, and providing individualized patient-centered care can reduce oral health disparities in the healthcare setting (Sabin & Greenwald, 2012).

Many studies have investigated the validity and use of the Adult Race IAT, however, a relative gap in the literature exists concerning the Child Race IAT. A comparative study on Adult Race and Child Race IAT concluded that 91 Emergency Department (ED) resident physicians including pediatric trainees showed pro-White/anti-Black bias among adults and children (Johnson et al., 2017). This was the first study to demonstrate that resident physicians including pediatric trainees have implicit racial bias against Black children (91%), relative to levels of racial bias among Black adults (85%). These findings are significant in that Black children are often not treated with the empathy and quality of care that is provided to White children (Johnson et al., 2017). This study found that resident demographics had no influence on implicit racial bias. The ED is characterized by high patient volume, challenging medical conditions, short appointment times, unestablished patient-provider relationship, patient handoffs, and inconsistent workflow accumulating clinician stress and pressure often promoting reliance on stereotypes and implicit bias (Johnson et al., 2017). Future studies should investigate the extent to which physician implicit bias toward children affects the patient-provider relationship, including parent communication and clinical decision-making. Disparities in care affect BIPOC, thus the potential for research to reflect other minority races and ethnicities is essential (Johnson et al., 2017).

An investigation of implicit race bias and its impact of thrombolysis treatment recommendations was conducted with 220 internal and emergency medicine residents from four academic hospitals in Atlanta and Boston (Green et al., 2007). This study found a pro-White implicit bias among these residents using a Race IAT and clinical vignettes (Green et al., 2007). Two new IATs were developed to measure race stereotypes such as cooperativeness and adherence to medical treatment recommendations. These three tests evaluated whether

preferences, attitudes, and stereotypes affected clinician decisions to prescribe thrombolysis for acute myocardial infarction in White and Black patients. Of the 220 participants used after exclusion criteria, 131 participants identified as European-American/White, with statistical scores of 68% anti-Black bias and 60% pro-White bias. Findings suggest that physician race was the only consistent predictor of IAT scores, with Black physicians averaging near zero on all three IATs and all other demographics showing anti-Black/pro-White bias. As pro-White bias on the race IAT increased, clinician recommendations for thrombolysis for Black patients decreased. Combining all three IATs (race, attitude, and stereotypes) showed the statistical significance between anti-Black bias and patient race on clinician treatment recommendations for thrombolysis. This was the first study of healthcare professionals using the IAT to measure implicit bias and its effect on clinical decision-making. Further research is needed to measure the extent to which implicit racial bias impact healthcare disparities (Green et al., 2007).

A systematic review of racial and ethnic discrimination in the healthcare setting used current literature to review the effects of interpersonal racism (implicit bias), institutional (structural) racism, and discrimination in healthcare settings on quality of healthcare received by racial/ethnic minority patients (Shavers et al., 2012). Of the 58 articles reviewed, the most common methodology used to gather data regarding patient perceptions of discrimination was via survey, followed by focus groups and in-depth interviews. The majority of studies found evidence of physician implicit bias and discrimination in healthcare settings (Shavers et al., 2012). Physician attitudes and beliefs, including the disbelief of healthcare disparities (Clark-Hitt et al., 2010), and the lack of influence discrimination and implicit bias have on healthcare disparities (Steed, 2010) can negatively impact the receipt of healthcare for racial/ethnic minority patients (Shavers et al., 2012). Some studies addressed the impact of perceived discrimination in

the health care setting on poorer patient health status, lower quality of care, more psychiatric disorders, lower colorectal screenings, worse diabetes, greater bodily pain, poor adherence with antiviral therapy, underutilization of health services, delays in seeking care, non-adherence to medical recommendations, mistrust of providers, avoidance of healthcare system, and more unmet health needs (Shavers et al., 2012). The effect on patient care included less shared decision-making, denying of healthcare disparities, and preferences for White and light-skinned patients. There were no studies that addressed the prevalence, trends, mechanisms, and institutional policies associated with the healthcare system. Absent from the review of literature were studies of institutional racism including the regulations, policies, and practices of the U.S. healthcare system. Researchers recommended future research to address racism at the structural levels to help explain how discrimination and bias impact healthcare disparities (Shavers et al., 2012). Examination of patient-provider interactions including healthcare audits to verify quality care will help identify implicit bias or stereotyping. Another area to be studied is the low levels of ethnic and racial minorities in healthcare professions and the potential bias and discrimination they face that can lead to their unavailability within the healthcare system. The researchers concluded that there is a need for data resources that track the reporting of discrimination in the healthcare setting which can lead to the accountability of facilities and the intervention of individuals (Shavers et al., 2012).

Case vignettes were used by White-Means et al. (2009) to examine objective and subjective cognitive processes among allied health and medical students to access racial differences in treatment recommendations. The participant population included first, third, and fourth-year pharmacy, nursing, and medical students from colleges in the southern region of the United States. The participant sample included 189 pharmacy students, 115 medical students,

and 29 nursing students which was representative of the student population demographics. This three-year study used self-reported cultural competency scores and race and skin tone IAT results.

The results showed that cultural competency scores were highest among non-Hispanic Blacks and Hispanics in medicine and pharmacy students and in multiracial nursing students compared to White students (White-Means et al., 2009). The majority of medical and allied health students had a preference for Whites over Blacks and light skin tone over dark skin tone. Non-Hispanic Black and multiracial students had the strongest preference for Blacks over Whites. One hundred percent of Hispanics, 94% of non-Hispanic Whites, and 76% of Asians had preference for Whites over Blacks. Similar to the findings for race preference, 100% of Hispanic, 85% of Asian, and 83% of non-Hispanic White students preferred light skin tone to dark skin tone. Racial bias was not found to be significantly different across graduate year, major or student gender. However, race and ethnicity significantly impacted the mean race and skin tone IAT scores. Findings also showed a negative correlation between self-reported cultural competency and IAT scores. Therefore, the stronger preference for Whites was statistically correlated with the lowest self-reported cultural competency (White-Means et al., 2009).

Implicit Racial Bias Among Dental Professionals

In oral healthcare, the perceptions, attitudes, and actions of dental hygienists can affect the patient-provider relationship including shared decisions and treatment goals, patient adherence, interpersonal communication, and trust. Although most studies related to implicit racial bias have focused on medical professionals, the following studies among dental professionals suggest that implicit racial bias may influence clinical decisions, patient-provider relationship, and adherence to recommended treatment (Patel et al., 2018; Sabbah et al., 2019). A

relative gap in literature exists concerning the extent of implicit racial bias among dental professionals.

Patel et al. (2018) investigated if explicit and implicit racial bias influences the recommendation of root canal therapy or extraction for White and Black patients with irreversible pulpitis. A cross-sectional survey of dentists (including postgraduate students) in the endodontic department at the University of Cagliari, Italy was conducted to determine if clinical decisions are affected by patient race. Data were collected for one month among 57 participants. To limit responses on bias, participants were told the purpose of the study was to evaluate restorability decisions. The participants were given a patient case vignette including clinical information, radiographs, intraoral photos, and a patient photo depicting either a Black or White patient. The case vignette was designed to indicate a diagnosis of irreversible pulpitis to which root canal therapy (RCT) was a practical treatment option. Explicit or conscious bias was measured through a questionnaire which evaluated participants' treatment recommendations including strength and course of treatment decision and perceptions of patient cooperation. Implicit bias was measured through two brief IATs (BIATs), one for race preference and one for race dental cooperativeness. Of the 58 participants, 29 were assigned White patient case studies and 28 Black patient case studies. There was almost equal diagnosis of irreversible pulpitis regardless of race; however, the prescription of RCT was greater in White (86.21%) than Black (60.71%) patients. The recommendation of extraction (EXT) was higher in Black patients and lower in White patients, with 89.65% of dentists not recommending EXT for White patients compared to 50% for Black patients. Clinician implicit bias results showed 91.23% bias in race and 78.95% bias in cooperation scores. Patel et al. (2018) concluded that dentists' clinical decision for RCT versus EXT were influenced by the race of the patient, with a clear bias toward

RCT in White patients and EXT in Black patients. Dentists showed a bias of pro-White in both race and cooperative scores on the BIATs. The BIAT was used instead of the IAT due to the length of the IAT. The new BIAT was created specifically for measuring implicit bias in dental care, also known as the Kings College London dental BIAT. This was the first study to assess unconscious and conscious racial bias impact on dentists' treatment recommendations on tooth restorability. The authors concluded there is a crucial gap in the literature and future research is needed on the effect implicit racial bias has on clinicians' decisions (Patel et al., 2018).

Research regarding the emotional impact of racial discrimination and the association with underutilization of dental services shows that implicit bias has an effect on the patient-provider relationship (Sabbah et al., 2019). This study used data from the 2014 Behavioral Risk Factor Surveillance System, a yearly, state-based telephone health survey organized by the CDC. Participant analysis was limited to the states of Minnesota, Mississippi, and New Mexico due to the inclusion of an optional module on "reactions to race". After exclusion criteria, the study sample included 11,950 adults. The "reactions to race" module consisted of two variables specifying discrimination: first, perceived racial discrimination while seeking healthcare; second, the emotional impact of discrimination in the past 30 days. Analysis of both "reactions to race" questions were compared with participant demographic information including sex, age, race/ethnicity, education, income, and smoking status as well as health insurance status, and need for dental services. Within the past year, 68.3% of participants had visited the dentist, more common among non-Hispanic White, older women with more education, greater income, health insurance, and no dental need. Higher rates of emotional impact of discrimination (5%) were reported than healthcare discrimination (2.7%). Participants who experienced racial discrimination while seeking healthcare were 22% less likely to visit the dentist in the past year

compared to their counterparts. Similarly, participants who experienced the emotional impact of discrimination (feelings of anger, sadness, and frustration) were 25% less likely to have visited the dentist in the past year even if there was a dental need. Even after the authors adjusted for predisposing factors such as demographics, education level, income, health insurance, smoking status, and dental need, the association between emotional impact of discrimination and the underutilization of dental services remained statistically significant.

The researchers concluded that findings suggest that racial discrimination should be viewed as a social determinant of oral health. Future research should focus on why, how, and to what extent perceived discrimination impacts the lives of BIPOC. Negative discriminatory experiences such as cultural or language barriers, insensitivity from health or dental staff, and implicit bias can collectively influence patient mistrust, non-compliance of treatment recommendations, and underutilization of health and dental services at the institutional level (Sabbah et al., 2019).

Color-blind racial attitudes and bias of dental hygiene students have been associated with racial prejudice and unawareness of White privilege. These beliefs can cause implicit racial bias and stereotyping in the receipt of oral health services of BIPOC contributing to oral health disparities. Ludwig and colleagues (2019) conducted a pilot study investigating color-blind racial attitudes of dental hygiene students. A cross-sectional survey was completed by 70 first- and second-year dental hygiene students at Old Dominion University in Virginia using the Color-Blind Racial Attitudes Scale (CoBRAS), a 20-item instrument using a Likert scale to measure contemporary racial attitudes and stereotyping. CoBRAS includes three subcategories: Unawareness of Racial Privilege, Institutional Discrimination, and Blatant Racial Issues. Scores range from 20-120, with higher scores signifying higher levels of unawareness or denial of

racism. Results of the CoBRAS questionnaire revealed an average score of 64.89, indicating that students possessed moderate levels of color-blind racial attitudes. Subcategory scores for White racial privilege (28.86) and institutional racism or discrimination (21.51) indicated moderate levels of unawareness. Scores for blatant racial issues (14.5) indicated low levels of unawareness. These scores suggest dental hygiene student participants were unaware of their bias, denial of the existence of racism, and advantages of White privilege (Ludwig et al., 2019). The researchers recommend future research to better understand color-blind ideology and racial attitudes of dental hygienists in a larger and more diverse sample (Ludwig et al., 2019).

As an extension of this study, Ludwig and colleagues (2022) used the CoBRAS to investigate contemporary racial attitudes of practicing dental hygienists. In addition to the CoBRAS subscales, five demographic questions were added to the survey including age, gender, ethnicity, geographic location, and education level. The study's results found an overall average score of 54.04, indicating a moderate unawareness of racism among participants. There was a statistically significant difference (p>0.05) between overall CoBRAS means and participant age group and ethnicity, but no difference in geographic location or education. Results revealed participants aged 18-29 had lower overall scores (49.41) compared with those aged 60 and over (59.17). African American participants had lower scores (42.27) compared to those in the other ethnicity category (62.08) (Ludwig et al., 2022).

Analysis of racial privilege showed an average score of 16.8, indicating low unawareness of White racial privilege among dental hygienists. The average score on the institutional racism subscale was 23.56, indicating moderate unawareness of the implications of institutional racism. Scores again showed a statistically significant difference when comparing age groups (18-29 years, 18.59 and 60+ years, 27.03). Finally, the average score on blatant racial issues was 13.87,

indicating low unawareness of explicit racism. When comparing means among group demographics on the blatant racial issues subscale, statistical significance was found among ethnicity groups only. These subscale findings reflect a growing consciousness of racial issues including explicit racism and White privilege. Awareness in color-blindness among dental hygienists is an important first step in healthcare equity. The findings of this study confirm that more research is needed to better understand how dental hygienists' color-blind ideology affects the delivery of care (Ludwig et al., 2022).

A similar study examined differences in color-blind racial attitudes at the University of Florida by assessing dental faculty members and dental student baseline CoBRAS scores (Su & Behar-Horenstein, 2017). Participants for this study included the classes of 2016, 2017, and 2018. A total of 235 students and 71 faculty members responded to all items. Students and faculty self-reported their race/ethnicity and were classified as either underrepresented minority (URM) or non-URM (non-Hispanic White). Findings of this study were consistent with the results of Ludwig and colleagues (2019). Underrepresented minority students had significantly lower scores than non-URM students on all three subcategories. Students in the Class of 2018 scored significantly lower in unawareness than students in the Classes of 2016 and 2017 in the subcategory of blatant racial issues. The average scores on the CoBRAS subscales indicated that the faculty and students possessed moderate levels of color-blind racial attitudes. There were statistically significant differences between URM and non-URM scores for faculty and students. In the subcategory of White privilege, URM students (27.9) scored lower than non-URM students (30.4). Underrepresented minority students (21.1) and non-URM students (26.9) scores varied with unawareness of institutional discrimination. Researchers concluded that this study verifies the importance of hiring culturally competent faculty who serve the oral health needs of

BIPOC while respecting health beliefs, behaviors, and values of the patient (Su & Behar-Horenstein, 2017). Institutionalized racism should be addressed by identifying sociohistorical processes such as racial identity, white privilege, and racial bias that affect the teaching of students. Small group discussions on racial issues can lead to ongoing support and advocacy of anti-racism as well as shared ideas, beliefs, and values (Su & Behar-Horenstein, 2017). Faculty should be trained to address learned assumptions and perceptions students may have of different races including anxiety, fear, and anger towards these races. It is important to raise awareness of racial bias and its impact on the dental community. The authors recommended further research to evaluated racial attitudes across several universities (Su & Behar-Horenstein, 2017). Using pre and posttests scores can help to establish cultural competence training programs for faculty and students (Su & Behar-Horenstein, 2017).

Summary of Chapter 2

In summary, implicit racial bias is present in all healthcare settings. BIPOC are subject to less accurate diagnoses, restrained treatment plans inconsistent with the standard of care, denial of pain management, and poorer health outcomes (Chapman, Kaatz, & Carnes, 2013). When clinicians' implicit bias blinds them from seeing the patient as more than their perceived demographic, patient interactions, the delivery of care, and missed diagnosis can impact the quality of care (Marcelin et al., 2019). If implicit racial biases influence healthcare services, including the delivery of care and the satisfaction of care provided, then implicit racial bias can have the same impact on dental care.

The extent of implicit racial bias among dental hygienists has not been significantly studied and thus the impact this bias has on oral health disparities for BIPOC goes unacknowledged in the literature. Bias, prejudice, stereotypes, and uncertainty of dental

hygienists can affect the patient-provider relationship including shared decisions and treatment goals, patient adherence, interpersonal communication, and trust.

This literature review helped to identify the implicit racial bias dental professionals possess toward BIPOC. Additional research is warranted to evaluate the influence bias, prejudice, stereotyping, and uncertainty of dental professionals (dentists, dental hygienists, dental assistants, etc.) has on oral health disparities among BIPOC. The proposed study was designed to investigate implicit racial preferences among dental hygienists. The results do not claim to predict future behavior of participants; however, evidence shows that implicit bias does generally predict behavior (Kurdi et al., 2019). Data from a meta-analysis substantiate the idea that explicit and implicit bias, prejudice, stereotypes, and attitudes are systematically related to behavior. Researchers suggested that future studies include the use of adequate statistical methods to analyze internal consistency among independent variables involved in associations between explicit and implicit measures and behavior (Kurdi et al., 2019).

Chapter 3 Methodology

Introduction

The purpose of this study was to investigate implicit racial preferences among dental hygienists. The sections in this chapter describe the methodology of the study including the research design, context of the study, sample population and sampling method, protection of human subjects, data collection instruments, study limitations, and statistical analysis.

Research Design

This study used a descriptive research design. In this research study, a two-part web-based survey was used to collect participant demographic characteristics and implicit racial preferences.

Research Questions

The research questions that guided the conduct of this study were:

1. What are the implicit racial preferences among dental hygienists as measured by the Race IAT?
2. Is there a difference in the implicit racial preferences among dental hygienists as measured by the Race IAT?

Null Hypothesis

The hypothesis related to this investigation was: There is no statistically significant difference in the implicit racial preferences among dental hygienists.

Variables

The independent variables examined in this study were dental hygienists licensed to provide oral healthcare services in any practice setting or in any professional role. Additional independent variables included dental hygienists' demographic information such as age, race,

gender, education level, practice setting, region of residence, and years of professional experience. The dependent variable was the implicit racial preferences, measured using the Race IAT automatic preference descriptions (Project Implicit, n.d.):

- Strong preference for African American over European American
- Moderate preference for African American over European American
- Slight preference for African American over European American
- Little to no preference between African American and European American
- Slight preference for European American over African American
- Moderate preference for European American over African American
- Strong preference for European American over African American

Research Context

A sample of licensed dental hygienists in the United States were invited to participant in the online survey. To achieve an adequate response rate, dental hygienists were encouraged to forward the survey link to colleagues. The survey was powered by Qualtrics which included the informed consent (Appendix A). The invitation to participate contained a digital link to the survey and was shared in national dental hygiene Facebook groups and email (Appendix B).

Research Participants

Sample Description

The sample population consisted of dental hygienists licensed to practice in the U.S. For the purposes of this study dental hygienists included any variation of this role. In addition, dental hygienists must work at least one day a week in a clinical setting caring for patients. Criteria for exclusion were <18 years of age and dental hygienists without a current license. The aim of this study's sampling strategy was to obtain a satisfactory representative sample including a similar

distribution of dental hygienists in the U.S (i.e., age, sex, race, ethnicity, etc.). Study participants consisted of a convenience sample of dental hygienists who were interested in completing the survey.

Human Subjects Protection

This study used a cross-sectional research design via an online survey method to investigate the implicit racial preferences among licensed dental hygienists. The IAT was self-administered through electronic web-based format. Participation was voluntary and involved minimal risk. A request for exemption was submitted to the Idaho State University (ISU) Human Subjects Committee and was approved prior to conducting this research study.

Dental hygiene ethical guidelines were followed to keep all participant information confidential. The data collected from the participant responses did not include identifiable information. A randomly generated identification code was given to participants. The Project Implicit Research Team used Secure Sockets Layer (SSL) security for data exchange, secure data storage on Project Implicit databases, and supervision by expert technical staff in case of hardware malfunction or failure (Frost, 2021). Raw data were retrieved from a password-protected site as surveys were scored. All data collected remains confidential and the property of this research group.

Description of Setting

The setting in which data were collected for this study was online through a snowball, convenience sample of dental hygienists who were initially contacted through 25 national dental hygiene Facebook groups. The internet-based survey was also distributed through electronic mail to the entire membership directory of the American Dental Hygienists' Association.

Data Collection

Procedure and Protocol

Surveys are designed to study the knowledge, attitudes, behaviors, beliefs, and values of the study population (Ponto, 2015; Jones et al., 2013). Online surveys or questionnaires can be self-administered and include demographic questions (Ponto 2015). Survey questionnaires must be valid (measure what they intend to measure) and reliable (measure consistently) research instruments (Ponto, 2015; Jones et al., 2013). This study used a quantitative approach to collect data through an internet-based program that delivered an electronic form of the survey.

This study used a two-part survey design to collect data. The first part of the survey was self-designed and administered through Qualtrics® (Provo, UT, to obtain participants' informed consent and demographic data (Appendix C). The second part of the survey used the Race IAT to collect implicit racial preference data among dental hygienists. An embedded link in Qualtrics routed participants to the Project Implicit platform where the Race IAT was housed. A randomly generated identification code matched participant response's between Qualtrics and the IAT. The initial webpage on the IAT site included a welcome page (Appendix D) and directions for the participants (Appendix E). When the IAT was completed, a debriefing page provided participants with important considerations for the IAT and additional implicit bias resources (Appendix F).

The Project Implicit agreement allowed access to the raw data, including latency data, through a password-protected link. Project Implicit cleaned and scored the Race IAT data at the end of data collection. Analysis and reporting of data were not included in the full-service agreement, nor was the convergence of participant demographic data into the study link.

Instruments

This research study used the IAT as the main instrument for data collection. The IAT measures the strength of associations between concepts (e.g., Black people, White people) and evaluations (e.g., good, bad) or stereotypes (e.g., lazy, smart) (Greenwald, McGhee, & Schwartz, 1998). According to Project Implicit (n.d.), the IAT measures implicit associations by having the participant quickly sort words into categories that are on the left ("e" key) and right ("i" key). There are five main parts to the IAT. First, the participant sort's words relating to the concepts (e.g., Black people, White people) into categories. Secondly, the participant sort's words relating to the evaluation (e.g., good, bad). In the third part of the IAT, the categories are combined, and the participant is asked to sort both concept and evaluation words (e.g., Black People + Good). Next, the placement of the concepts switches from left to right and vice versa. This step in the IAT is important because increasing the number of trials can minimize the effects of memorization or practice. In the final step of the IAT, the categories are combined in a way that is opposite to what they were before. The IAT score is based on how quickly a participant sorts the words in the third part of the IAT versus the fifth part of the IAT. The main idea behind the IAT effect is that participant performance is faster when highly associated categories share a response key (Project Implicit, n.d.).

Research shows the IAT is an effective educational tool for raising awareness about implicit racial preferences and potential bias; however, the IAT does not meet the standards of measurement reliability for diagnostic use. Although the IAT does not claim to predict the future behavior of participants, it is still the best choice for identifying implicit racial preferences among dental hygienists. The Project Implicit Demo Website allows for manipulation of previously produced IATs. Therefore, a full-service programming agreement was implemented

with Project Implicit. The agreement included the following features: the modification and development of a Race IAT study link for private data collection.

Race IAT

The Race IAT requires the ability to categorize pictures (e.g., European American, African American, or Black people and White people) and words (e.g., good, bad) into groups as quickly as possible (Project Implicit, n.d.). In this study, the Race IAT was used to measure the implicit racial preferences among dental hygienists. The results of the Race IAT are described as an automatic preference of "slight, moderate, strong," or "no preference" toward European American, African American, or Black people and White people. This indicates the strength of the automatic preference (Project Implicit, n.d.). In this study, racial preferences among dental hygienists were measured using the Race IAT automatic preference descriptions.

Reliability and Validity

The Race IAT is a validated research instrument that uses reaction time data to identify implicit racial preferences and potential bias. According to research completed by Blanton and Jaccard (2008), the test-retest reliability rating of the IAT has been found to vary from 0.27 (Cunningham et al., 2001), 0.56 (Greenwald et al., 2006), and from 0.50 to 0.62 (Steffens & Buchner, 2003). According to Brunel and colleagues (2004), other studies claim test-retest reliabilities of the IAT average 0.60 (Greenwald et al., 2006) with high internal consistency at 0.80 (Greenwald & Nosek, 2001). Validity was established in market research when involving implicit brand associations (Brunel et al., 2004). According to Brunel and colleagues (2004), the IAT can measure implicit attitudes, stereotypes, self-concepts, and self-esteem.

Limitations

There are many known limitations to survey research including coverage error, sampling error, measurement, and nonresponse error (Ponto, 2015). Surveys were distributed through national dental hygiene Facebook groups and via email. By not using a combination of data collection methods to reduce coverage error, not all dental hygienists had access to or were informed of the opportunity to participate in this study. Without a similar distribution of participants, the sample population may not be an accurate representation of the study population, resulting in sampling error. Results of this study cannot be generalized to the entire population of dental hygienists in the United States. The sample was predominantly female and non-Hispanic White. Regions of residency were not equally distributed across the U.S. Additionally, the IAT does not meet the standards of measurement reliability for diagnostic use. Despites these limitations, the IAT was still the best choice for identifying implicit racial preferences among dental hygienists.

Statistical Analysis

Statistical analysis investigated trends, patterns, and relationships between the data collected. Data were analyzed using *R* statistical software (R Core Team: Vienna, Austria), in consultation with a senior data analyst at the University of Virginia. Responses from Qualtrics and the Race IAT were analyzed together. Outcome variables of demographic data and implicit racial preference scores were reported descriptively including means and standard deviations and analyzed using confidence intervals (CI) and proportion estimates. Participant characteristics were evaluated using descriptive statistics including frequencies, percentages, means and standard deviations. Race IAT d-scores were summarized using mean and standard deviation. Linear regressions were used to examine the association between d-scores and participant

characteristics among dental hygienists. Separate linear regressions determined statistically significant differences among participants based on age, years worked, and race/ethnicity.

Summary of Chapter 3

In this descriptive research study, a two-part web-based survey was used to collect participant demographic characteristics and measure implicit racial preferences. Licensed and practicing dental hygienists within the United States were recruited to participate through national dental hygiene Facebook groups and via email. Descriptive statistics and linear regression analysis compared dental hygienists' demographic data and implicit racial preferences (d-scores).

Results and discussion are reported in the form of a manuscript to be submitted for publication in the *Journal of Dental Hygiene*. The remaining sections of this thesis reflect the manuscript specifications outlined in the author guidelines located at https://jdh.adha.org/content/information-authors.

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Appendix A

Informed Consent Form

Informed Consent.

Title: Implicit Racial Preferences Among Dental Hygienists

You are invited to participate in a research study conducted by Olivia Morzenti, RDH, BS, CDHC, a graduate student at Idaho State University. The goal of this research study is to investigate implicit racial preferences among dental hygienists.

Qualifications to participate in this study: (1) licensed dental hygienist currently working at least one day a week in a patient care setting and (2) 18 years or older. Participation in this study is voluntary. Your involvement in this study is completely voluntary and you may withdraw from the study at any time. The survey will take about 10 minutes to complete.

Participating in this study may not benefit you directly, but it will help us learn about implicit racial preferences among dental hygienists. You may skip questions and end the survey at any time.

If you participate in this study, the information you share will be kept confidential and presented in group form only. No identifiable information will be collected. Participants will be assigned an autogenerated number that is unique to their survey link. Data will be compared to other licensed dental hygienist responses.

If you have any questions about this study, please contact my graduate thesis advisors, Kristin Calley, RDH, MS at callkris@isu.edu, or Colleen Stephenson, RDH, MS at colleenstephenson@isu.edu.

If you prefer not to participate, you do not need to do anything further.

By clicking on the arrow below, you are consenting to participate in this study.

Appendix B

Participant Recruitment Announcement

Dental Hygienists' Participation Welcome

My name is Olivia Morzenti, and I am a registered dental hygienist pursuing a Master of Science in Dental Hygiene degree at Idaho State University. You are being invited to participate in a research study investigating implicit racial preferences among licensed dental hygienists. Your involvement in this study is completely voluntary and you may withdraw from the study at any time. The survey will take about 10 minutes to complete.

Participating in this study may not benefit you directly, but it will help me learn about unconscious bias among dental hygienists. Results from this investigation may provide guidance for developing educational opportunities to enhance self-awareness, reflection, and mindfulness of oral health care providers.

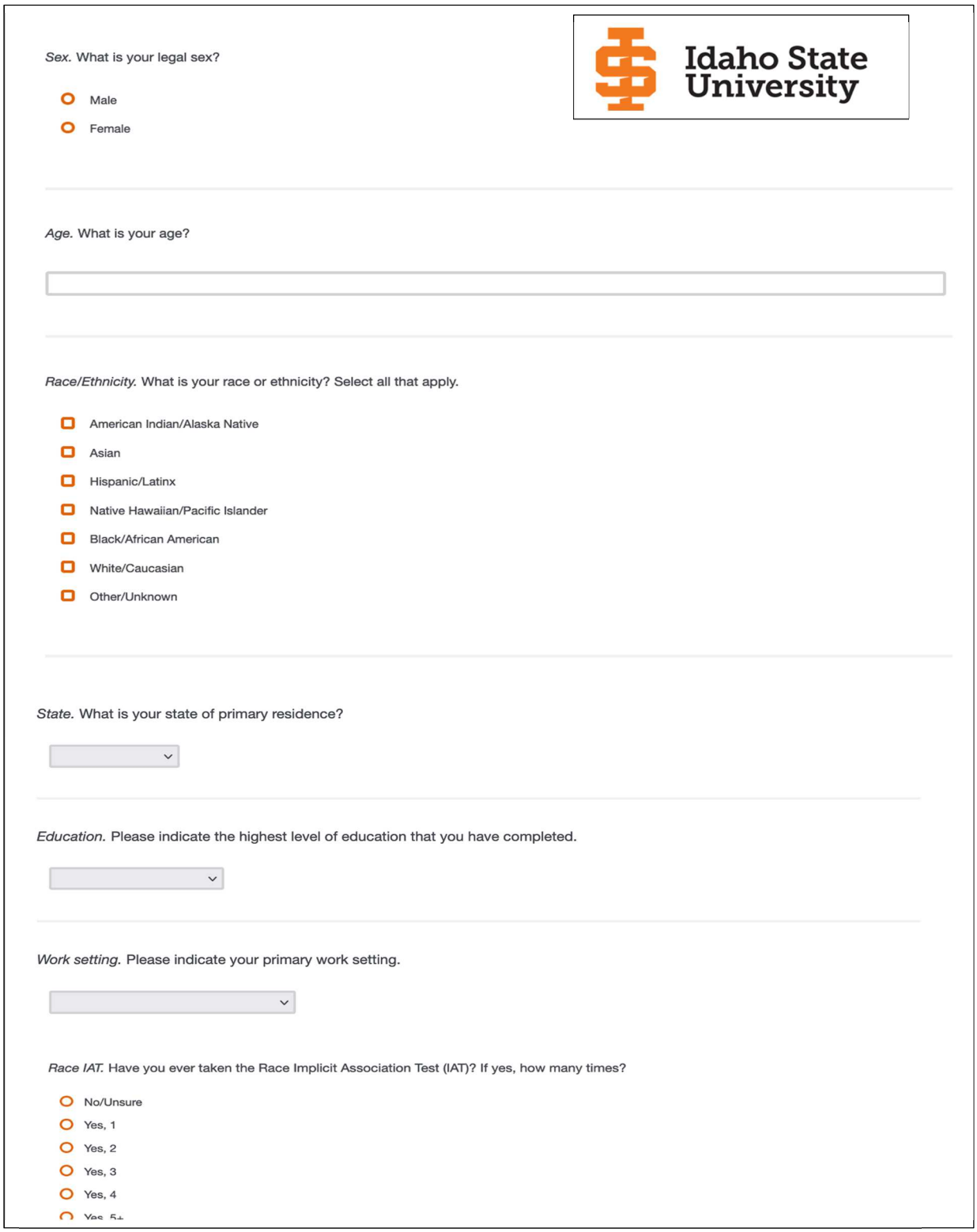
Please **copy**, **paste**, and **forward** this invitation and survey link to your licensed dental hygiene colleagues (part-time and full-time).

Thank you for participating!

https://isu.co1.qualtrics.com/jfe/form/SV_3pD3ypDnNgLjuDk

Appendix C

Demographic Questionnaire



Sex. What is your legal sex?

- Male
- Female

Age. What is your age?

Race/Ethnicity. What is your race or ethnicity? Select all that apply.

- American Indian/Alaska Native
- Asian
- Hispanic/Latinx
- Native Hawaiian/Pacific Islander
- Black/African American
- White/Caucasian
- Other/Unknown

State. What is your state of primary residence?

Education. Please indicate the highest level of education that you have completed.

Work setting. Please indicate your primary work setting.

Race IAT. Have you ever taken the Race Implicit Association Test (IAT)? If yes, how many times?

- No/Unsure
- Yes, 1
- Yes, 2
- Yes, 3
- Yes, 4
- Yes, 5+

State. What is your state of primary residence?

Idaho State University

Education. Please indicate the highest level of education that you have completed.

Work setting. Please indicate your primary work setting.

Days worked per week. On average, how many days per week do you work?

- 1
- 2
- 3
- 4+

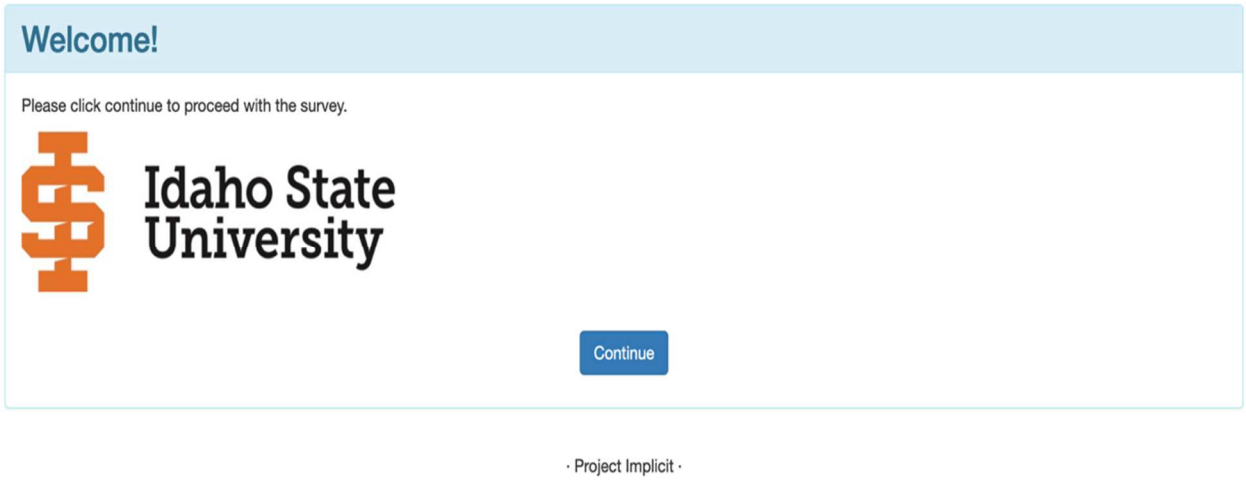
Years worked. How many years have you worked in your current occupation?

Training. Have you had any formal education or training in cultural awareness, race and diversity, or cultural sensitivity?

- Yes
- No
- Unsure

Appendix D

Welcome Page to Race IAT

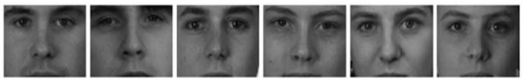


Appendix E

Project Implicit IAT Directions

Implicit Association Test

Next, you will use the 'E' and 'I' computer keys to categorize items into groups as fast as you can. These are the four groups and the items that belong to each:

Category	Items
Good	Joy, Love, Peace, Wonderful, Pleasure, Excellent, Laughter, Happy
Bad	Angry, Terrible, Horrible, Nasty, Evil, Awful, Failure, Hurt
African American	
European American	

There are seven parts. The instructions change for each part. Pay attention!

Continue

· Project Implicit ·

Appendix F

Project Implicit IAT Debriefing Page

Debriefing

Below is the interpretation of your Implicit Association Test(s) performance:

Your responses suggested a moderate automatic preference for European Americans over African Americans.

The sorting test you just took is called the Implicit Association Test (IAT). Half of you completed the task for African Americans and European Americans, whereas the other half completed the task for Black People and White people. You categorized good and bad words with images of African Americans (or Black People) and European Americans (or White People).

THANK YOU FOR TAKING THE TIME TO COMPLETE THE SURVEY!

Disclaimer: These IAT results are provided for educational purposes only. The results may fluctuate and should not be used to make important decisions. The results are influenced by variables related to the test (e.g., the words or images used to represent categories) and the person (e.g., being tired, what you were thinking about before the IAT).

The purpose of this survey is to educate participants about their potential for implicit racial bias. The results of your Race Implicit Association Test (IAT) should raise awareness and encourage self-reflection.

The IAT should not be used for diagnostic purposes

Research shows the IAT is an effective educational tool for raising awareness about implicit bias, but the IAT cannot and should not be used for diagnostic or selection purposes (e.g., hiring or qualification decisions). For example, using the IAT to choose jurors is not justifiable, but it is appropriate to use the IAT to teach jurors about implicit bias.

The IAT does not meet the standards of measurement reliability for diagnostic use. Just as blood pressure readings might change from one doctor's visit to another depending on how stressed and tired you are, and even how much coffee you may have had, IAT results can change from one time to another depending on where you currently are, your recent thoughts or experiences, and deliberate strategies you might use to influence test results.

Studies that summarize data across many people find that the IAT predicts discrimination in hiring, education, healthcare, and law enforcement. However, taking an IAT once (like you just did) is not likely to predict your future behavior well.

More information

Unconscious biases are not permanent. In fact, they are malleable, and steps can be taken to limit their impact on our thoughts and behaviors. Promoting self-awareness by recognizing one's biases using the Implicit Association Test is the first step in addressing unconscious bias. Several resources containing strategies to address unconscious bias are listed below.

- The New Science of Unconscious Bias: Workforce & Patient Care Implications. This program explores human bias and the implications of unconscious bias theory for the health care system both in terms of workforce bias and in terms of threats to clinical objectivity.
- The Science of Equality, Volume 1: Addressing Implicit Bias, Racial Anxiety, and Stereotype Threat in Education and Health Care. Perception Institute.
- Proven Strategies for Addressing Unconscious Bias in the Workplace. Includes an overview of unconscious bias and includes case studies to explore the impact of unconscious bias in the workplace. Diversity Best Practices. Sponsored by Cook Ross.
- 3 Steps for Addressing Unconscious Bias at Work. Unconscious bias training works.

Section II: Manuscript

Implicit Racial Preferences Among Dental Hygienists

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Manuscript Abstract

Purpose: Investigations focused on implicit racial bias have shown that racial and ethnic disparities are common in healthcare and that healthcare provider bias is a contributing factor to healthcare disparities. The purpose of this study is to investigate implicit racial preferences among dental hygienists.

Methods: A convenience sample of licensed and practicing dental hygienists within the United States were recruited to participate through email and national dental hygiene Facebook groups via snowball sampling. A two-part survey design was used for data collection. Participants completed a demographic survey through Qualtrics and were then routed to the validated Race Implicit Association Test (IAT) housed by the Project Implicit, Inc., website. Descriptive statistics and linear regression analysis compared dental hygienists' demographic data and implicit racial preference scores (d-scores).

Results: Of the 603 licensed dental hygienists that completed the two-part survey, and 404 surveys were used. One-hundred and ninety-nine surveys were excluded due to latencies and errors. Results revealed that just over two-thirds (67.8%) of participants showed a preference for White or European American. Data analysis determine an average d-score of 0.31, indicating a slight preference for European American over African American. A significant difference was found between implicit racial preference scores and participant age (0.01), years worked (-0.19), and race (-0.17). No difference was found with task order, previous Race IAT experience, or previous implicit bias training or education.

Conclusions: The Race IAT is widely used to show biases that are unrecognized and may differ from what one consciously believes. However, findings from this investigation underscore the need for more research to better understand the context and content of implicit bias training, as

well as further examining implicit and explicit racial bias with a more generalizable dental hygiene population.

Keywords: implicit racial bias, implicit racial preferences, Race IAT, dental hygienists

Introduction

Black, Indigenous, and People of Color (BIPOC) face disparities in access to healthcare, quality of care received, and health outcomes.[1-3] In the United States (U.S.), BIPOC are more commonly affected by diseases including COVID-19, diabetes, and cardiovascular disease.[4] Disparities in oral health are also a critical factor when considering overall health. According to the Centers for Disease Control and Prevention (CDC), non-Hispanic Blacks, Hispanics, and American Indians or Alaska Natives have poorer oral health compared with other racial and ethnic groups in the U.S.[5]

The prevalence of periodontal disease in the U.S. is significantly higher in Mexican-Americans (59.7%) and non-Hispanic Blacks (58.6%) compared with non-Hispanic Whites (42.6%), indicating how BIPOC are disproportionately affected by oral health disparities.[1] In the United States, Mexican-American and poor children aged 2-5 years have the highest dental caries prevalence (more than 30%) and a 10% untreated tooth decay prevalence rate.[5] Non-Hispanic Black (40.2%) and Mexican-American (37.1%) adults aged 20-64 years have higher rates of untreated tooth decay than non-Hispanic Whites (22.2%).[5]

Research on BIPOC has shown that complex multifarious factors exist between health, health services, health outcomes and socioeconomic status, discrimination, racism, and legislative policies.[3,6] Structurally racist systems are generated through policies, institutional practices, and cultural representations, which all play an important role in influencing health inequalities.[2,6,7] Structural systems and institutional practices are viewed as external to the healthcare system; thus, allowing healthcare providers to relinquish ownership and responsibility for their influence of disparities in healthcare. By contrast, implicit bias is internally driven by interactions within the healthcare system.[6]

Implicit bias is the unconscious association of perceptions, attitudes, and stereotypes that affect decisions and behaviors and can be based on characteristics such as race, ethnicity, age, gender, gender identity, and sexual orientation.[8,9] Affectively addressing the role of implicit bias in oral health disparities and promoting racial health equity requires identifying and dismantling policies and practices on both institutional and individual levels.[6] Health disparities adversely affect BIPOC who have continually faced systemic and institutionalized racism, historical discrimination, and exclusion based on race or ethnicity.[2,6,10] As with many facets of society the issue of race and bias in the health care system must first be acknowledged by health care professionals and social institutions.[3,6]

Investigations focused on implicit racial bias have shown that racial and ethnic disparities are common in healthcare and that healthcare provider bias is a contributing factor to healthcare disparities.[6,11-19] More specifically, how physicians' implicit racial bias can negatively impact patient-provider interactions, healthcare delivery, treatment recommendations and adherence, and medical treatment outcomes.[15,17] Studies show that BIPOC are subject to less accurate diagnoses, restrained treatment plans inconsistent with the standard of care, denial of pain management, and poorer health outcomes.[20]

Implicit racial bias is present in all healthcare settings. When clinicians' implicit bias blinds them from seeing the patient as more than their perceived demographic, patient interactions, the delivery of care, and missed diagnosis can impact the quality of care.[21] If implicit racial biases influence healthcare services including the delivery of care and the satisfaction of care provided,[15,17] then implicit racial bias can have the same effect with oral health care delivery.

Similar with findings from implicit bias studies of healthcare providers, studies of dental professionals suggest that implicit racial bias influences clinical decisions, patient-provider relationships, and adherence to recommended treatment.[22,23] However, a relative gap in literature exists concerning the extent of implicit racial bias among dental professionals. In oral health care, the perceptions, attitudes, and actions of dental hygienists can affect the patient-provider relationship including shared decisions and treatment goals, interpersonal communication, and trust.

One study investigated if explicit and implicit racial bias influences the recommendation of root canal therapy (RCT) or extraction (EXT) for White and Black patients with irreversible pulpitis. The researchers concluded that dentists' clinical decision for RCT versus EXT were influenced by the race of the patient, with a clear bias toward RCT in White patients and EXT in Black patients.[22] Dentists showed a bias of pro-White in both race and cooperative scores on two brief IAT. Patel and colleagues were the first researchers to assess the impact unconscious and conscious racial bias had on dentists' treatment recommendations on tooth restorability.[22]

Negative discriminatory experiences such as cultural or language barriers, insensitivity from health or dental staff, and implicit bias can collectively influence patient mistrust, non-compliance of treatment recommendations, and underutilization of health and dental services at the institutional level.[23] Research regarding the emotional impact of racial discrimination and the association with underutilization of dental services shows that implicit bias has an effect of the patient-provider relationship.[23] According to the researchers, findings suggest that racial discrimination should be viewed as a social determinant of oral health. The researchers recommend future research should focus on why, how, and to what extent perceived discrimination impacts the lives of BIPOC.[23]

Color-blind racial attitudes and bias of dental hygiene students are associated with racial prejudice and unawareness of White privilege. These beliefs can cause implicit racial bias and stereotyping in the receipt of oral health services of BIPOC contributing to oral health disparities.[24] Ludwig and colleagues conducted a pilot study investigating color-blind racial attitudes of dental hygiene students' using the Color-Blind Racial Attitudes Scale (CoBRAS).[24] Results of the CoBRAS questionnaire revealed that students possessed moderate levels of color-blind racial attitudes. Subcategory scores for White racial privilege and institutional racism or discrimination indicated moderate levels of unawareness. These scores show dental hygiene student participants were unaware of their bias, denial of the existence of racism, and advantages of White privilege.[24] The researchers suggest future research to better understand color-blind ideology and racial attitudes of dental hygienists in a larger and more diverse sample.[24]

These studies indicate a need for cultural competence education in order to reduce implicit bias among dental hygienists. Awareness of racial preferences among dental hygiene practitioners, educators, and students can predict and prevent implicit racial bias among dental hygienists. The oral health delivery system can be modified, improved, and evaluated to recognize implicit racial bias and the impact on dental decisions, treatment, and the patient-provider relationship. Appropriate policy and education interventions can be designed to increase self-awareness, reflection, and mindfulness of how implicit bias influences others. Furthermore, dental hygienists who are trained to be aware of their racial preferences can be sensitized to their potential for implicit biases. Integrating recognition and management of racial preferences in the dental hygiene curriculum creates early awareness and active prevention of implicit biases. The extent of implicit racial bias among dental hygienists has not been significantly studied and thus the impact this bias has on oral health disparities for BIPOC goes unacknowledged in the

literature. This study investigated implicit racial preferences among dental hygienists in the United States.

Methods

This study was reviewed and granted IRB approval by the University Human Subjects Committee (IRB-FY2021-250). A two-part survey design was used for data collection. Participants completed a 10-item demographic survey administered online through Qualtrics® (Provo, UT) (Appendix A) and then routed to the Race Implicit Association Test (IAT) housed by the Project Implicit, Inc., secured server. A convenience sample of licensed and practicing dental hygienists were invited to participate via national dental hygiene Facebook groups as well as through electronic mail. Administrators or moderators of the selected Facebook groups were asked for approval to post the survey invitation, unless the group forum was open to public discussion. Snowball sampling was also used for ease of data collection. Potential participants had to be licensed to practice dental hygiene in the U.S. and had to work at least one day a week in a clinical setting caring for patients. Participant responses were excluded if the Race IAT was inaccurately completed (i.e., too many errors, latencies) or if all demographic information was missing. All responses were collected anonymously. Participation was voluntary and involved minimal risk.

Survey Instrument

This research study used the Race Implicit Association Test (IAT) as the main instrument for data collection (Appendix A). The Race IAT measures the strength of associations between concepts (e.g., Black people, White people) and evaluations (e.g., good, bad) or stereotypes (e.g., lazy, smart).[25] The IAT measures implicit associations by having the participants quickly sort words into categories that are on the left (“e” key) and right (“i” key). There are five main parts

to the IAT. First, the participants sort words relating to the concepts (e.g., Black people, White people) into categories. Secondly, the participants sort words relating to the evaluation (e.g., good, bad). In the third part of the IAT, the categories are combined, and the participant is asked to sort booth concept and evaluation words (e.g., Black People + Good). Next, the placement of the concepts switches from left to right and vice versa. This step in the IAT is important because increasing the number of trials can minimize the effects of memorization or practice. In the final step of the IAT, the categories are combined in a way that is opposite to what they were before. The IAT score is based on how quickly a participant sorts the words in the third part of the IAT versus the fifth part of the IAT. The main idea behind the IAT effect is that participant performance is faster when highly associated categories share a response key.[25] The results of the Race IAT are described as an automatic preference of "slight, moderate, strong," or "no preference" toward European American, African American, or Black people and White people.[26] This indicates the *strength* of the automatic preference.[26] Racial preferences among dental hygienists were measured using the Race IAT automatic preference descriptions

- Strong preference for African American over European American
- Moderate preference for African American over European American
- Slight preference for African American over European American
- Little to no preference between African American and European American
- Slight preference for European American over African American
- Moderate preference for European American over African American
- Strong preference for European American over African American

Research shows the IAT is an effective educational tool for raising awareness about implicit racial preferences and potential bias; however, the IAT does not meet the standards of

measurement reliability for diagnostic use.[25,26] The IAT is still the best choice for identifying the implicit racial preferences among dental hygienists. The Project Implicit Demo Website allows for manipulation of previously produced IATs.[26] Therefore, a full-service programming agreement was implemented with Project implicit. The agreement included the following feature: The modification and development of a Race IAT study link for private data collection.

Statistical Analysis

Statistical analysis investigated trends, patterns, and relationships between the data collected. Data were analyzed using *R* statistical software. Responses from Qualtrics and the Race IAT were analyzed together. Participant characteristics were evaluated using descriptive statistics including frequency, percentages, mean and standard deviation. D-scores were summarized using mean and standard deviation. Linear regressions were used to examine the association between d-scores and participant characteristics among dental hygienists. Separate linear regressions determined statistically significant differences among dental hygienist participants based on age, years worked, and race/ethnicity.

Results

Six-hundred and three dental hygienists participated in the study; 199 of IAT surveys were not used due to latencies greater than 10000 ms, more than 30% errors overall, more than 40% errors on any given block, and 10% of trials with latency less than 300ms, yielding a participation rate of 67% (n=404).

Demographic characteristics of participants are shown on Table 1. Based on the 404 useable surveys, 98.5% of respondents were female and 80.4% identified as non-Hispanic White. Participant ages ranged from 21 – 74 years old. Most participants had completed a bachelor's degree (44.1%), or associate degree as a close second (38.1%). Private practice was the primary

work setting for dental hygiene participants. More than 35% of respondents have worked 21-50+ years as a dental hygienist. Respondents were divided into 4 regions according to the US Census Bureau: West, 149 participants (37.0%); Midwest, 118 participants (29.3%); South, 93 participants (23.1%); Northeast, 43 participants (10.7%).

Two-thirds (67.8%) of respondents preferred European American over African American (Table 2). Only 18.3% had little to no preference between the two groups. The average d-score was 0.31± 0.41 representing slight preference for European American over African American. The assigned task order in which participants completed their first task in the IAT was evenly split, as either "White + good" or "Black + good" (Table 3).

Although few respondents had taken the Race IAT previously, just over half of respondents reported having received some form of bias training. Table 4 shows significant associations between d-scores and demographic characteristics. For every 1-year increase in age, there was a subsequent 0.01 increase in the d-score. Those with less than 5 years of work experience scored 0.19 fewer points on the IAT compared to those with 21 or more years of experience. Age and years worked were colinear. Non-Whites scored 0.17 fewer points on the IAT compared to Whites.

Discussion

Bias, prejudice, stereotypes, and uncertainty of dental hygienists can affect the patient-provider relationship including shared decisions and treatment goals, patient adherence, interpersonal communication, and trust. Increased awareness of racial preferences and the potential these preferences have on implicit racial bias may influence health disparity outcomes for BIPOC. Dental hygienists who are trained to be aware of their racial preferences can be sensitized to their potential for implicit biases. This study investigated implicit racial preferences

among dental hygienists in the U.S. Results show the average d-score was 0.31, indicating a slight preference for European American over African American. Findings revealed that just over two-thirds (67.8%) of dental hygiene participants had a preference for White over Black, which is similar to previous studies among medical and dental healthcare professionals.[12,16-19]

Dental hygiene participants were not a representative sample of the current dental hygiene population in the U.S. According to 2020 data from the U.S. Census Bureau, 95.3% of dental hygienists are female, the median age of dental hygienists is 42.9 years, and the most common race/ethnicity for dental hygienists is non-Hispanic White (78.8%).[27] These statistics accurately represent the dental hygiene population in the U.S.[27] In this study, 98.5% of respondents were female, while 80.4% identified as non-Hispanic White. The average age of dental hygiene participants in this study was 42.6 years.

The results of this study showed that IAT d-scores increased as dental hygienists became older, which suggests greater levels of implicit bias as they age. Previous research suggests aging causes people to rely more on stereotypes.[28] Aging decreases suppression of prejudicial thoughts or actions from consciousness, allowing implicit bias to be more easily expressed.[28] Learned experiences, perceptions, and recent media coverage could all influence biased thoughts and actions.[6-8] Additionally, participants who worked less than five years had lower d-scores compared to those who worked 21+ years, showing age and years worked to be colinear.

Participant race and ethnicity played a significant role in implicit racial preference scores (d-scores). Results showed non-Whites had more positive implicit preferences toward African Americans compared to White participants, which is consistent with previous research.[12,16-19] Previous studies investigating implicit intergroup, or in-group bias, found that implicit bias is more likely to be exhibited toward non-members of a group.[17,29]

Although half of participants reported some form of implicit bias training or education prior to IAT utilization, only 18% of respondents had little to no preference for either race. Results from this study suggest that dental hygiene participants with implicit bias education or training still exhibit a preference for White over Black. This finding illustrates the importance of integrating recognition and management of racial preferences in the dental hygiene curriculum, which may create early awareness and active prevention of implicit biases.

The IAT is widely used to show biases that are unrecognized and that may differ from what one consciously believes. IAT used for this study is validated but does not meet the standards of measurement reliability for diagnostic use; therefore, the results do not claim to predict future behavior of participants. Task order of association did not influence responses, suggesting internal consistency reliability. Previous experience taking a race implicit association test was not significant, which illustrates IAT validity. Previous bias training had no change on d-scores. This finding is concerning because educational interventions and trainings are the basis for recognizing and changing implicit bias.

The dental and dental hygiene professions may benefit from this study by recognizing how dental hygienists' racial preferences could influence implicit racial bias, affecting the patient-provider relationship, clinician decision-making, and oral health disparities. The oral healthcare delivery system can be modified, improved, and evaluated to recognize implicit racial bias and the impact on dental decisions, treatment, and the patient-provider relationship. Appropriate policy and education interventions can be designed to increase self-awareness, reflection, and mindfulness of how implicit bias influences others. The IAT is one tool to help people become more aware and reflective of their implicit bias.

Limitation

Several limitations could have influenced the results of this study, the first being that implicit racial bias is a controversial topic. Future studies could include a brief synopsis of implicit racial bias in the invitation letter with a short explanation of the importance of participation. This could increase the response rate for future studies. Surveys were distributed via email or through national dental hygiene Facebook groups. By not using a combination of data collection methods to reduce coverage error, not all dental hygienists had access to or were informed of the opportunity to participate in this study. Without a similar distribution of participants, the sample population may not be an accurate representation of the study population, resulting in sampling error. Results of this study cannot be generalized to the entire population of dental hygienists in the United States. The sample was predominantly female and non-Hispanic White. Regions of residency were not equally distributed across the U.S. This sample also included few underrepresented minority dental hygienists (1.5% non-White)[27]; however, this reflects the lack of racial and ethnic diversity in the U.S. dental hygiene workforce.[1,30]

Despite these limitations, the IAT remains the best choice for identifying implicit racial preferences among dental hygienists. Research focusing on how dental hygienists' explicit and implicit racial bias affect patient care is suggested as a starting point in addressing oral health disparities associated with implicit racial bias. Future studies should also focus on the context and content of implicit bias education or training interventions specifically designed for oral healthcare professionals to assist with understanding and mitigating personal bias and stereotypes.

Conclusion

The average participant implicit racial preference scores revealed a slight preference for European American over African American. Non-Whites had more positive implicit preferences toward African American compared to White participants. Results from this study suggest that dental hygiene participants with implicit bias education or training still exhibit a preference for White over Black. Findings of this study underscore the need for further research to investigate the context and content of implicit bias training or education prior to IAT utilization. Future research examining implicit and explicit racial bias with a larger and more generalizable participant group is recommended to enhance the understanding of racial attitudes and stereotypes of dental hygienists.

In conclusion, our findings suggest that dental hygienists, like other healthcare workers, may harbor unconscious preferences and stereotypes that influence clinical decisions, patient-provider relationship, and patient adherence to recommended treatment. Further research is needed to confirm these findings, and to determine the extent to which implicit racial biases contribute to disparities in oral health.

Disclosures

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Tables

Table 1: Demographics of Dental Hygiene Participants (N=404)

Gender[ay6,]	**n (%)**
Female	394 (98.5%)
Race/ethnicity[b]	**n (%)**
White/non-Hispanic	324 (80.4%)
Highest level of education	**n (%)**
Associates	154 (38.1%)
Bachelors	178 (44.1%)
Postgraduate	72 (17.8%)
Region[b]	**n (%)**
West	149 (37.0%)
Midwest	118 (29.3%)
South	93 (23.1%)
Northeast	43 (10.7%)
Practice setting[c]	**n (%)**
Private practice	271 (67.4%)
Days worked per week	**n (%)**
4	267 (66.1%)
3	81 (20.0%)
2	39 (9.7%)
2	17 (4.2%)
Years worked	**n (%)**
21-50+	142 (35.1%)
11-20	90 (22.3%)
6-10	74 (18.3%)
<5	98 (24.3%)

[a] Missing data (n=4); [b] missing data (n=1); [c] missing data (n=1)

Table 2: Implicit bias distribution among dental hygienists across the United States (N=404)

IAT category	Overall (n, %)
Strong preference for African American over European American	3 (0.7%)
Moderate preference for African American over European American	25 (6.2%)
Slight preference for African American over European American	28 (6.9)
Little to no preference between African American and European American	74 (18.3)
Slight preference for European American over African American	72 (17.8%)
Moderate preference for European American over African American	121 (30.0%)
Strong preference for European American over African American	81 (20%)

IAT = Implicit Association Test.

Table 3: Participant Implicit Bias Characteristics (N=404)

Variable	**n (%)**
d-score (mean ± SD)	0.31 ± 0.41
Task order of *White* + *good* first[d]	200 (49.5%)
Previously Race IAT experience	18 (4.5%)
Previous implicit bias training[e]	224 (55.4%)

IAT= Implicit Association Test. [d] The order in which participants were first assigned "White + good" or "Black + good". [e] Training includes any formal education or training in cultural awareness, race and diversity, or cultural sensitivity.

Table 4: Association Between d-score and Participant Characteristics (N=404)

Participant Characteristics	Estimate (95% CI)
Age[a]	**0.01 (0.00, 0.01)**
Non-White[b]	**-0.17 (-0.27, -0.07)**
Years Worked	
11-20	-0.12 (-0.23, -0.01)
6-10	-0.11 (-0.22, 0.01)
<5	**-0.19 (-0.30, -0.09)**

CI = confidence intervals; [a] Missing data (n=5); [b] Missing data (n=1).