Impact of Variations in Access to Orthodontic Treatment Among Medicaid Populations: Oregon and Washington Patient Perspective

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A thesis submitted in partial fulfillment of the requirement for the degree of Master of Science in Craniofacial Orthopedics

Oregon Health & Science University

Portland, OR

December 2022

ACKNOWLEDGEMENTS

Huge thank you to my thesis committee members: Dr. Howard Freedman, Dr. Richie Kohli, and honorary member, Dr. Michelle Kim. An extra special thanks to my committee chairperson, Dr. Rosemarie Hemmings! This study would not have been possible (or completed ☺) without you. You have been an excellent mentor, and I'm forever grateful.

Thank you to my big brother, Kerry Collins, who helped to hand pack over 1000 envelopes without complaint!

Special thanks to Dr. Stephen Christenson for organizing raw data in a matter of minutes, and to Dr. Dongseok Choi for analyzing and providing statistical analysis for all collected data. Thank you!

Thank you to my favorite chairperson and program director, Dr. Iwasaki and Dr. Nickel, respectively, for allowing this project to take shape, for the mentoring, for the review of my poster submission and for just being all around great humans. Thank you both for a wonderful educational experience!

Thanks to the following people for their roles in making this project possible:

- OHSU language services for providing translations of surveys and consents in Spanish and Russian
- Xianna Marcus, Anna Murphy and Elle Cramer for printing surveys and consents for distribution and gentle reminders
- Dental Informatics Team (Kim Howard – Humphreys) for report data from axiUm
- Sarah Cinnamon for report data from axiUm
- Megan Sage for report data from axiUm
- Billie Speicher for text distribution of surveys and reminder texts

Big shout out to my co-residents: Drs. Pranita Ramanan, Jeff Rawley, Matt Tsai, Myriam Hamieh, Brandon Nguyen, Brandon Zegarowski, Angela Li, Kyle Hane, Garrett Masuda, Elizabeth Gross, and Cherry Choy! Your encouragement and support helped make this possible! From resident room shenanigans to orthodontic conferences and everything in between, you all are some of the best people this world has to offer. Thank you!

And the absolute BIGGEST thank you to the love of my life, Trey! None of this would have been possible without your endless love and support, your encouragement and your patience! Thank you to my baby boys, Quad and Jack, and the rest of my family and friends both near and far!

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DECLARATION OF INTERESTS

None of the authors have any interest, financial or otherwise, in any of the parameters involved in this study.

ABSTRACT

Objective: The purpose of this study was to quantify the incidence of disparities and adverse psychosocial impacts, as reported by the patient, in accessing orthodontic treatment.

Methods and Materials: In accordance with IRB oversight, patient health information data were derived from orthodontic screening appointments. Criteria for participation were children between 7-18 years old during 2015-2021 who were insured through Oregon Health Plan or Washington Medicaid. Questionnaires were sent electronically via Qualtrics and physical mail to 1056 people. Text messaging with links and QR codes was used for follow-up. Data were analyzed using descriptive statistics, measures of central tendency, and frequency distribution of binomial responses to survey questions.

Results: Data were derived from 86 respondents (response rate of 5.4%). Respondents reported that more than half (n=59, 53%), and in some instances, more than three quarters (n=58, 79.5%), of patients regardless of age, gender, or race were unhappy with their smile at their orthodontic screening appointment. However, when asked whether or not patients agreed with other adverse psychosocial statements at time points "at orthodontic screening" and "currently," all respondents reported less agreement with these statements "currently" as compared to "at orthodontic screening." Finally, regardless of age, gender, or race, respondents reported that more than three quarters of patients did receive orthodontic treatment (n=66, 71.7%).

Conclusions: Though not all were statistically significant, measured variables, age, gender and race, demonstrate trends that suggest access to orthodontic care may be associated with disparities and adverse psychosocial circumstances in children. Further studies should be conducted to further support these results.

Introduction

Oregon Health Plan (OHP) is Oregon's state Medicaid program. It provides health care coverage for low-income individuals and families.[1] The goals of OHP are to increase access to health care for low-income people, improve the quality of care and access to preventative services, as well as lower the cost of health care.[1] There are many benefits associated with OHP which includes access to coordinated care such as regular check-ups, mental health care, prescription services and other healthcare services including dental services[1]. By investigating covered and noncovered dental services, program evaluators have the opportunity to determine which services should be prioritized.[1] In Washington state, Apple Health is the "umbrella" term used to describe the state's Medicaid program. It provides preventative care such as cancer screenings, treatment for diabetes and high blood pressure and many other healthcare services including pediatric oral health services.[9] Apple Health covers orthodontic treatment for children with cleft palate and other serious dental problems. Dental problems which are medically necessary require prior authorization.[9] The goal for Apple Health is to provide a healthier Washington covering roughly 2 million residents with high quality health care through innovative health policies.[9] The purpose of this study is to highlight the patient's perspective regarding barriers and disparities faced in receiving orthodontic treatment which can influence policy decisions related to oral health coverage by OHP and Apple Health.

Studies have been conducted for many years (Brown et al, 2009, Bresnahan et al, 2010, Berdahl et al, 2016) implicating disparities in healthcare, especially oral health. From an orthodontic perspective, the disparities become even more evident. Orthodontic treatment

is considered, by most, an elective procedure that is less frequently covered by dental insurance. Private insurance companies may pay out a portion to the provider for orthodontic services on occasion.[2] However, taxpayer-funded insurance programs, such as state Medicaid, have minimal to no orthodontic benefit.[2] The Department of Health and Human Services states that orthodontic treatment should be a dental service provided under the Medicaid stature, and further asserts in the State Medicaid Manual that orthodontic treatment should be provided when it is medically necessary to correct handicapping and other malocclusions.[2] Handicapping malocclusions are deemed eligible for Medicaid funding, but they are defined by individual states as opposed to the federal government due to the 50/50 reimbursement methodology between state and federal Medicaid funding.[2] The Early and Periodic Screening, Diagnosis, and Treatment Program (EPSDT) mandates access of orthodontic treatment for Medicaid eligible patients.[3] Additionally, The Oregon Health Authority states that orthodontic services are covered for children with cleft lip and palate, deformities of the head and dental conditions such as malocclusions.[4] However, based on orthodontic services provided by the Oregon Health and Science University School of Dentistry (OHSU SOD), reimbursement through Oregon Health Plan currently only covers orthodontic services for children with cleft lip and palate.

As of January 2018, 14 states expanded Medicaid and offered dental benefits to adults.[5] A three-year program study of Iowa's Medicaid program from January 2008 to December 2010 found that overall orthodontic utilization by Medicaid enrollees was 3.1%. The study also found that enrollees in small town and rural areas were more likely to utilize orthodontic services than those enrollees in urban areas.[6] In a study conducted by

Laniado et al, results showed visits for orthodontic procedures were greatest among populations who were uninsured and had higher incomes.[7] Children with public insurance had the fewest orthodontic visits, and racial/ethnic disparities were most evident among orthodontic visits involving Black and Hispanic children receiving the fewest orthodontic procedures out of all groups studied.[7] Additionally, it has been shown that significant disparities exist in orthodontic utilization based on insurance status, as well as other factors, including race/ethnicity and poverty level. Children who have public health insurance have the fewest orthodontic visits.[3,7]

Psychological impacts on patients seeking oral health services are not uncommon. Adverse childhood experiences (ACE) can severely impact routine oral health care utilization.[11] ACE includes personal experiences such as divorce, domestic violence, parental incarceration, drug/alcohol abuse, mental illness, and emotional, physical or sexual abuse.[11] However, the presence of at least one protective adult often mitigates any negative experience and allows children to receive adequate oral health care.[11] There is also fear of treatment from negative memories experienced by patients.[12] These memories can include impatience or scolding and were described by Risløv et al as being significantly associated with dental fear.[12] By intervening and attempting to restructure negative oral health experiences, emphasizing the positive aspects of memory, it might be possible to increase oral health care utilization.

Though barriers to care and psychological trauma exist, there are also psychosocial effects to not receiving orthodontic treatment. Imani et al evaluated the relationship between orthodontics, mental health, and body image.[13] The study aimed to identify ways to provide the development of treatment services and greater accessibility to these

services.[13] In this study, the individuals were assessed before and after orthodontic treatment using Goldberg's General Health Questionnaire and the Multidimensional Body-Self Relations Questionnaire.[13] The results of this study showed that orthodontic treatment could increase mental health and bring about an increase, though not statistically significant, in multidimensional body-self relations.[13] In addition, Iranzo-Cortés et al, found a statistically significant association between psychosocial impact and malocclusions.[14] Additionally, patients who previously had any type of orthodontic treatment had reduced psychological impacts.[14]

Ultimately, disparities continue to persist among underserved and underrepresented populations.[8] Reducing socioeconomically driven differences requires policies that evaluate and support programs and insurance benefits that will provide necessary treatment.[8] The population who are enrolled in either OHP or Apple Health was chosen for a more robust comparison of those receiving orthodontic treatment versus not receiving orthodontic treatment amongst a similar demographic..

Null hypothesis: There are no reported disparities or psychosocial impacts among Medicaid patients who received an orthodontic screening for orthodontic treatment.

This study aims to quantify the incidence of disparities and adverse psychosocial impacts, as reported by the patient, among those who have Medicaid dental coverage and received an orthodontic screening for orthodontic treatment at the OHSU SOD.

A literature search was conducted using PubMed and Google Scholar search engines for the following terms: orthodontic treatment, Medicaid, disparities, access to care,

psychosocial impact, dental experiences, dental trauma, patient perspective and returned over 100 results. Results were found to be both aligned and not aligned with the purpose of this current study. There was a limited number of studies that focused on both the Medicaid population and the patient's perspective which further supports the need for this current study.

Materials and Methods

The protocol for this study was approved by the Oregon Health & Science University Institutional Review Board (Appendix A). This study utilized a quantitative and qualitative survey design method whereby the participants answered a series of questions related to their perspective on receiving or not receiving orthodontic treatment. The individuals who participated in the survey consented to have their answers used in this study. The following inclusion criteria were used: age 7-18 years, Oregon Health Plan or Washington Medicaid insurance, and orthodontic screening completed at Oregon Health & Science University School of Dentistry between 2015 and 2021.

A cloud-based survey (Appendix B) using a platform designed for this purpose (Qualtrics, 2020, Provo, UT, USA) allowed participants to answer a series of 33 questions grouped into the following categories: Demographics, Education, Household Comparison, Dental Experience, Psychosocial and Trauma Experience, and Other. The categories were outlined as follows: Demographics section inquired about gender, age, race, ethnicity, and primary language spoken. The Education section inquired about the level of schooling completed. The Household Composition section inquired about marital status, the number of children living in the home, and estimated annual income. The Dental Experience section inquired about the patient's last dental visit, existing restorations plus restorative needs, existing oral habits, tooth position in the mouth from the patient's or guardian's perspective, jaw position relative to the profile from the patient's or guardian's perspective. The Psychosocial and Trauma Experience section inquired about a patient's feelings of unhappiness, whether or not they were teased, bullied, excluded or had ever considered self-harm. This section also expressly asked

how the patient felt about their teeth based on the patient's or guardian's perspective. The Other section asked whether the patient received orthodontic treatment, the type of insurance they had, as well as any additional questions, comments, or concerns that the patient or the parent or guardian of the patient may have had.

The survey was estimated to take between 15-20 minutes to complete and was available in English, Spanish, and Russian. These languages represented the largest selection of patients who selected one of these languages as their primary language of choice when completing their Axium electronic health record (Figure 1). Axium is an academic dental software and is used at OHSU SOD for entering, monitoring, and maintaining electronic health records. Each survey was accompanied by a consent form (Appendix C) in the respective language. The survey was designed so that all questions had to be answered before moving on to the next question; however, some questions required open-ended responses. To encourage the answering of all questions, an error message was delivered if questions were left unanswered. Once a question was completed, the participant was allowed to go back to questions answered previously. Respondents had the option to be entered into a raffle for two $50 gift cards as incentive to participate. This required the participant to enter a valid email address and an identifier. Participants who supplied an email address and an identifier assumed the risks associated discussed in the available consent. Participants in the raffle were informed that their participation would not be associated with their survey response answers to help maintain anonymity. In addition to the provided consent information, consent was further implied from the completion of the survey.

An invitation (Appendix D) to participate in the web-based survey was emailed, as well as a physical paper survey with added consent was physically mailed, to approximately 1056

patients who met the inclusion criteria out of 1590 patients who presented for an orthodontic screening at OHSU SOD (Figure 2). The email informed participants that the survey was collecting data for a Master's thesis research project, and those survey responses would be anonymous. Initial email invitations to participate in the survey were sent between June 15, 2022, and June 23, 2022. Follow-up emails were sent on June 29, 2022. Physically mailed surveys were sent on June 24, 2022. A reminder text was sent to the potential sample who were physically mailed a survey on July 14, 2022. The web-based survey closed temporarily on July 27, 2022, but was reopened on September 15, 2022. Physical surveys could still be completed and returned during the temporary suspension of the web-based survey. The entire potential sample population received a text reminder on September 15, 2022. The web-based survey was officially closed and no additional physical copies were accounted for on October 28, 2022.

DATA ANALYSIS

All Likert style survey answers, open ended responses and demographic data were exported directly from Qualtrics into an Excel (Microsoft, 2018, Dallas, TX, USA) spreadsheet for statistical analyses. The data were reviewed and cleaned and analyzed using statistical software (R Core Team, 2022, Vienna, Austria). Descriptive statistics were calculated using Excel. Frequency tables were generated, and Chi-squared tests were performed across all questions for comparison using a set variable of age, race, or gender separately. A p-value less than 0.05 was considered statistically significant. Graphical presentation for exploratory analysis was also used. Since there was a relatively small sample size, ordered logistics regression was not feasible. Neutral responses were not included in the survey design. Missing data points were included in the analysis of the data as "missing" but were not included in the resulting statistics

for clarity sake. Only data points contributing to the “agree” and “strongly agree” categories with complete data points were included in this manuscript. Open-ended and discussion style questions were evaluated and summarized using Microsoft Office Suite – Excel and Word (Microsoft, 2018, Dallas, TX, USA).

Figure 1. *Primary languages of patients presenting to OHSU SOD Orthodontic Clinic between 2015-2020 enrolled in OHP or Apple Health.(Source: axiUm Academic Dental Software, Exan Software*, 2021, Surrey, BC, Canada)

LANGUAGES - GRADUATE ORTHODONTIC CLINIC - OREGON HEALTH AND SCIENCE SCHOOL OF DENTISTRY - 2015 THROUGH 2021							
	2015	2016	2017	2018	2019	2020	2021
ARABIC	1	1	2	2	3	4	3
AMHARI (ADDED 2021)	not tracked	not tracked	not tracked	not tracked	not tracked	not tracked	1
ASL	0	0	1	1	1	2	2
BURMESE	2	2	2	3	3	2	3
CANTON	4	4	3	2	2	3	2
ENGLISH	>100	>100	>100	>100	>100	>100	>100
FARSI	0	0	0	1	0	0	0
KINYAR (added 2021	not tracked	not tracked	not tracked	not tracked	not tracked	not tracked	1
KOREAN	1	1	1	1	1	2	1
KURD	0	0	0	0	0	0	1
MANDRN	1	0	2	0	0	0	0
ROMAN	1	1	1	2	2	0	0
RUSS	32	20	15	13	18	17	14
SOMALI	0	0	2	2	2	3	3
SPAN	34	34	46	39	85	56	86
SWA	0	0	0	0	1	1	0
TAHIT	0	0	1	0	0	0	0
VIET	2	2	4	3	1	1	0

Figure 2. *Number of patients presenting to OHSU SOD Orthodontic Clinic between 2015-2020 enrolled in OHP or Apple Health.(Source: axiUm Academic Dental Software, Exan Software, 2021, Surrey, BC, Canada)*

Patients with Oregon Health Plan or Washington Medicaid Insurance								
Completed Treatment in Year	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**Grand Total**
Orthodontic Screening	**177**	**233**	**230**	**231**	**291**	**134**	**294**	**1590**
Extensive Evaluations	**33**	**44**	**40**	**39**	**53**	**18**	**42**	**269**
Limited Care Ortho	**5**	**9**	**7**	**6**	**15**	**3**	**1**	**46**
Comp Care Ortho	**18**	**16**	**18**	**23**	**62**	**27**	**29**	**193**
Records	**27**	**28**	**29**	**36**	**90**	**24**	**35**	**269**
TOTALS:	**260**	**330**	**324**	**335**	**511**	**206**	**401**	**2367**

Results

The total number of patients enrolled in Oregon Health Plan (OHP) or Washington Medicaid who received an orthodontic screening at Oregon Health and Science University (OHSU) School of Dentistry (SOD) Orthodontics Department between 2015 and 2021 was over 1590. From the over 1590 patients, 1056 met the inclusion criteria for the study and were included in the surveyed population. Of these, 86 patients completed the survey leaving a response rate of 5.4%. Survey completion ranged from 71 surveys (82.6%) being completed in totality, while 15 surveys (17.4%) were partially completed with a range of being 79% complete to 100% complete. Any surveys below 70% completed were not included in the data. The most common unanswered questions were from the Dental Experience section of the survey and included the following questions: "What was the approximate date of the patient's last dental visit to a general dentist?"; "During the patient's last dental visit, were they told they had any teeth with cavities? If yes, how many?"; "Does the patient currently have any fillings? If yes, approximately how many?". There were a total of 849 English language survey invitations distributed, 58 Russian language survey invitations distributed, and 149 Spanish language survey invitations distributed (Table 1). The respondents represented each language group with 69 (81.4%) surveys being in English, 13 (15.1%) Spanish surveys, and 3 (3.5%) Russian surveys. The most important results considered age, race, and gender as variables for measurement.

AGE

The majority of the survey respondents, 91.9%, were the parent and/or guardian of the patient, while 8.1% identified as the patient. The mean age ± standard deviation (SD) of the

study population between 2015 and 2021 was 9 to 15 ± 4 years. As illustrated in Table 2, the birth years were 1997 – 2002 representing 21.1% of the study population, 2004 – 2009 representing 60.4% of the study population, and 2010 – 2014 representing 17.5% of the study population. For analysis, age for the population was considered in terms of "born before 2006" and "born in or after 2006" (Figure 1). When asked if the respondent agreed or not with the statement, "The patient has top teeth that stick out further than the bottom teeth (bucked teeth)," 35.9% of respondents reported patients born before 2006 either agreed or strongly agreed while 39.1% of respondents reported patients born after 2006 either agreed or strongly agreed with the statement (Figure 2). This difference was not found to be statistically significant between the two age groups (Chi-square = 6.43; df = NA; p = 0.094). Additionally, when asked if the respondent agreed or not with the following statements, the findings were also not found to be statistically significant between the two age groups: "The patient does not have enough space in their mouth (crowded teeth) for their teeth to look straight," and "The patient has large or excessive gaps between the teeth." (Chi-square = 6.12; df = NA; p = 0.1144 and Chi-square = 3.31; df = NA; p = 0.3618, respectively). For the former statement, 30.7% of respondents reported patients born before 2006 either agreed or strongly agreed, while 52.2% of respondents reported patients born after 2006 either agreed or strongly agreed with the statement (Figure 2). For the latter statement, 25.6% of respondents reported patients born before 2006 either agreed or strongly agreed, while 26.1% of respondents reported patients born after 2006 either agreed or strongly agreed with the statement (Figure 2).

More than three quarters (79.5%) of respondents reported patients born before 2006 either agreed or strongly agreed that they were unhappy with their smile at the time of screening (Figure 1). There were more than half (58.7%) of respondents who reported patients born after

2006 who either agreed or strongly agreed that they were unhappy with their smile at the time of screening (Figure 1). These values were not found to be statistically significant between the two age groups (Chi-square = 4.69; df = NA; p = 0.1974). Furthermore, when asked if they agreed or not with the same statement but in present time (at time of survey completion), 30.8% of respondents reported patients born before 2006 either agreed or strongly agreed, while 41.3% of respondents reported patients born after 2006 either agreed or strongly agreed (Figure 1). Between the two age groups, the values were not found to be statistically significant (Chi-square = 1.32; df = NA; p = 0.7581).

At the time of the orthodontic screening, 30.7% of respondents reported patients born before 2006 either agreed or strongly agreed that they were teased, tormented and/or bullied because of how their teeth looked (Figure 3). 26% of respondents reported patients born after 2006 either agreed or strongly agreed with the same statement (Figure 1). These values were not found to be statistically significant between the two age groups (Chi-square = 0.53; df = NA; p = 0.9115). Additionally, when asked if they agreed or not with the same statement at the time of survey completion, 7.7% of respondents reported patients born before 2006 either agreed or strongly agreed, while 21.7% of respondents reported patients born after 2006 either agreed or strongly agreed (Figure 1). These values were not found to be statistically significant between the two age groups (Chi-square = 5.69; df = NA; p = 0.1364).

When presented with the statement that, “Prior to the orthodontic screening, the patient felt excluded, outcast, or ostracized by others because of how their teeth looked,” 28.2% of respondents reported patients born before 2006 either agreed or strongly agreed, and 30.4% of respondents reported patients born after 2006 with agreed or strongly agreed (Figure 1). For the two age groups, the values were not found to be statistically significant (Chi-square = 3.05; df =

NA; p = 0.3838). For the same statement but at the time of survey completion, 5.1% of respondents reported patients born before 2006 either agreed or strongly agreed, while 23.9% of respondents reported patients born after 2006 either agreed or strongly agreed (Figure 1). These values were not found to be statistically significant between the two age groups (Chi-square = 6.56; df = NA; p = 0.1019).

There were 5.2% of respondents who reported patients born before 2006 either agreed or strongly agreed that they had considered self-harm at the time of screening (Figure 1). This was compared to 10.8% of respondents for when patients were born after 2006 (Figure 1). The values between the two groups were not found to be statistically significant (Chi-square = 1.05; df = NA; p = 0.8076). Additionally, when asked if they agreed or not with the same statement but in present time (at time of survey completion), 0% of respondents reported patients born before 2006 either agreed or strongly agreed, while 4.4% of respondents reported patients born after 2006 either agreed or strongly agreed (Figure 1). These values were not found to be statistically significant between the two age groups (Chi-square = 1.17; df = NA; p = 0.949). There was one missing data point for this question.

When asked if the patient received orthodontic treatment, 84.6% of respondents reported patients born before 2006 reported receiving orthodontic treatment, while 71.7% of respondents reported patients born after 2006 reported receiving orthodontic treatment (Figure 1). There were a total of 6 data points missing from this question. The values between the two age groups were not statistically significant (Chi-square = 1.61; df = NA; p = 0.2234).

RACE

The majority of respondents identified as being white/Caucasian (60.5%), with those respondents who preferred not to include race being the second largest group (18.6%). Both

Asian and Black/African American made up 4.7% each of total respondents; American Indian and/or Alaskan Native respondents represented 3.5% while other mixed raced groups totaled 7% of respondents. More than half of respondents did not identify as being of Hispanic, Latino, or Spanish origin (65.1%) while 34.9% of respondents identified as being of Hispanic, Latino or Spanish origin.

For analysis purposes, the sample population for race was considered in terms of "white" and "other races (Table 3 and Table 4)." The race category was grouped accordingly due to a minimal response rate from other racial and underrepresented groups. The count was not sufficient for statistical analysis to be completed; therefore, grouping of "other races" was more beneficial to the interpretation of data for this study. For the statement, "The patient has top teeth that stick out further than the bottom teeth (bucked teeth)," 46.1% of respondents who identified as white either agreed or strongly agreed, while 26.5% of respondents who identified as a race other than white either agreed or strongly agreed with the statement (Figure 3). This difference was not found to be statistically significant between the two groups (Chi-square = 7.75; df = NA; p = 0.0). When asked if the respondent agreed or not with the statement, "The patient does not have enough space in their mouth (crowded teeth) for their teeth to look straight," more than half (53.8%) of respondents who identified as white agreed or strongly agreed (Figure 3). This percentage was compared to 26.4% of respondents who identified as a race other than white (Figure 3). There was a statistically significant difference noted between race groups (Chi-square = 8.89; df = NA; p = 0.0290) with people who identified as white feeling more frequently that there was not enough space in the mouth for all of the teeth to look straight. For the statement, "The patient has large or excessive gaps between the teeth," 28.9% of respondents who identified as white either agreed or strongly agreed, while 20.6% of respondents who identified as a race

other than white either agreed or strongly agreed (Figure 3). There was no statistically significant difference between the two race groups (Chi-square = 3.81; df = NA; p = 0.2904).

More than three quarters (78.8%) of respondents who identified as white either agreed or strongly agreed that they were unhappy with their smile at the time of screening (Figure 4). There were more than half (53%) of respondents who identified as a race other than white who either agreed or strongly agreed that they were unhappy with their smile at the time of screening (Figure 4). These values were found to be statistically significant between the two race groups (Chi-square = 9.27; df = NA; p = 0.021). Moreover, when asked if they agreed or not with the same statement but in present time (at time of survey completion), 46.1% of respondents who identified as white either agreed or strongly agreed, while 23.5% of respondents who identified as a race other than white either agreed or strongly agreed (Figure 4). Between the two race groups, the values were not found to be statistically significant (Chi-square = 5.97; df = NA; p = 0.1124).

At the time of the orthodontic screening, 30.7% of respondents who identified as white either agreed or strongly agreed that they were teased, tormented and/or bullied because of how their teeth looked, while 23.5% of patients who identified as a race other than white either agreed or strongly agreed with the same statement (Figure 4). These values were not found to be statistically significant between the two race groups (Chi-square = 2.33; df = NA; p = 0.5202). Additionally, when asked if they agreed or not with the same statement at the time of survey completion, 19.2% of respondents who identified as white either agreed or strongly agreed, while 8.8% of respondents either agreed or strongly agreed (Figure 4). These values were not found to be statistically significant between the two race groups (Chi-square = 4.99; df = NA; p = 0.1744).

When presented with the statement that, “Prior to the orthodontic screening, the patient felt excluded, outcast, or ostracized by others because of how their teeth looked,” 28.8% of respondents who identified as white either agreed or strongly agreed, and 29.4% of respondents who identified as a race other than white agreed or strongly agreed (Figure 4). For the two race groups, the values were not found to be statistically significant (Chi-square = 0.43; df = NA; p = 0.923). For the same statement but at the time of survey completion, 17.3% of respondents who identified as white either agreed or strongly agreed, while 11.7% of respondents who identified as a race other than white either agreed or strongly agreed (Figure 4). These values were not found to be statistically significant between the two age groups (Chi-square = 1.43; df = NA; p = 0.7176).

There were 11.5% of respondents who identified as white either agreed or strongly agreed that they had considered self-harm at the time of screening (Figure 4). This was compared to 2.9% of respondents who identified as a race other than white (Figure 4). The values between the two groups were not found to be statistically significant (Chi-square = 3.49; df = NA; p = 0.3508). In addition, when asked if they agreed or not with the same statement but in present time (at time of survey completion), 9.6% of respondents who identified as white either agreed or strongly agreed, while 0% of respondents who identified as a race other than white either agreed or strongly agreed (Figure 4). These values were not found to be statistically significant between the two race groups (Chi-square = 5.94; df = NA; p = 0.0835). There was one missing data point for this question.

When asked if the patient received orthodontic treatment, 80.8% of respondents who identified as white reported receiving orthodontic treatment, while 73.5% of respondents who identified as a race other than white reported receiving orthodontic treatment (Figure 4). There

were a total of 6 data points missing from this question. The values between the two age groups were not statistically significant (Chi-square = 0.01; df = NA; p = 1).

GENDER

Of the respondents, there were 58.1% who identified as female and 38.4% who identified as male. There was 2.3% of respondents who chose the option "prefer not to say." There was 1 respondent who did not put an answer to the question of gender (Table 3 and Table 4). When asked to consider the statement, "The patient has top teeth that stick out further than the bottom teeth (bucked teeth)," 42% of respondents who identified as female, 33.4% of respondents who identified male, and 0% of respondents who preferred not to say a gender either agreed or strongly agreed with the statement (Figure 5). These differences were not found to be statistically significant between the gender groups (Chi-square = 2.53; df = NA; p = 0.922). For the statement, "The patient does not have enough space in their mouth (crowded teeth) for their teeth to look straight," 44% of respondents who identified female agreed or strongly agreed. This percentage was compared to 39.4% of respondents who identified male and 50% of those respondents who chose not to say a gender (Figure 5). There was no statistically significant difference noted between the gender groups (Chi-square = 3.02; df = NA; p = 0.8626). When considering the statement, "The patient has large or excessive gaps between the teeth," 24% of respondents who identified as female either agreed or strongly agreed, while 27.3% of respondents who identified as male and 0% of respondents who chose not to say a gender either agreed or strongly agreed (Figure 5). There was no statistically significant difference between the gender groups (Chi-square = 1.65; df = NA; p = 0.9615).

More than three quarters (76%) of respondents who identified as female either agreed or strongly agreed that they were unhappy with their smile at the time of screening (Figure 6).

There were more than half (60.6%) of respondents who identified as male who either agreed or strongly agreed that they were unhappy with their smile at the time of screening (Figure 6). Additionally, there were 0% of respondents who chose not to say a gender who either agreed or strongly agreed with being unhappy with their smile at the time of screening (Figure 6). These values were found to be statistically significant between the gender groups (Chi-square = 19.29; df = NA; p = 0.005). When asked if they agreed or not with the same statement but in present time (at time of survey completion), 40% of respondents who identified as female either agreed or strongly agreed, while 36.3% of respondents who identified as male either agreed or strongly agreed (Figure 6). Again, there were 0% of respondents who chose not to say a gender who either agreed or strongly agreed with the same statement but in present time (at time of survey completion) (Figure 6). Between the gender groups, the values were found to be statistically significant (Chi-square = 12.67; df = NA; p = 0.041).

At the time of the orthodontic screening, 28% of respondents who identified as female either agreed or strongly agreed that they were teased, tormented and/or bullied because of how their teeth looked, while 30.3% of respondents who identified as male and 0% of respondents who chose not to say a gender either agreed or strongly agreed with the same statement (Figure 6). These values were not found to be statistically significant between the gender groups (Chi-square = 5.68; df = NA; p = 0.4703). Additionally, when asked if they agreed or not with the same statement at the time of survey completion, 16% of respondents who identified as female either agreed or strongly agreed, while 15.2% of respondents who identified as male and 0% of respondents who chose not to say a gender either agreed or strongly agreed (Figure 6). These values were not found to be statistically significant between the gender groups (Chi-square = 6.77; df = NA; p = 0.3453).

When presented with the statement that, “Prior to the orthodontic screening, the patient felt excluded, outcast, or ostracized by others because of how their teeth looked,” 28% of respondents who identified as female either agreed or strongly agreed, and 33.3% of respondents who identified as male agreed or strongly agreed (Figure 6). 0% of respondents who chose not to say a gender agreed or strongly agreed with the former statement (Figure 6). For the gender groups, the values were not found to be statistically significant (Chi-square = 9.77; df = NA; p = 0.1259). For the same statement but at the time of survey completion, 16% of respondents who identified as female either agreed or strongly agreed, while 15.2% of respondents who identified as male either agreed or strongly agreed with 0% of respondents who chose not to say a gender agreed or strongly agreed (Figure 6). These values were not found to be statistically significant between the gender groups (Chi-square = 7.34; df = NA; p = 0.3038).

There were 10% of respondents who identified as female either agreed or strongly agreed that they had considered self-harm at the time of screening (Figure 6). This was compared to 6.1% of respondents who identified as male (Figure 6). 0% of respondents who chose not to say a gender agreed or strongly agreed that they had considered self-harm at the time of screening (Figure 6). The values between the gender groups were not found to be statistically significant (Chi-square = 3.05; df = NA; p = 0.7021). Additionally, when asked if they agreed or not with the same statement but in present time (at time of survey completion), 8% of respondents who identified as female either agreed or strongly agreed, while 0% of respondents who identified as male and those who preferred not to say either agreed or strongly agreed (Figure 6). These values were not found to be statistically significant between the gender groups (Chi-square = 3.44; df = NA; p = 0.5967). There was one missing data point for this question.

When asked if the patient received orthodontic treatment, 80% of respondents who identified as female reported receiving orthodontic treatment, while 81.8% of respondents who identified as male reported receiving orthodontic treatment (Figure 6). There were a total of 5 data points missing from this question. The values between the gender groups were found to be statistically significant (Chi-square = 12.33; df = NA; p = 0.0065).

TIME POINT COMPARISONS

The study questionnaire attempted to account for changes in perspective from respondents at different time points: at the time of screening versus current (at the time of survey completion). The following statements were presented and responses to these statements compared to one another were analyzed for significance.

68.6% of respondents reported they either agreed or strongly agreed with the statement, "The patient was unhappy because of how their teeth looked at the time of the orthodontic screening," compared to 36.6% of respondents who reported they either agreed or strongly agreed with the statement, "The patient is currently unhappy because of how their teeth look" (Figure 7). The values between the two statements were found to be statistically significant (Chi-square = 17.59; df = 3; p = 0.0005).

Additionally, for the statement, "The patient was teased, tormented and/or bullied because of how their teeth looked prior to the orthodontic screening," 27.9% of respondents agreed or strongly agreed. Comparatively, 15.1% of respondents agreed or strongly agreed with the statement, "The patient is currently being teased, tormented and/or bullied because of how their teeth look" (Figure 8). The values between the two statements were found to be statistically significant (Chi-square = 7.68; df = 3; p = 0.053).

When presented with the statement, “Prior to the orthodontic screening, the patient felt excluded, outcast, or ostracized by others because of how their teeth looked,” 29.1% of respondents either agreed or strongly agreed. For the same question but a change in time point, “The patient currently feels excluded, outcast, or ostracized by others because of how their teeth look,” there were 15.1% of respondents who either agreed or strongly agreed (Figure 9). The values for the two statements were not found to be statistically significant (Chi-square = 5.13; df = 3; p = 0.1623).

8.2% of respondents either agreed or strongly agreed with the statement, “The patient considered harming themselves because of how their teeth looked.” This was compared to the 5.9% who either agreed or strongly agreed with the same statement but at a different time point, “The patient currently considers harming themselves because of how their teeth look.” (Figure 10). The values between the two statement were not found to be statistically significant (Chi-square = 1.9979; df = 3; p = 0.5728).

Discussion

The purpose of this study was to quantify the incidence of disparities and adverse psychosocial impacts, as reported by the patient, in accessing orthodontic treatment. The results of this research focused on age, race, and gender for conciseness and clarity to better align with some of the primary concerns of the national health promotion and disease prevention initiative, Healthy People 2030[15]. However, data points collected included the patient's primary language, the education level of the patient's parents and/or guardian, the marital status of the patient's parent and/or guardian, the number of children in the home, the household income, the patient's various dental experiences and reasons why patients either received orthodontic treatment or not (Appendix B). The intent was to demonstrate the patient's perspective on topics not historically allowing for the patient's opinion. Disparities and inequities remain an issue for underrepresented groups and those individuals with socioeconomic hardships[16]. However, when designing this study, the gathering of information regarding disparities was not ideally captured. There were limited responses to open-ended questions, and most respondents reported receiving orthodontic treatment without statistically significant differences found amongst the analyzed variables – age, race, gender. The choice to survey the sample population attempted to mitigate certain confounding variables by keeping insurance type standardized. However, when considering the data collected across the board (age, race, gender), there were general trends regarding the psychosocial and dental aspects of the questionnaire.

Respondents were generally unhappy with their teeth at the time of the orthodontic screening. For the age variable, this finding was not statistically significant, but for the gender and race categories, this finding was found to be statistically significant. This would imply that the null hypothesis was rejected for those groups, and the feelings of unhappiness associated

with teeth were found to be significantly greater for those identifying as female, as well as for those identifying as white, respectively. Though this research is unable to make a definitive claim, it can be speculated that feelings of unhappiness were a chief complaint and/or a primary concern for seeking care. It could also be considered that most respondents agreed or strongly agreed that they were unhappy with their teeth at the orthodontic screening because there were no other viable options in the survey for them to choose from regarding emotions. Furthermore, happiness was not defined and left to the interpretation of the respondent. Regardless of how respondents concluded that they were unhappy with their smile at the time of the orthodontic screening, it still goes to demonstrate the emotional aspect of seeking out and accessing orthodontic care.

For patients born before 2006, more than three quarters of the respondents reported being unhappy with their smile at the time of their orthodontic screening. Interestingly, slightly more than half of respondents for patients born after 2006 reported being unhappy with their smile at the time of their orthodontic screening. Though not considered in this study, these results lead to the question of why older patients felt unhappier with their smile at the orthodontic screening. Additionally, respondents for patients born before 2006 also tended to agree or strongly agree more with being teased, tormented, or bullied because of their teeth at the time of orthodontic screening. Studies that look at adolescents and puberty, state that puberty begins on average between 8 and 13 in females and 9 and 14 in males.[17] The onset of puberty could play a role in why respondents for patients born before 2006 were higher than for those patients born after 2006. Furthermore, patients born before 2006 could also have additional stressors from a psychosocial aspect with appearance being a top priority and peer group comparisons being made.

For the race category, respondents who identified as white reported statistically significant values when asked if they agreed or strongly agreed with whether patients had bucked teeth or crowded teeth. Furthermore, those respondents also reported a statistically significant difference when asked if they agreed or strongly agreed with being unhappy at the time of orthodontic screening compared to the respondents who identified as a race other than white. These values reject the null hypothesis and suggest that respondents who identified as white have strong feelings regarding how the teeth are positioned in the mouth (bucked – too far out and/or crowded – not enough room). It further suggests that respondents who identify as white were unhappier with their teeth at the time of screening. Though not evaluated in this study, genetic components could be at play when considering the position of the teeth in the alveolar housing for patients[18]. Independent of race, respondents could be predisposed to certain tooth positions[18]. Furthermore, the survey may not have included options with which respondents who identified as a race other than white agreed. Nonetheless, these results demonstrate that respondents may have a better sense of overall esthetics when it comes to tooth position and consider it when deciding whether to access orthodontic treatment or not.

The overall trend for respondents who identified as a race other than white was that they reported less of a psychosocial impact, percentage wise, than those respondents who identified as white on most all statements with the exception of having feelings of being excluded, outcast, or ostracized. This small change in association with this statement could have been that respondents who identified as a race other than white would utilize these words to describe their feelings as opposed to other descriptive words that may or may not have been present in the survey.

More than three quarters of the respondents who identified as being female reported being unhappy with their smile at the time of their orthodontic screening. Interestingly, slightly

more than half of respondents who identified as being male reported being unhappy with their smile at the time of their orthodontic screening. This study did not consider the reason for the difference in responses between those respondents identifying as female and male; however, it can be suggested that females may focus more on the esthetics of their teeth than males do[19]. It can also be considered that since females hit puberty prior to males[17], then overall appearance is more important to them sooner.

Overall, it can be noted that throughout each category of measured variables (age, race, gender), there was a decrease between questioned timepoints. Generally, each statement of psychosocial status saw a downward trend when comparing "at time of orthodontic screening" versus "currently (upon survey completion)" timepoints. This decrease could be seen due to numerous factors: receiving orthodontic treatment; patients not being concerned over appearance; social norm changes; priorities changing; or aging. Interestingly, though the following observation cannot be considered definitive, the inverse relationship demonstrated a trend where the high responses for patients reporting that they received treatment were comparable to the reduction at the "current (upon survey completion) timepoint.

LIMITATIONS AND FUTURE DIRECTIONS

Limitations for this study included missing data points and loss to follow up. Some respondents did not answer vital questions, which left gaps in the data. Furthermore, physically mailing surveys may have been an outdated method that led to a lower response rate from people who may have otherwise responded if access to the survey was more convenient. Unfortunately, when counting responses, some physically mailed surveys were returned without being delivered. There were between 50-100 copies of the survey returned, but this count was not

confirmed for analysis. If delivered and completed, these surveys may have not only added to data collected and altered outcomes, but could have also bolstered response rate. Though expected, there was a small sample population. With so few responses, survey results were unable to be applied to a broader population. It was also difficult to assess whether or not patients' feelings actually aligned with answered questions since parents and/or guardians were possibly completing the survey. This could have led to implicit bias from the parents that influenced results. Furthermore, parents and/or guardians may have answered survey questions based on their own feelings as opposed to how the patient truly felt. Parents and/or guardians may not have been unaware of how the patient felt.

For future directions, it would be ideal to analyze different variables to see if significance would change. The study could be expanded and/or recreated to compare between groups such as OHP and Washington Medicaid. Other comparisons for insurance coverage could also be considered such as public versus private insurance. Additionally, the study design could be altered to allow for a prospective approach, and the use of verified questions or combination of both verified and created questions. A prospective approach could also give way to a better response rate amongst the sample population.

Conclusions

In conclusion, this type of research can lead to profound revelations which could potentially help encourage policy changes in accessing orthodontic treatment. More studies will be necessary to support existing data and uncover new data. Though disparities exist in healthcare, and access to care still remains a top priority, a portion of the null hypothesis can be accepted from this study – there were no evident disparities for this Medicaid population noted in the results. However, there were psychosocial impacts on which conclusions can be drawn:

- Respondents who reported for patients born between 2004 – 2009 made up the majority (60.4%) of the study population. This demographic could be used for future studies.
- Most respondents reported being white (60.5%) which aligns with the race demographics of both Oregon (86.2%) and Washington (77.5%)[20]. Additional conclusions could be drawn from this demographic and the reason for the high response rate compared to other races.
- Over half of the respondents reported identifying as female (58.1%).
- In all measured variables (age, race, gender), the highest "agreed or strongly agreed" sentiment came from individuals reporting being unhappy with their smile.
- In all measured variables (age, race, gender), most respondents "agreed or strongly agreed" with the patient not having enough space in their mouth for the teeth to look straight (crowded teeth).
- An overall trend noted that psychosocial impacts decreased from the time point of "at orthodontic screening" to "current – time of survey completion".
- In all measured variables (age, race, gender), the majority of respondents did report receiving orthodontic treatment.

Tables

Table 1: Sample Population Survey Distribution Breakdown

Language	Number of Surveys Sent	Number of Responses
English	**849**	**43**
Russian	**58**	**2**
Spanish	**149**	**10**

Table 2: Birth year distribution of sample population

Birth Year	Number of Respondents (n=85; *1 missing data point)	Percentage of Total (100%)
1997	**1**	**1.2%**
1998	**1**	**1.2%**
1999	**3**	**3.5%**
2000	**4**	**4.7%**
2001	**5**	**5.8%**
2002	**4**	**4.7%**
2004	**5**	**5.8%**
2005	**16**	**18.6%**
2006	**11**	**12.8%**
2007	**8**	**9.3%**
2008	**7**	**8.1%**
2009	**5**	**5.8%**
2010	**6**	**7.0%**
2011	**5**	**5.8%**
2012	**1**	**1.2%**
2013	**1**	**1.2%**
2014	**2**	**2.3%**

Table 3: Sample Population Psychosocial Status Breakdown by Number

Psycho-social Status		N	Not happy - screen	Not happy - current	Tease - screen	Tease - current	Exclude - screen	Exclude - current	Self-harm - screen	Self-harm - current	Tx	No Tx
Gender	Females	50	38	20	14	8	14	8	5	4	40	9
	Males	33	20	12	10	5	11	5	2	0	27	2
Age	15+	50	31	12	12	3	11	2	2	0	33	4
	less than 15	35	27	19	12	10	14	11	5	2	33	9
Race	White	52	41	24	16	10	15	9	6	2	42	8
	Other race	34	18	8	8	3	10	4	1	0	25	5

Table 4: Sample Population Dental Perspective Breakdown by Number

Dental Perspective		N	Bucked Teeth	Crowded Teeth	Gaps/Spacing
Gender	Females	50	21	22	12
	Males	33	11	13	9
Age	15+	50	14	12	10
	less than 15	35	18	24	12
Race	White	52	24	28	15
	Other race	34	9	9	7

FIGURES

Figure 1: Graphical Representation of Psychosocial Status of Respondents by Age (percentages)

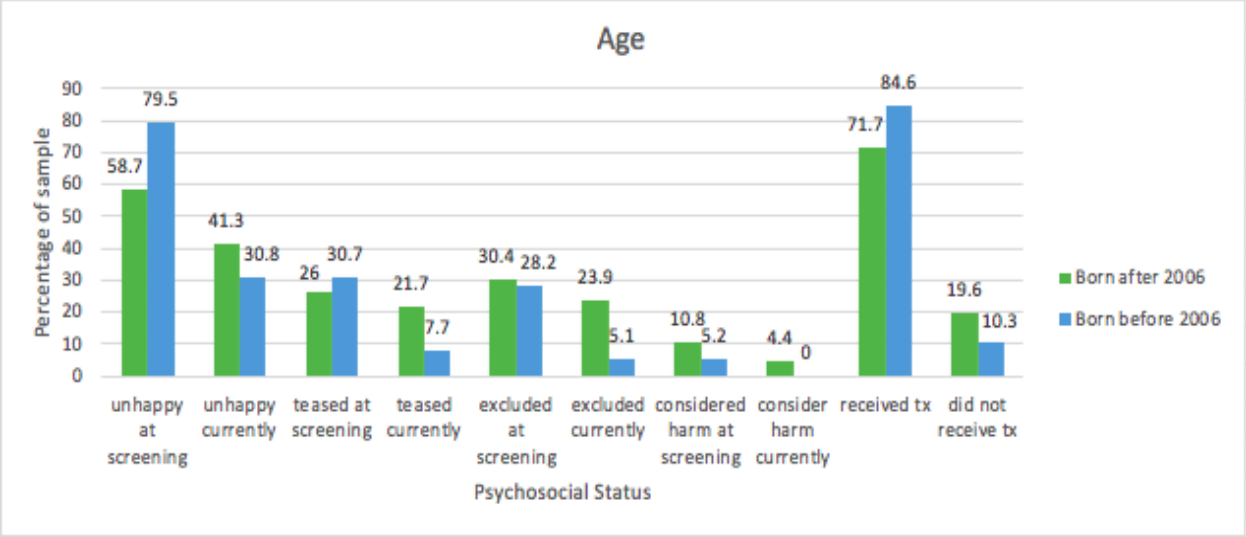


Figure 2: Graphical Representation of Dental Perspective of Respondents by Age (percentages)

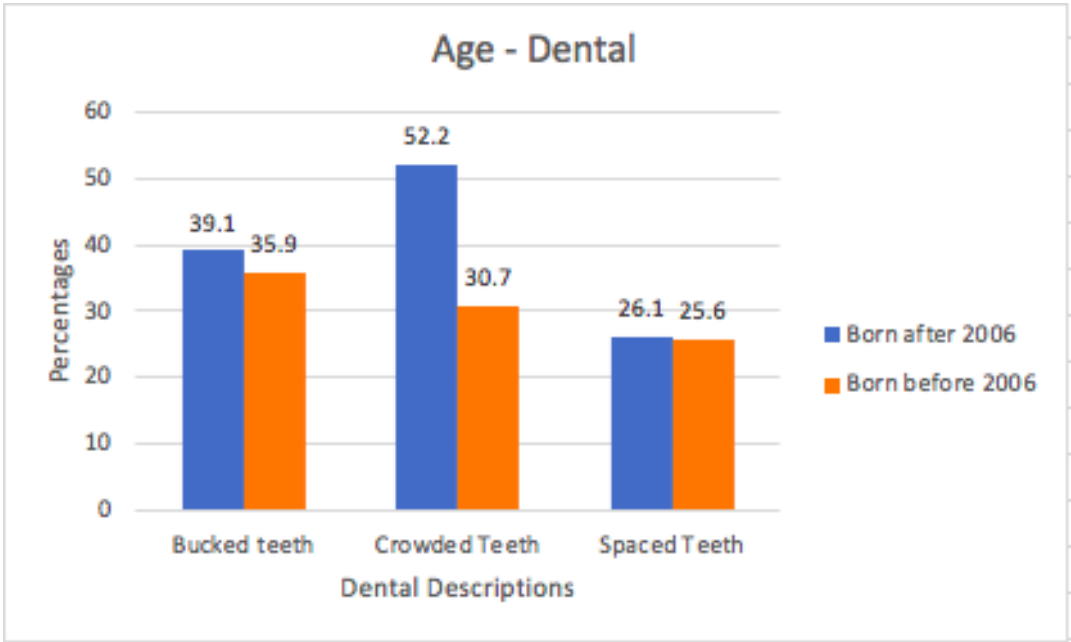


Figure 3: Graphical Representation of Dental Perspective of Respondents by Race (percentages)

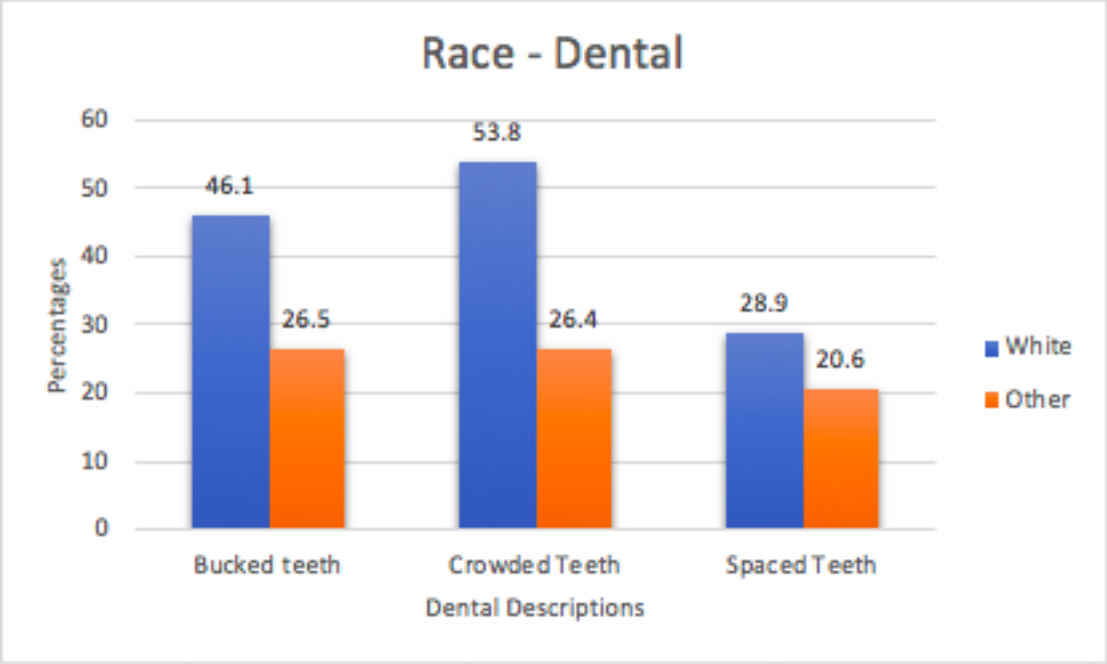


Figure 4: Graphical Representation of Psychosocial Status of Respondents by Race (percentages)

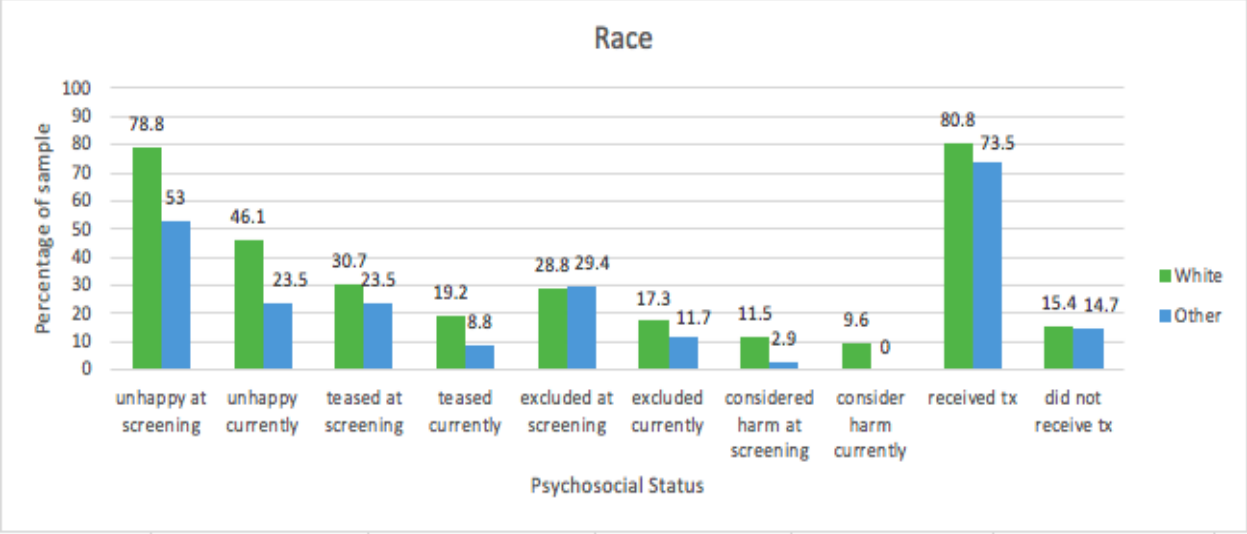


Figure 5: Graphical Representation of Dental Perspective of Respondents by Gender (percentages)

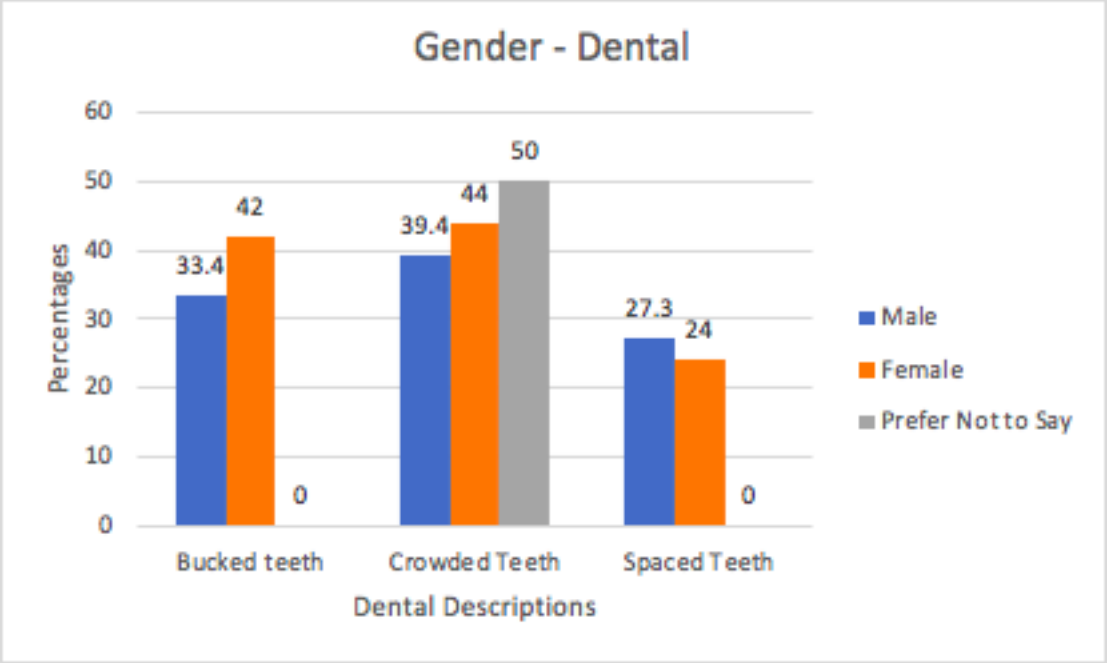


Figure 6: Graphical Representation of Psychosocial Status of Respondents by Gender (percentages)

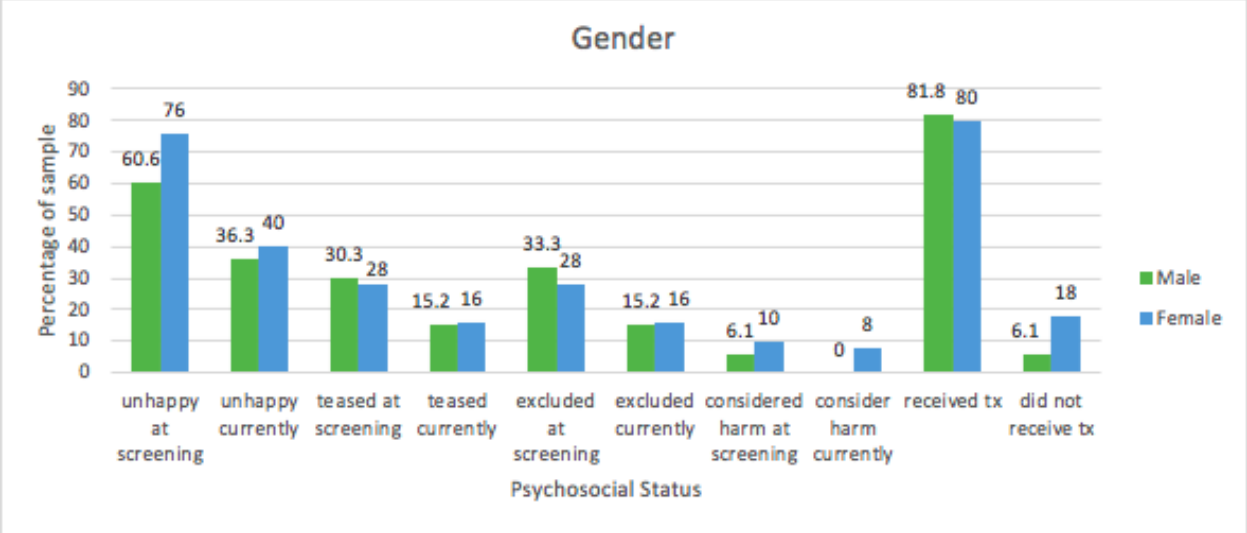
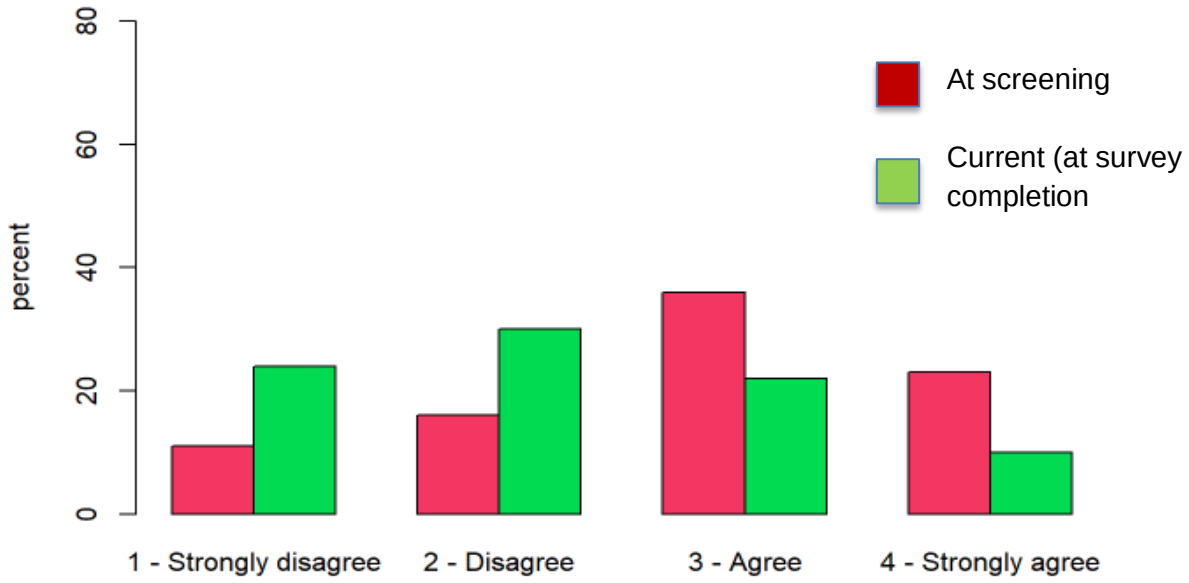
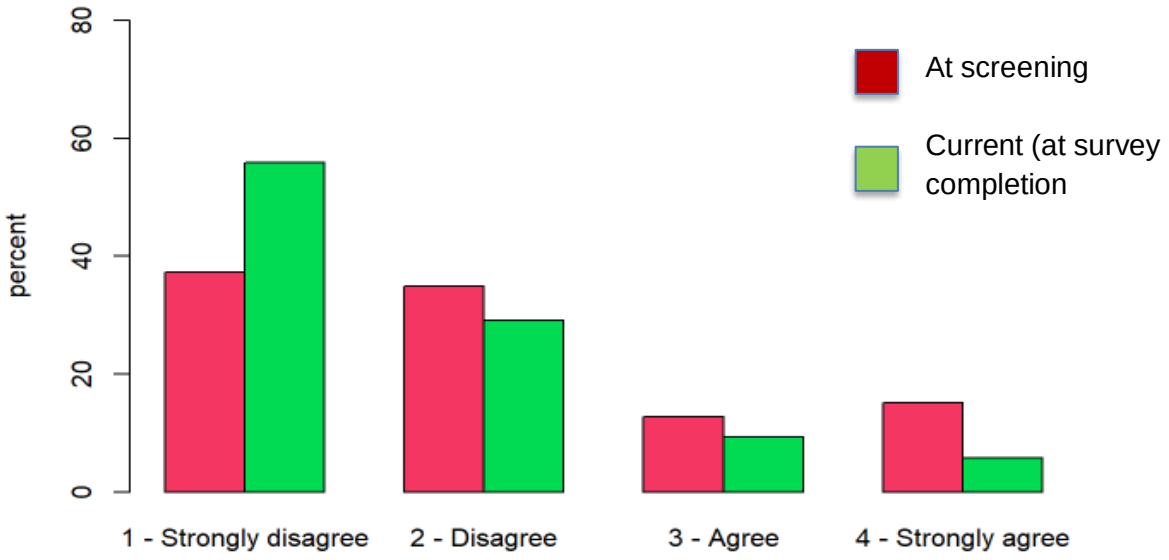


Figure 7: Graphical Representation of Psychosocial Status of Respondents by Time Point (percentages)



Respondents – Unhappy with how teeth look

Figure 8: Graphical Representation of Psychosocial Status of Respondents by Time Point (percentages)



Respondents – Teased, tormented and/or bullied

Figure 9: Graphical Representation of Psychosocial Status of Respondents by Time Point (percentages)

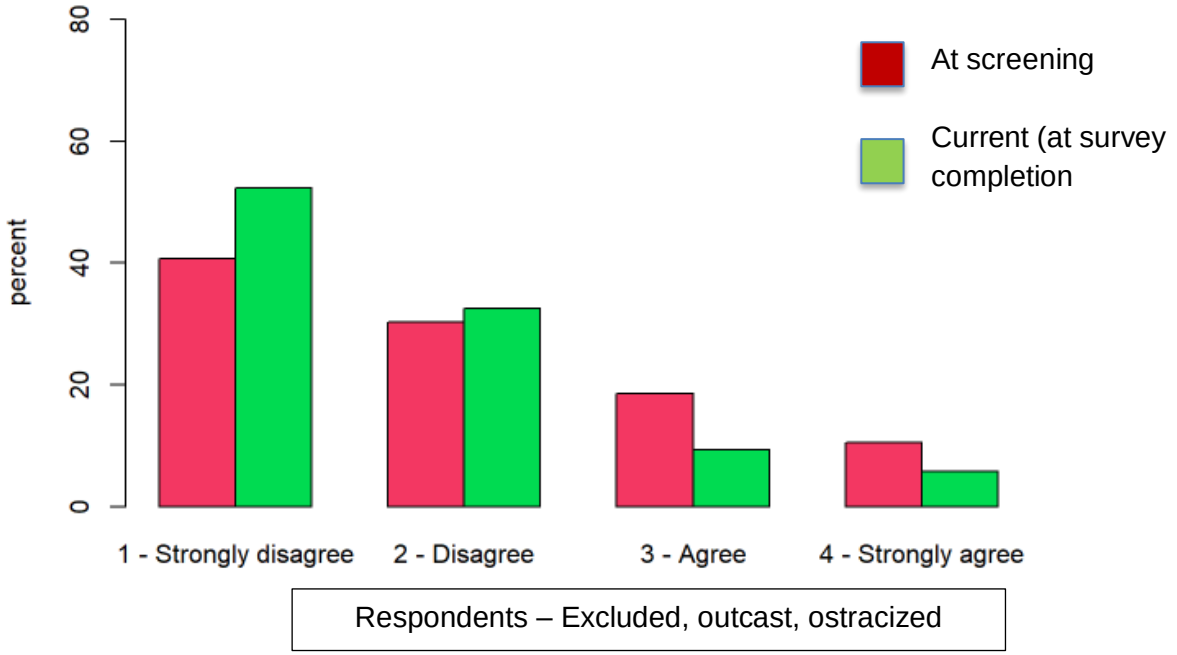
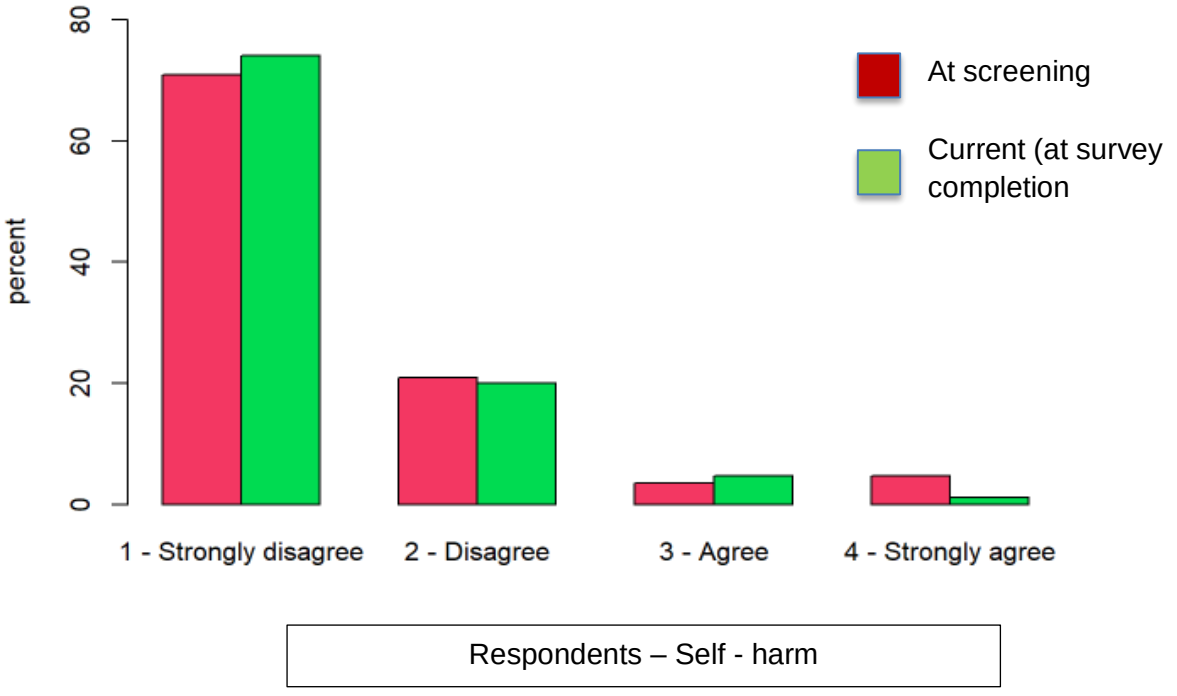


Figure 10: Graphical Representation of Psychosocial Status of Respondents by Time Point (percentages)



Appendices

Appendix A. *Paperwork demonstrating approval for the study by Oregon Health & Science University Institutional Review Board (OHSU IRB).*

OREGON HEALTH & SCIENCE UNIVERSITY

IRB MEMO

Research Integrity Office
3181 SW Sam Jackson Park Road - L106RI
Portland, OR 97239-3098
(503)494-7887 irb@ohsu.edu

APPROVAL OF SUBMISSION

December 27, 2021

Dear Investigator:

On 12/27/2021, the IRB reviewed the following submission:

IRB ID:	STUDY00023512
Type of Review:	Initial Study
Title of Study:	Impact of Variations in Access to Orthodontic Treatment Among Medicaid Populations: Oregon Patient Perspective
Principal Investigator:	Ryan Thrower
Funding:	None
IND, IDE, or HDE:	None
Documents Reviewed:	• HIPAA- Waiver or Alteration of HIPAA Authorization (1) (1) (2).docx • Project Protocol • RESUBMIT - Consent - Information Sheet .pdf • Survey post RH edits.docx

The IRB granted final approval on 12/27/2021. The study requires you to submit a check-in before 12/25/2024.

Review Category: Expedited Category # 7

Copies of all approved documents are available in the study's **Final** Documents (far right column under the documents tab) list in the eIRB. Any additional documents that require an IRB signature (e.g. IIAs and IAAs) will be posted when signed. If this applies to your study, you will receive a notification when these additional signed documents are available.

Appendix B. *Survey questions prepared for the survey platform* (Qualtrics, 2020, Provo, UT, USA) *and those physically mailed in the English language*

Demographics

1. Are you the parent or guardian of a patient who was between the ages of 7-18 years old at the time of a screening or treatment done at Oregon Health and Science University School of Dentistry Orthodontics Department between 2015-2021?

Yes
No

2. If not, what is your relationship to the patient and how old are you?

3. With which gender does the patient identify? Choose F for female, M for male, or O for other

F – female
M – male
N – non-binary
O – other

4. What year was the patient born?

1997 - 2014

5. What is the race of the patient? Select all that apply.

Black or African American
White
American Indian or Alaska Native
Asian
Native Hawaiian or Other Pacific Islander
Decline to answer

6. What is the ethnicity of the patient?

Hispanic or Latino or Spanish origin
Not Hispanic or Latino or Spanish origin

7. Is English your first language (or your parent/legal guardian's first language?

Yes
No

8. If English is not your first language, what is your first language?

English
Spanish

Russian
Other

Education

1. What was the highest degree or level of school completed by the parent/legal guardian at the time of orthodontic screening? *If currently enrolled, highest degree received.*

No schooling completed
Kindergarten to 8th grade
Some high school, no diploma
High school graduate, diploma or the equivalent (for example: GED)
Some college credit, no degree
Trade/technical/vocational training
Associate degree
Bachelor's degree
Master's degree
Professional degree
Doctorate degree

Household composition

1. What was the marital status of the parent/legal guardian at the time of orthodontic screening?

Single, never married
Married or domestic partnership
Widowed
Divorced
Separated

2. How many children lived in the household at the time of the orthodontic screening?

1-3 children
4-6 children
6+ children

3. What was the estimated total household income (per year) of the parent/legal guardian at the time of orthodontic screening? Choose the number beside the category that best describes the household.

$0 – $9,999
$10,000 – $19,999
$20,000 – $29,999
$30,000 – $39,999
$40,000 – $49,999
$50,000 – $59,999
$60,000 – $69,999
$70,000 – $79,000

$80,000+

Dental Experience

1. What was the approximate date of the patient's last dental visit to a general dentist? (for example: June 2020) *If you cannot recall the date, please move to the next question.*

2. During the patient's last dental visit, were they told they had any teeth with cavities? If yes, how many?

3. Does the patient currently have any fillings? If yes, approximately how many?

4. Does the patient have any oral habits such as nail biting, finger/thumb sucking, ice chewing, biting on pencils or pens, chew on straws/toothpicks? If yes, what is the habit?

5. On a scale from 1-4 with 1 being strongly disagree and 4 being strongly agree, in your opinion, the patient has top teeth that stick out further than the bottom teeth (bucked teeth).

1 - strongly disagree
2 - disagree
3 - agree
4 - strongly agree

6. On a scale from 1-4 with 1 being strongly disagree and 4 being strongly agree, in your opinion, the patient does not have enough space in their mouth (crowded teeth) for their teeth to look straight.

1 - strongly disagree
2 - disagree
3 - agree
4 - strongly agree

7. On a scale from 1-4 with 1 being strongly disagree and 4 being strongly agree, in your opinion, the patient has large or excessive gaps between the teeth.

1 - strongly disagree
2 - disagree
3 - agree
4 - strongly agree

8. Choose the letter beside the statement that best describes how the patient's jaw looks from the side (patient's profile).

A - The patient's bottom jaw is pushed back further than the top jaw.
B - The patient's bottom jaw sticks out further than the top jaw.
C - The patient's bottom jaw and top jaw look good together.
D - I do not know.

Psychosocial and Trauma Experiences

1. On a scale from 1-4 with 1 being strongly disagree and 4 being strongly agree, was the patient unhappy because of how their teeth look at the time of the orthodontic screening.

1 - strongly disagree
2 - disagree
3 - agree
4 - strongly agree

2. On a scale from 1-4 with 1 being strongly disagree and 4 being strongly agree, the patient is currently unhappy because of how their teeth look.

1 - strongly disagree
2 - disagree
3 - agree
4 - strongly agree

3. On a scale from 1-4 with 1 being strongly disagree and 4 being strongly agree, was the patient teased, tormented and/or bullied because of how their teeth look prior to the orthodontic screening?

1 - strongly disagree
2 - disagree
3 - agree
4 - strongly agree

4. On a scale from 1-4 with 1 being strongly disagree and 4 being strongly agree, is the patient currently being teased, tormented and/or bullied because of how their teeth look.

1 - strongly disagree
2 - disagree
3 - agree

4 - strongly agree

5. On a scale from 1-4 with 1 being strongly disagree and 4 being strongly agree, prior to the orthodontic screening, the patient felt excluded, outcast, or ostracized by others because of how their teeth look.

1 - strongly disagree
2 - disagree
3 - agree
4 - strongly agree

6. On a scale from 1-4 with 1 being strongly disagree and 4 being strongly agree, the patient currently feels excluded, outcast, or ostracized by others because of how their teeth look.

1 - strongly disagree
2 - disagree
3 - agree
4 - strongly agree

7. On a scale from 1-4 with 1 being strongly disagree and 4 being strongly agree, the patient considered harming themselves because of how their teeth look. *If you or a loved one have experienced suicidal thoughts or need help navigating through tough situations, you are not alone. Please call 800-273-TALK (8255) or visit online at suicidepreventionlifeline.org. Representatives are available to you 24/7.*

1 - strongly disagree
2 - disagree
3 - agree
4 - strongly agree

8. On a scale from 1-4 with 1 being strongly disagree and 4 being strongly agree, the patient currently considers harming themselves because of how their teeth look. *If you or a loved one have experienced suicidal thoughts or need help navigating through tough situations, you are not alone. Please call 800-273-TALK (8255) or visit online at suicidepreventionlifeline.org. Representatives are available to you 24/7.*

1 - strongly disagree
2 - disagree
3 - agree
4 - strongly agree

9. Choose the statement(s) that describes how the patient felt about their teeth at the time of the orthodontic screening (select all that apply).

My teeth are ugly.
I do not smile because of how my teeth look.
I want straight teeth.
My teeth make me self-conscious.
I like my teeth.

10. Choose the statement(s) that describes how the patient currently feels about their teeth (select all that apply).

My teeth are ugly.
I do not smile because of how my teeth look.
I want straight teeth.
My teeth make me self-conscious.
I like my teeth.

Other

1. Did the patient ever receive orthodontic treatment? Choose 1 for yes and 2 for no.

   If yes, did the patient have any orthodontic coverage via Oregon Health Plan or Washington Medicaid?
   Please state which insurance coverage patient had at the time of treatment.

   If no, what factors caused the patient to not receive orthodontic treatment?

2. In your opinion, if the patient did not receive orthodontic treatment, the patient's quality of life would have greatly improved with orthodontic treatment. Choose T for True and F for False.

T - True
F - False

3. Please provide any additional comments in the blank space below.

Appendix C. *Survey consent to participate in survey, approved by the OHSU IRB.*

OREGON HEALTH & SCIENCE UNIVERSITY

Information Sheet

IRB#_0002351_____

TITLE: Impact of Variations in Access to Orthodontic Treatment Among Medicaid Populations: Oregon Patient Perspective

PRINCIPAL INVESTIGATOR: Dr. J. Ryan Thrower [(870) 830-9966]

CO-INVESTIGATORS: Drs. Rosemarie Hemmings, Michelle Kim, Richie Kohli [(503) 494-####]

WHY IS THIS STUDY BEING DONE?:

Please note that some of the data collected from/about you or your child in this study could be used and/or shared for future research.

WHAT PROCEDURES ARE INVOLVED IN THIS STUDY?:
Participants are being asked to complete a short survey with questions involving demographics, education, household composition, dental experience, psychosocial and trauma experiences.

This survey will take approximately 15-20 minutes to complete. All responses will be completely unidentifiable. The survey will not have any identifiers linking your responses back to you or any other participants. However, volunteers who complete the survey will be invited to participate in a raffle for two $50 gift cards.
If you have any questions, concerns, or complaints regarding this study now or in the future, or you think you may have been injured or harmed by the study, contact Dr. J. Ryan Thrower, 870-830-9966.

WHAT RISKS CAN I EXPECT FROM TAKING PART IN THIS STUDY?:
Although we have made every effort to protect your identity, there is a minimal risk of loss of confidentiality. If you choose to participate in the raffle, there is minimal risk that personal identifiers can be revealed such as name, email addresses, and/or physical addresses**.** Furthermore, participants may experience frustration and post-traumatic stress for being asked to complete a research survey regarding orthodontic treatment that they may not have received. Participants also risk a minimal time burden in completing this survey

WHAT ARE THE BENEFITS OF TAKING PART IN THIS STUDY?:
You will likely not benefit from being in this study. However, by serving as a subject, you may help us learn how to benefit patients in the future.

WHAT ARE THE ALTERNATIVES TO TAKING PART IN THIS STUDY?:
You may choose not to be in this study. Your participation is completely voluntary.

WILL I RECEIVE RESULTS FROM THIS STUDY?
The results of this research will not be made available to you because the research is still in an early phase and the reliability of the results is unknown. However, the results of this research may be published and used in future research to further bolster or disprove any conclusions reached.

WHO WILL SEE MY PERSONAL INFORMATION?:
In this study we are not receiving any identifiable information about you so there is little chance of breach of confidentiality. However, to those of you who choose to participate in the raffle, we will take steps to keep your personal information confidential, but we cannot guarantee total privacy. However, we will do our best to keep your information confidential by keeping it coded and on an encrypted computer. Furthermore, only the principal investigator, Dr. J. Ryan Thrower, will have access to your personal information to provide the winners with their rewards for those opting to participate in the raffle. Personal information will be destroyed upon distribution of the rewards.

WILL ANY OF MY INFORMATION OR SAMPLES FROM THIS STUDY BE USED FOR ANY COMMERCIAL PROFIT? Information about you or your child or obtained from you in this research may be used for commercial purposes, such as making a discovery that could, in the future, be patented or licensed to a company, which could result in a possible financial benefit to that company, OHSU, and its researchers. There are no plans to pay you if this happens. You will not have any property rights or ownership or financial interest in or arising from products or data that may result from your participation in this study. Further, you will have no responsibility or liability for any use that may be made of your information.

WHAT ARE THE COSTS OF TAKING PART IN THIS STUDY?:
It will not cost you anything to participate in this study. However, volunteers who complete the survey will be invited to participate in a raffle for one of two $50 gift cards.

WHERE CAN I GET MORE INFORMATION?:
This research is being overseen by an Institutional Review Board ("IRB"). You may talk to the IRB at (503) 494-7887 or irb@ohsu.edu if:

- Your questions, concerns, or complaints are not being answered by the research team.
- You want to talk to someone besides the research team.
- You have questions about your rights as a research subject.
- You want to get more information or provide input about this research.

You may also submit a report to the OHSU Integrity Hotline online at
https://secure.ethicspoint.com/domain/media/en/gui/18915/index.html
or by calling toll-free (877) 733-8313 (anonymous and available 24 hours a day, 7 days a week).

DO I HAVE TO TAKE PART IN THIS STUDY?

You do not have to join this or any research study. If you do join, and later change your mind, you may quit at any time. If you refuse to join or withdraw early from the study, there will be no penalty or loss of any benefits to which you are otherwise entitled.

HOW DO I TELL YOU IF I WANT TO TAKE PART IN THIS STUDY?

By completing the survey and returning it to the principal investigator, Dr. J. Ryan Thrower, either via email or by physical mail, your participation is assumed. If survey is not received by the close date, it will be assumed that you chose not to participate in the study.

Appendix D. *Invitation to participate in the survey*

Hello,

You are being asked to participate in a research study. This study is being conducted by orthodontic resident, Ryan Thrower, in qualification for Master's degree candidacy. This research study has been approved by IRB #____.

The purpose of this research is to identify disparities that exist in oral health outcomes for patients who may or may not have received an orthodontic screening or general dentist referral for orthodontic treatment at Oregon Health and Science University School of Dentistry Orthodontic Department.

I am asking for volunteers to complete a short survey with questions involving demographics, education, household composition, dental experience, psychosocial and trauma experiences.

This survey will take approximately 15-20 minutes to complete. All responses will be completely unidentifiable. The survey will not have any identifiers linking your responses back to you or any other participants. However, ***volunteers who complete the survey will be invited to participate in a raffle for two $50 gift cards****. If you choose to participate in the raffle, there is minimal risk that personal identifiers can be revealed such as name, email addresses, and/or physical addresses.*

Volunteers should be aware that minimal risks are involved in completing this survey. However, volunteers may experience frustration and post-traumatic stress for being asked to complete a research survey regarding orthodontic treatment that they may not have received. Volunteers also risk a minimal time burden in completing this survey.

Your participation in this research survey is completely voluntary. The alternative to participating is not participating.
If you have any questions regarding this research study, please contact me, Ryan Thrower, at throwerj@ohsu.edu. If you have any questions regarding your rights as a research participant, please contact the OHSU Institutional Review Board at (503) 494-7887 or irb@ohsu.edu.

Your time and contribution to this research is extremely valued and much appreciated.

Best regards,
Dr. J. Ryan Thrower
Orthodontic Resident 2022

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